

# UTM Green Leaf Award System

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**Abstract**— Since 2019, Universiti Teknologi Malaysia Campus Sustainability (UTMCS) had conducted a yearly award named Green Leaf Award as an appreciation to recognize the efforts of various Responsibility Centre (PTJ) at Universiti Teknologi Malaysia (UTM) in driving the sustainability agenda. The purpose of this study is to develop a system named Green Leaf Award System that will be used to replace the current manual process of the award. Using manual process, UTMCS faced many difficulties and challenges to ensure the process of the award application and evaluation. All participants' manual submissions are unorganized, resulting in human mistakes, incomplete submission materials, a lack of proof or evidence ticket, and no alert message issued to both the organizer and the participants. Based on these issues, UTMCS intends to create an automated online system that will serve as a platform for participants to submit their applications and for juries to analyze and award scores for each application. The system will provide a systematic environment for all parties that crucial for the awards which are UTMCS, participants and juries. The system will have three main features which are award management, award application and award evaluation. The Waterfall-Agile hybrid approach is being used for the development of the proposed system. In brief, Waterfall is used for planning, design, and requirements formulation, whereas Agile is applied for development and testing. All the functionality of the system has been tested by using the black box testing approach. In the activity of black box testing, unit testing, integration testing, and system testing are merged and executed concurrently.

**Keywords**- UTMCS : Universiti Teknologi Malaysia Campus Sustainability, PTJ : Responsibility Centre, MVC : Model – View-Controller.)

## I. INTRODUCTION

Green Leaf Award System is an application that will be used as a platform for the application and evaluation for Green Leaf Award that been commenced by the UTM Campus Sustainability (UTMCS). This application will replace the existing way of application and evaluation which are manual using google form. For this project, UTM Campus Sustainability will be our main stakeholders as represented by Dr. Shamsul Sarip, Deputy Director of UTMCS.

The primary goal of this system is to serve as a platform for the Green Leaf Award. It will cover the entire procedure, beginning with management and ending with the award evaluation. Green Leaf Award System will improve the manual award procedure to make it easier and faster to complete the award. The needs for the system have been elicited from the system's stakeholders. Then, before the development of the expected system, design and analysis need to be done.

The system can receive application from all the participants. The participants will be able to fill up and upload it on the same platform. This will save a lot of time for the participants rather than in the existing way of application. The data will be securely kept in the database and will be retrieved for the evaluation for the award.

Next, jury can evaluate the application for the award in the system systematically. The jury can evaluate the form and give marks based on the schemes. By using this system, the evaluation will be more precise and reliable as it can to avoid any human errors.

Lastly, the system will generate an analysis for the award for the campus sustainability data collection by UTMCS. By using the proper data analysis, it can guarantee the accuracy of the data collected.

## II. PROBLEM BACKGROUND

Sustainability Award is one of the many activities commenced by the UTM Campus Sustainability (UTMCS). The Citra Karisma 2020 Council established the Sustainability Award to recognize the efforts of various Responsibility Centers (PTJ) in driving the sustainability agenda. This assessment will be used as a single sustainability database on the UTM campus to help the current sustainability management system.

There were 4 categories for the awards which are Faculty/School, Department/Office, CoE/HICoE/Research Institute and Residential College.

The competition will be judged by several professional juries based on some element. Recently, UTMCS used the online forms that allow the panel of juries to nominate and state their marks for 5 elements which are profile (110 marks), management (140 marks), education and innovation (200 marks), community (180 marks) and environment (370 marks).

For Sustainability Awards Majlis Citra Karisma 2020, all the Responsibility Centres (PTJ) in UTM were invited to this competition online. All participants need to fill in the application form online. The form will need to be manually submitted and uploaded in Google forms created by UTMCS [<http://gg.gg/greenleaf2020>]. The participants will be updated with the latest information by UTMCS. Based on this procedure, the manual submissions from all participants are disorganized, resulting in human errors, incomplete submission materials, a lack of proof or evidence ticket, and no notification sent to both the organizer and the participants as an alert. Based on these problems, UTMCS is planning to develop an automated online system that will be a platform for the participant to submit their application and for the juries to assess the application as well as provide the marks for each application. This system will make the competition more systematic to avoid any unwanted errors. The organizer also can manage all the events throughout the competition.

### III. COMPARISON OF EXISTING SYSTEM

#### A. Judgify

Judgify is one of the online judging software that available online. It is a platform of a cloud-based and mobile-ready awards management software. It can be used for all types of awards, contests, events and many more. Judgify is a user-friendly award administration solution for automating contests of any size and type [1]. It gives the users the ability to customize the awards event planning, judging management, submissions management and advanced scoring and reporting.

