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DEVELOPMENT OF DYNAMIC EVENT TABULATION SYSTEM

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ABSTRACT

Manual event tabulation is a tedious and error-prone process, often hampering efficient event management. Therefore, the Dynamic Event Tabulation System was developed to solve the manual process itis a Web-based domain system that is user-friendly and efficient in tabulation results which tackles this challenge head-on, automating score-keeping for events at SLSU – Tomas Oppus and beyond. A comprehensive survey with 20 user responses assessed the system's effectiveness, and inquiry into existing issues, features, and user experience. Developed using Agile and open-source technologies, the web-based system smooth-running tabulation processes, resulting in a reduction in time and improved accuracy. Post-implementation evaluations highlighted its user-friendly interface, reliable performance, and overall success in streamlining event management. This study underscores the Event Tabulation System's potential to revolutionize event organization and enhance participant satisfaction.

Keywords: Automated Tabulation, Enhanced Accuracy, Event Management, Improved Efficiency, User-Friendly Interface.

INTRODUCTION

Southern Leyte State University – Tomas Oppus Campus, has organized noteworthy events. Frequently, they employed a paper-based method as a standard practice for tabulating results or scores. The university has occasionally resorted to manual tabulation processes, especially in pageant contests. However, these paper-based methods were time-consuming, susceptible to human error, and posed the risk of lost records. This study is about developing a web-based system designed to smooth-running the management of events and the tabulation of results.

According to Ontua, Garcia & Patel (2022), several issues were identified with manual tabulation. It can encounter technical errors, such as shuffling participant scores in an event or competition. Additionally, it may misplace the tabulation of scores or the records of tabulated scores. The manual process is not ideal, it does not yield highly accurate and reliable contest results because the data can be manipulated when written on paper. This realization prompted the creation of an online event tabulation system, aiming to modernize and automate the current manual, paper-based tabulation system utilized during events and competitions. The objective is to enhance the accuracy and dependability of contest results.

Capstoneguide (2019) observed that the manual process is very time-consuming for event facilitators, and they noted occasional inaccuracies in the results. Recognizing the need for improvement, they advocated for an

automated Events Tabulation System for events conducted by the Supreme Student Government (SSG). To address this issue, the group decided to develop the Events Tabulation System (ETS), aiming to calculate the tabulation process faster with higher accuracy in results. Manual event tabulation, where individual coders' interpretations and biases can influence the coding process. They offer recommendations for enhancing objectivity and reducing biases (Lee & Kim, 2022).

The study's related articles pinpointed gaps between manual and automated tabulation processes, concluding that the optimal solution to challenges linked to manual tabulation processes in events was developing a DynamicEvent Tabulation System at SLSU-Tomas Oppus and other institutions. The online event tabulation system revealed that the UI design was outdated, not good, lacked security verification, struggled with simultaneous event starts, required internet access, lacked dynamism, had no logs for past events, and lacked category distinctions in criteria for events like pageants (Ontua, Garcia & Patel, 2022). To address those deficiencies in the newly developed system, the researcher improved the outdated UI design, enhanced security verification, refined handling of simultaneous event starts, ensured offline accessibility through LAN, introduced dynamism, implemented event logging, included category distinctions in criteria for events like pageants, and maintained records for past events. This initiative ensured real-time, verified, accurate, and precise event results.

Research Objectives

The researchers aimed to achieve the following objectives;

1. Identify common issues associated with manual tabulation in events andaddress the challenging problems inherent in this process.
2. Design and develop a dynamic event tabulation system.
3. Evaluate the implemented dynamic event tabulation system in terms of:
   - 3.1 Efficiency
   - 3.2 Functionality; and;
   - 3.3 Reliability.

Conceptual Framework

This framework aims to provide an efficient process, from initial data entry to final result tabulation and reporting. In the input stage, the system will require the entry of user credentials for authorized access. Additionally, specific data for events will need to be entered, such as event details, contestant information, judging criteria, and scoring parameters. This comprehensive input will serve as the foundation for the subsequent processes. The core processes within the system include setting up events, managing contestant entries, defining judging criteria and scoring mechanisms, assigning judges with appropriate access levels, and enabling judges to enter and tabulate scores based on their evaluations. These processes are designed to be intuitive and user-friendly, ensuring efficient data management and accurate scoring. The expected output of the system will be multifaceted. First, it will generate individual contestant scorecards, providing detailed feedback and marks from each judge. Second, it will produce summary reports that consolidate scores across all judging criteria and categories. Third, it will offer tabulated reports categorized by specific criteria or events, facilitating in-depth analysis. Crucially, the system will ensure the accuracy of tabulated scores, minimizing errors and inconsistencies. Finally, the system will enable the printing of final results, ensuring transparent and reliable communication of outcomes to all stakeholders.

