ATCSJ
Applied Technology and Computing Science Journal
Open Access **p-ISSN 2621-4458 | e-ISSN 2621-4474**

Available online to journal2.unusa.ac.id
UNUSA
S4-Accredited – SK No.79/M/KPT/2023
Journal Page is available to https://journal2.unusa.ac.id/index.php/ATCSJ

Automatic Network Failure Detection Feature in IT Helpdesk Application PKG V2 at PT. Petrokimia Gresik

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Article history:

Received 20 August 2025
Revised 10 October 2025
Accepted 28 November 2025
Available online 31 November 2025

Keywords:

Automation,
Clustering,
FaultDetectio
n,
IT Incident Management,
Laravel,
Helpdesk,
Zabbix.

Abstract

The IT Helpdesk application at PT Petrokimia Gresik faced significant challenges with the initial version (V1), which relied heavily on manual incident reporting. This led to delays and errors, especially in managing urgent issues for high-priority users, such as executives. To address these limitations, Helpdesk TI PKG V2 was developed, incorporating an automatic network failure detection feature. This enhanced version integrates Zabbix, an open-source network monitoring tool, to detect network issues like high latency, packet loss, and downtime in real-time, without requiring user input. When an anomaly is detected, Zabbix sends an alert to the Laravel-based backend system via webhook, where the issue is logged, and a helpdesk ticket is automatically created. Additionally, to ensure quick responses from the network support team, real-time notifications are sent to a Telegram group. This feature allows staff to receive alerts on their mobile devices, enabling faster action even when they are away from their desks. The integration of Telegram notifications ensures that network issues are promptly addressed, improving service continuity for critical users. The implementation of these features has significantly improved incident response times, reduced manual workload, and enhanced overall operational efficiency.

I. INTRODUCTION

In large-scale enterprise environments, maintaining continuous network availability is critical, especially for high-priority users who require uninterrupted IT services. PT Petrokimia Gresik faced significant challenges in managing IT incidents with the initial version (V1) of the Helpdesk TI PKG application [1], [2], [3], [4], which relied on manual reporting of technical issues through a web-based form. This manual dependency led to delays and potential errors in handling incident reports [5], particularly for urgent cases involving strategic-level users. The problem was compounded by the lack of proactive network failure detection capabilities in V1 [6].

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To address these limitations, the Helpdesk TI PKG V2 application was developed with an automatic network failure detection feature. This enhanced system eliminates the need for manual issue reporting and integrates with Zabbix a real-time open-source monitoring system to automatically detect anomalies such as high latency, packet loss, or network downtime without requiring user input. Data from Zabbix is sent via a webhook to a Laravel-based backend, which logs the event as an incident in the helpdesk and notifies the IT support team without any user intervention [7], [8], [9].

Furthermore, to improve responsiveness, the system now also includes the capability to send instant notifications to Telegram [10], [11]. This ensures that network staff can receive alerts about network issues immediately, even when they are not in front of their computers, allowing them to respond more quickly and effectively.

This solution not only reduces the reliance on manual operations but also significantly enhances operational efficiency by ensuring faster response times and reducing delays in addressing critical issues, especially for VIP users such as executive staff. The goal of this development is to enhance the system's intelligence through automatic data input, issue classification, and real-time notifications, thereby ensuring faster response times and minimizing reliance on manual operations. This project aims to improve proactive IT incident management and reliability, while also minimizing service downtime for critical users, and serves as a practical reference for implementing smart incident detection in enterprise IT support environments.

II. RELATED WORKS

Research into intelligent network monitoring and automated fault detection has significantly accelerated in recent years, driven by organizations' continuous efforts to minimize downtime and enhance IT service response times. Zabbix, an open-source monitoring solution, has become a widely adopted tool in enterprise environments for real-time network oversight, offering robust capabilities such as anomaly detection, performance metrics tracking, and automated alerting [12], [13]. These features establish Zabbix as a foundational technology for developing proactive IT support solutions.

