Design of Competition Website Database at the University Level Using the Rapid Application Development (RAD) Method

Nur Anisa[1*], Muhammad Wildan[2]
Universitas Bina Nusantara, Indonesia
Email: nur.anisa001@binus.ac.id[1*], muhammad.wildan@binus.ac.id[2]

*Correspondence

ABSTRACT

Keywords: competition registration system; database; rapid application development; website.

The development of the digital era has created high interest among students in taking part in competitions organized by universities to improve their practical skills. The Business and System Innovation Challenge (BASIC) an international competition which is held annually by the Faculty of Information Systems, a University in Jakarta, plays a role in facilitating this. However, the entire competition process is still carried out manually, which often makes teams experience difficulties in managing data. This problem can be overcome by designing a BASIC website database using the Rapid Application Development (RAD) method. The benefit of creating this system is that it makes it easier for participants to register for competitions and admins to manage data. Problem analysis was carried out by building entity relationship diagrams, the PHP programming language using the Laravel framework, and the MySQL database. The results of designing the BASIC website are features such as registering for competitions, uploading competition work results, providing feedback, and evaluating work results. Admin can also process data on the number of competition participants each year into a report. Data processing becomes faster and more accurate through complex database design.

Introduction

The development of the current digital era has made companies and institutions in Indonesia have higher requirements for students' practical abilities, one of which is participating in competitions and professional activities during their college years (Ming, Pan, & Wu, 2019). This has led to an increase in competitions organized by educational institutions to develop students to achieve their academic achievement cognitively {Formatting Citation}. There are also more platforms to publish and share information about competitions organized by various educational institutions.

The Business and System Innovation Challenge (BASIC) is one of the international competitions that is held annually by the Faculty of Information Systems, one of the

universities in Jakarta. The BASIC competition will facilitate students from various majors with two types of competitions, namely, the UI/UX Competition and the IT-Business Case Competition. Most of the registration process in the BASIC competition is still processed manually, starting from the time the participant registers until the competition is completed. However, research by (Wei, Niu, Zhang, Schererline, & and Damasevicius, 2020) also states that most competitions organized by other educational institutions are still managed manually. Therefore, with the rapid development of computer technology and science, it can be used to complete complicated manual processes more efficiently with the use of information technology (Kausar, 2024).

The number of participants who register for the BASIC competition is increasing every year and causes so much data to be processed by the organizing team. This data management process is quite difficult to do because of the risk of data loss. However, this can be overcome by the involvement of databases to manage large amounts of data with minimal risk of data loss (Islam, 2022). A database is a place where data is stored. However, in theory, a database is a complex set of data or information arranged in groups with similar data types or what is usually referred to as entities, where data can be interconnected so that it is easy to access (Vilma M. Falolo, Kenneth T. Capillas, Nerissa A. Vergara, & Adonis F. Cerbito, 2022). The concept of a database model can also improve the efficiency of recording information in an organized format. The database that is built must be useful, and reliable, and meeting the needs is one of the important aspects of designing a database (Taiwo et al., 2020). The problems experienced by each institution are certainly unique and different.

In this research, I will design an information system for the BASIC competition by building an efficient database and website using the Rapid Application Development (RAD) method. Rapid Application Development (RAD) is a system development methodology with a prototyping approach designed to produce high-quality systems with relatively fast time and relatively low cost (Mudassar & Khan, 2023). This method aims to shorten the time in planning, designing, and implementing a system compared to using traditional methods (Tabrani, Priyandaru, & -, 2021).

The purpose of this research is to build a BASIC competition registration system that includes all stages of registration carried out by participants, uploading data as a condition for participating in the competition and competition results, assessment from the judges, and others. Through the client and server, the system can manage information systematically and can easily display the status of the competition at each stage that participants participate in (Zhang & Liu, 2020). If the management of participant and jury data, the management of competition schedules, and the overall management of BASIC data are not supported by this information technology, then the accuracy of the data cannot be guaranteed.

Research Methods

The research method used in this study is Rapid Application Development (RAD). Rapid Application Development (RAD) is a system development methodology that

focuses on building applications in a short time, simply comparing usability, features, and execution speed (Sasmito, Wibowo, & Dairoh, 2020). This method has key elements as a unique methodology that includes prototyping, iterative development, timing and team members, and the use of tools at the time of implementation.