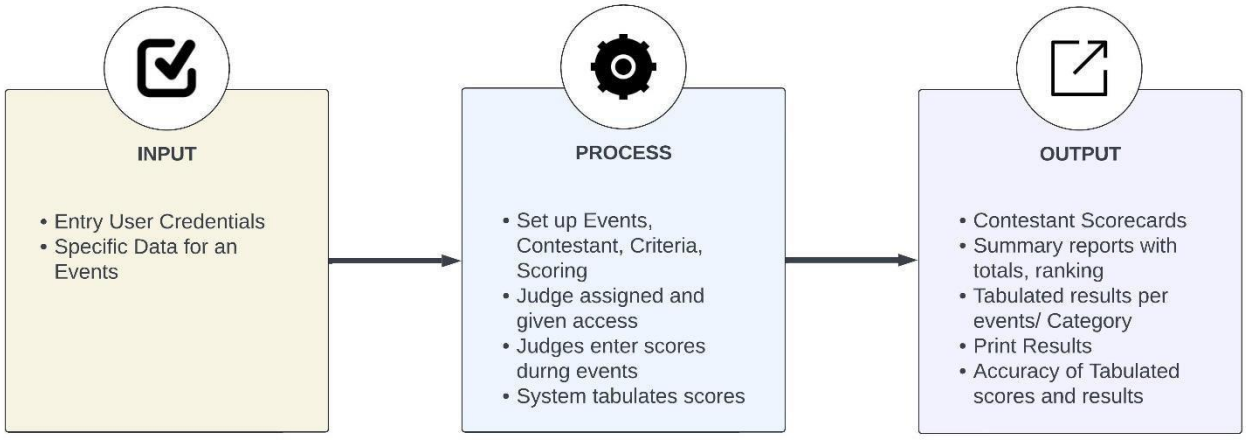


Figure 1:Conceptual Framework of the Study

METHODOLOGY

The study used a Quantitative Developmental-Evaluation Research Study. This study employed the Agile methodology, emphasizing collaborative planning, iterative and continuous evaluation, and adaptation development (Holloway, Mulvihill, and Hartmann, 2018). The Requirements Analysis phase focused on understanding the purpose of creating the event tabulation system. Project initiation involved formulating and submitting a research proposal to the approval committee at Southern Leyte State University - Tomas Oppus Campus. The study extended beyond the campus to enhance contest result accuracy, involving organizers and judges from SLSU-TO and Saint James College Of Padre Burgos were benefited from the system. Upon the implementation of the system to SLSU-TO and the school of Saint James College the system undergoes multiple dry runs to check the functionality, accuracy, and reliability of the system in actual event tabulation. There are 20 randomly selected respondents of the study consisting of 1 admin, 2 organizers, 5 judges, and 12 candidates. Data collection utilized Likert Five-Point Scale survey questionnaires and an adapted ISO 25010 evaluation form, with data processed using Mean and Mode statistical tools.

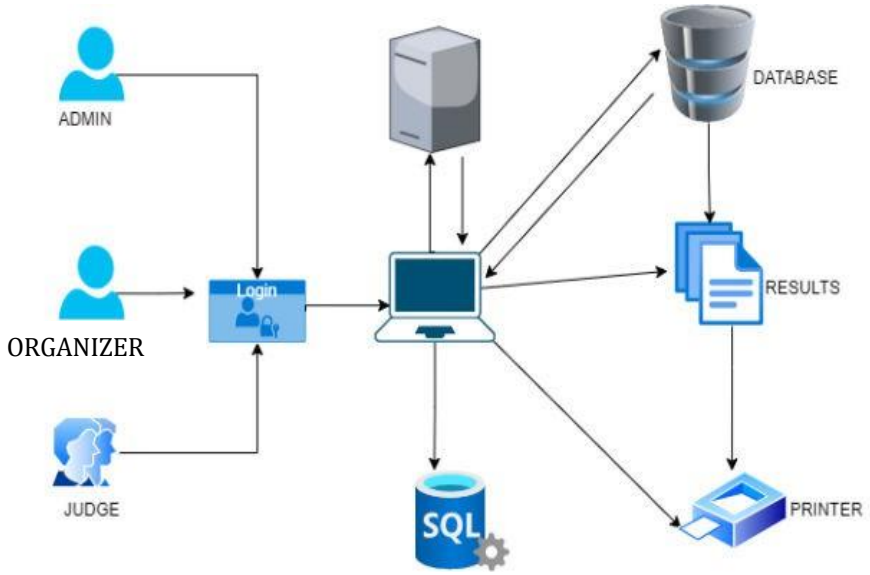
The Agile Software Development consists of 1. Requirements Phase - In this phase, the project's vision and high-level requirements are defined. Stakeholders, including event organizers, judges, and potential users, are identified and consulted to gather initial requirements. 2.Planning Phase - Task estimation and assignment are performed, ensuring that the workload is evenly distributed among team members. The project would involve a cross-functional team comprising developers, testers, event organizers, and subject matter experts (e.g., judges, and scoring experts). 3. Design Phase - During this phase, the development team works on implementing the planned features and tasks for the current iteration ensuring a user-friendly interface for better interaction with the users of the system. 4. Development Phase –In this phase, the developers will conduct series of testing of the systemto ensure that the system will function smoothly and compatible in any means to be more reliable. Stakeholders can provide input on the delivered features, suggest improvements, or identify any missing requirements. 5. Release/Implementation Phase – In this phase, Once all the planned features and requirements have been implemented and tested, the system is prepared for release and deployment. Final testing and quality assurance activities are performed to ensure the system's efficiency, accuracy, performance, and reliability. User documentation and training materials are prepared to support the adoption and effective use of the system. 6. Track and Monitor

