Backend Programming Techniques in the Development of Resource Manager Features in VRMS Systems Based on ORM Prisma

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Article Info	
	Abstract: The development of community makes human resource management in the company also needs to consider changing work rhythms. Nowadays, many companies use external human resources to complete work in the company. Therefore, an external human resource management strategy is needed that suits the company's needs. The Industrial Revolution 4.0 makes human resource management more about cross-generational competency-based management with a more integrated system. Information systems are one of the most widely used technologies in computer science and communication networks in companies' development of computing systems. information system as a primary computing system that needs to be owned by a company in order to optimize the company's business processes. This optimization also includes managing the company's internal and external human resources. This research focused on the development of human resource management systems. Therefore, this system is called the VRMS system. The VRMS system was developed using a hybrid agile method using the concept of Prisma ORM with NestJs. This research succeeded in building a VRMS system with a performance level of 100%.

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INTRODUCTION

It is undeniable that human resources are one of the most essential parts in the development of a company. The role of human resources, which can determine the company's future, has made many companies flock to create an appropriate human resource management strategy (Contreras et al., 2024). Before setting a human resource management strategy, companies need to consider what kind of strategy can be applied as best as possible. Human resource strategies are determined based on several factors, such as the size of the company, the type of business, the marketing strategy used by the company, and financial management within the company (Goswami et al., 2023). In another opinion, Boon et al. (2019) stated that the human resource management strategy is nothing but does not have to be in accordance with the company's vision, mission, and goals.

Attention to human resource management in the company continues to increase. This is because the performance of human resources in the company significantly impacts the company's growth. Silva et al. (2024) said that changes in the human generation also affect the human resource management strategy in the company. Companies must be able to adapt to changes in the generation of human resources. Efianingrum et al. (2022) stated that generational changes, in general, also describe changes in human characteristics. Therefore, the company must determine the right human resource management strategy to ensure that the company's business processes continue to run.

Human resource management in the company also needs to consider changing work rhythms. Nowadays, many companies use external human resources to complete work in the company. Keegan et al. (2018) stated that the emergence of project-based work presents a variety of human resources in companies. Human resources can come from within the company itself with the status of permanent employees and non-permanent employees. In order to meet the demand from consumers, the company now has internal human resources and external human resources (Varandas et al., 2024). These human resources can be outsourced, freelancers, or full-stack developers whose management is partially tied to the company. This is also an example of cross-generational human resources in the company. The difference in the status of human resources owned by the company poses challenges for companies in monitoring the performance of their external human resources. Therefore, an internal and external human resource management strategy is needed that suits the company's needs (Apascaritei & Elvira, 2022).

The development of technology and communication networks is one of the solutions to meet the needs of companies in determining the right internal and external human resource management strategies. Hidayat et al. (2020) said that changes in digitalization and automation show that a country has entered the era of the Industrial Revolution 4.0. The Industrial Revolution 4.0 forces every company to prioritize human resource management to survive for a long time and develop even more advanced (Avey & Holley, 2024). The Industrial Revolution 4.0 makes human resource management more about cross-generational competency-based management with a more integrated system (Munsamy et al., 2024).

Information systems are one of the most widely used technologies in computer science and communication networks in companies' development of computing systems. Haerani et al. (2022) define an information system as a computerized system composed of components that primarily collect, store, and process integrated data. In another opinion, Adilawati et al. (2023) define an information system as a primary computing system that needs to be owned by a company in order to optimize the company's business processes. This optimization also includes managing the company's internal and external human resources.

Developing information systems to manage the company's internal and external human resources needs to be done with good planning. This is done so that the system's features can automate the company's operational needs to manage its human resources optimally. Therefore, the development of information systems is carried out using backend programming techniques. Falah & Suryawan (2022) said that backend programming is one of the approaches in system development that focuses on the system side that users cannot see. Backend programming will focus more on connecting the system with

the server so that users can access the system. Not only that, the citation mentions that backend programming also includes techniques developers use so that every function and feature in the system can run correctly without bugs (Reza et al., 2022).

Before implementing backend programming in developing a human resource management information system, developers need to map the functional needs of the system along with features and analyze user access rights appropriately. This is done so that the development of the company's internal and external human resource management system can be more structured and completed on time by minimizing errors in the development process. This mapping can be done by utilizing the Prisma ORM concept. ORM (Object-Relational Mapping) Prisma is a tool that can manage the interaction between applications and users using objects and program code without writing queries in data processing (Medak, 2018). ORM Prisma is a library that can describe the stages of data processing in the system more clearly and simply because it only focuses on the objects involved in the system. Pham (2020) said that the development of ORM-Prisma-based backend developers can optimize the time needed to process data instead of using SQL queries.

This research focused on the development of human resource management systems. The system is developed to manage the company's internal and external resources. Therefore, this system is called the VRMS system. A VRMS system is developed to manage vendors, resources, and managers in a company. The VRMS system was developed using backend programming techniques based on the Prisma ORM.