#### B. Award Force

Award Force is a management software tools are ideal for building and managing a portfolio. It is quick, secure, and provides a positive user experience for students, assessors, and course administrators. It is designed for performance and function. Users can manage many types of programs such as awards, contests, portfolio assessments, incubation and many more. For award management, users can manage the award easily as the flexible configuration for the unique program needs. They can manage the planning, entries, judging, awards, and close-out.

TABLE I COMPARISON WITH GREEN LEAF SYSTEM

	Judgify	Award Force	Green Leaf Award System
Platform	online	online	online
Features	<ul style="list-style-type: none"> <li>- Event planning</li> <li>- Judging management</li> <li>- Submissions management</li> <li>- Advanced scoring and reporting</li> </ul>	<ul style="list-style-type: none"> <li>- Event planning</li> <li>- Event entries management</li> <li>- Judging management</li> <li>- Awards</li> <li>- Close-out</li> </ul>	<ul style="list-style-type: none"> <li>- Award management</li> <li>- Award application</li> <li>- Award evaluation</li> <li>- Award analysis</li> </ul>
Purpose	<ul style="list-style-type: none"> <li>- Awards events</li> <li>- Contests</li> <li>- Academic conference</li> </ul>	<ul style="list-style-type: none"> <li>- Awards and contests</li> <li>- Portfolio assessments</li> <li>- Incubation</li> <li>- Corporate giving</li> </ul>	<ul style="list-style-type: none"> <li>- Green Leaf Award</li> </ul>
Main User	Open	Open	UTMCS

### IV. METHODOLOGY AND DESIGN

Methodology that will be use for the development for the proposed system is Waterfall-Agile hybrid model. Waterfall will be used for planning, design, and requirements definition, whereas Agile will be used for development and testing in short.

The waterfall model divides project activities into linear sequential stages, each of which is dependent on the deliverables of the preceding one and corresponds to a task specialism. Stakeholders' requirements will be gathered in the early phase, then sequential project will be project plan is created to correspondent those requirements.

For the development and testing phases, Agile model will provide a lot of advantages for the development team. It promotes teamwork and cross training as it will require the teams operate near one another and are based in the same area.

Besides, this model doesn't need a detailed planning or a complete forecast of the exacts tasks and features like the traditional SDLC models. This will give more flexibility for the developers as it allows for simultaneous development and delivery within a larger context.

The waterfall-agile method will benefit this project as it will shorten the analysis, planning, and design. It will also let we define project frames with the budget and time delivery. Lastly, we will always maintain compliance with the standards by using the hybrid model.

### A. Requirement Elicitation

Before the development of the system, requirement elicitation is needed to define all the requirements for the system. The essential feature of waterfall is that all client needs are obtained at the start of the project, allowing all subsequent phases to be planned without additional customer interaction until the product is completed [6]. Eliciting requirements is one of the most complex, error-prone, and communication-intensive aspects of software development [5]. The requirements should be gathered from the stakeholders. There were several techniques can be used such as interviews, questionnaires, workshops and many more. All the information needs to be documented clearly to be the basis of the development of the system.

### B. Analysis and Design

In this phase, we need to revise and understand all the requirements that have been elicited from the stakeholders. This is important to ensure that the system will perform perfectly as intended by the stakeholders. All the requirements will be used to describe the functional and non-functional requirements, use case description and diagrams, sequence diagrams and many more that will be documented as the System Requirement Specification (SRS) and System Design Document (SDD). This phase is done after all the documents is completed.

### C. System Development

In this phase, the system will start to be developed until the system is functioning as expected. The development by done by sprint which means the developments is divided to several parts and each part will need to be done in one sprint. Each sprint will have specific goal and after each sprint ended, meetings will be made to discuss the achievements, challenges on the current progress of the development. The iteration will continue until all the sprint is done.

### D. System Testing

After the development phase, the developed system will be tested its functionality. In this phase, we will need to produce test plans for the functions that need to be tested. There were many types of tests that can be performed, such as black-box testing, white-box testing and user acceptance testing.

### E. Product Delivery

In this phase, the developed system will be presented to the stakeholders. The system will be deployed and being used by the end-users. In the early stages, we need to closely monitor the progress of the system as we may missed any bugs or errors during the testing.

### F. Feedback

For the last phase, we will receive feedback about the system from the stakeholders. We will need to go through all the feedback and check for any improvements that can be made.