Results and Discussion

System Requirements Analysis

In this study, the analysis of system needs was carried out by designing a website-based system that can be used by BASIC competition participants to register and upload competition answers. In addition, there are other users such as committees, judges, and admins who will manage the website.

Use Case Diagram

In conducting a more in-depth needs analysis, you can use a use case diagram to find out the interaction between the use case and the actor. Actors can be people, equipment, or other systems that interact with the built system, use cases describe the functional system or the requirements that the system must meet from the user's point of view (Nasution & Muliani, 2022). In the "BASIC Information System" depicted in the use case diagram, the interaction between various stakeholders and the system is critical to the functionality of the entire process (Ravi, Yadav, Jindal, & Anand, 2020). BASIC participants begin their journey within the system by going through the registration process, which most likely involves entering personal data details and creating a profile. After that, users can register teams as long as the competition registration period is still ongoing, which indicates that the system has a time-bound function designed to handle team entries for events or competitions. Once the team is registered, the participants of the race are tasked with uploading an answer or submission, which implies an interactive element where the system collects and stores data for further processing. The flow of the process then involves updating the status of the answers and the team, which shows a dynamic system that tracks and reflects changes in real-time.

On the other hand, the system also provides a series of separate, but interrelated, functions for judges, committees, and admins. The judges can access the system to provide feedback and assign grades or scores to the submitted work, thus playing an important role in the evaluative aspect of the system's objectives. For the committee, it is necessary to update the period and information related to the jury and the committee itself which shows a high level of administrative control and supervision, ensuring that the system remains relevant to the current operational context. Admins can create reports, which are most likely comprehensive documents that reflect the analytical side of the system, offering insights into user submissions, feedback from judges, and overall system performance during the ongoing race period. The holistic view provided by this system features a robust framework designed to manage, evaluate, and report on user engagement in an organized manner. The following is a use case diagram of the BASIC information system:
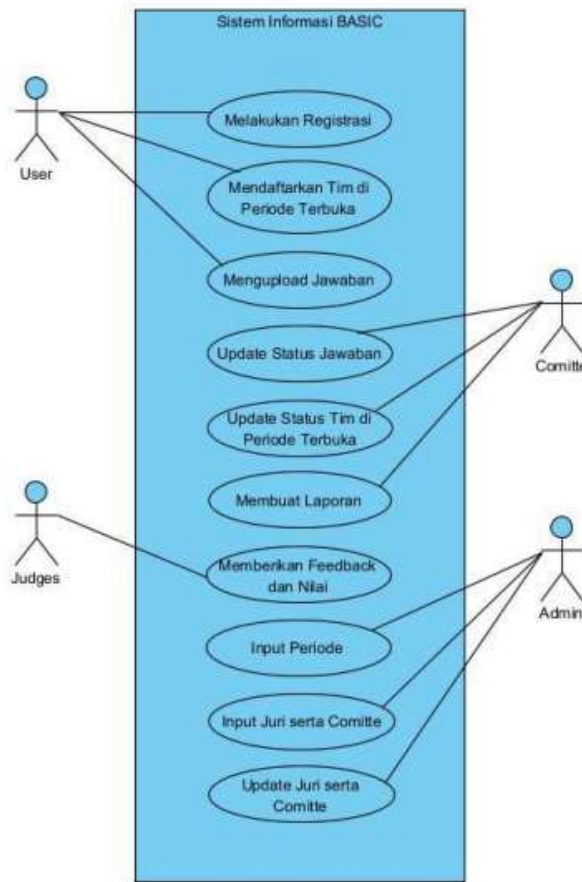
Gambar 1 Use Case Diagram

The following is an explanation of the image above:

User (User/Participant)
1. Registration: The user initiates interaction with the system through registration on the website.
2. Team Registration during the Competition Period: After registering, users can register their team during the competition registration period.
3. Upload Answers: Users can upload the results of the competition to the system to be judged by the judges.

