Development of an Information System with User-Controlled Structure and Content

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Abstract

This paper presents the development of an information system with a user-controlled structure and content, aimed at providing a flexible platform for dynamic data entry and management. The system allows administrators to create templates for documents dynamically, which can then be filled out by other users. This approach enables the process to adapt to changing requirements without requiring new pages to be programmed in the information system. Instead, administrators can create new dynamic document templates, which users can subsequently fill out, making the system highly adaptable to evolving needs. The data is stored in a JSON format, allowing high flexibility in data representation and integration. Key functionalities include user-driven creation of data structures, dynamic content generation, and a user-friendly interface for seamless interaction. The paper discusses the architecture of the system, the technical challenges faced, and the solutions implemented to achieve a robust and adaptable platform. The presented system has potential applications in the educational sector where customizable data management is crucial.

Key words: Information System, Dynamic Content, JSON, Templates, Education

JEL: C88, L86.

Introduction

This paper presents the development of an information system with user-controlled structure and content, aimed at providing a flexible platform for dynamic data entry and management. The system is designed to meet the needs of organizations where data collection requirements frequently change, requiring flexibility and easy adaptation. By allowing users to create dynamic templates, the system offers a new approach to content management that eliminates the need for constant code changes and allows quick adaptation to new requirements. The implementation of such a concept could be particularly useful in a university environment, where frequent changes in regulations dictate the structure of various documents and forms.

The aim of this paper is to present a concept that can serve as a basis for the development of an information system with user-controlled structure and content. This includes:

- Creating a user interface that allows easy configuration of page structure and content.
- Ensuring data dynamism through the use of JSON for storage.
- Developing functionalities that allow quick adaptation to new requirements by creating new templates and dynamic data entry.

The system is designed to be user-friendly and to provide a high level of flexibility in data management.

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Literature Review

In recent years, the development of user-controlled information systems has gained momentum due to the need for adaptable, user-friendly, and dynamic data management platforms. These systems cater to sectors like education and business, where data and content structures often need continuous adjustments without requiring deep technical intervention. Existing literature on user-driven structure creation and content flexibility emphasizes the relevance of JSON-based data management, dynamic template creation, and the seamless integration of user interfaces, aligning closely with the objectives of this study. Some authors investigated a user-controlled document recommendation system aimed at knowledge workers, which shares foundational goals with dynamic template creation [1]. Their study highlights how allowing users to control content structures enables systems to better align with individual needs, fostering a flexible environment for document management. Similarly, this paper presents a system's template creation mechanism that allows administrators to design and deploy document structures dynamically, enhancing usability and scalability without complex reprogramming. Other authors explored the adaptability of hypermedia systems, focusing on user-controlled metadata to allow fluid data categorization and retrieval [2]. Their approach, which enables metadata structuring through user-driven actions, complements the aim of the system presented in this paper to support evolving data management requirements by leveraging JSON for flexible data storage. This adaptability is crucial in systems where content relevance depends on user-driven modifications. JSON's role in flexible data representation has been widely recognized for its ease of integration and its adaptability in storing and retrieving complex data structures. Some authors utilized JSON-based structuring in their exploratory search system, allowing users to personalize data visualization and interaction [3]. The use of JSON within the approach of the current research similarly supports a responsive and versatile system where document templates can be modified in real-time based on user or administrator needs, fostering a flexible data environment that can adjust to various use cases. In the educational sector, the need for dynamic content management is critical. Authors in this subject area examined adaptive learning environments where users, particularly educators, could customize learning materials based on evolving curricular demands [4]. The application potential of the presented in the paper system in education is evident, as dynamic document templates would enable institutions to address changing educational content requirements seamlessly without reprogramming efforts. Other authors investigated user-controlled systems in the context of privacy and user data management [5]. Their study underscores the importance of user-friendly interfaces that allow non-technical users to interact with complex data structures easily. In line with this, the presented in the research system's emphasis on a user-friendly interface for template creation and content management ensures that even those with limited technical knowledge can effectively utilize the platform, broadening its usability across diverse applications. Another research discusses the impact of emerging technologies on higher education, highlighting the importance of flexibility and adaptability in the face of rapidly changing educational needs [6]. This aligns closely with the objectives of the present study, which aims to create an information system capable of addressing dynamic requirements in a university context. The integration of cloud services into educational environments has been found to significantly enhance interactivity and improve the learning experience [7]. The use of cloud-based platforms such as Office 365 provides students and instructors with seamless access to collaborative tools, which aligns closely with the objective of this study to create a flexible and user-controlled system for managing educational content. The integration of the Internet of Things (IoT) in education has the potential to transform the educational landscape by enhancing data-driven decision making and providing personalized learning experiences [8]. This aligns with the objectives of the current study, which aims to create a flexible information system capable of supporting evolving educational requirements. Integration of Business Process Management (BPM) software within existing IT environments is crucial for enabling dynamic management of business processes [9]. Universities face challenges in integrating BPM solutions into their IT infrastructure, yet the potential benefits for improved efficiency and adaptability are significant. The proposed in the paper information system aims to

