Web-Based Document Workflow Management Information System

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Abstract

In business process and document approval characteristics, approval workflow is a process for automatically flowing business between approval providers with predetermined rules. When viewed from the process of requesting goods, we still use e-mail. With the increasing number of documents that must be approved and still using e-mail communication media, obstacles were found that caused delays in the document approval process. In this study, the authors aim to develop a computerized workflow document that will be integrated into the purchasing request procedure for goods and promotional items from branches. This system will assist document recipients in organizing documents that have not yet been approved or have already been approved. The intended outcome is to enhance the user experience by streamlining the process. Document approval. The information system the author has developed can only be run for internal users who already have login access to the system and can only be accessed using the internal network. The development process uses the waterfall method, and data collection methods in this study include observation, interviews, and literature study. System testing is carried out using blackbox testing evaluation and interface design evaluation using the eight golden rules. From the implementation and evaluation results, it was concluded that the system had achieved the desired results, namely, the branch admin page for sending information on approval documents and the approval party page for responding to documents.

Keywords: document approval, document workflow, web application.
1. Introduction

The document workflow is essential in the document submission process because the process requires verification and approval (approval) from parties related to the recipient of the document so that the document workflow can manage the document workflow of the procedure for submitting documents to related parties (Pasaribu & Susanti, 2021). XYZ company is a company engaged in the car care sector with X branches spread across Indonesia. Submitting requests for promotional items and requests for promotional budgets submitted from branches to the head office still uses email and chat applications for coordination causes delays in the document approval process.

This workflow approval application was also developed by Rahmat, Septari, Yuniawan, and Ito using an electronic document management system (e-DMS) with the aim of identifying the factors influencing the document approval process. The system's development outcome is that all e-certification data is stored in the database (Rahmat et al., 2019). Mark Quevedo, Ken Gorro, Kim Gorro, Brenette Abrenica, Rogelio Bagao, Kay Conales, and John Rafael Arañas in 2019 created a document workflow system for offices to explore NoSQL as a more flexible approach (Quevedo et al., 2019). In 2021, Larisa Cherckesova, Nikolay Boldyrikhin, Elena Revyakina, Olga Safaryan, and Irina Yengibaryan developed a real-time document approval system using the Node.js software platform and the Express.js framework. Their research aimed to enhance economic and environmental aspects by significantly reducing printing and photocopying costs (Cherckesova et al., 2021).

Bangun Pasaribu and Wilda Susanti (2021) created a Draft Proposal Submission System (RUP) at the Faculty of Computer Science, Pelita Indonesia Institute of Business and Technology with PHP Netive and Instagram Bot. They use the waterfall method and design an information system using PHP NATIVE as the web server, and mysql database (Pasaribu & Susanti, 2021). And in 2019 N.Nizamuddinan, K.Salahfa, M.Ajmal Azadb, J. Arshadc and MH Rahmand also developed a document workflow system with the ethereum blockchain and IPFS. They take advantage of Blockchain features, smart contracts, and IPFS files. This research was tested using the Remix IDE to create a stable website to control document approval flows and store data safely (Nizamuddin et al., 2019).

Rahmat et al., (2019) developed a system using the electronic document management system (e-DMS). The purpose of developing this system is to identify the
factors that influence the document approval process. In 2019, Mark Quevedo, Ken Gorro, Kim Gorro, Brenette Abrenica, Rogelio Bag-ao, Kay Conales, and John Rafael Arañas developed a document workflow system for Community Extension Service offices using document-based NoSQL. This study aims to explore NoSQL as a document workflow that may benefit in terms of flexibility. This study uses the Community Extension Process office service in the Project Proposal Application to build document workflows using NoSQL (Quevedo et al., 2019).

Cherckesova et al., (2021) undertook the development of a real-time document approval system. The author uses the Node platform.js software and the Express.js framework. The purpose of conducting this research is to improve the economic and environmental aspects of this because the cost of printing and photocopying is significantly reduced. In 2021 Bangun Pasaribu and Wilda Susanti developed a system for submitting draft proposals (RUP) at the Faculty of Computer Science, Pelita Indonesia Institute of Business and Technology (FILKOM IBT-PI). The author develops an application using Native PHP and Instagram Bot. The author uses the waterfall method, and this study aims to design a web-based RUP information system at FILKOM IBT-PI, using NATIVE PHP as the web server and the MySQL database (Pasaribu & Susanti, 2021).

Nizamuddin et al., (2019) developed a document workflow system with the Ethereum blockchain and IPFS. The author uses Blockchain features, smart contracts, and IPFS files. This research was tested using Remix IDE. The purpose of this research is to create a stable website to control document approval flows and store data safely.