Committee (Pana)
1. Answer Status Update: The committee reviews the works uploaded by the competition participants and updates their status.
2. Team Status Update during the Competition Period: The Committee also manages and updates the team status during the competition period.
3. Preparing Reports: The committee is responsible for making reports that may be required for record-keeping or assessment purposes.

Judges (Juri)
    Providing Feedback and Assessment: The judges will evaluate the work of the competition participants and provide feedback along with the scores produced.

Admin
1. Enter Period: Admin will enter the details of the timeline or schedule of the BASIC competition taking place from registration to final.
2. Entering Jury and Committee Data: Admins are also responsible for entering information about BASIC judges and committees into the system.
3. Updating Jury and Committee Data: Admins update detailed data about judges and committees if needed.

Entity Relationship Diagram

The provided Entity-Relationship Diagram (ERD) offers a comprehensive view of the database schema intended for the system in managing the competition, including participant registration, submission handling, and the judging process. This scheme organizes the system into several main entities: 'User', 'Committee', 'Admin', 'Judge', 'Feedback', 'Answer', 'Registration', 'Contest Type', and 'Contest Period', each of which has a special attribute that allows recording in detail the information and activities of each entity in the system.

The 'User' entity stores important details of race participants, including their personal data identification, contact information, and registration status, indicating that the system is designed to accommodate multiple users with unique profiles. The relational relationship between 'User' and 'Registration' implies that the user can register for different competitions, and the system will track these registrations from time to time.

The 'Judge' and 'Feedback' entities exhibit a strong judging mechanism. The judges are given individual login credentials and can provide feedback and scores, which are directly linked to the 'Answers' entity, which most likely represents submissions or responses from users participating in the competition. This relationship indicates a closed circle for the submission and evaluation of the competition.

The 'Committee' and 'Admin' entities indicate the level of control and administration hierarchy in the system, with the committee that will oversee the running of the competition and the admin having overall access and control over the system's back-end operations.

The 'Race Type' and 'Race Period' entities will categorize competitions into different types and timeframes, which are essential for organizing and scheduling purposes.

In conclusion, the ERD describes a system intended to manage the complex workflows associated with the organization of competitions, including participant management, submission processing, and evaluation. This database design allows for scalability and robust data management, which is essential for efficiently running large-scale competitions (Ravi et al., 2020).

Nur Anisa, Muhammad Wildan
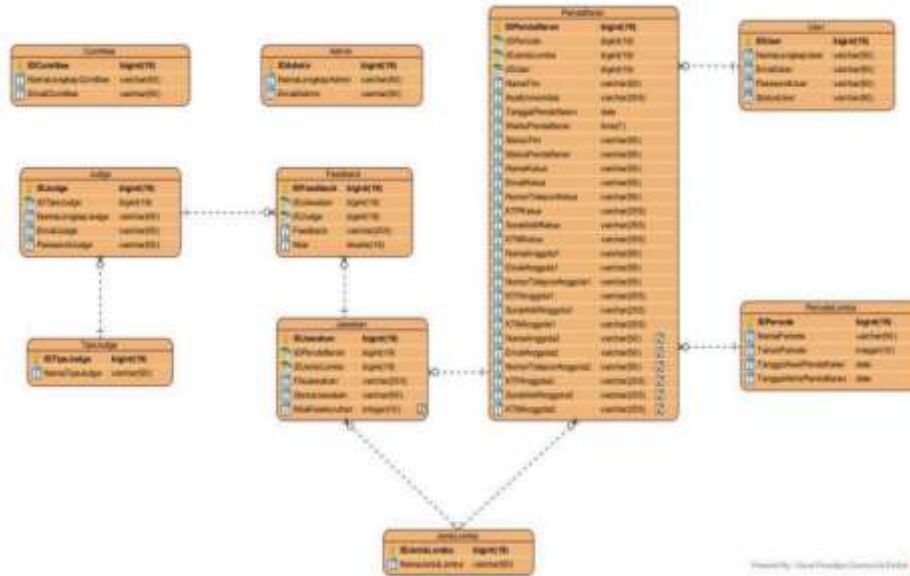
Gambar 2 Entity Relationship Diagram BASIC

