J-INTECH (Journal of Information and Technology)
Accredited Sinta 4 Ministry of Higher Education, Science and Technology Republic of Indonesia SK No. 10/C/C3/DT.05.00/2025
E-ISSN: 2580-720X || P-ISSN: 2303-1425

Design of an Enterprise Architecture for Monitoring IT Services and Infrastructure Using TOGAF ADM at PT Fratama Kencana Gemilang

Karina[1*], April Lia Hananto[2], Bayu Priyatna[3], Agustia Hananto[4]

[1,2,3,4]*Information Systems Study Program, Faculty of Computer Science, Universitas Buana Perjuangan Karawang, Jl. H.S. Ronggo Waluyo, Puseurjaya, Telukjambe Timur, Karawang, West Java, 41361, Indonesia*

Keywords
EnterpriseArchitecture; IT Infrastructure,Monitoring System;TOGAF ADM

Corresponding Author:
si22.karina@mhs.ubpkarawang.ac.id

Abstract
The management of information technology infrastructure at PT Fratama Kencana Gemilang currently faces delayed incident response and a lack of monitoring tools. This is due to fragmented and manual ad-hoc monitoring of individual server units, which lacks a unified system and causes the IT team to rely on user complaints to identify technical issues. This reactive approach inevitably hinders company productivity, particularly regarding server services that form the core of the business. Therefore, this study aims to design a more proactive, automated, and integrated enterprise system monitoring architecture using the TOGAF ADM (The Open Group Architecture Framework Architecture Development Method) framework. Through this approach, it is expected that all of the company's technology assets can be centrally monitored and aligned with long-term strategic business objectives. This research employs a qualitative descriptive approach conducted through direct observation of the existing system infrastructure and in-depth architectural modeling. This design process covers various key domains in a structured manner, ranging from the vision domain, business architecture, information system architecture, to the supporting technology infrastructure. The research results indicate that the proposed open-source-based monitoring system design has successfully met the company's functional and technical requirements comprehensively. This is evidenced by the results of the expert validation process (expert review), which yielded an average score of 4.3 out of 4.7. These results indicate that the architectural design provides better visibility into infrastructure performance, supporting more actual and precise monitoring as validated by technical experts. This study concludes that the proposed architecture and resulting blueprint are highly suitable to serve as the primary reference for company management in enhancing the reliability of their IT services. The implementation of this design is expected to accelerate the troubleshooting process and minimize the risk of future system failures.

1. Introduction

Currently, the reliability of information technology infrastructure is no longer merely a business enabler but a core component of corporate operations [1]. Disruptions to data flow have a direct impact on productivity and reputation, where the absence of an automated monitoring system often leads to delayed detection of server failures and disrupts transaction services for customers at PT Fratama Kencana Gemilang. Therefore, companies must be able to monitor their entire digital infrastructure in an integrated manner to ensure it remains efficient and resilient against technical disruptions [2] [3].

The need for such an integrated system is particularly evident at PT Fratama Kencana Gemilang, a company engaged in trading and server services that relies heavily on information systems to support operations and customer service. The reality at PT Fratama Kencana Gemilang shows that infrastructure monitoring is still conducted separately and manually by each unit. As a result, the IT team often only takes action after complaints or disruptions arise. This lack of integrated monitoring data leads to slow problem resolution, often taking hours to identify the root cause because fixes are still reactive [4]. This situation highlights a gap in the research literature, as previous studies have often focused on the partial implementation of monitoring tools, while there remains a need for an architectural design capable of aligning operational needs with the overall IT infrastructure [5].

While previous studies have indeed addressed web-based monitoring systems for hardware efficiency [6], they often overlook alignment with broader organizational strategies [7]. Research combining technical monitoring aspects with business and data governance remains scarce [8]. This is where an enterprise architecture approach is needed to fill this gap.

A major limitation of previous research is the lack of a framework linking infrastructure monitoring to long-term business objectives. These limitations open opportunities for a more holistic architectural approach. One internationally recognized framework for establishing strategic alignment between technology and business objectives is TOGAF ADM or the Architecture Development Method [9]. TOGAF ADM offers a systematic approach through eight phases of architecture development that ensure system design not only meets functional needs but also supports organizational governance and sustainability [10]. The application of TOGAF ADM is highly relevant to ensure that the design of the monitoring system does not stop at technical aspects but also becomes part of a measurable, adaptive, and long-term oriented enterprise architecture [11].