provide dynamic customization and optimization, akin to the approach described by other authors in the subject area, where a proactive performance management solution ensures timely identification and resolution of issues, ultimately leading to positive economic impacts [10].

The literature review positions this paper within a broader framework of user-controlled information systems, emphasizing the benefits of dynamic document management, JSON-based flexibility, and user-centric design. Additionally, it underlines the significance of incorporating emerging technologies and proactive approaches to ensure the adaptability and efficiency of data-intensive systems.

Approach for Development of the Information System

The fundamental process of digitalization of regulations for process automation in the form of an information system is illustrated in Fig. 1.

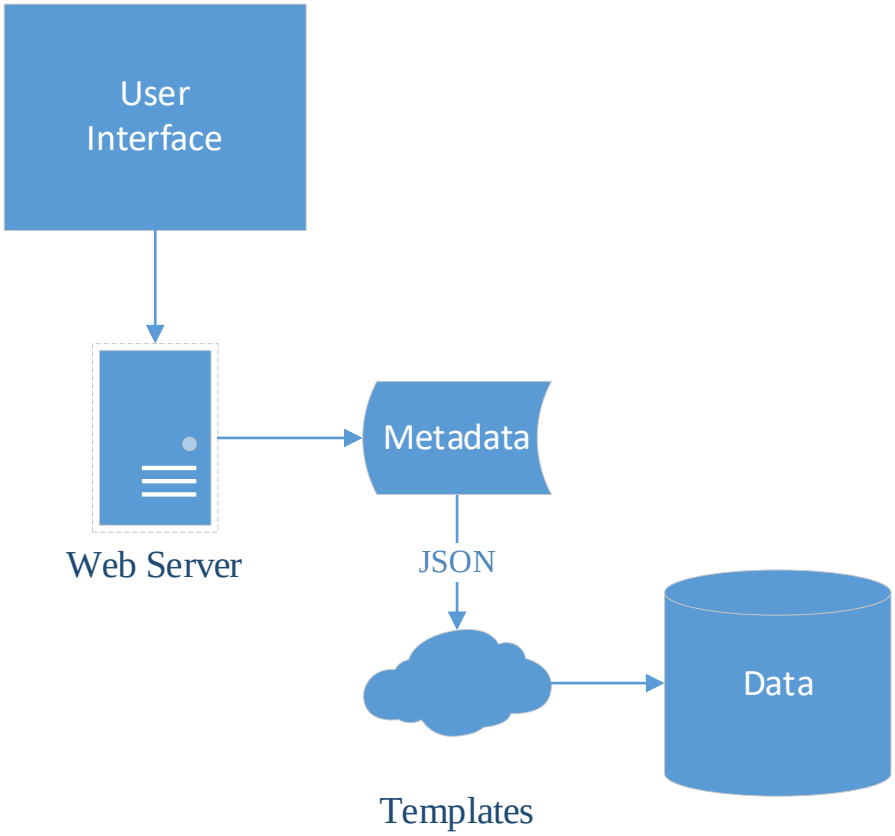
Source: Author

Figure 1: Fundamental process of digitalization of regulations through the use of an information system