Design Interface

1. Register

The displayed "Account List" user interface (UI) is the entry point for new users into the system. The interface is designed with simplicity and clarity in mind, by asking for important information such as full name, gender, email, and password. This simplified approach facilitates a user-friendly experience, minimizing the complicated registration process. With a clean and intuitive design, the BASIC website also offers a direct link to the "Login" page for users who already have an account, reinforcing the ease of navigation of the system.
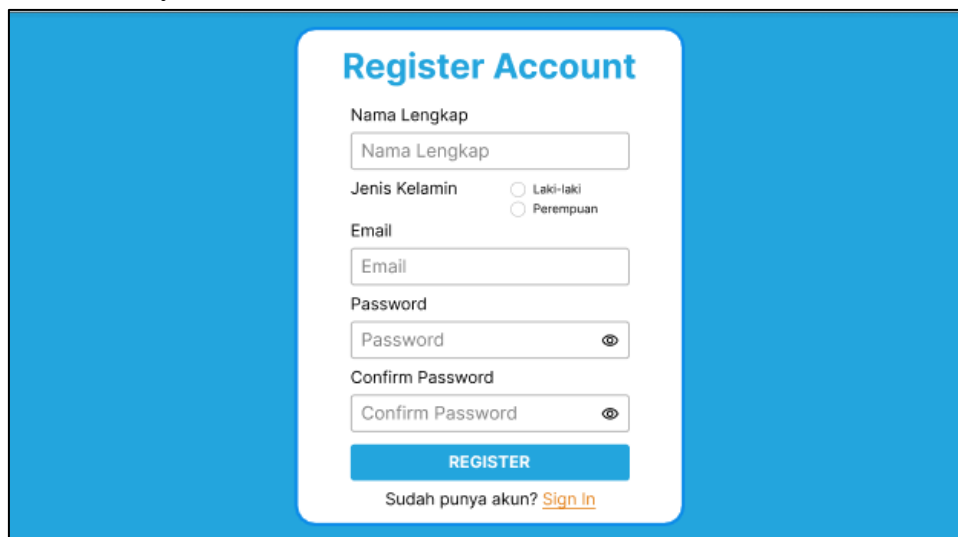
Figure 3 Register Page Display

2. Login

The "Login" user interface (UI) is a portal for users who already have an account to access the website. This UI embodies simplicity and convenience by simply filling in the email and password, which speeds up the login process and improves security. The "Sign Up" link for new users and the "Forgot Password?" feature for account recovery meet the needs of users. The uniformity in design between the sign-up and sign-in pages offers intuitive transitions for users as well as contributes to a cohesive experience across platforms.
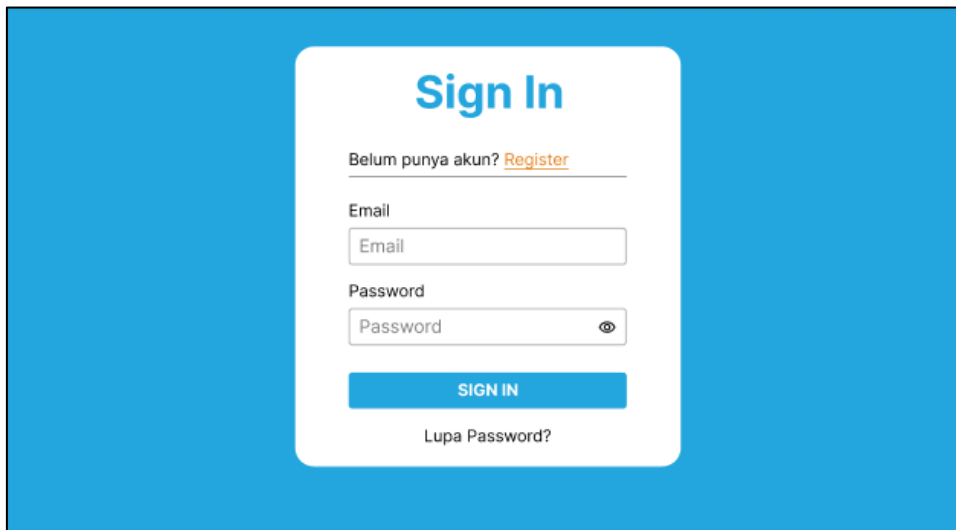
Figure 4 Sign-In Page Display

3. Home for Users

The home page view for "Basic Competition" provides a balance between visual appeal and a motivating call to action. The home page is framed with an inspiring illustration of a cyclist on the move symbolizing progress and determination. This metaphor not only captures the competitive spirit but also aligns with the motivational message that encourages website visitors to sign up and be part of an unforgettable experience. The inclusion of a guidebook for UI/UX and IT competitions also indicates targeted resources for participants, indicating a well-structured support system to help them succeed.