METHOD

The Prisma ORM-based human resource management information system was developed using the agile hybrid development method. The hybrid agile method is a system development method that combines the waterfall method and the agile method. The waterfall method is a systematic system development model. This method has advantages, such as describing a clear development flow with optimal development costs. The waterfall method also has the advantage of good development documentation, so it is suitable for large-scale system development (Ferdian et al., 2022). However, this method has some drawbacks, such as being less flexible and having longer estimated processing times. Researchers also apply agile methods to develop VRMS systems to overcome this weakness. Iterations in system development characterize the agile method. This characteristic makes agile more flexible than waterfall (Dzaky & Kurniawan, 2023). Citations added that system development developed with agile methods tends to have high flexibility and better quality software results. However, agile has weaknesses, especially in the lack of clear system development documentation. Therefore, to extract the advantages of the agile and waterfall methods well and overcome the weaknesses of these two methods, researchers use the hybrid agile method in system development. Figure 1 shows the hybrid agile method applied by the researcher to develop the VRMS system.
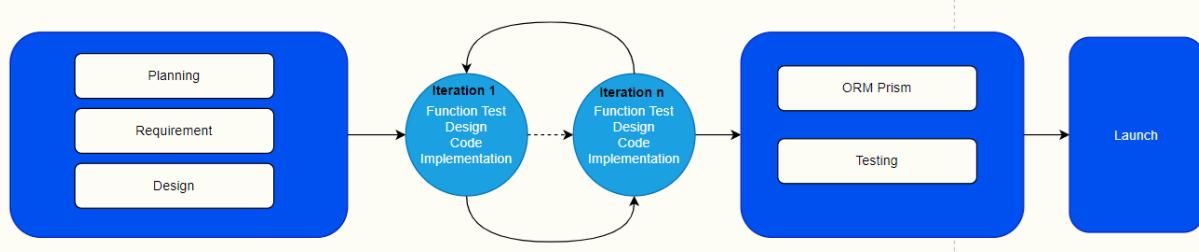

Figure 1. Hybrid Agile

Initialization
Planning
The system initialization stage requires good planning. At this stage, a thorough analysis of the system is required. The planning stage usually includes the problem analysis stage, the purpose of system development, and user analysis in the system (Kang et al., 2024). Preparing the system requires

a massive communication network between developers and clients. At this stage, system developers and clients need to ensure the scope of the system, the limitations that exist in the system, the purpose of system development, and the design of system development milestones. Kheybari et al. (2020) consider planning to be the stage where critical points are found in deciding on development strategies and development schedules, predicting risks that may arise during system development, and planning adaptive measures to overcome these risks.

Requirement

The next stage after planning is requirements analysis. At this stage, developers identify system specifications as guidelines for validating and managing the needs and expectations of the system development process (Demirel & Das, 2018). Several requirements need to be analyzed in the development of VRMS systems. The first is the system response analysis. System resources include what technologies will be used as the basis for the development of VRMS systems. From the analysis of resources, developers can determine the needs of the team's skills and capabilities, technologies by the goals of system development, and an overview of the objects involved in the system (Catanio, 2020). The second analysis is the operational analysis of the system.

System optimization includes the data processing flow starting from the system getting requests from users to the system providing the appropriate output (Wang et al., 2024). In this section, developers can visualize the flow through an activity diagram. The third requirement analysis is requirement eligibility, which includes analysis to obtain a knowledge base for system development. At this stage, developers will conduct surveys and focus group discussions to decide on a system development model (Guruwada, 2021). The following requirement analysis is the specification analysis. This analysis includes analysis of functional requirements such as input, database, and user interface, as well as non-functional requirements such as performance, reliability, usability, and security.

Design

The last stage of initialization is the design phase. At this stage, developers will begin implementing system development ideas that have been planned and analyzed for their requirements. At this stage, researchers create a system development roadmap, user case diagrams, activity diagrams, and databases. The design stage focuses on providing a design of all system requirements in simple diagrams and charts, making them easy to understand during the sprint and implementation stages.

Sprint

The next phase in hybrid agile is where system development has entered the execution stage. In hybrid agile, this stage is known as a sprint. Sprint has the advantage that system development can be done remotely. This stage is carried out by functional testing, design, and programming. Waja et al. (2021) mentioned that a sprint can consist of several iterations of system development. This iteration is generally initialized with iteration 1, iteration 2, and so on as much as n. Iterations describe the execution stages of system development that can be carried out simultaneously. It is common for each iteration to focus on one milestone in system development along with the review and improvement process (Dong et al., 2024).

Implementation
ORM Prism

ORM Prisma is a tool developed specifically with a function to manage the interaction between applications and data written in programming code. Prisma ORM is designed explicitly for Node.js and Typescript. With ORM, the system can interact with the database simply by calling the objects in the database without having to write SQL queries manually (Prisma, 2024). ORM Prisma makes it easy to develop a system for creating database schemas using more intuitive syntax. Users of Prisma ORM can improve system performance and data security and optimize data interaction with just program code.

The VRMS system was developed using NestJs, and dependency injection was adopted to improve the system's modularity and optimize the Prisma ORM's functions.
Testing

Testing is carried out to check the extent to which the VRMS system can perform its features well. Testing is indispensable so that before the system is used by users, the system can run smoothly without any bugs or errors.

Launch

If the system has passed the testing stage and shows good performance, then the system is ready to be launched. So, the last stage in hybrid agile is the system's launch. Launching the incoming system is at the hybrid agile stage because the system in its running will require maintenance and updates along with increasing demand from users. Reiff & Schlegel (2022) said that even though the system has been successfully launched to the public and received good feedback, developers still have to oversee the system so that the system is maintained and continues to be used by users.