## V. PROJECT METHOD

The Green Leaf Award System is made up of three distinct entities: the Utmcs, Participant and Jury. Each entity has a distinct and distinct functionality. The specifics of each entity's characteristics are shown below.

### A. Utmcs

Utmcs act as an admin to the system. As Utmcs, you can manage user that will be using the system as utmcs, participant and jury. Utmcs also can manage element for the award by each criteria. He can add question for the criteria. Next, Utmcs also can assign jury with the form to be evaluated and lastly he can view Green Leaf award analysis.

### B. Participant

Participant is the one who will be evaluated for the award. In the system, participant can view award info. Then, participant can fill in the form by criteria for the award and attach evidence when needed.

### C. Jury

Jury that have been assigned by Utmcs are responsible to evaluate the form filled by the participant. Jury will allocated marks for the answer provided by the participant.

## VI. SYSTEM ARCHITECTURE

Green Leaf Award System will be using Model-View-Controller (MVC) architectural style. MVC is a web development technique that separates the model layer, controller layer, and display layer to make web development easier and faster [4]. MVC separates the presentation and interaction from the system data. The style will have three components that will interact with each other. Model will be responsible to deal with the interaction between the system's object and the database. The view components manage how the data to be presented to user and the component will manages user interaction and passes these interactions between the view and model.

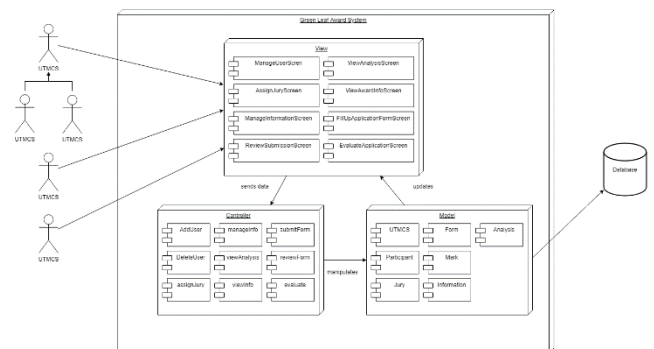


Figure 1 System Architecture of Green Leaf Award System

## VII. PACKAGE DIAGRAM

A package is a general-purpose technique for grouping items. It is a model component that may contain other model components. A package improves the modularity of a system. In one package, there is a layer of display, business, and data. A package diagram may consist of a few packages that indicate the dependencies between them.

In Green Leaf Award System, there are three packages for package diagram which are Award Management, Award Application and Award Evaluation. There is a relationship of dependence between the packages. Figure 2 shows the Green Leaf Award System package diagram.

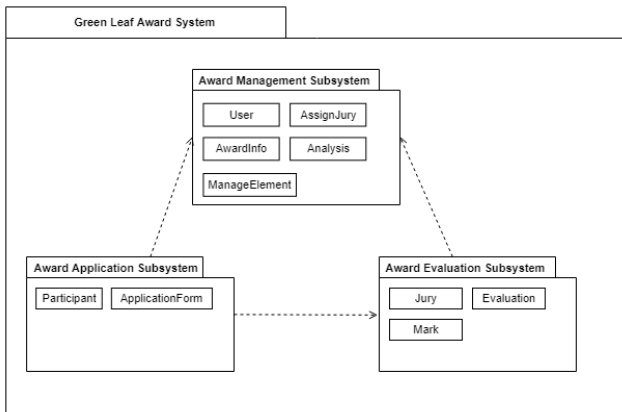


Figure 2 Subsystem of Green Leaf Award System

## VIII. SYSTEM ANALYSIS AND DESIGN

### A. System Function

TABLE II GREEN LEAF AWARD SYSTEM FUNCTION

Function	Description
Manage User	The user shall be able to add or delete the user of the system.
Assign Jury	The user shall be able to assign the jury with the form to be evaluated.
Manage Information Section	The user shall be able to manage the information section to add information about the award.
View Analysis	The user shall be able to view analysis of the award generated by the system. User can view marks allocated by the juries for the forms evaluated.

View Award Info	The user shall be able to add or delete question in each element in that will be in the form.
View Award Info	The user shall be able to view the information section created by the UTMCS.
Fill Up Application Form	The user shall be able to fill up the application form and submit.
Evaluate Application	The user shall be able to evaluate the application form assigned by UTMCS.

### B. System Interface

Interface design referred to the design of user interfaces for systems with the goal of maximizing usability and user experience. The design is the example of interface that will need to be implemented when developing the system. Figure below show the interface of manage user.