This study aims to design an information system architecture for monitoring services and information technology infrastructure at PT Fratama Kencana Gemilang using the TOGAF ADM (Architecture Development Method) framework. The selection of TOGAF ADM is based on its ability to align technology needs with strategic business objectives through a structured development phase [12]. The impact of this research is expected to provide an adaptive architectural blueprint for the company in the long term. This research is expected to produce a blueprint for the company to transition to a more proactive work model through early detection of disruptions. In addition to supporting the operations of PT Fratama Kencana Gemilang, the findings of this study can also serve as a reference for academics regarding the application of enterprise architecture in monitoring systems within the server services industry [13].

2. Research Method

This study was conducted at PT Fratama Kencana Gemilang in November 2025, with a primary focus on designing an enterprise architecture for an IT infrastructure monitoring system. The study involved the company's IT operations team, which handles technical issues with servers and networks on a daily basis. Methodologically, this study integrates four main domains, business, data, applications, and technology—where business requirements serve as the foundation for determining data and application needs, which are then used as the basis for selecting the appropriate technology infrastructure in accordance with the TOGAF ADM cycle.

The research process began with data collection through direct observation of the network infrastructure to map the inventory of existing physical and virtual devices. In addition, in-depth interviews were conducted with three key participants from the IT department, consisting of one IT Manager and two Network Administrators. Participants were selected using purposive sampling criteria, specifically staff with at least two years of experience managing the company's server infrastructure. The interview protocol focused on mapping the current monitoring workflow, identifying the history of system downtime, and documenting the technical requirements for automated alerts. The information from these interviews was crucial for understanding the real-world challenges on the ground that were not apparent from technical data alone.

The data obtained was then processed using a gap analysis method by comparing the "Baseline Architecture" (current manual setup) with the "Target Architecture" (goal of integrated monitoring). The criteria used in this analysis include system visibility, real-time alerting capabilities, and data centralization. This process was essential to determine the monitoring technology specifications best suited to the company's needs.

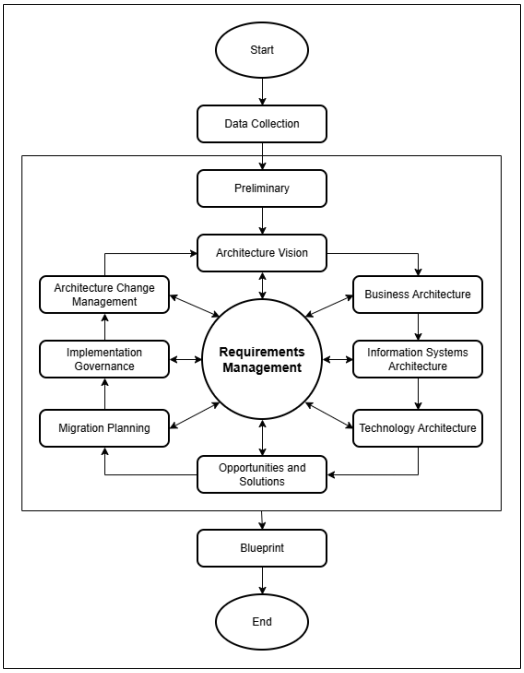

Figure 1. Work Procedures

Systematically, the design steps followed the phases of the TOGAF ADM. The initial phase began with the preliminary and architecture vision stages to establish the system's principles and vision. Once the vision is agreed upon, the next step is mapping the business architecture, information systems, and supporting technology infrastructure. This mapping serves as the foundation for analyzing gaps through the opportunities and solutions phase, as well as migration planning, to ensure a more focused implementation sequence. Finally, future oversight and adaptation are ensured through the implementation governance and architecture change management phases.

The entire blueprint design is then validated through an expert review involving academics and expert practitioners in the field of IT infrastructure. The validation used a structured questionnaire instrument with a 5-point Likert scale (1 for "Not Feasible" to 5 for "Very Feasible"). The scoring system focused on three main aspects: technical feasibility, operational efficiency, and alignment with TOGAF standards. The reliability of the results was confirmed through a consensus review that yielded an average score of 4.5, indicating that the design is highly suitable for practical application. This consultation aims to test the feasibility of the design while obtaining technical input to refine the proposed monitoring system. It is this input from experts that

helps bridge the gap between the current manual system and the automation goals the company aims to achieve, ensuring the final result can truly be implemented in practice.