RESULTS AND DISCUSSIONS

This research successfully produced a VRMS system using backend programming techniques based on ORM Prisma in data processing. The results of developing the VRMS system achieve its goal of managing human resources, especially those outside the company. However, VRMS is also a feature that allows companies to manage their internal resources as long as the work is project-based. Based on the research method, this study succeeded in creating a VRMS system with the following details:

Planning

Through the planning process, the VRMS system is planned to meet the needs of a series of business activities, which are mainly project-based. Figure 2 shows the concept of the entire business process that the main menu of the resource manager in the VRMS system can handle.

Requirement

Based on the results of the survey and focus group discussion conducted with the client, the researcher formulated the system's functional needs. Table 1 shows the details of the functional requirements of the VRMS system.

Table 1. Functional Requirement

Kode	Functional Requirement	Actor
FR001	Provides endpoints to display a list of all resource management	Superadmin, *Admin, User*
FR002	Provides endpoints to add and store Translation, Non-Translation, and Vendor data	Superadmin, *Admin*
FR003	Provides endpoints to display Translation, Non Translation, and Vendor data details	Superadmin, *Admin*
FR004	Provides endpoints to edit and store Translation, Non-Translation, and Vendor data details	Superadmin
FR005	Provides endpoints to temporarily delete Translation, Non-Translation, and Vendor data	Superadmin
FR006	Provides endpoints for editing account details and updating account data in the database on the System Administrator page.	Superadmin
FR007	Provides endpoints for manage job seeker and insternship role account	User
FR008	Provides endpoints to display record log from all actor	Superadmin

Kode	Functional Requirement	Actor
FR009	Provides endpoints to download files on Submit Rating Translation, Non Translation, and Vendor data details	Admin, User

Table 1 shows that VRMS has three main actors: super admin, admin, and user. Each actor has their roles and duties in monitoring the company's human resources as follows:

a. **Superadmin**, responsible for assigning and managing user access rights, managing system configuration, monitoring user activity, and performing actions such as creating, updating, and deleting. This role is given to the owner of the system.

b. **Admin**, has access to all menus except System Administrator. Menu access is adjusted when creating an account by a superadmin. This role is usually held by the company's Human Resource Development (HRD).

c. **User**, have access to manage personal information and access related information related to internships and project-based work from the company. Users in VRMS consist of students and alums from universities.

Design

From the planning and requirements analysis stage, the researcher succeeded in designing the architecture of the system development needs. Figure 2 shows a used case that describes the type of actor and the access rights each actor has.
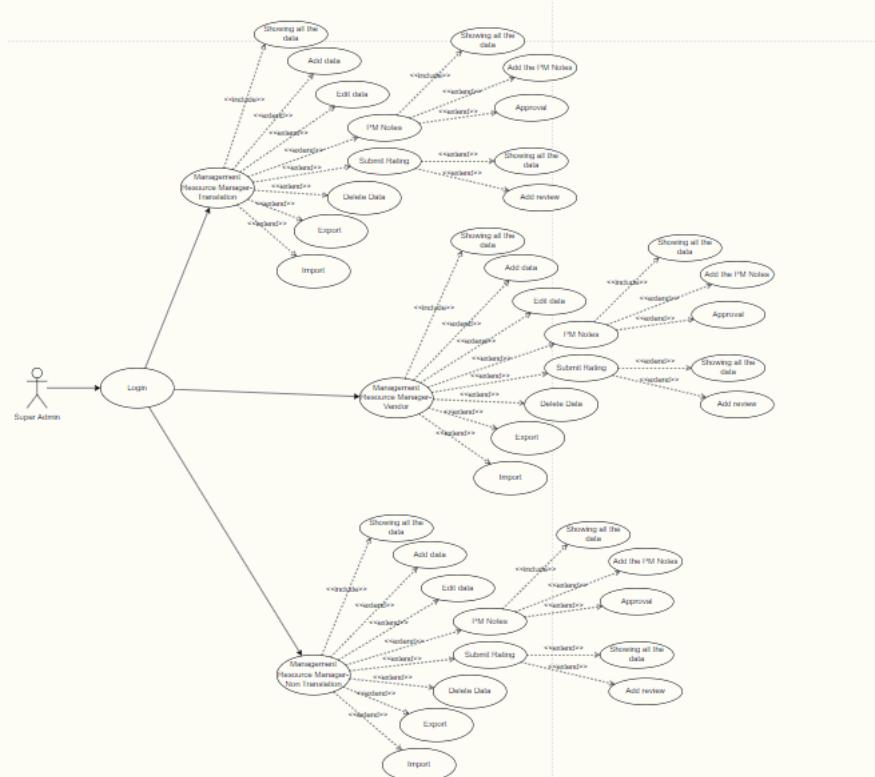
Figure 2. Use Case Diagram

After designing the use case diagram, the next step is to design the activity diagram. Activity diagrams are able to provide an overview of the process flow that the VRMS system goes through, starting from the input provided by the system and the response of the system to the output provided by the system. The next design is a class diagram. Class diagrams are the initial stage to illustrate the needs of an object with the data associated with it. Figure 3 shows the class diagram design of the VRMS system.