Phase - After the initial release, the system enters a continuous improvement and maintenance phase. Feedback from users and stakeholders is collected, and any identified issues or new requirements are added to the product backlog for future iterations. Regular maintenance activities, such as bug fixes, security updates, and performance optimizations, are performed to ensure the system's ongoing stability and reliability.

Figure 2: Agile Software Development

The architecture layout outlines the structure of the software system. It shows the key components. And how they fit together. It describes the pieces that make up the application. The Application Architecture provides a technical blueprint. It maps out the core building blocks. Application Architecture helps understand how the software works. It provides a guide for development teams. And keeps documentation in one place. With diagrams and simple language. It makes complex software easy to understand. In this system, the admin and organizer interact. The admin can add data, create event coordinators, and access user accounts and event information. Organizers can create and access event information and assign events to judges. Judges retrieve event information and input scores. The database stores all user-input data, and the results function tabulates and displays scores in the system view. This ensures efficient data management and result presentation. The admin and organizers can print the tabulated results from the system and can compare it to the actual raw scores of the judge to ensure reliable data.

Figure 3:Architectural Design



The Use Case Diagram of the Dynamic Event Tabulation System demonstrates that the admin had full access to all features such as log-in, create account, manage user, evaluate results and system maintenance including the organizer everything rely on the system admin. In contrast, the organizer had limited access only, they can login and create account, manage events and evaluate results. However in the judges interface, they only have minimum set of features such as login accounts, input scores and evaualte results. This diagram could explain the role and responsibility of different users of the system.