3. Result and Discussions

The first step in this design process is to identify the company's actual needs through the requirements management phase. Based on field observations and interviews, it was found that PT Fratama Kencana Gemilang's operations heavily rely on server stability to serve customers.

Unfortunately, the current monitoring is still manual and fragmented. This situation necessitates automated reporting, organized logging, and real-time monitoring on a single screen to mitigate the risk of service disruptions. Based on these issues, the architecture design phases were structured as follows:

1.1 Architecture Vision

In the Architecture Vision phase, the overarching goals of this project were established. The primary vision is to build a 'control center' capable of displaying the status of all servers and networks on a single screen. The importance of this vision lies in shifting the IT team's workflow from a reactive to a proactive approach. This shift is evaluated based on the system's ability to reduce the time required to identify the root causes of failures, with the goal of detecting anomalies early before users report service disruptions.

Tabel 1. Identify stakeholders

Stakeholder	Role	Managerial/Operational Effectiveness
IT Manager	Decision Maker	Operational cost efficiency and accurate service availability reports.
IT Support	End-User	Receive real-time outage notifications and streamline troubleshooting.
Company Management	Business Owner	Ensure seamless IT services to support customer satisfaction.

Based on this matrix, a vision has been formulated to transform information technology governance from a reactive to a proactive model. The objectives of this transformation include automating monitoring and centralizing data to address the issue of limited visibility in the existing system. Details of the architectural transformation are presented in the table below:

Tabel 2. Architectural Vision and Transformation Goals

Aspects	Baseline	Architectural Goals
Operational Model	Issues are only addressed after a user report or complaint is received.	Early detection of issues through an alerting system before they impact users.
Data Management	Monitoring data is stored separately on each device or server.	All infrastructure logs and metrics are integrated into a single monitoring platform.
Monitoring Methods	The IT team must periodically check the status of each device one by one.	The system monitors 24/7 and sends automatic notifications if anomalies occur.
Log Storage	Logs are often overwritten or lost due to limited local storage capacity.	Logs are stored in a centralized database, facilitating audit processes and post-incident analysis.

To ensure consistent implementation of the vision, architectural principles have been established that encompass efficiency, scalability, accessibility, and interoperability. These principles ensure that the system can reduce manual workloads, is flexible for future infrastructure development, and supports integration across various vendors. Conceptually, this solution integrates all components through three main layers: a data collector for real-time metric collection, a monitoring engine as the center for anomaly analysis, and visualization and alerting for dashboard presentation and automated notification distribution.

1.2 Business Architecture

On the business side, work processes have been streamlined. Whereas staff previously had to manually check servers one by one, this design replaces that workflow with an automated alerting system. These changes to the business process are intended to streamline the incident reporting chain, so that technical issues can proceed directly from system detection to the technical resolution phase. By eliminating the need for manual status verification and hierarchical reporting barriers, response times can be significantly reduced. This shift in the business process from a manual to an automated model is shown in Table 3:

Tabel 3. Business Process Efficiency Comparison Matrix for Monitoring

Process Dimensions	Current Situastion (Baseline)	Proposed Conditions (Targets)
Monitoring Methods	The IT team performs manual checks of server rooms or remote locations one by one on a regular basis.	The system performs 24/7 automated monitoring of all infrastructure parameters.
Sources of Incident Information	Issues are often only discovered after users report them (User Report).	Issues are detected instantly via the automated alert system (Auto-generated Alert).
Coordination Workflow	Coordination between IT teams is done conventionally (waiting for verbal or phone reports).	Incident notifications are sent centrally to integrated Telegram groups and email addresses.
Root Cause Analysis	The IT team must manually investigate the root cause of issues without the support of comprehensive historical data.	The dashboard provides real-time logs and metrics that facilitate root cause identification.
Incident Documentation	Incident logging is often inconsistent or only performed when the issue is significant.	Every anomaly and uptime is automatically recorded in the system for reporting purposes.

By implementing these targeted business processes, PT Fratama Kencana Gemilang can minimize the risk of human error in infrastructure monitoring. The standardization of these new workflows enables the operations team to act more quickly based on accurate data provided by the system. Functionally, this business architecture serves as the foundation for the information systems and technology that will be developed in the next phase to ensure optimal continuity of server services.