Freelance
+ freelance_id: int
+ type_freelance: string
+ username: string
+ full_name: string
+ whatsapp: enum
+ nickname: string
+ email: timestamp
+ language_from_id: int
+ language_to_id: int
+ specialization_on: string
+ tools: array
+ country_id: int
+ state_id: int
+ city_id: int
+ district: string
+ postal_code: string
+ full_address: string
+ bank_name: string
+ account_holder_name:
+ account_number: string
+ name_tax: string
+ resource_status: enum
+ npwp_number: string
+ currency_id: int
+ created_at: datetime
+ updated_at: datetime
+ getNextFreelanceId()
+ pad()
+ createFreelance()
+ findAllFreelance()
+ findOneFreelance()
+ updateFreelance()
+ removeFreelance()
+ uploadAttachment()
+ deleteAttachment()
+ createSubmitRating()
+ findAllSubmitRating()
+ createPMNote()
+ findAllPMNote()
+ patchPMNote()

PMNotes
+ pm_notes_id: int
+ freelance_id: int
+ vendor_id: int
+ type_resource: enum
+ note: string
+ reply: string
+ status_approval: enum
+ user_note_id: int
+ user_reply_id: int
+ created_at: timestamp
+ updated_at: timestamp
+ create()
+ approval()
+ reply()
+ logout()

SubmitRating
+ submit_rating_id: int
+ freelance_id: int
+ vendor_id: int
+ type_resource: enum
+ rating: float
+ project_name: string
+ review: string
+ upload_file: string
+ submited_by: int
+ created_at: timestamp
+ updated_at: timestamp
+ create()
+ upload()

| Vendor |
| --- |
| + vendor_id: int |
| + type_freelance: string |
| + username: string |
| + full_name: string |
| + whatsapp: string |
| + nickname: string |
| + email: string |
| + language_from_id: int |
| + language_to_id: int |
| + specialization_on: string |
| + tools: array |
| + country_id: int |
| + state_id: int |
| + city_id: int |
| + district: string |
| + postal_code: string |
| + full_address: string |
| + bank_name: string |
| + account_holder_name: |
| + account_number: string |
| + name_tax: string |
| + resource_status: enum |
| + npwp_number: string |
| + currency_id: int |
| + created_at: datetime |
| + updated_at: datetime |
| + getNextVendorId() |
| + pad() |
| + createVendor() |
| + findAllVendor() |
| + findOneVendor() |
| + updateVendor() |
| + removeVendor() |
| + uploadAttachmentVendor() |
| + deleteAttachmentVendor() |
| + createSubmitRating() |
| + findAllSubmitRating() |
| + createPMNote() |
| + findAllPMNote() |
| + patchPMNote() |

Figure 3. Class diagram

The class diagram shown by Figure x has described the needs of data objects and transactions in the system. Armed with this, the researcher designed a relational database as shown by Figure 4.

Figure 4. Entity Relational Diagram

After going through the development stage in the form of the implementation of ORM Prisma and programming code, the VRMS system display was successfully developed and can carry out its features and functions properly. Figure 6 shows the dashboard view owned by the superadmin.
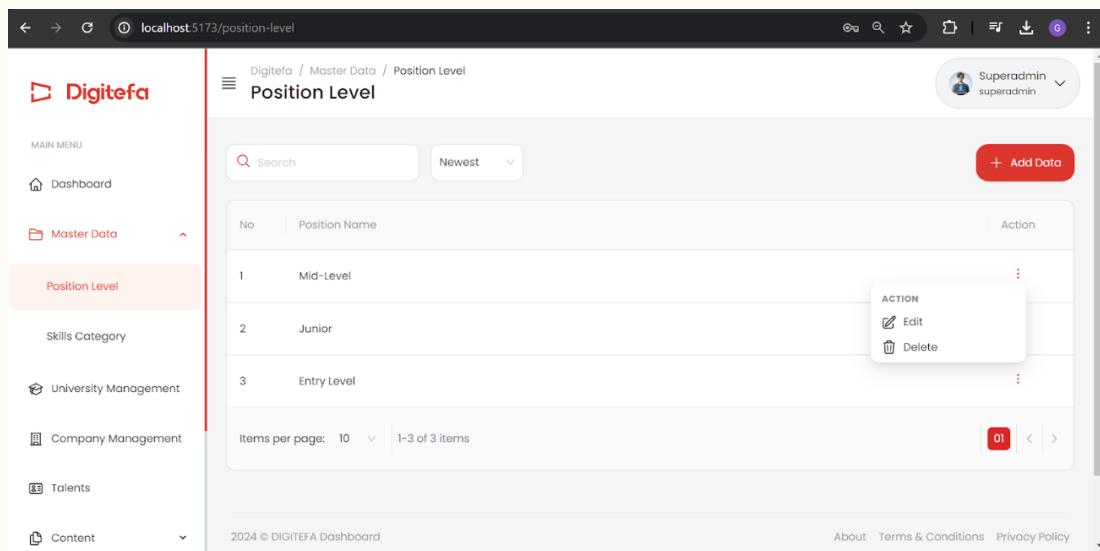