Personalized elements, such as the greeting "Hi, Adam Fahsyah," foster a sense of individual attention, while navigation options are laid out for an intuitive user experience, from uploading information to learning about the organization. The design of this page embodies the ethos of competition—innovation, engagement, and excellence. A dynamic and dynamic interface isn't just about aesthetics; It is a strategic tool to engage and convert visitors into active participants.

Nur Anisa, Muhammad Wildan

Figure 5 Home Page Display

4. Halaman Our Judges

The "Our Judges" section of the website provides participants with a transparent view of the experts who evaluate and judge the competition. The inclusion of professional portraits along with names and titles such as Product Developer, UI/UX Designer, and Lecturer in the field of Information Systems, gives credibility and a sense of authority. This assures the participants that their work will be reviewed by individuals who have a wealth of knowledge and experience in the relevant field.

This section is crucial because it not only highlights the expertise behind the competition but also builds trust and respect for the event. This reflects the competition's commitment to quality and fairness in the evaluation process. The clean and consistent design of the jury profiles ensures ease of reading and adds to the overall professional look of the website, fostering a relationship between attendees and judges even before the event begins.
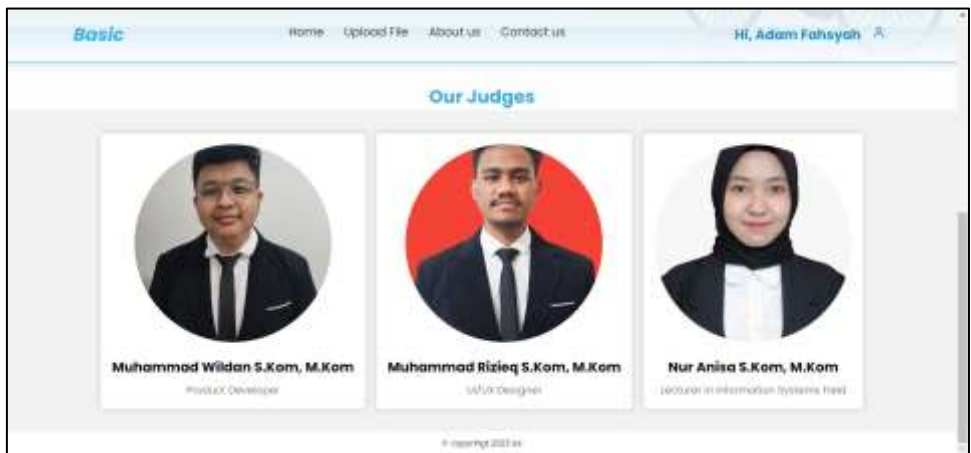
Gambar 6 Tampilan Halaman Our Judges

5. Team List

The "Team List" interface (Team Registration) was created for efficiency and as an initial phase for participants to enter the competition. This form is divided into several clear and logical sections, such as team data and team leader information, ensuring that

all necessary details can be recorded. Required fields are marked with an asterisk, indicating important information that must be provided, such as the name of the team, the university they represent, and the category of competition they are participating in, whether it is UI/UX or IT Business Case.

The step-by-step progression at the top communicates to participants where they are in the registration process, from registration to waiting for the assessment results. The design of this user interface reinforces a sense of development and clarity, so participants can navigate the application process with confidence and ease.

Figure 7 Team Registration Page

6. Upload File

The "Upload Answer" interface is designed to simplify the process of submitting competition entries. This interface clearly defines the submission deadline and the required file format, i.e. PDF, to ensure that the participants adhere to the guidelines, which contributes to the assessment process.

