Jurnal Sistem Informasi dan Teknik Informatika
Vol. 3, No. 2, August 2025, pp. 37~42
E-ISSN: 3031-2698 (ONLINE)

Integrated Information System for Livestock Health Data Management

Sayzajaya Ramadhan
Indo Global Mandiri University, Indonesia

Article Info

Article history:

Received Aug 04th, 2025
Revised Aug 29th, 2025
Accepted Aug 29th, 2025

Corresponding Author:

Sayzajaya Ramadhan
Email: 2021210032@igm.ac.id
Indonesia

Abstract

The growing demand for efficient livestock management highlights the importance of reliable health data systems that support decision-making and disease prevention. However, many existing approaches still rely on fragmented and manual processes, leading to inaccuracies, delays, and limited collaboration among stakeholders such as farmers, veterinarians, and government officers. This study proposes an Integrated Information System for Livestock Health Data Management designed to centralize health records, streamline data entry, and enhance reporting accuracy. The system employs structured data modeling through class diagrams, flowcharts, and interface designs to capture farmer reports, veterinary diagnoses, and administrative validations in a coordinated workflow. By integrating these processes, the solution ensures seamless data flow, reduces redundancy, and fosters collaboration across roles. The results demonstrate improved data consistency, faster response times, and stronger support for monitoring livestock health. This approach provides a practical and replicable framework to modernize livestock health management systems.

Keywords: *Livestock Health, Information System, Data Management*

Abstrak

Permintaan akan sistem pengelolaan ternak yang efisien semakin meningkat, sehingga diperlukan sistem data kesehatan yang andal untuk mendukung pengambilan keputusan dan pencegahan penyakit. Namun, banyak pendekatan yang ada masih bergantung pada proses manual dan terfragmentasi, yang menyebabkan ketidakakuratan, keterlambatan, serta keterbatasan kolaborasi antara peternak, dokter hewan, dan petugas pemerintah. Penelitian ini mengusulkan Sistem Informasi Terintegrasi untuk Pengelolaan Data Kesehatan Ternak yang dirancang untuk memusatkan catatan kesehatan, menyederhanakan proses entri data, serta meningkatkan akurasi pelaporan. Sistem ini menggunakan pemodelan data terstruktur melalui diagram kelas, flowchart, dan rancangan antarmuka untuk menangkap laporan peternak, diagnosis dokter hewan, serta validasi administratif dalam alur kerja yang terkoordinasi. Dengan mengintegrasikan proses tersebut, solusi ini memastikan aliran data yang lebih lancar, mengurangi redundansi, dan memperkuat kolaborasi antar peran. Hasil penelitian menunjukkan peningkatan konsistensi data, percepatan respons, dan dukungan yang lebih kuat dalam pemantauan kesehatan ternak.

Kata kunci: Kesehatan Ternak, Sistem Informasi, Manajemen Data

1. INTRODUCTION

In recent years, the livestock industry has become increasingly vital in supporting food security and rural livelihoods across the globe. As livestock production intensifies, ensuring the health and well-being of animals has emerged as a crucial concern [1]-[3]. Effective health data management is essential to monitor

disease outbreaks, administer vaccinations, and maintain records of veterinary interventions [4], [5]. However, traditional livestock health monitoring systems are often paper-based or fragmented across different institutions, leading to inefficiencies and data inaccuracies. These limitations hinder timely decision-making and the implementation of preventive health strategies.

The primary challenge facing livestock health management lies in the lack of an integrated and centralized system for collecting, storing, and analyzing health-related data. Many regions, especially in developing countries, still rely on manual or semi-digital processes, resulting in poor data quality, duplication, and delays in reporting. Additionally, veterinary services are often scattered, with limited coordination among farmers, veterinarians, and agricultural authorities. This fragmentation undermines the ability to quickly identify disease trends, trace sources of infection, or implement coordinated responses during health crises such as zoonotic outbreaks or livestock epidemics. In response to these issues, this study proposes the development of an Integrated Information System for Livestock Health Data Management. The purpose of this system is to streamline the process of recording, sharing, and analyzing livestock health data across all relevant stakeholders. By consolidating health records, vaccination histories, diagnostic results, and veterinary interventions into a single digital platform, the system aims to enhance the efficiency and reliability of livestock health monitoring. Furthermore, it supports early detection of diseases and facilitates real-time data-driven decision-making at both farm and policy levels.