Figure 5. Superadmin Dashboard

Superadmins have access rights to manage all features on the system starting from adding, editing, and deleting data from admins and users. Figure x shows the superadmin view to perform data additions. Figure 7 to make edits and Figure 8 for data deletion. While the figure 9 shows the monitoring of admins and users by superadmins.
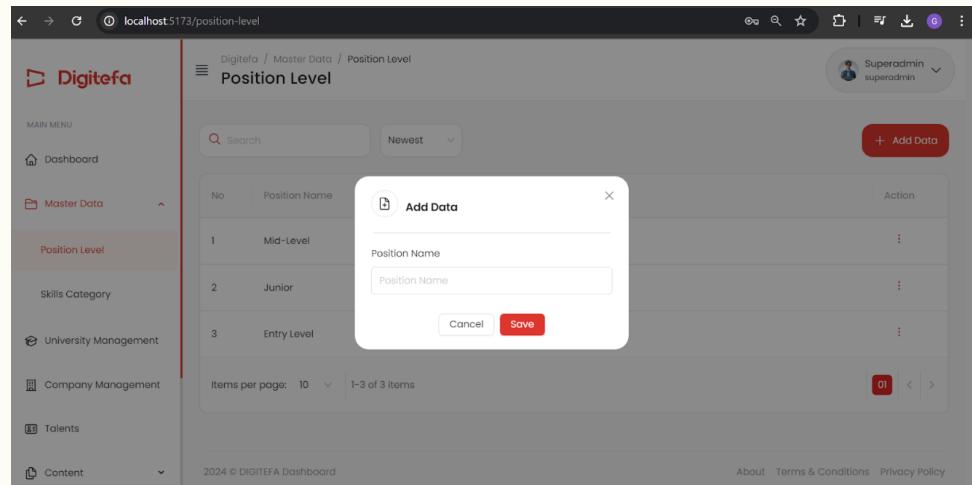
Figure 6. Addition of admin and user data by superadmin
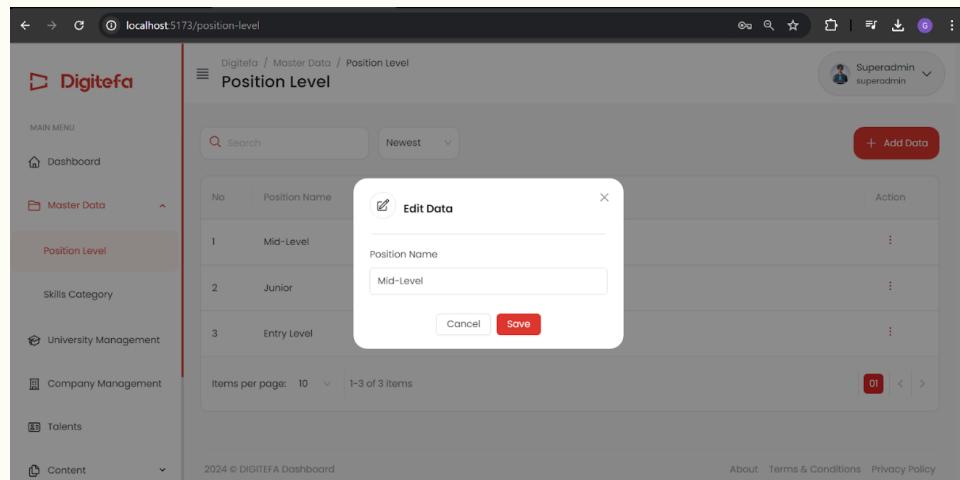
Figure 7. Data editing by superadmin
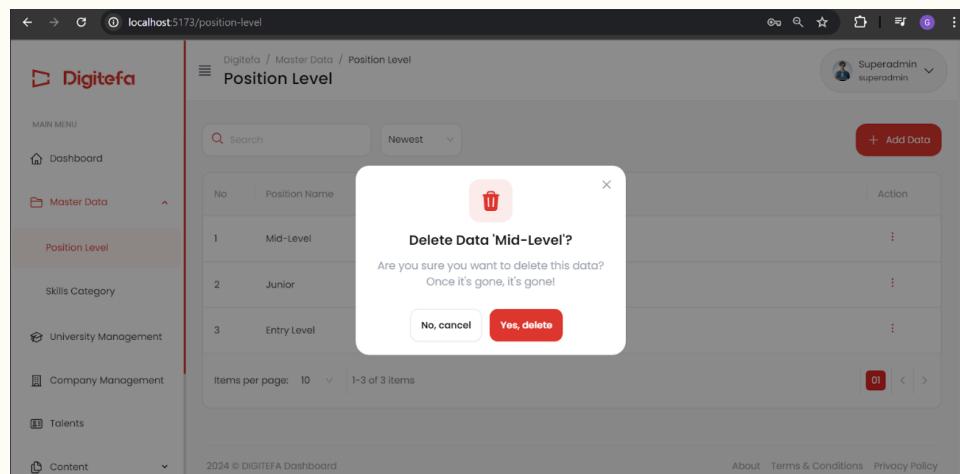
Figure 8. Data deletion by superadmin
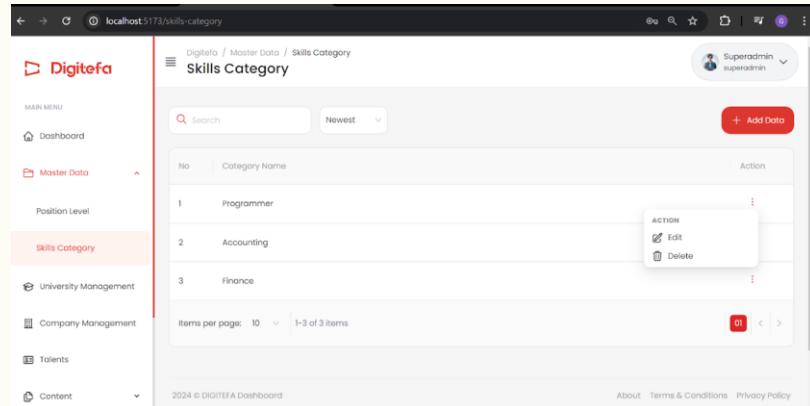
Figure 9. Monitoring Data by superadmin