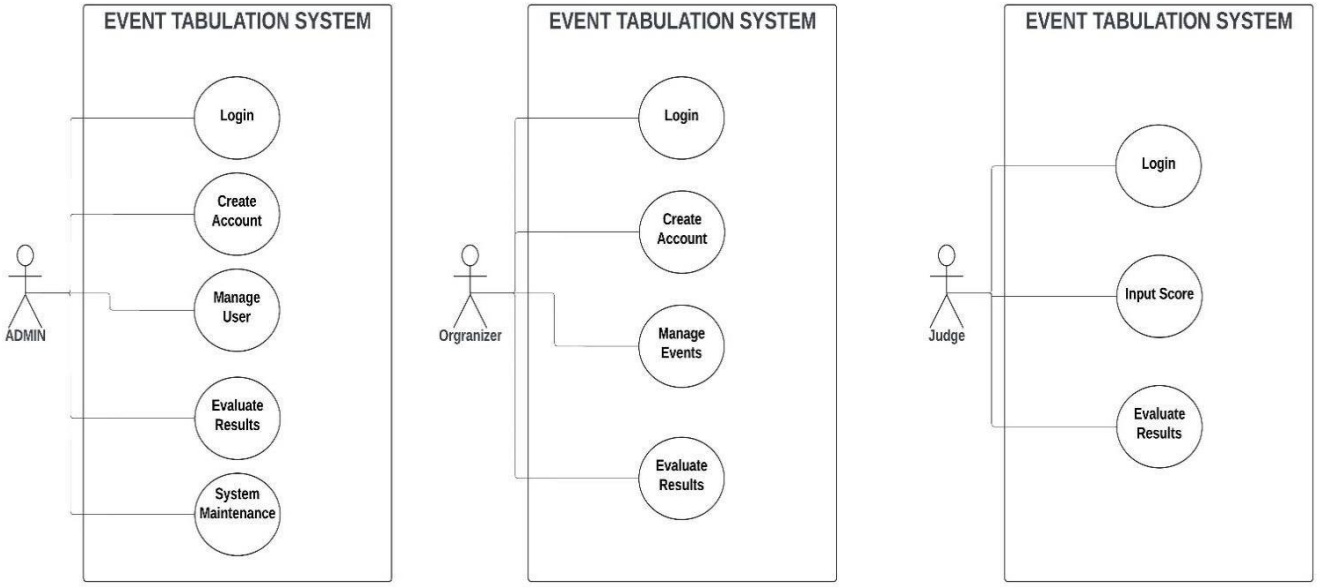


Figure 4: Use Case Diagram

RESULTS AND DISCUSSION

Identify and analyze the problems of the existing manual tabulation process

Table 1. The existing Manual Process of Tabulation

Problem Encountered	Response (N=20)					Weighted Mean	Interpretation
	5	4	3	2	1		
The manual tabulation process is prone to errors.	17	1	2	0	0	4.75	Strongly Agree
The manual tabulation process is time-consuming.	18	2	0	0	0	4.9	Strongly Agree
The manual tabulation process is susceptible to bias.	17	2	1	0	0	4.75	Strongly Agree
The manual tabulation process is more resources-intensive and may require additional manpower.	18	1	1	0	0	4.85	Strongly Agree
The manual tabulation process lacks security features.	17	2	1	0	0	4.75	Strongly Agree
The manual tabulation process may lead to difficulties in result verification.	18	1	1	0	0	4.85	Strongly Agree
The manual tabulation process lacks clear records and audit trails.	18	2	0	0	0	4.9	Strongly Agree
Average						**4.82**	Strongly Agree

Legend: 5.00-4.21 Strongly Agree 4.20-3.21 Mostly Agree 3.20-2.61 Agree 2.60-1.81 Slightly Agree 1.80-1.0 Not Agree

Table 1. The manual event tabulation process would involve directly observing and manually recording instances or occurrences where the respondents express strong agreement with a particular statement. Thus, it indicates that the majority of 20 respondents Strongly Agree that manual event tabulation can be time-consuming, labor-intensive, and prone to human error or bias. Ramirez & Garcia (2020), highlight the time-consuming and labor-intensive nature of manual event tabulation, especially in large-scale studies supported by the study of Wilson & Patel (2021), the challenges of maintaining inter-rater reliability and consistency in manual event tabulation studies, particularly when multiple coders are involved or when coding over extended periods.

Design and Develop the Dynamic Event Tabulation System

Table 2: Design Features of the System.

Features of the Developed System	Rating (N=20)					Weighted Mean	Interpretation
	5	4	3	2	1		
User Friendly Interface	19	1	0	0	0	4.95	Strongly Agree
Event coordinators can control all aspects of scoring.	20	0	0	0	0	5.00	Strongly Agree
Judges can easily access, and view events assigned to them.	19	1	0	0	0	4.95	Strongly Agree
Event scores are automatically updated in real-time, allowing seamless performance tracking and result viewing.	18	1	1	0	0	4.85	Strongly Agree
Event results can be downloaded as PDFs or other file formats.	20	0	0	0	0	5.00	Strongly Agree
Event coordinators can evaluate the scores assigned by judges for each contestant.	19	0	1	0	0	4.9	Strongly Agree
Admin can create secure accounts for event coordinators, ensuring system access control.	17	2	1	0	0	4.75	Strongly Agree
Average						**4.91**	**Strongly Agree**

Legend: 5.00-4.21 Strongly Agree 4.20-3.21 Mostly Agree 3.20-2.61 Agree 2.60-1.81 Slightly Agree 1.80-1.0 Not Agree

Table 2.Dynamic event tabulation systems are optimized for mobile devices, allowing coders to perform coding and annotation tasks on-the-go, facilitating data collection in the field, and ability to facilitate real-time data collection and analysis. Thus, it revealed that the majority of the 20 respondents Strongly Agree that the design and features of the system meet their expectations and resolve their problems compared to manual event tabulation. A web-based system that allows for dynamic event tabulation and real-time data visualization and leverages modern web technologies to enable collaborative coding (Kim, Park, & Lee, 2019).

Figure 5. The Login Page

1. Enter Username (default admin username: alex). 2. Enter Password (default admin password: admin). 3. Click "Submit" to proceed.n4. For password recovery, click "Forgot Password."