The methodology adopted in this study includes a needs assessment involving key stakeholders such as veterinarians, livestock farmers, and local government agricultural departments. The Model is a software development methodology that follows a linear and structured flow [6], [7], [8]. Based on the findings, a system architecture is designed incorporating user-friendly interfaces, secure cloud storage, and mobile access features. The development process follows an agile methodology, allowing for iterative testing and feedback during system prototyping. A pilot implementation is conducted in a selected livestock farming community to evaluate system functionality, user acceptance, and performance in a real-world context.

This research contributes significantly to the field of agricultural informatics and veterinary public health by presenting a scalable digital solution tailored to the specific needs of livestock health management. The integrated system not only improves the accuracy and timeliness of data collection but also empowers stakeholders to take preventive and corrective measures based on reliable insights [9]-[12]. Moreover, it supports compliance with national livestock health regulations and enhances the traceability of animal health records, which is crucial for local and international trade. In conclusion, addressing the gaps in livestock health data management through a well-designed integrated information system offers tangible benefits for animal health, farm productivity, and public health. By embracing digital transformation in livestock health monitoring, this study lays the groundwork for more resilient and responsive agricultural health systems, ultimately contributing to sustainable livestock development and food security.

2. METHOD

After the requirements are collected, the next step is to design the system architecture. This includes designing the system structure, identifying algorithms, and preparing the necessary technical specifications [13]-[15]. Figure 1 shows the basic flow diagram used. The flowchart illustrates the process of an integrated information system designed for livestock health data management. It begins with farmers and veterinarians submitting health data, vaccination schedules, and field reports into the system. This information flows into a centralized database where administrators oversee data quality, manage records, and ensure the system runs smoothly. The process also involves generating regular reports that can be accessed by agricultural authorities to guide decision-making. At each stage, checks are in place to ensure data accuracy and completeness, minimizing the risk of errors while supporting timely interventions.

As the flow progresses, the system not only enables operational tasks such as vaccination management and health monitoring but also ensures higher-level functions like compliance reporting and disease trend analysis. If issues are found—such as incomplete records or inconsistencies—they are flagged for correction before further processing. Ultimately, this structured flow provides transparency, efficiency, and reliability, making livestock health management more proactive and data-driven.