At the bottom of the submission instructions is a section for "Answer History", which is designed to track and display files that have been sent and actions that have been taken, such as uploads. This area will remain blank until the first document is uploaded, so users can see their submission activity transparently and organized. The upload button is displayed, inviting users to add their documents easily. This focus on clarity and functionality in the UI ensures that participants can concentrate on the content of their posts, rather than on the logistics of how to deliver them.
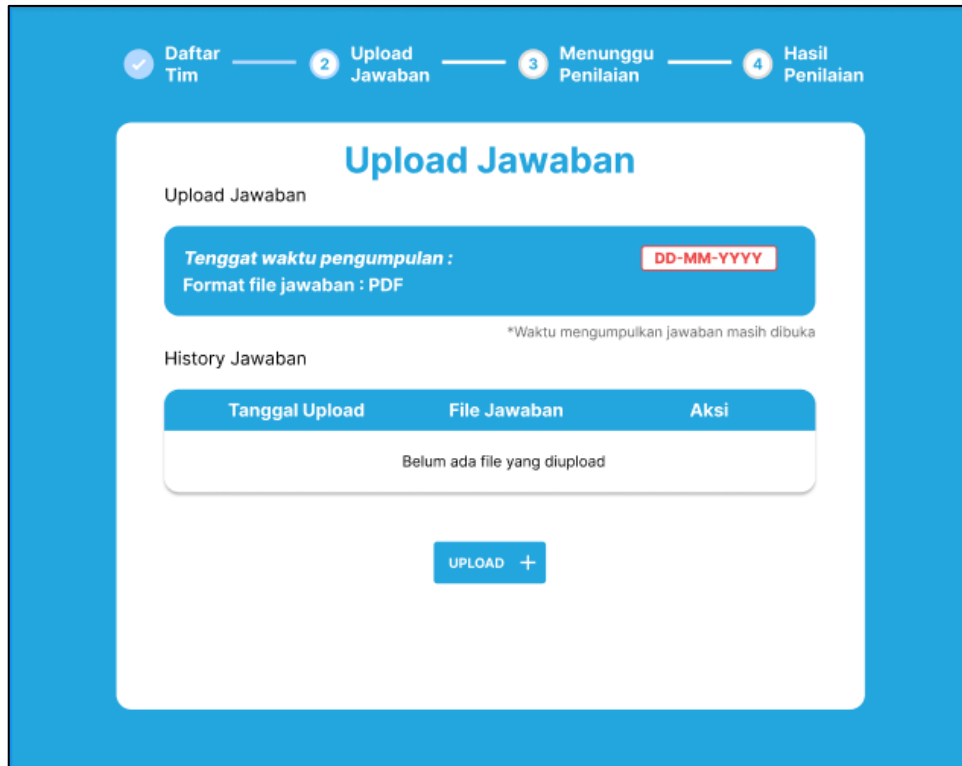
Figure 8 Answer Upload Page

7. Valuation

The "Upload Answer" interface seems to have been updated to not only allow submission of entries but also to provide feedback and overall scores from the judges. Answer history is now complete with a status indicator indicating confirmation, ensuring participants are informed about the successful acceptance of their entry. The inclusion of the feedback section is very important, as it reflects a transparent evaluation process. The scores of each judge are displayed alongside their feedback, giving the team insight into the strengths and areas for improvement in the work. This user interface is more than just functionality; This interface serves as a bridge between participants and judges, facilitating a clear understanding of the work.

Figure 9 Jury Rating Page

8. Answer Page for Judges

The "Answers" interface is described as a functional dashboard for reviewing the work of the competition participants. The layout is designed for ease of use, with a clear display of the team name, delivery date, and link to the submitted file. The "Download" option next to each entry indicates that the judges can easily access and review the work of the competition participants. In addition, the "Action" column allows the judges to manage submissions, such as updating the status of entries.