Figure 6. Admin Homepage

1. Event Created. 2. System Users

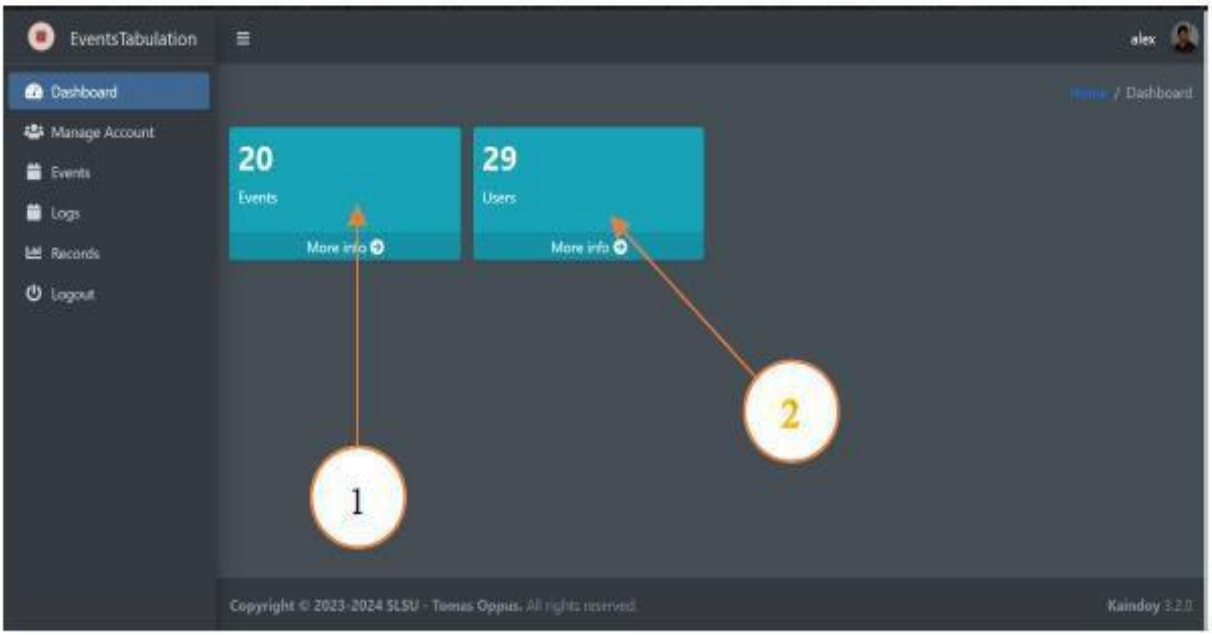


Figure 7. Manage Account

1. Add Event Coordinator (Click "Add" to create an account for an event coordinator, input the necessary data, and click "Register"). 2. Delete Event Coordinator Account. 3. Events (Admin can view event status, data, and whether it's complete or ongoing). 4. Logs (View user activity logs). 5. Records (View past events). 6. Logout

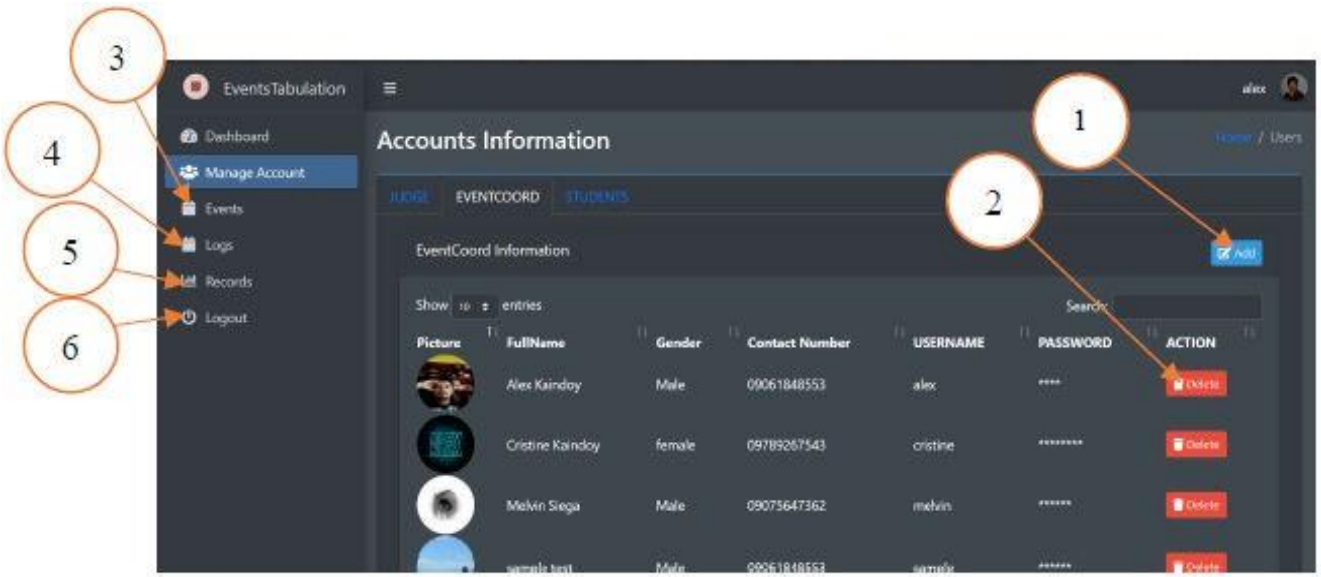
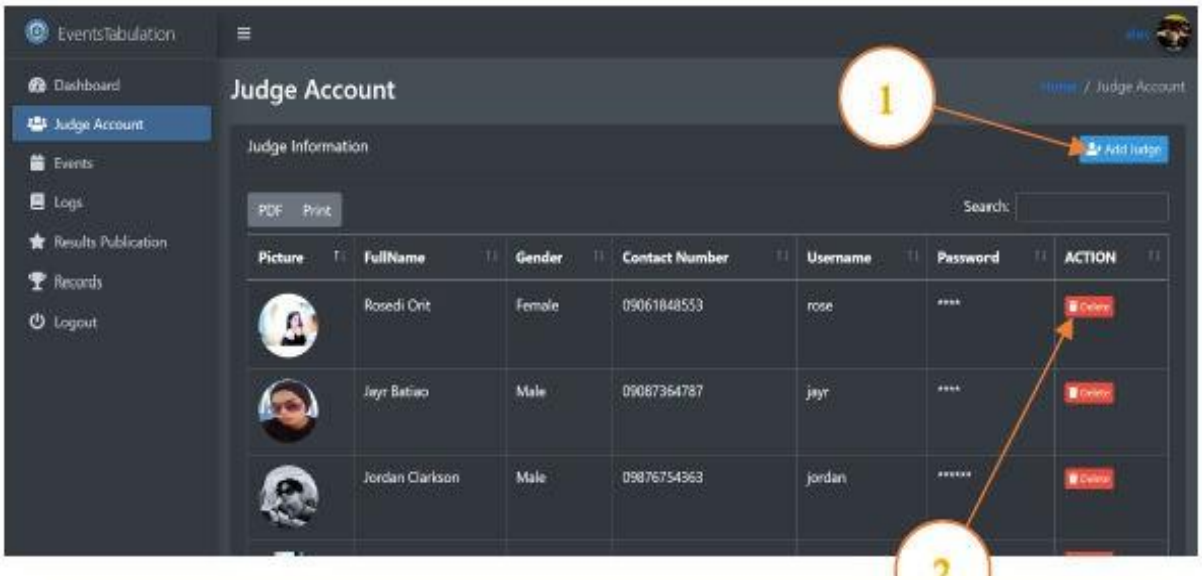