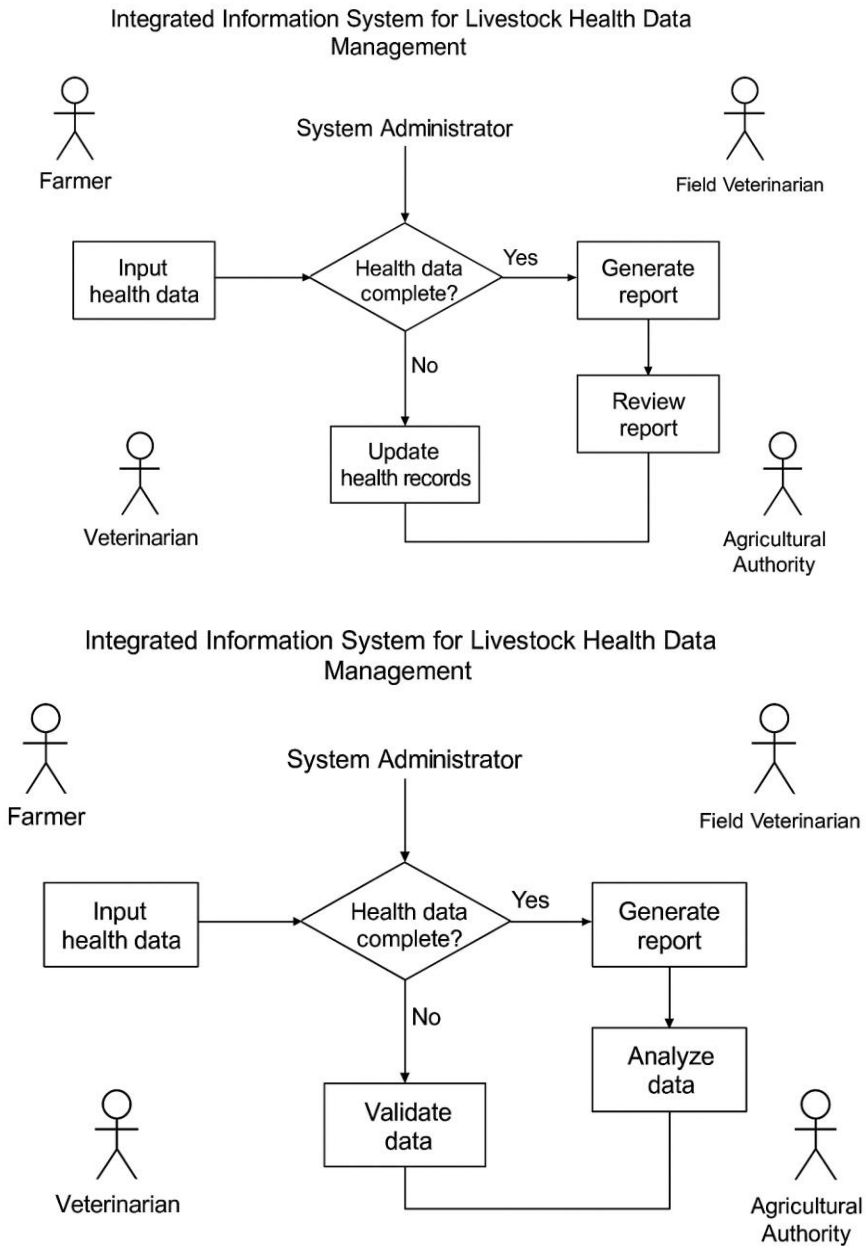

Figure 1 – The Basic Diagram

In the earlier version of the flowchart, the process relied heavily on manual steps such as "Review Report" and "Update Health Record". This implied that much of the responsibility fell on individual users (like veterinarians or admins) to interpret reports, check them for accuracy, and then manually update records. While this workflow was straightforward, it carried risks of delays, inconsistencies, and human error, especially when handling large amounts of livestock data.

In the improved flowchart, these steps were refined into "Analyze Data" and "Validate Data". This shift represents a move toward a more systematic and automated approach. Instead of just reviewing reports, the system now emphasizes analyzing the collected data to identify trends, detect anomalies, or generate insights. Likewise, instead of directly updating records, a validation stage was introduced to ensure the accuracy and consistency of the data before it becomes part of the permanent database. This change strengthens reliability, minimizes duplication, and ensures that decisions are based on clean, verified information—making the whole system more robust and trustworthy (Figure 2).

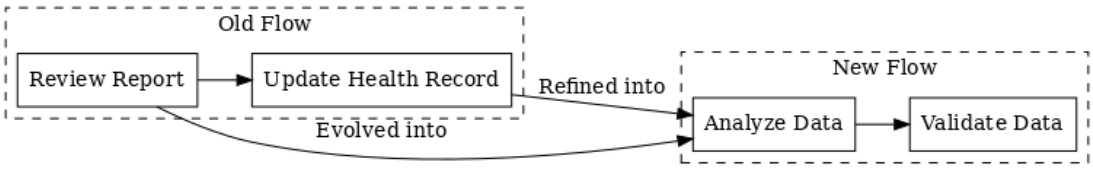

Figure 2 - The transformation

The transformation from "Review Report" to "Analyze Data" represents an important shift in how livestock health information is processed. While reviewing a report primarily involves checking the contents of a document, analyzing data goes a step further by extracting patterns, detecting anomalies, and generating meaningful insights. This change indicates that the system is not only designed to collect information but also to support decision-making by turning raw reports into actionable knowledge. It reflects a more proactive approach, where the focus is on understanding the health trends of livestock rather than just reading through reports. Similarly, the adjustment from "Update Health Record" to "Validate Data" shows an emphasis on data integrity and reliability. Updating records can sometimes introduce inconsistencies if the data entered is incomplete or incorrect. By including a validation process, the system ensures that all inputs are accurate, standardized, and aligned with predefined rules before being stored. This refinement strengthens the overall quality of the information within the system, making it more dependable for veterinarians, farmers, and policymakers who rely on accurate data for effective livestock health management.

3. RESULT

Figure 3 show the proposed interface design emphasizes simplicity and usability, making it easy for different users—such as farmers, veterinarians, and agricultural authorities—to interact with the system. The dashboard provides quick access to essential features like livestock health records, vaccination schedules, and reporting tools. Clear icons and well-organized menus help minimize confusion, allowing even users with limited technical skills to navigate the system effectively. The layout prioritizes key health indicators and alerts, ensuring that urgent information is immediately visible and actionable.