In addition to superadmins, there are also users who have access rights as admins. Users with this admin status have primary access rights to provide information related to projects and human resources. Admins in the VRMS system are companies that can provide information about human resource needs. Figure 10 shows the dashboard view of the admin from the company.
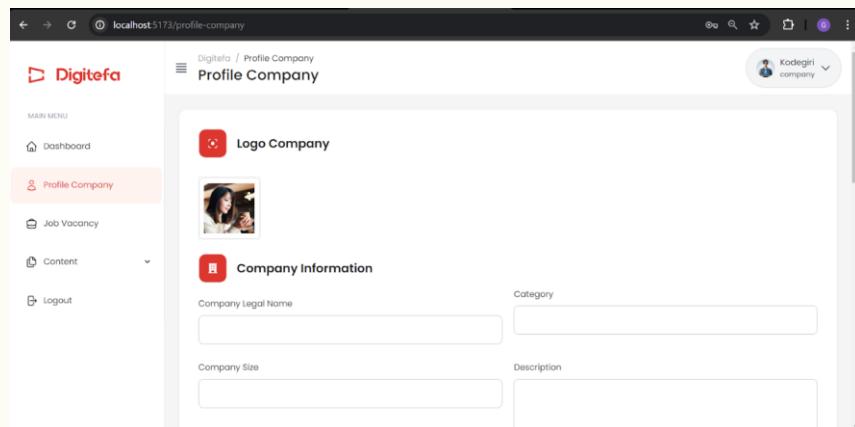

Figure 10. Admin dashboard

The company has a main feature to provide information about job vacancies that can be applied for by users. Therefore, companies can add, edit, and delete job vacancies. Figure 11 shows the view of job vacancies that can be managed by the admin (company).
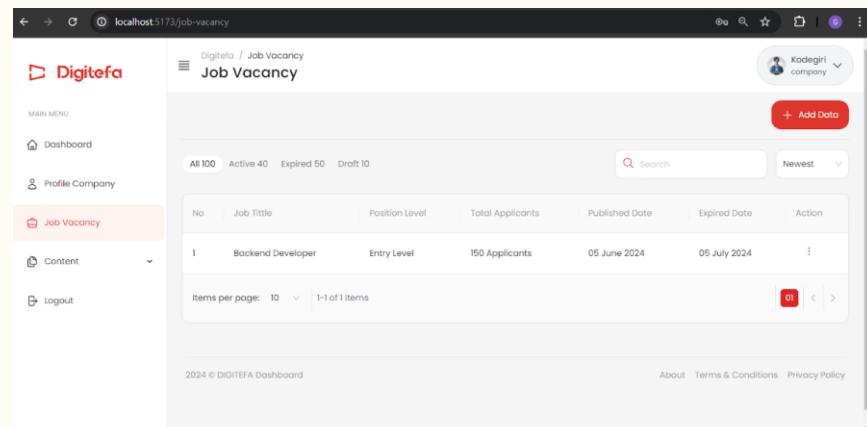

Figure 11. Manage Job Vacancies

The last actor access is the access owned by the user. Users in the VRMS system are prospective workers or human resources, especially those from outside the company. Through this VRMS system, external human resources with qualified skills can be met with projects that match their abilities. Figure 12 shows the dashboard menu of users with job job recommendations in accordance with the skills that have been described in the curriculum vitae of the VRMS system.
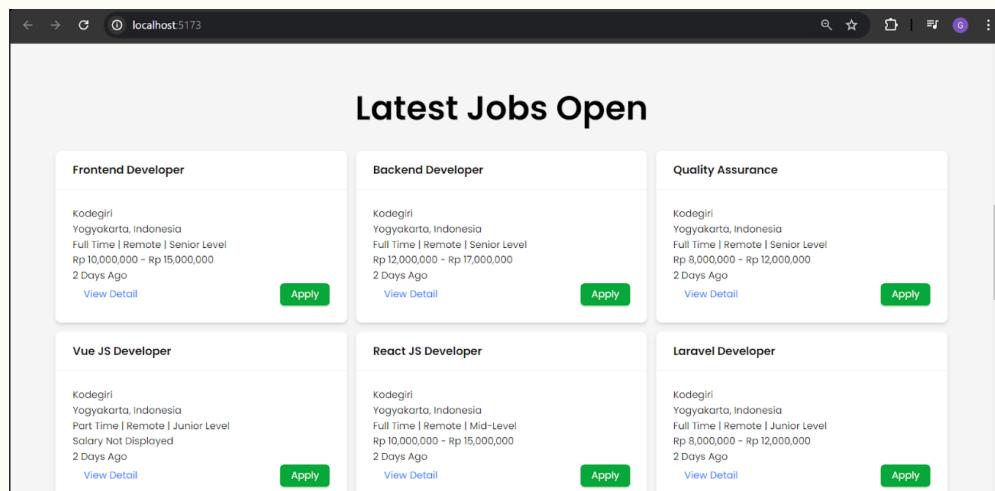