1.3 Information System Architecture

The design of this information system architecture begins with organizing the data structure to accommodate all performance data from each device in an organized manner. This structure is designed so that each incoming metric is stored using a time-series data indexing approach, to ensure efficient use of storage and high data retrieval speeds for generating monthly reports. The data flow and relationships between information within this monitoring system are illustrated in detail in the following figure:

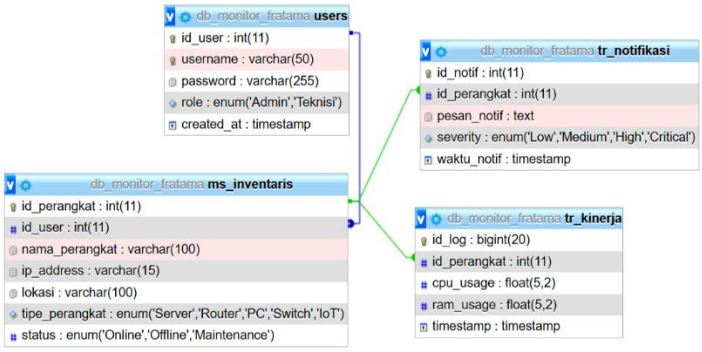

Figure 2. Data Architecture and Database Entity Monitoring Schema

This database design organizes data into four main tables to maintain system consistency. The 'ms_inventaris' table stores technical details such as IP addresses and device specifications, while CPU and memory performance data are periodically recorded in the 'tr_kinerja' table. In the event of an outage, the 'tr_notifikasi' table documents the history of alerts along with their urgency levels. Additionally, the users table is designed to manage personnel access rights so that every activity within the system can be traced. The relationships between these tables are structured to facilitate tracking device history without the risk of duplicate data This relational structure directly helps reduce data redundancy and optimize query response times, ensuring that the dashboard remains responsive even as the volume of performance logs continues to grow.

The designed application architecture processes raw data into easily understandable operational information. The system's workflow manages data distribution from device sources to its presentation on the monitoring dashboard by utilizing asynchronous data processing mechanisms. This architecture prevents bottlenecks by separating the data collection process from the visualization layer, ensuring that high-frequency metric inputs do not compromise the dashboard's responsiveness. The detailed relationships between these application components can be seen in Figure 3 below:

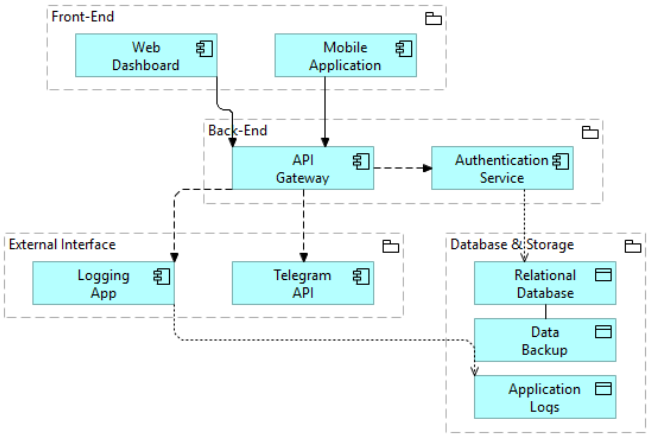

Figure 3. Application Architecture and Interactions Between Components of the Monitoring System

This system is divided into four interconnected main layers. The Front-End layer, which consists of a web dashboard and a mobile app, serves as a visualization tool for the technical team. Business processes are managed in the Back-End layer via the API Gateway and Authentication Service to ensure secure access. This separation of functions ensures that data exchange between the Data Collector and the database remains protected. Integration with the Telegram API is also implemented to send automatic notifications directly, while the database layer ensures that historical data is stored securely and consistently.

1.4 Technology Architecture

The technology architecture in the design encompasses the physical and software infrastructure required to ensure the monitoring system operates stably. This section ensures that all applications and data have a secure processing environment to support user access. An overview of the relationships between hardware components and network configurations is shown in the following figure:

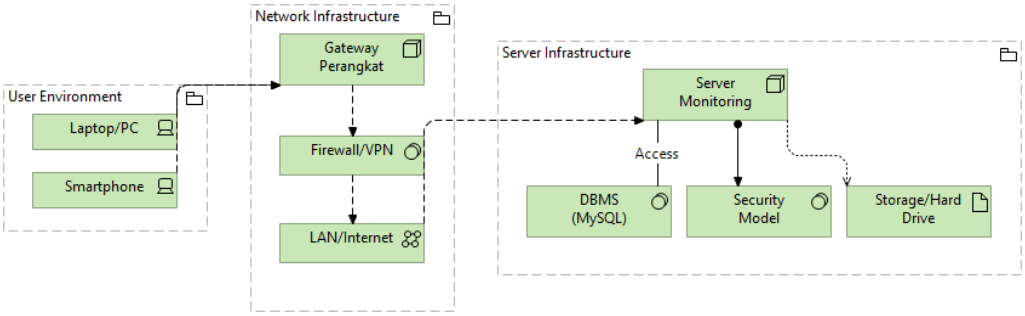

Figure 4. Conceptual Technology Architecture Visualization

Based on this scheme, the technology infrastructure at PT Fratama Kencana Gemilang is organized into several key components. Administrators use remote devices secured via a gateway and VPN protocol to prevent unauthorized access. Meanwhile, the SNMP protocol was chosen as the universal standard to bridge the various device brands (multi-vendor) in use.

Monitoring activities will be centralized on a single main server. With a 4-core processor and 8 GB of RAM, this server is configured to handle the system's workload. These specifications are based on an estimated volume of 50–100 monitored nodes with a 5-minute polling interval, which remains within the stable operating limits for the selected database and visualization tools. Within it, MySQL operates to store all incoming metric data. This data is then processed by Grafana into dynamic visual displays. With this integration, the IT team has the flexibility to customize dashboard layouts, set detailed warning thresholds, and select specific data visualizations that prioritize the server services most critical to the operations of PT Fratama Kencana Gemilang.

The implementation of this infrastructure ensures that all collected metric data is securely stored, making the retrieval of historical data for dashboard displays faster. Additionally, the use of directly connected storage media ensures that system log data remains secure and available whenever needed for future audit purposes.

1.5 Opportunities and Solutions

The sequence of these steps is designed to ensure that the architecture is implemented in phases to address operational gaps at PT Fratama Kencana Gemilang. Development priorities are divided into three main initiatives [14], as detailed in the following table:

Tabel 4. Matrix of Strategic Initiatives and Transformation Monitoring Solutions

Functional Units	Description	Benefits
Basic Connectivity	SNMP integration across all primary routers and switches.	The status of all network links is monitored (up/down).
Log & Metrics Center	Installation of a central monitoring server and database.	Performance data is centralized and no longer fragmented.
Visualization & Alerts	Creation of a Grafana dashboard and a Telegram bot.	The IT team receives real-time information without the need for manual checks.

The steps above indicate that SNMP must be enabled on network devices before proceeding to data management. An open-source platform was chosen for its flexibility in supporting the various device brands (multi-vendor) used within the company. This design ensures a smooth transition from manual to automated systems without disrupting active network operations.

1.6 Migration Planning

This migration plan was created so that the monitoring system can be deployed without disrupting ongoing business operations. The goal is to divide the work into a realistic six-week schedule, starting from the integration phase through to functional testing. This step ensures that every system component has been validated according to company standards before full operational handover takes place. The detailed workflow can be seen in the roadmap below:

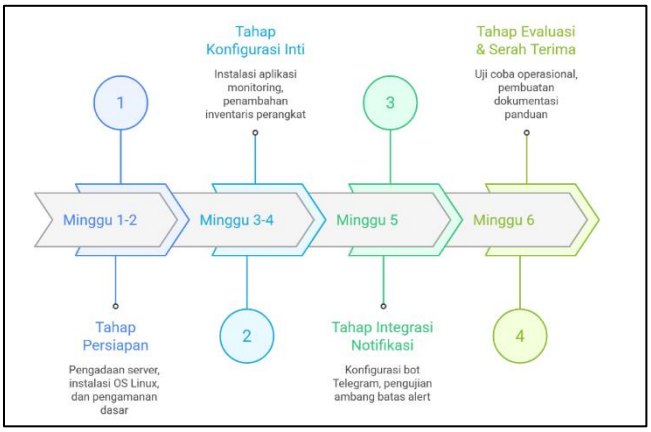

Figure 5. System Implementation and Migration Roadmap

Referring to Figure 5 above, work began with a technical requirements analysis and server setup during the first week. During the second and third weeks, basic connectivity integration was carried out to ensure a stable flow of data from network devices into the system. Once the connection is stable, the fourth and fifth weeks move into the database refinement phase and the development of the dashboard interface. The final phase in the sixth week involves comprehensive system testing (User Acceptance Test) before the system is officially managed by the IT team. This phased approach enables a smooth transition from manual to automated monitoring and ensures that the integration process can be completed without disrupting ongoing network services.