Historically, helpdesk systems have primarily focused on manual ticket management and user-initiated reporting processes [14], [15], [16], [17]. While some existing implementations have introduced basic automation for ticket categorization, a substantial reliance on human intervention persists, particularly in identifying and responding to critical network issues. This dependency on manual processes frequently results in delayed responses, which is particularly detrimental in environments where service availability is paramount.

To address these enduring challenges, various researchers have explored the integration of monitoring systems with backend infrastructure [18]. However, there remains a notable gap in studies that comprehensively combine real-time network monitoring, webhook communication, and automated ticket generation within a unified helpdesk framework. This paper aims to build upon previous research by introducing a feature that automatically detects network failures and generates incident reports without requiring manual user input, thereby significantly enhancing the responsiveness and overall efficiency of IT support systems.

III. METHODS

The methodology for developing the automatic network failure detection feature in Helpdesk TI PKG V2 is rooted in a well-structured, three-layer architecture: Input, Process, and Output. This design provides a clear roadmap for how the research will be conducted and how the theoretical underpinnings, particularly those related to real-time monitoring and automated incident management, will be translated into a functional system.

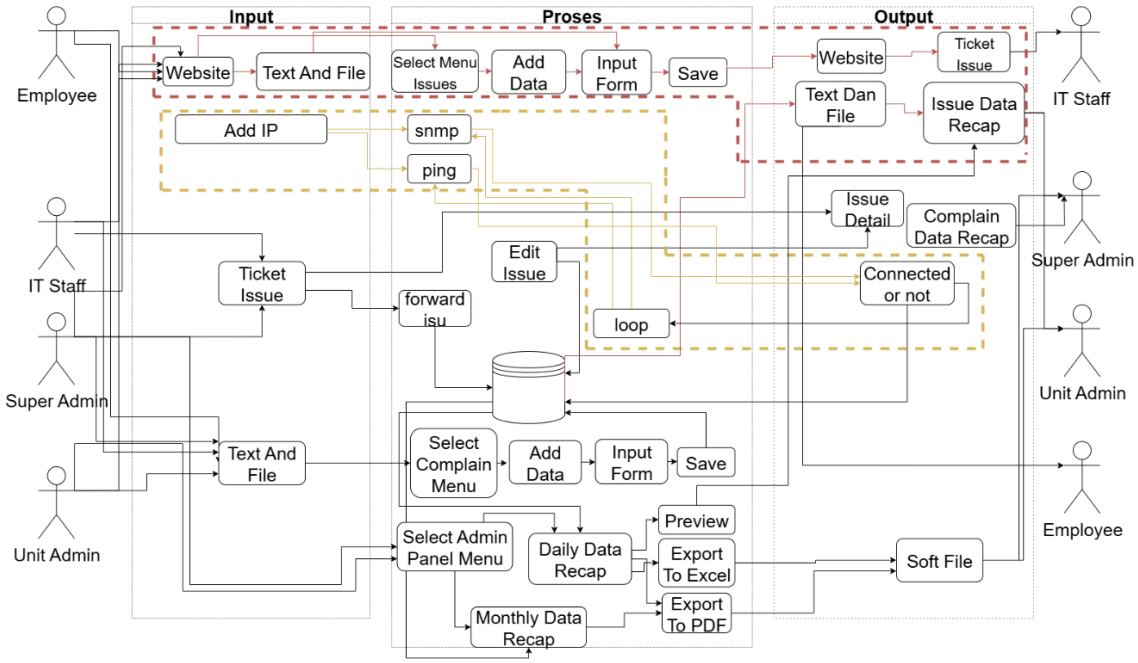

Figure 1. Design Architecture Common

A. Input Layer

The Input Layer is responsible for gathering comprehensive data from various sources. In the case of Helpdesk TI PKG V1, manual reporting by users through a web-based interface was the primary method of data input. However, this process introduced delays and potential errors, particularly with urgent issues. With the introduction of Helpdesk TI PKG V2, a shift to automated network failure detection was implemented. The Zabbix monitoring system is used to automatically monitor the network and detect anomalies such as packet loss, high latency, or network downtime. Network administrators configure devices for active monitoring within Zabbix by setting triggers for specific conditions such as server downtime or resource overutilization. Additionally, users can still submit issue tickets and complaints through a web-based interface using text and file uploads for non-network-related issues [19].