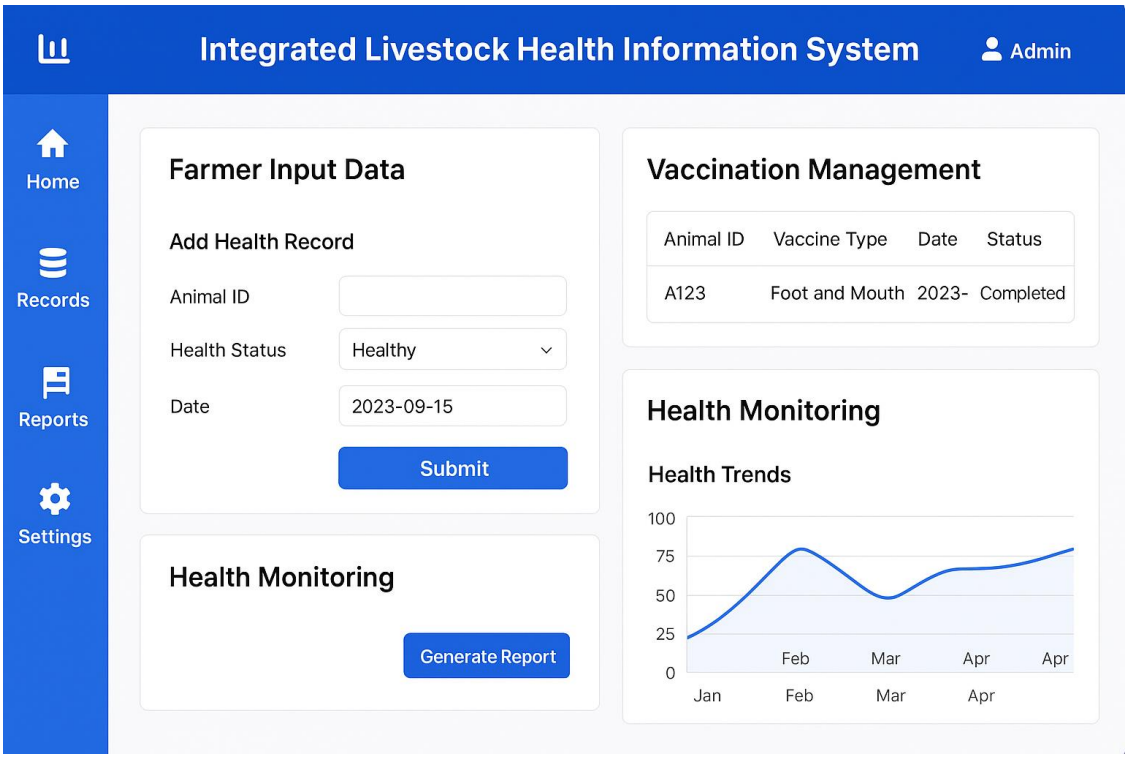

Figure 3 – The design interface

Another notable aspect of the design is its focus on collaboration and data validation. Farmers can easily update animal health records, while veterinarians and authorities can review and validate the data through intuitive workflows. Integrated visualization tools, such as charts and summary reports, help users analyze trends and make informed decisions. Overall, the interface bridges functionality and accessibility, ensuring that the system supports efficient livestock health management across all stakeholders.