The architecture of the proposed information system consists of several key components that interact to provide dynamic data management capabilities (Fig. 2):

- Client-Side Component: Provides a user-friendly interface that allows administrators to create templates and users to fill out the forms dynamically.
- Server-Side Component: Handles user requests, processes data, and manages interactions between the client and data storage.
- Intermediate Component: Stores the configuration of page structures in JSON format. The web server uses this component to dynamically generate pages based on the stored configurations before loading the relevant data. This approach ensures that any changes in page structure are easily reflected without the need for direct modifications in the server code.
- Data Storage: Utilizes a traditional relational database for storing user data and filled-out forms, while JSON is used to store the dynamic configurations of page structures. This combination ensures both the flexibility of representing dynamic templates and the robustness of structured data management for user inputs.

The architectural design aims to decouple the data representation from the underlying storage mechanisms, allowing for greater flexibility in adapting the system to different use cases. The use of JSON enables efficient storage of hierarchical page configurations, while the relational database ensures consistent and reliable storage of the collected data.



Source: Author

Figure 2: Architecture of the information system

The proposed information system is designed to allow users to create and manage document templates dynamically. Administrators can define the structure of templates by specifying the fields required, which can then be filled out by other users. This approach allows the system to adapt quickly to changing requirements without needing developer intervention. For instance, if new regulations require additional information in a particular form, administrators can easily modify the existing template or create a new one, and the changes will be immediately reflected in the system. This process eliminates the need for traditional software development cycles to implement such changes, making the system more agile and responsive.

The system provides several key functionalities to enhance user experience and adaptability (Fig. 3):

- Administrators have the ability to create and edit templates, specifying the structure and type of data to be collected.
- Users can fill out documents based on the templates created, ensuring that the data collected meets the current requirements.

- The use of JSON allows for flexible storage of page configurations, while the relational database manages user data effectively, making it easier to adapt to different types of data and changes in structure.

Source: Author

Figure 3: Key functionalities of the information system

These functionalities make the system highly adaptable to evolving needs and enable easy customization of data collection processes.

Developing a system with such a high degree of flexibility posed several technical challenges. The most notable challenges are presented in Fig. 4. The corresponding solutions implemented are:

- Using JSON to store page configurations allows for flexible and efficient representation of dynamic structures. This makes it easier to generate and modify pages without requiring code-level changes.
- A combination of JSON for configurations and a relational database for user data is proposed. The relational database ensures data consistency and integrity, while JSON provides the flexibility needed for dynamically changing templates.
- The client-side component should be designed with a focus on usability, incorporating intuitive drag-and-drop features and straightforward input fields to make template creation and editing accessible to non-technical users.

Source: Author

Figure 4: Challenges in development of the information system

The proposed corresponding to the challenges solutions allow the system to maintain a high level of adaptability while ensuring reliability and ease of use.

The presented in the paper approach for development of an information system has potential applications in various fields where data collection and document management need to be flexible and adaptive. Specific benefits include the educational sector, because universities can use the system to manage forms and documents, adapting to frequent changes in regulations and requirements. Overall, the flexibility offered by the system allows organizations to respond quickly to changing requirements without significant overhead in software development.

Conclusion

In conclusion, this paper presents a concept for an information system that addresses the need for flexibility and adaptability in document management. By allowing user-controlled configurations and using JSON alongside a traditional relational database, the system effectively handles dynamic requirements without the need for extensive programming. The implementation of such a system can greatly benefit sectors that require frequent updates to document structures, such as the educational sector.

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