Figure 8. Organizer Homepage

1. Events Created. 2. Judge Account Created

Figure 9. Judge Account Homepage

1. Add Judge Account (After clicking "Register," the judge account password will be displayed. Once the judge logs in and changes the password, the event coordinator can no longer see it). 2. Delete Judge Account. Judge Homepage:1. Events (it will display the events on the judge homepage) 2. View (the judge can view the scores and results of every event/category)



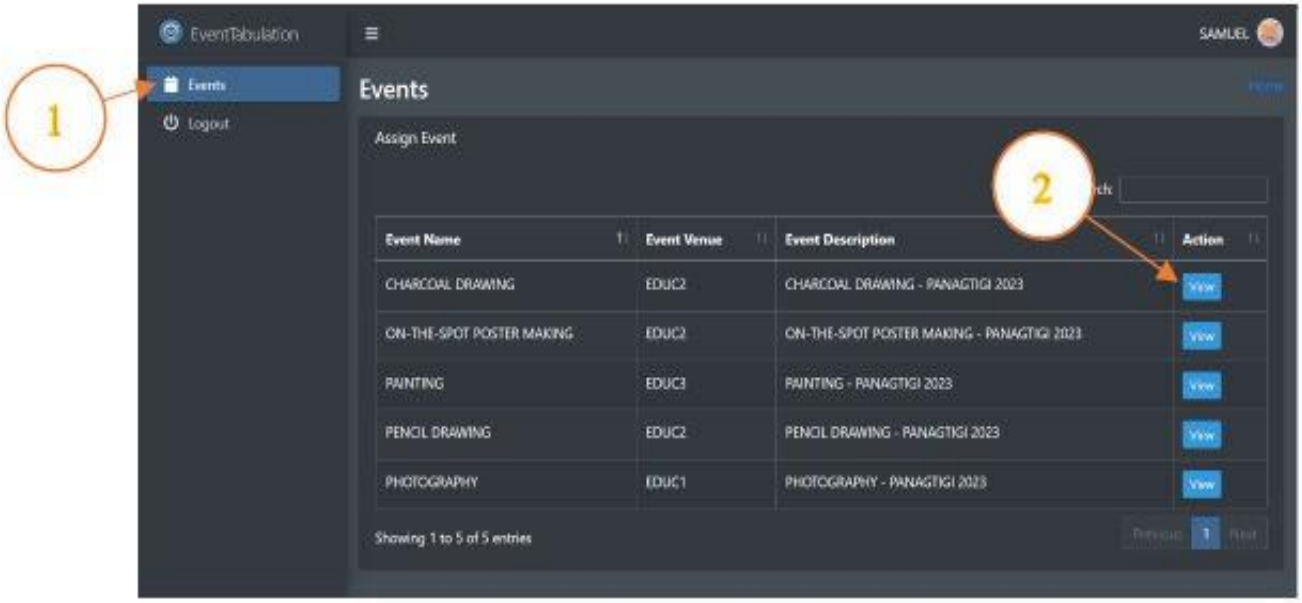


Figure 10. Events Page

1. Add Category (Used to identify and categorize events for easy navigation, especially when dealing with multiple events). 2. Delete (Deleting an event category does not remove the events created under it; instead, they are transferred to the Records page for past events).3. View (Displays events created under a specific category). View Event: 1. Add Events (Click to add specific event/category). 2. View Events Information (this will display specific information about the event/category. 3. Complete (click this button to transfer the complete events to the records page. 4. Delete (similar to the complete button it will also transfer the event to the records page.