Based on the aforementioned explanation, there is a need for computerized workflow approval. Delays in the approval process are often found because the media used for the approval process needs to be improved. Each party has yet to receive information on what documents must be approved and from which parties. Thus, a web-based application is designed for document management along with document approval workflows within the scope of this Information System that can only be run for internal companies that already have login access to the system. The workflow document system will be developed using the waterfall method with an object-oriented analysis design (OOAD) approach (Pressman, 2016), the system design will use the unified modeling language (UML), database design will use entity relationship diagrams (ERD) (Mohania et al., 2000), and evaluation will use blackbox testing (Jaya, 2018) and eight golden rules (Wong, 2020).
2. Research Method

2.1 Research Stages

Essential steps are taken in researching to produce good research and direction. From the initial stage, namely the problem identification, to the final stage, which contains the conclusion. Moreover, the author uses the waterfall software development method to develop the application itself. The following is an explanation of each process contained in the research stage:

1. Data Collection: Data collection is the first stage that the author did in writing this thesis. Starting with problem identification, then collecting data using interviews, and ending with conducting a literature study to obtain information on developing web-based workflow document applications.

2. Requirement Analysis: The analysis phase used in this study uses the Object-Oriented Analysis (OOA) approach. The analysis process is carried out on the results of the data collection stages by interviews, observation, and literature study to obtain the specifications for the needs of the system being developed.

3. System Design: The design stage is an advanced stage of the analysis stage. The author uses UML to describe the application to be built. Furthermore, the interface design uses the Balsamiq mockup (Balsamiq Wireframes, 2023) and ends by making a database design with ERD.

4. System Implementation: The implementation stage is translating the design into an application ready to be used by the user. After the application has been built, testing is conducted to detect any errors in the implementation results after the application is declared without errors.

5. System Evaluation: The Evaluation Phase is the final activity after testing the document approval workflow system. System evaluation uses eight golden rules to design an interface using the principles of a good interface, blackbox testing evaluation, and user acceptance test evaluation as the final stage of document management system testing and document approval workflows.

2.2 System Design

The system to be designed uses UML (Unit Modeling Language) (Sujatha & Saradha, 2014). In general, UML is used to model systems and business processes, including visually describing the structure and behavior of the system being built. UML has various types of diagrams that can be used to model systems: use case diagrams and class diagrams. Database Design uses Entity Relationship Diagram (ERD).
3. Results and Analysis

3.1 Implementation

The implementation results are as follows:

1. Users will get a website link and access to the website from the Central IT. If the user has gained access, the initial page that will appear is the Login page. The user must enter a username and password according to the data provided by the Central IT. Then the user selects the “Sign In” button.

![Login page](image)

Source: Research Result (2023)

Figure 1. Login page.

2. The main page of this application consists of several menus and incoming message notification buttons.

   a. For Branch Admins. Users can select the Notification Button to view incoming messages, Workspace Menu (to create an Approval folder. In the folder view, users can upload approval documents or cancel documents), My Approval Menu (to view documents sent in the approval process). If the user have sent the approval document and the Approval has responded, so the user can see the response on the Approval Request Menu.

![Admin branch workspace page](image)

Source: Research Result (2023)

Figure 2. Admin branch workspace page.
b. Approval parties consist of several parties including the Branch Head, Area Manager, Center Promotion Manager and Operations Director. User can select Notification Button to view incoming messages. Incoming messages are in the form of approval documents that need to be responded to. Users can respond by viewing notification details. If you have agreed, the User can select the Approve Button to continue the approval process to the next party or select the Reject Button to return the notification to the Branch Admin.

Source: Research Result (2023)

Figure 3. Approval request page.

c. For Central IT, Users can Set Workflow Templates if there are changes or additions to workflows. Users can manage User data, departments, branches, job levels on the data management menu provided.

Source: Research Result (2023)

Figure 4. Setting workflow template page.
3.2 Evaluation

After implementation, an evaluation is carried out on the document management system along with the document approval workflow which consists of two evaluation stages are user evaluation using eight golden rules and blackbox testing.

1. User Interface Evaluation

a) Strive for consistency: The consistency of the application that the author has developed can be seen from the website page, display color, font type, font size and language used. The background color, layout, and font on each page of this website match one of the examples in figure 5.

![Image](image1.png)

Source: Research Result (2023)

Figure 5. Example of strive consistency

b) Cater to universal usability: The user interface of this website has been designed by the author in such a way that it is user friendly.