The filter options at the top show the ability to sort data based on various criteria such as status. This is quite useful for judges who need to manage a large number of assessment entries. The save button at the bottom indicates that any action taken or annotation made can be saved directly within the platform. This jury dashboard is not only practical but also encourages a thorough and organized review process, ensuring efficiency in competition judging.
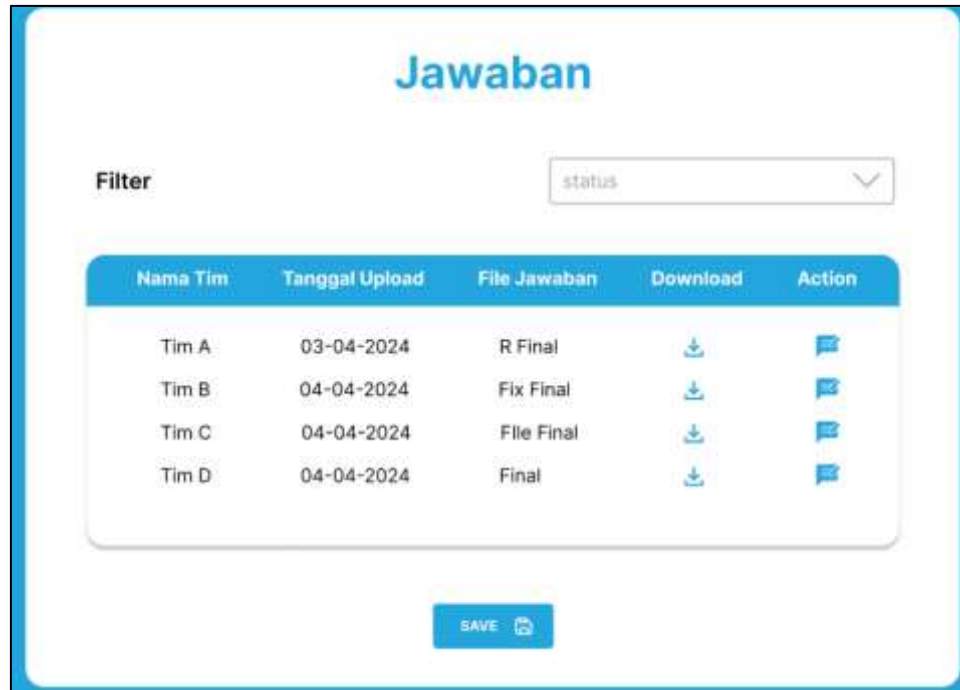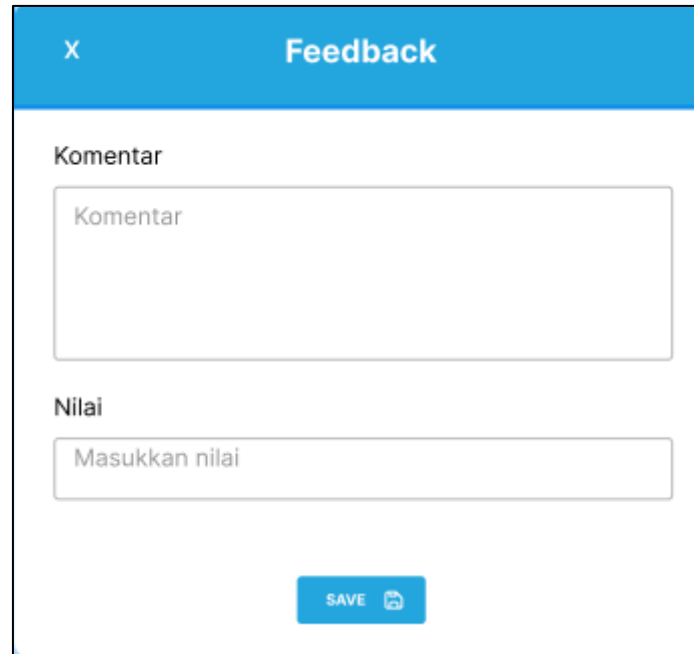
Figure 10 Answer Page

9. Ratings for Judges

This pop-up window titled "Feedback" is a feature integrated into the judges' dashboard, allowing them to provide a detailed evaluation of the work submitted in the competition. The design is minimalist, focusing on functionality and efficiency. This feature provides a text field for "Comments" and judges can articulate their feedback on the post. Then, a separate column for "Value" to provide a numerical value that reflects the judge's assessment of the work.