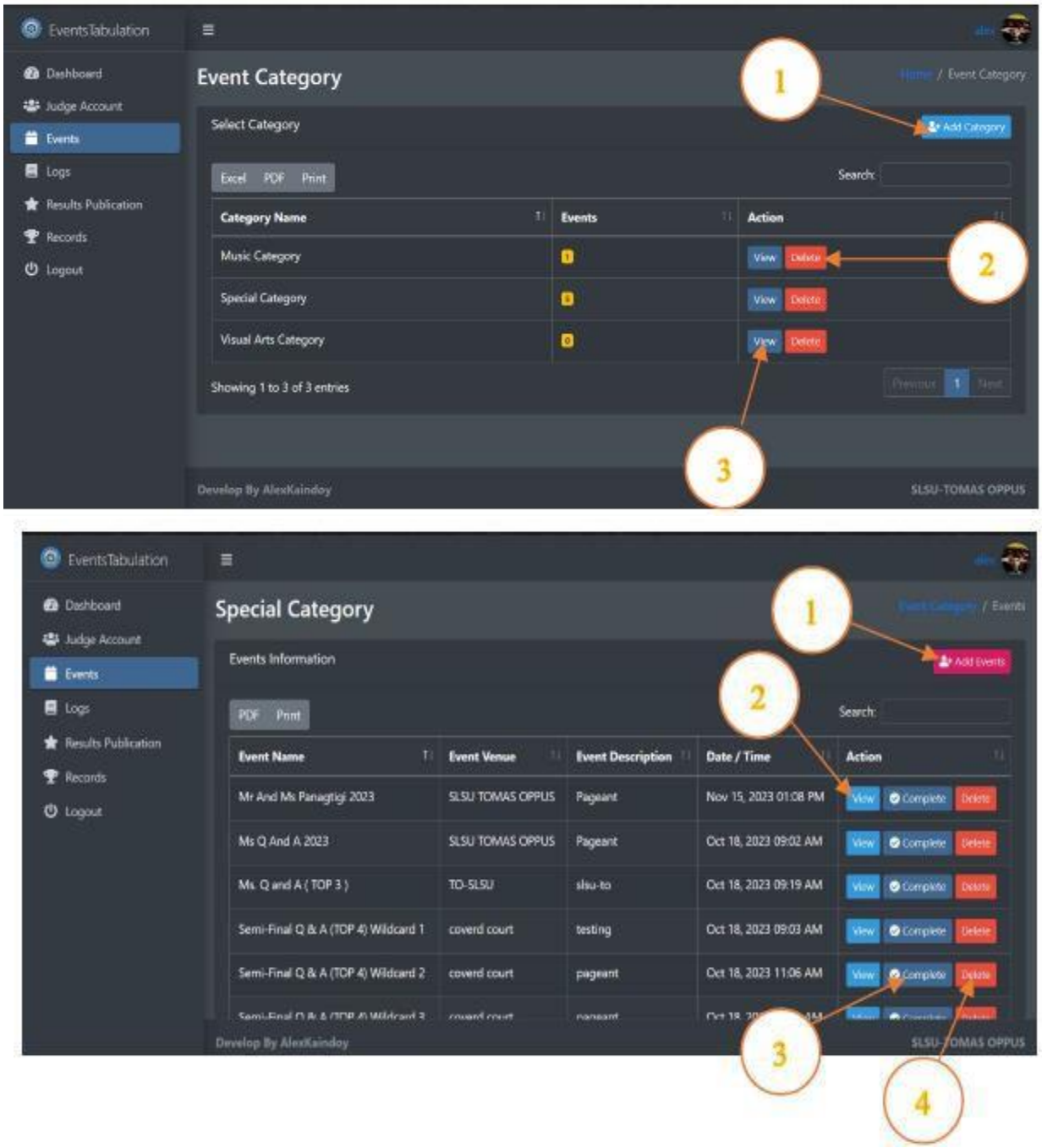


Figure 11. View Events Information Page

1. Details (it will show the specific name of the event and its description). 2. Participants (it will display the different participants/candidates in the event. 3. Assign Judge (based on the organizer judge account creation). 4. Add Criteria (it allows to input of specific criteria forjudging). 5. Scoring (specify the scoring criteria, decide the category to start scoring first, and make it visible in judge views). Results Publication: 1. View Results (it allows you to view the results of the event and it will also display the name of the event and realtime and date.