Figure 12. User Dashboard Menu

Testing

Testing is carried out on all features and functions of the system whether it can run properly or not. Testing is carried out by checking whether all features in the VRMS system can run properly or not. The VRMS system trial is carried out on clients and vendors who will use this VRMS system. Based on the test scenarios and procedures that have been carried out, the test results are obtained as shown in Table x.

	Tested Features	Test Scenario	System Response	Test Results
1	Login	a. User access the system b. User enters email and password	Displays email and password error information	Succeed
			Displaying the user dashboard	Succeed
			View user profiles	Succeed
2	Registration	a. User access the system b. User registration c. The user confirms the information provided d. User successfully creates an account on the VRMS system	The system provides notifications of lack of information	Succeed
			The system will pop up a notification that the account has been created	Succeed
			The system provides a notification for users to confirm their account via registered email	Succeed
3	Internships and Project-Based Jobs	Vendors manage internship activity information (adding, editing, deleting, rejecting and	Vendors can create new project-based internship/job vacancy data	Succeed

		accepting internship/project work applications)	Vendors update information related to internship activities/project-based work within the company	Succeed
			Vendors remove information related to internships/project-based jobs	Succeed
			The vendor provides rejection or acceptance of the internship/project work offer	Succeed
4	Internship and project-based job applications	Job seekers who already have an account in the VRMS system apply for internships/project-based jobs	Displays a list of locations and internship/project-based job positions	Succeed
			Displaying the application form for internships/project-based jobs	Succeed
			Providing notification that the internship/project-based job offer has been successfully sent to the destination company	Succeed
5	Review of internships and project-based jobs	Job seekers who have completed internships and project-based work at a company give testimonials to the company	The system displays a notification that the person concerned has completed the internship/project-based work	Succeed
			The system displays a review form	Succeed
			Review storage system	Succeed
6	User Management	Superadmins can identify active and inactive users. Superadmins can also monitor user activity	The system displays the status of each user with active and inactive flags	Succeed
			Superadmins can restore the status of inactive user accounts	Succeed
			Superadmin deactivates user accounts (vendors and job seekers)	Succeed

CONCLUSIONS

This research successfully produced VRMS to manage integrated human resources based on dynamic role-based access control and record logs. The dependency injection basis successfully provides convenience in real-time managing, monitoring, and assessing all VRMS users. From the simulation results, the system can centrally manage all external resources, both vendors and talents, by the super admin. The system can also record the activities of all external resources to provide ratings

for both vendors and talents based on the activities that have been carried out. The system was tested using the User Acceptance Testing method, which found that 80% of the system's features ran well. So, although it has achieved good system performance, the quality of backend programming in VRMS development still needs to be improved to overcome existing bugs.

REFERENCES

Adilawati, L., Aini, Q., & Nuryasin, N. (2023). Usability Analysis of MSME Business Accounting Applications Based on User Retention Using ISO 9241-11. *INTENSIF: Jurnal Ilmiah Penelitian Dan Penerapan Teknologi Sistem Informasi*, *7*(1), 106–120. https://doi.org/10.29407/intensif.v7i1.18879

Apascaritei, P., & Elvira, M. M. (2022). Dynamizing human resources: An integrative review of SHRM and dynamic capabilities research. *Human Resource Management Review*, *32*(4). https://doi.org/10.1016/j.hrmr.2021.100878

Avey, J. B., & Holley, E. (2024). Architecting human resource management systems with positive psychological capital. *Organizational Dynamics*. https://doi.org/10.1016/j.orgdyn.2024.101082

Boon, C., Den Hartog, D. N., & Lepak, D. P. (2019). A Systematic Review of Human Resource Management Systems and Their Measurement. *Journal of Management*, *45*(6), 2498–2537. https://doi.org/10.1177/0149206318818718

Catanio, J. T. (2020). Requirements Analysis: A Review. In T. Sobh & K. Elleythi (Eds.), *Advances in Systems, Computing Sciences and Software Engineering*. Springer.

Contreras, F., Jauregui, K., & Rank, S. (2024). The intellectual structure of human resource management and digitalization research: A bibliometric-mapping analysis. *Journal of Engineering and Technology Management - JET-M*, *73*. https://doi.org/10.1016/j.jengtecman.2024.101829

Demirel, S. T., & Das, R. (2018, March 25). Software requirement analysis: Research challenges and technical approaches. *International Symposium on Digital Forensic and Security (ISDFS)*.