1.7 Implementation Governance

This governance framework ensures that the development of the monitoring system remains aligned with the initial design [15]. This phase establishes quality standards and system acceptance criteria to guide the implementation team on-site.

This design sets thresholds for each metric so that the system can provide accurate alerts, rather than merely collecting data. The process involves periodic verification, ranging from SNMP integration to Telegram bot configuration. This step is crucial to ensure the final system output does not deviate from the agreed-upon technical specifications [16].

1.8 Architecture Change Management

Architecture Change Management is established as a procedure to be implemented in the future to ensure system stability when adding devices or transitioning to new technologies [17]. Additionally, the storage capacity for metric data is routinely monitored to anticipate spikes in monitoring load that could trigger server bottlenecks [18].

The goal is to ensure that infrastructure expansion does not disrupt the existing architectural framework. With this approach, the established architecture does not require a complete overhaul during infrastructure development, thereby maintaining the monitoring system's long-term efficiency [19].

1.9 Design Validation (Expert Review)

This stage is conducted to assess the feasibility of the architectural design before proceeding to the finalization stageThe validation process involved three experts as sources: two academics specializing in IT infrastructure and the IT Manager at PT Fratama Kencana Gemilang, who served as a technical practitioner. The involvement of these three experts ensured a balanced perspective between theoretical standards and practical implementation needs within the company. Based on the assessment results using the validation instrument, the following data was obtained:

Tabel 5. Summary of Expert Validation Assessments

Evaluation Criteria	Skor	Comments
Alignment with Stakeholder Vision and Needs	4.6	Strongly Agree
Support for Business and Organizational Processes	4.3	Agree
Data and Application Architecture Standards	4.5	Strongly Agree
Technical Feasibility	4.5	Strongly Agree
Implementation Feasibility	4.4	Agree
Effectiveness of the Monitoring Solution	4.7	Strongly Agree

The evaluation results in Table 5 show consistent scores ranging from 4.3 to 4.7, indicating that the architectural draft falls into the "Highly Feasible" category. This category is determined based on a Likert scale evaluation, in which scores above 4.2 indicate a high level of validity and readiness for implementation. In particular, the validators provided positive feedback regarding the effective use of open-source platforms, which were deemed a solution to the current limitations of manual monitoring. Consequently, all architectural components were deemed valid and suitable to serve as a standard reference for IT development within the company. This indicates that a design approach focused on functional needs can meet technical operational standards that are well-received by users and support service efficiency [20] [21].

1.10 Discussion and Comparison

This architectural design offers specific added value when compared to other TOGAF-based studies. For example, research by Sista et al. [16] successfully designed an enterprise architecture for academic institutions, but its focus was more on general information system governance without emphasizing the technical aspects of direct infrastructure monitoring.

A fundamental difference in this study lies in the integration of real-time monitoring functions specifically designed to maintain the stability of the IT infrastructure at PT Fratama Kencana Gemilang. This is supported by Misal's theory [17], which states that automated monitoring systems are crucial for optimizing detection and response mechanisms within IT infrastructure. Compared to enterprise architecture designs in other domains [14], [19], this model utilizes more cost-effective open-source mechanisms while still providing detailed metric data. The inclusion of automated notifications via Telegram is also a key differentiator, offering a more practical solution for IT teams to respond to disruptions quickly compared to traditional architectural models that have not yet integrated automated early-warning features.

4. Conclusions and Future Works

The architectural design using TOGAF ADM at PT Fratama Kencana Gemilang demonstrated its effectiveness in providing a structured framework for transforming the monitoring system from a manual to an automated model. This success is evidenced by expert validation results yielding an average score of 4.5 out of 5.0, confirming that the design has met the company's functional requirements. Through the established vision, the

IT team now has a roadmap for conducting 24/7 centralized server and network monitoring, enabling technical issues to be detected earlier before users report them.

Real-time data integration with this custom-designed open-source application is expected to improve operational efficiency for technical teams, as evidenced by the high score on the "Monitoring Solution Effectiveness" criterion in the expert review. With scalable server specifications and a six-week migration plan, this document serves as a practical guide for companies to transition to the new system with minimal risk of disruption. As a result, PT Fratama Kencana Gemilang now has a technical blueprint for building a more responsive monitoring system to handle any network disruptions.

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