![Image](image2.png)

Source: Research Result (2023)

Figure 6. Example of cater to universal usability
c) Offer informative feedback: This application provides informative responses to inform users about which page they are currently on, located at the top of the website page.

![Image of Approval Document]

Source: Research Result (2023)

Figure 7. Example of Informative Feedback Design

d) Design dialogs to yield closure: this application notifies that the action has been completed by providing a status column containing tracking of the document approval process.

![Image of My Approval]

Source: Research Result (2023)

Figure 8. Example of Dialogs to Yield Closure Design
e) Prevent errors: This application prevents errors made by the user.

![Welcome to DMS](image)

*Source: Research Result (2023)*

**Figure 9. Example of prevent error.**

*permit easy reversal of actions*: This application provides a back button to make it easier for users if they want to return to the previous page easily.

![Workflow Template Page](image)

*Source: Research Result (2023)*

**Figure 10. Example of Easy Reversal Of Actions Design**

f) Support internal locus of control: Users of this application are given the freedom to send approval documents according to the wishes of the user.

![Drop files here to upload](image)

*Source: Research Result (2023)*

**Figure 11. Example of Support Internal Locus of Control.**
g) Reduce short-term memory load: Users have limited memory so that this application is designed as simple and informative as possible so that users do not need to remember the functions as much as possible and can use this application easily.

![Example of Reduce Short-Term Memory Load Design](image)

Source: Research Result (2023)

Figure 12. Example of Reduce Short-Term Memory Load Design

### 3.3 Black Box Testing

Black Box Testing is used to test system functionality and will be declared 100% valid if it is as expected. The first test results start with logging in by: the user will enter the login page and enter the next username & password then black box testing is declared valid if the system successfully enters the website page and if it fails to enter the website page it will display an alert failed to enter.

Admin Branch:

a) Branch admin creates a new folder that will be used to upload approval documents. Implementation of black box testing is declared valid if the system succeeds in creating a new folder.

b) The branch admin creates a new folder relationship with the approval folder. The implementation of black box testing is declared valid if the system succeeds in displaying the relation folder input form and creating a relation folder and displays
an alert failing to create a relation folder if the form filled in does not match the criteria.

c) The branch admin looks at my approval details for revisions. Implementation of black box testing is declared valid if the system displays a closed workflow status.

d) Branch admins see my approval details for closed workflows. Implementation of black box testing is declared valid if the system succeeds in uploading a new version of the document.

Approval party:

a) The approval party carries out the approval process by approving or rejecting the received file. The implementation of black box testing is declared valid if during the approval process, (1) the system displays comments on the approve status and sends documents to the next party (2) the system displays comments on reject status and sends documents back to the branch admin.

b) The approval party looks at the approval request data. Implementation of black box testing is declared valid if the system succeeds in displaying the approval request data and detailed data.

Central IT:

Central IT manages data. The implementation of black box testing is declared valid if (1) when at the time of adding data, the system succeeds in displaying the data input form and displaying the results of added data and displaying an alert failing to add new data if the form filled in does not meet the criteria. (2) if at the time of editing the data, the system successfully displays the data edit form and displays the edited data and displays an alert for failing to edit the data if the edited data does not match criteria. (3) if at the time of data deletion, the system successfully displays an alert confirming data deletion.

4. Conclusion

Based on the results of the design and implementation, it can be concluded that this study succeeded in developing a document management information system along with document workflows by implementing the stages of the waterfall method. This system also has features such as workspace menu, my approval menu, notification button, approval request menu and master data menu. Furthermore, all functions contained in the application have been tested without failure using black box testing evaluations, eight golden rules interface design evaluations and UAT evaluations with...
user access rights such as Branch Admins, Approval Parties and Central IT. Thus the document management system along with the document approval workflow has succeeded in assisting the document approval process carried out by the branch admin as the document sender and the approval party as the document responder. As for suggestions that can be submitted for further development and implementation of a document management system along with document approval workflows, namely developing applications in a mobile version so that approval parties can carry out the approval process more easily and implementing approval workflows in other procedures.

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Author Contributions
Yohan Aris Darmawan proposed the topic; Yohan Aris Darmawan dan Emny Harna Yossy conceived models and designed the experiments; Yohan Aris Darmawan dan Emny Harna Yossy conceived the implementation and evaluation; Yohan Aris Darmawan dan Emny Harna Yossy supervision and analysed the result.
Conflicts of Interest

The author declares no conflict of interest.

References


Rahmat, R., Mohamad, E., Jaafar, R., Saptari, A., Mohamad, N. A., Yuniawan,