Dong, H., Dacre, N., Baxter, D., & Ceylan, S. (2024). What is Agile Project Management? Developing a New Definition Following a Systematic Literature Review. *Project Management Journal*. https://doi.org/10.1177/87569728241254095

Dzaky, F. A., & Kurniawan, D. (2023). Implementasi Metode Agile Framework Scrum dalam Pengembangan Sistem Informasi Manajemen Aset Terpadu Universitas Diponegoro Modul Inventarisasi. Jurnal Masyarakat Informatika, 14(1), 53-69.

Efianingrum, A., Maryani, M., Sukardi, J. S., Hanum, F., & Dwiningrum, S. I. A. (2022). Kesadaran multikultural generasi Z dan implikasinya pada pendidikan. *Humanika*, *22*(1), 1–20. https://doi.org/10.21831/hum.v22i1.49102

Falah, Z. F., & Suryawan, F. (2022). *Recommendation System to Propose Final Project Supervisor using Cosine Similarity Matrix*.

Ferdian, D., Pratama, W., Daru, A. F., & Artikel, I. (2022). *Penerapan Metode Waterfall untuk Pengembangan Sistem Informasi Perpustakaan Berbasis Web Menggunakan Framework Code Igniter*. *3*(1), 55–63. https://doi.org/10.26623/jisl

Guruwada, S. H. (2021). Understanding Requirement Analysis Phase. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 474–476. https://doi.org/10.32628/cseit217293

Haerani, R., Khawa, T., Rahman, A., & Kamelia, L. (2022). The Measurement and Evaluation of Information System Success Based on Organizational Hierarchical Culture. *Jurnal Online Informatika*, *7*(2), 211–218. https://doi.org/10.15575/join.v7i2.871

Hidayat, N., Hubeis, M., Sukmawati, A., & Eriyatno, E. (2020). Model Pengelolaan Sumberdaya Manusia Berbasis Kompetensi Era Industri 4.0. *Jurnal Aplikasi Bisnis Dan Manajemen*. https://doi.org/10.17358/jabm.6.3.501

Indrajit Goswami, Hamida, A. G. Ben, Gopal, S. P., & Kumar, J. A. (2023). Effective Role of Human Resource Management Policies Within Marketing Organization: The Impact on Business and Marketing Strategy Implementation. *International Journal of Professional Business Review*, 8(7), e0997. https://doi.org/10.26668/businessreview/2023.v8i7.997

Kang, X., Hong, Y., Duan, P., & Li, S. (2024). Fusion of hierarchical class graphs for remote sensing semantic segmentation. *Information Fusion*, *109*. https://doi.org/10.1016/j.inffus.2024.102409

Keegan, A., Ringhofer, C., & Huemann, M. (2018). Human resource management and project based organizing: Fertile ground, missed opportunities and prospects for closer connections. *International Journal of Project Management*, *36*(1), 121–133. https://doi.org/10.1016/j.ijproman.2017.06.003

Kheybari, S., Rezaie, F. M., Naji, S. A., Javdanmehr, M., & Rezaei, J. (2020). Evaluation of factors contributing to the failure of information systems in public universities: The case of Iran. *Information Systems*, *92*. https://doi.org/10.1016/j.is.2020.101534

Medak, J. (2018). Review and Analysis of Minimum Spanning Tree Using Prim's Algorithm. *International Journal of Computer Science Trends and Technology*, *6*(2). www.ijcstjournal.org

Munsamy, M., Telukdarie, A., & Manenzhe, M. (2024). A 4th Industrial Revolution Systems Approach for Human Resource Optimization in Maintenance. *Procedia Computer Science*, *232*, 1900–1908. https://doi.org/10.1016/j.procs.2024.02.012

Pham, A. D. (2020). *Developing back-end of a web application with NestJS framework Case: Integrify Oy's student management system*. Lab University of Applied Sciences.

Prisma. (2024). *Prisma ORM*. Https://Www.Prisma.Io/Docs/Orm.

Reiff, J., & Schlegel, D. (2022). Hybrid project management – a systematic literature review. In *International Journal of Information Systems and Project Management* (Vol. 10, Issue 2, pp. 45–63). SciKA. https://doi.org/10.12821/ijispm100203

Reza, L., Sunardi, & Herman. (2022). *Academic Information System Assessment of AKRB Yogyakarta Using UTAUT*.

Silva, T. A., Oliveira, C. M., & Martins, E. (2024). Generations and Work Motivation - Ageism and The Practices of Human Resource Management. *Procedia Computer Science*, *237*, 61–71. https://doi.org/10.1016/j.procs.2024.05.080

Varandas, C., Fernandes, C. I., & Veiga, P. M. (2024). Human resource management in ambidextrous organisations – A systematic literature review. *Technology in Society*, *77*. https://doi.org/10.1016/j.techsoc.2024.102504

Waja, G., Shah, J., & Nanavati, P. (2021). AGILE SOFTWARE DEVELOPMENT. *International Journal of Engineering Applied Sciences and Technology*, *5*. http://www.ijeast.com

Wang, H., Yu, S., Chen, D., & Xiao, J. (2024). Mission-oriented situation awareness information requirements of submariners: A goal directed task analysis. *Ocean Engineering*, *299*. https://doi.org/10.1016/j.oceaneng.2024.117200