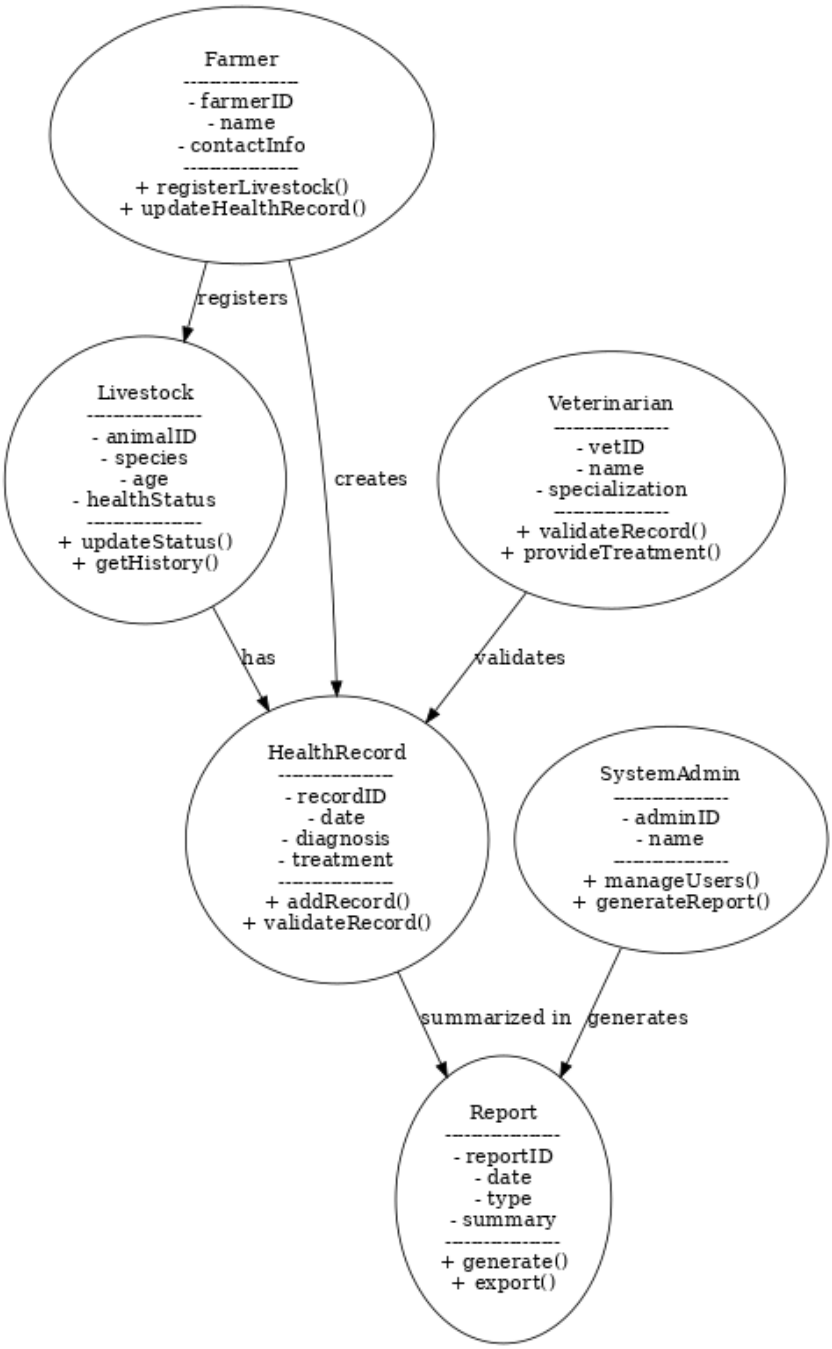

Figure 4 – Class Diagram

Figure 4 show how different components of the Integrated Information System for Livestock Health Data Management interact to form a well-structured and organized system. At the core, we have the Livestock class, which stores key attributes such as ID, type, age, and owner details. This class connects

directly with HealthRecord, which maintains medical history, vaccination schedules, and treatments, ensuring that each animal's health data is carefully tracked over time. Supporting this structure, the DiseaseCase class documents any illnesses detected, linking back to the health record for context and providing information like symptoms, diagnosis, and treatment outcomes. These connections ensure that the health journey of each animal can be traced comprehensively, making it easier to monitor progress and identify patterns. On the operational side, classes like User (with roles such as Farmer, Veterinarian, and Officer) and Report integrate human interaction and decision-making into the system. Farmers can input livestock details and request updates, veterinarians can add medical records or validate data, and officers can generate official reports for broader livestock management policies. The SystemAdmin class oversees the overall structure, ensuring smooth management of data access and security. Together, these relationships create a balanced ecosystem where data flows logically from input to analysis, ultimately supporting efficient decision-making in livestock health management. This design not only emphasizes traceability and accuracy but also highlights how collaboration among stakeholders is streamlined through technology.

4. CONCLUSION

The Integrated Information System for Livestock Health Data Management offers a structured and collaborative approach to managing animal health records, ensuring that every step—from data entry to validation and reporting—flows seamlessly between farmers, veterinarians, and officers. By combining organized data structures with clear user roles, the system not only improves accuracy and efficiency but also supports better decision-making in livestock care and disease prevention. Ultimately, this design reflects a practical solution that strengthens communication among stakeholders while safeguarding the long-term well-being of livestock populations.