These pop-ups facilitate a structured approach to providing feedback, ensuring that judges can provide qualitative comments and quantitative values within the same interface. The "Save" button indicates that feedback can be securely stored in the system, simplifying the process of delivering evaluations to participants. A system like this not only helps maintain transparency in the judging process but also supports constructive communication between judges and participants.

Figure 11 Feedback Pop-Up Page

Conclusion

Based on the design of the BASIC competition website database, it can be concluded that this system was built to facilitate the management of competition participant data and the assessment process from the judges. This system is designed so that data processing is fast and accurate and data storage has a long period. In addition, it can also make it easier for admins to make transaction reports for the competition that runs every year by minimizing the redundancy of data that occurs. This system was created to replace and become a solution to the competition registration process which is still manual by filling out a form through Google Form. However, with this system, it is hoped that it can make it easier for all parties involved in BASIC as an international competition that is held every year. Other features will certainly be present along with the increasing needs.

Nur Anisa, Muhammad Wildan

Bibliography

Al-enazi, Alaaaldeen Ali. (2022). The competitive behavior of university students and its relation to some variables. *Journal for Educators, Teachers, and Trainers*, *13*(4), 260–269. https://doi.org/10.47750/jett.2022.13.04.035

Islam, Tariqul. (2022). *Design and implementation of Database and Software with Testing and Quality Assurance for Online Business*. (February).

Kausar, Fahd Naveed. (2024). *Journal of Management & Educational Research Innovation*. (January 2023). https://doi.org/10.5281/zenodo.10055077

Ming, Xiaobo, Pan, Haizhen, & Wu, Yun. (2019). Design and Implementation of Campus Competition Information Sharing Platform Based on Android. *MATEC Web of Conferences*, *267*, 02011. https://doi.org/10.1051/matecconf/201926702011

Mudassar, Sardar, & Khan, Ali. (2023). *V-Model Used in Software Development*. (June).

Nasution, Rukiah, & Muliani, Aninda. (2022). Web-Based Inventory Data Processing Information System At The Regional Development Planning Agency (Bappeda) North Sumatra Province. *Journal of Information Systems and Technology Research*, *1*(1), 32–41. https://doi.org/10.55537/jistr.v1i1.95

Ravi, Yadav, Shikha, Jindal, Rishabh, & Anand, Santwana. (2020). A Study on Comparison of UML and ER Diagram. *International Research Journal of Engineering and Technology*, *7*(5), 7575–7580.

Sasmito, Ginanjar Wiro, Wibowo, Dega Surono, & Dairoh, D. (2020). Implementation of Rapid Application Development Method in the Development of Geographic Information Systems of Industrial Centers. *Journal of Information and Communication Convergence Engineering*, *18*(3), 194–200. https://doi.org/10.6109/jicce.2020.18.3.194

Tabrani, Muhamad, Priyandaru, Hananda, & -, Suhardi. (2021). Application of the Rapid Application Development Method To the Baznas Zakat Receipt Information System in Karawang. *Jurnal Teknologi Dan Open Source*, *4*(1), 78–84. https://doi.org/10.36378/jtos.v4i1.1365

TAIWO, OLUSEGUN OJEYINKA, & MATHEW, OLUSEGUN AFOLABI. (2020). Efficient Database Design and Implementation of Students Academic Results Processing System (Sarps). *I-Manager's Journal on Computer Science*, *7*(4), 1. https://doi.org/10.26634/jcom.7.4.16849

Vilma M. Falolo, Kenneth T. Capillas, Nerissa A. Vergarra, & Adonis F. Cerbito. (2022). Student Registration and Records Management Services towards Digitization. *International Journal of Educational Management and Development Studies*, *3*(1).

Wei, Wei, Niu, Shaowen, Zhang, Beibei, Schererline, Rafal, & Damasevicius, Robertas.

(2020). Design and implementation of discipline competition management system. *Proceedings - 2020 International Conference on Intelligent Computing and Human-Computer Interaction, ICHCI 2020*, 160–163. https://doi.org/10.1109/ICHCI51889.2020.00043

Zhang, Shuang, & Liu, Mairu. (2020). Design of Horse Race Registration System Based on Wireless Network and Simulation System. *2020 International Conference on Data Processing Techniques and Applications for Cyber-Physical Systems*, 1661–1669.