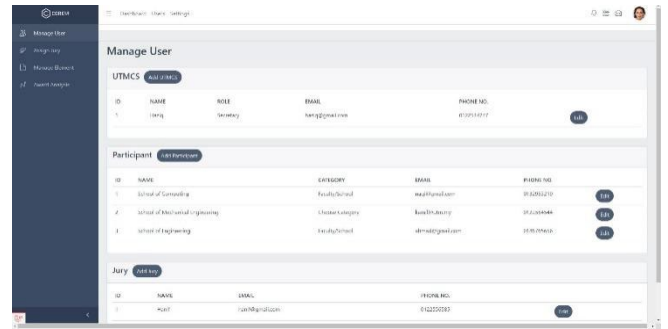


Figure 3 Manage User Interface

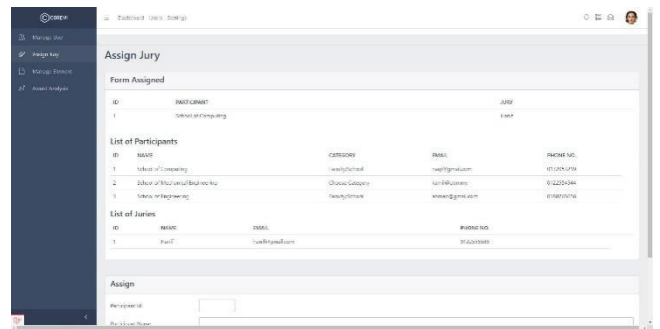


Figure 4 Assign Jury Interface



Figure 5 View Analysis Interface

### C. System Testing

System testing focused on testing the complete system, including its design and behaviour. This section will go into further detail about the system's Black Box Testing and User Acceptance Testing (UAT).

Green Leaf Award System will be put through black box testing. In the activity of black box testing, unit testing, integration testing, and system testing are merged and executed concurrently. The modules listed below have been tested in Green Leaf Award System using the Black Box Testing approach.

TABLE III TEST CASE OF MANAGE USER (ADD USER)

TC001_01: Add User				
Test Case TC001_01 : Successful add new user				
Author: Naqi				
Summary: This test case is about the UTMCS add new user for the system				
Precondition: 1. Sign in as UTMCS.				
	Step action:	Expected Results	Execution notes	Execution Status:
1.	Click add user	Display add user form		Pass
2.	Enter details of the user	Details can be entered correctly.		Pass
3.	Click add button	User added.		Pass
Execution type: Manual				
Priority: Medium				
Requirement: none				
Version: 1				
Tester: Naqi				
Execution Result: Pass				
Execution Mode: Manual				
Execution Note:				

TABLE IV TEST CASE OF MANAGE USER (EDIT USER)

TC001\_02: Edit User

Test Case TC001_02 : Successful delete user				
Author: Naqi				
Summary: This test case is about the UTMCS delete existing user of the system.				
Precondition: 1. Sign in as UTMCS.				
	Step action:	Expected Results	Execution notes	Execution Status:
1.	Click edit user	Display list of users.		Pass
2.	Edit details of the user	Users can be edited		Pass
3.	Click done button	User edited		Pass
Execution type: Manual				
Priority: Medium				
Requirement: none				
Version: 1				
Tester: Naqi				
Execution Result: Pass				
Execution Mode: Manual				
Execution Note:				

TABLE V TEST CASE OF ASSIGN JURY

TC002\_01: Assign Jury

Test Case TC002_01 : Successful assign jury				
Author: Naqi				
Summary: This test case is about the UTMCS assign the jury with the forms.				
Precondition: 1. Sign in as UTMCS.				
	Step action:	Expected Results	Execution notes	Execution Status:
1.	Click assign jury	Display list of juries.		Pass
2.	Click assign form on the selected jury	Display textbox to enter form id.		Pass
3.	Enter form id	Forms assigned to the jury		Pass
Execution type: Manual				
Priority: Medium				
Requirement: none				
Version: 1				
Tester: Naqi				
Execution Result: Pass				
Execution Mode: Manual				
Execution Note:				

### CONCLUSION

After completing this project, we have achieved all the objectives stated in the chapter 1. Firstly, we managed to elicit requirements from the stakeholders by using some techniques. We managed to generate the use case diagrams, sequence diagrams and the activity diagrams for the system.

Next, we manage to analyze and design the system architecture, system design, database design and prototype of the Green Leaf Award System. We managed to implement MVC style for the system. For the third objectives, we managed to develop the proposed system as. Lastly, we have done testing the Green Leaf Award after we done developing the system.

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