Evaluation during the Implementation of the Developed System

Table 3.Efficiency of the Newly Developed System

Efficiency	Rating (N=20)					Weighted Mean	Interpretation
	5	4	3	2	1		
Responds quickly to user actions.	19	1	0	0	0	4.95	Very Efficient
Execution time is appropriate.	20	0	0	0	0	5.00	Very Efficient
Utilizes resources efficiently.	19	1	0	0	0	4.95	Very Efficient
Average						**4.96**	**Very Efficient**

Legend: 5.00-4.21 Very Efficient 4.20-3.21 Mostly Efficient 3.20-2.61 Efficient 2.60-1.81 Slightly Efficient 1.80-1.0 Not Efficient

Table 3. The evaluation included a sample of 20 participants who assessed each aspect on a 5-point scale. The results show that the examined system or application performed extraordinarily well on all three efficiency parameters. Specifically, responses to user actions acquired a weighted mean score of 4.95, read as "Very Efficient," while execution time is acceptable obtained a perfect weighted mean score of 5.00, deemed "Very Efficient." Utilizes resources efficiently achieved a weighted mean score of 4.95, signifying "Very Efficient" performance. The overall average weighted mean score across the three elements was 4.96, placing it in the "Very Efficient" range as indicated by the legend.This implies that the evaluated system or program was exceptionally efficient in terms of responsiveness, execution time, and resource consumption, as experienced by the respondents. These conclusions are corroborated by the research of Mistry and Patel (2021) and Ahmadi and Shirmohammadi (2020).

Table 4. Functionality of the Newly Developed System

Functionality	Rating (N=20)					Weighted Mean	Interpretation
	5	4	3	2	1		
Loads pages and components quickly.	17	2	1	0	0	4.75	Fully Functional
Provides smooth and fluid navigation.	17	2	1	0	0	4.75	Fully Functional
Respond promptly to user input.	18	2	0	0	0	4.9	Fully Functional
Average						**4.8**	**Fully Functional**

Legend: 5.00-4.21 Fully Functional 4.20-3.21 Mostly Functional 3.20-2.61 Functional 2.60-1.81 Slightly Functional 1.80-1.0 Not Functional

Table 4. The evaluation focused on three major functional aspects: page and component loading speed, navigation smoothness and fluidity, and user input responsiveness. The evaluation had a sample size of 20 participants, who scored each aspect on a 5-point scale. The results show that the evaluated system or application performed exceptionally well across all three functionality measures: loading pages and components quickly received a weighted mean score of 4.75, interpreted as "Fully Functional," and providing smooth and fluid navigation also received a weighted mean score of 4.75, considered "Fully Functional." Respond immediately to user input had a slightly higher weighted mean score of 4.9, still within the "Fully Functional" range.The overall weighted mean score across the three elements was 4.8, placing it in the "Fully Functional" range according to the supplied interpretation. This means that the examined system or application performed admirably in terms of loading speed, navigation smoothness, and responsiveness to user interaction, as perceived by the respondents. These conclusions are supported by the research of Dhankar and Srivastava (2020) and Nguyen and Le (2022).

Table 5. Reliability of the Newly Developed System

Reliability	Rating (N=20)					Weighted Mean	Interpretation
	5	4	3	2	1		
Performs reliable calculations.	18	1	1	0	0	4.85	Very Reliable
Operates without errors.	16	2	2	0	0	4.7	Very Reliable
Generates precise outputs and reports.	19	1	0	0	0	4.95	Very Reliable
Average						**4.83**	**Very Reliable**

Legend: 5.00-4.21 Very Reliable 4.20-3.21 Mostly Reliable 3.20-2.61 Reliable 2.60-1.81 Slightly Reliable 1.80-1.0 Not Reliable

Table 5. The evaluation focused on three main areas of reliability: executing accurate computations, running error-free, and producing precise outputs and reports. The evaluation had a sample size of 20 participants, who scored each aspect on a 5-point scale. The results show that the evaluated system or application demonstrated high reliability across all three measures: Performs reliable calculations received a weighted mean score of 4.85, interpreted as "Very Reliable." Operates without errors obtained a weighted mean score of 4.7, also considered "Very Reliable." Generates precise outputs and reports" achieved the highest weighted mean score of 4.95, falling within the "Very Reliable" range. The overall average weighted mean score across the three elements was 4.83, indicating "Very Reliable" performance based on the supplied interpretation.This indicates that the evaluated system or application displayed exceptional reliability in terms of computation correctness, error-free functioning, and exact output creation, as seen by the respondents. These conclusions are reinforced by the research of Wang and Zhang (2020) and Kim and Lee (2023).

Conclusions

The survey results strongly support the implementation of the Dynamic Event Tabulation System at SLSU – Tomas Oppus and other institutions. The newly developed system directly addresses the articulated needs of end-users, offering improved productivity and result accuracy, thus making a substantial contribution to the

modernization of the event tabulation process.The developed system will run both online with internet connectivity and offline using LAN depending on the perspectives of the event organizer.

Recommendations

The ethical and privacy measures taken in developing the Events Tabulation System serve as a valuable reference for future researchers. Key insights include addressing scoring preferences and preventing unauthorized changes during events. The robust model for data security, encompassing personal details, limited access, data encryption, and password hashing, sets a standard for safeguarding sensitive information.Continual input from users and experts is crucial for enhancing ethical practices in system development.Future researchers may build upon this study or explore the creation of further enhancements to tabulation systems.

Compliance with Ethical Standards

The authors declare that there was no conflicts of interest and no bias in the interpretation of the results during and after the implementation of the system, plagiarism was avoided and results were used only for educational purposes.

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