REFERENCES

[1] G. Papadopoulos et al., "Economic and environmental benefits of digital agricultural technological solutions in livestock farming: A review," Smart Agric. Technol., vol. 10, no. January, p. 100783, 2025, doi: https://doi.org/10.1016/j.atech.2025.100783.

[2] H. Görge, I. Dittrich, N. Kemper, and J. Krieter, "Solutions and prospects for digital documentation of treatment data on-farm," Smart Agric. Technol., vol. 5, no. August, 2023, doi: https://doi.org/10.1016/j.atech.2023.100299.

[3] A. Shahbaz, W. Zhang, and M. Smith, "A novel system for automated continuous on-farm assessment of digital dermatitis using artificial intelligence," Smart Agric. Technol., vol. 12, no. July, p. 101178, 2025, doi: https://doi.org/10.1016/j.atech.2025.101178.

[4] M. A. Al-ghouti, M. Khan, M. S. Nasser, K. Al Saad, and O. O. N. E. Heng, "Jo ur na l P re of," J. Clean. Prod., p. 125039, 2020, doi: https://doi.org/10.1016/j.csag.2025.100069.

[5] T. Ohashi, M. Saijo, K. Suzuki, and S. Arafuka, "From conservatism to innovation: The sequential and iterative process of smart livestock technology adoption in Japanese small-farm systems," Technol. Forecast. Soc. Change, vol. 208, no. June, p. 123692, 2024, doi: https://doi.org/10.1016/j.techfore.2024.123692.

[6] K. D. Prasetya, Suharjito, and D. Pratama, "Effectiveness Analysis of Distributed Scrum Model Compared to Waterfall approach in Third-Party Application Development," Procedia Comput. Sci., vol. 179, no. 2019, pp. 103–111, 2021, doi: https://doi.org/10.1016/j.procs.2020.12.014.

[7] T. Thesing, C. Feldmann, and M. Burchardt, "Agile versus Waterfall Project Management: Decision model for selecting the appropriate approach to a project," Procedia Comput. Sci., vol. 181, pp. 746–756, 2021, doi: https://doi.org/10.1016/j.procs.2021.01.227.

[8] A. A. S. Gunawan, B. Clemons, I. F. Halim, K. Anderson, and M. P. Adianti, "Development of e-butler: Introduction of robot system in hospitality with mobile application," Procedia Comput. Sci., vol. 216, no. 2019, pp. 67–76, 2022, doi: https://doi.org/10.1016/j.procs.2022.12.112.

[9] P. Guarnaccia, G. Timpanaro, S. Incardona, V. T. Foti, and M. Cammarata, "Innovation in crop rotations for sustainable integrated crop-livestock systems: The case of a typical semi-arid Mediterranean area," Clean. Environ. Syst., vol. 13, no. March, p. 100182, 2024, doi: https://doi.org/10.1016/j.cesys.2024.100182.

[10] L. G. Prado et al., "Management of Brachiaria ruziziensis biomass affects soybean productivity in integrated crop-livestock system," J. Agric. Food Res., vol. 20, no. February, 2025, doi: https://doi.org/10.1016/j.jafr.2025.101792.

[11] L. M. Alderkamp et al., "Social aspects of integrated crop-livestock systems: key for future policy," Animal, vol. 19, no. 8, p. 101564, 2025, doi: https://doi.org/10.1016/j.animal.2025.101564.

[12] V. J. L. P. Simões et al., "System fertilization improves soil quality and increases primary production in an integrated crop-livestock system," J. Integr. Agric., vol. 24, no. March, pp. 3671–3688, 2025, doi: https://doi.org/10.1016/j.jia.2025.03.002.

[13] S. Park, J. yoon Lee, and J. Lee, "AI system architecture design methodology based on IMO (Input-AI Model-Output) structure for successful AI adoption in organizations," Data Knowl. Eng., vol. 150, no. September 2023, 2024, doi: https://doi.org/10.1016/j.datak.2023.102264.

[14] W. Lu et al., "Design for the Emergency Command Information System Architecture of Ocean Oil Spill," Aquat. Procedia, vol. 3, no. 22, pp. 41–49, 2015, doi: https://doi.org/10.1016/j.aqpro.2015.02.226.

[15] G. A. Attwell, K. E. Bennin, and B. Tekinerdogan, "Reference architecture design for computer-based speech therapy systems," Comput. Speech Lang., vol. 78, no. August 2022, p. 101465, 2023, doi: https://doi.org/10.1016/j.csl.2022.101465.