Moreover, an innovative feature in V2 is the integration with Telegram, which ensures that network staff receive immediate notifications via Telegram messages when critical issues are detected. This real-time alerting mechanism ensures that the network support team can act quickly, reducing response times and improving operational efficiency.

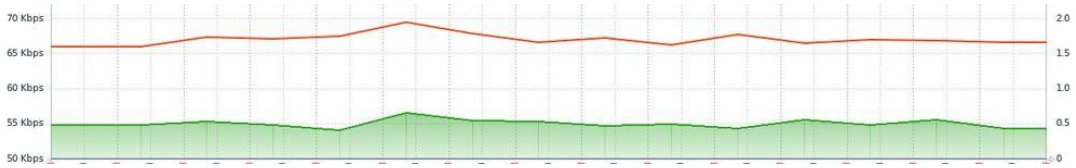

Figure 2. Network Performance Monitoring Graph

B. Proses Layer

The Process Layer involves the core operations executed after data is received from the Input Layer. When Zabbix detects anomalies in the network, such as high latency, packet loss, or downtime, it flags the issue as a "PROBLEM" and sends a real-time alert via a webhook to the Laravel-based backend. The incident data received through the webhook contains structured information such as the problem description, the affected host, timestamp, and severity level. Once the Laravel backend receives this data, it processes the information and stores it in the PostgreSQL database for further tracking and visualization.

The system then automatically generates an incident ticket within the helpdesk interface, which can be accessed by the IT personnel for further resolution. This allows the creation of incident tickets without requiring manual input from the user, thus reducing reliance on manual reporting and speeding up the response time to issues. Additionally, when an incident affects VIP users, such as executives or directors, the system automatically prioritizes the alert and escalates the issue to ensure quick and timely handling. This feature ensures that critical issues are immediately addressed, minimizing response times and improving operational efficiency in IT incident management.

Integration with Telegram also plays a crucial role in this process layer, enabling real-time notifications to be sent directly to network staff through Telegram [20]. This ensures that the IT team can respond to issues quickly, even when they are not in front of a computer, with complete information about the incident at hand.

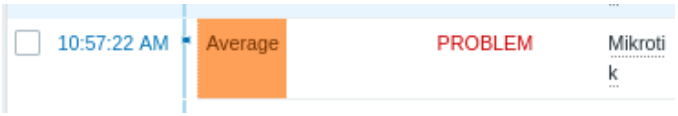

Figure 3. Notification Problem From Zabbix

C. Output Layer

The Output Layer handles the delivery of processed data and information to the users. The primary output is the creation of incident tickets in the helpdesk system, which are visible in the Laravel dashboard. This allows IT personnel to track, manage, and resolve issues efficiently. The system provides administrators with a centralized view to review the incident, edit entries, and forward them to relevant departments. Additionally, the system supports daily and monthly data recaps that can be exported in formats like Excel and PDF for reporting purposes.

For real-time monitoring, the Zabbix dashboard continuously displays the status of network devices, while the Laravel dashboard provides a comprehensive view of all incidents. With the Telegram integration, IT staff are also notified instantly about critical incidents, enabling them to respond promptly to ensure network stability.

This architecture ensures a smooth flow of information, from the initial detection of a network issue through Zabbix to the creation of incident tickets in the helpdesk system. The seamless integration of automated monitoring, intelligent issue classification, and Telegram notifications guarantees that issues are identified and resolved as quickly as possible, providing proactive and reliable IT support.

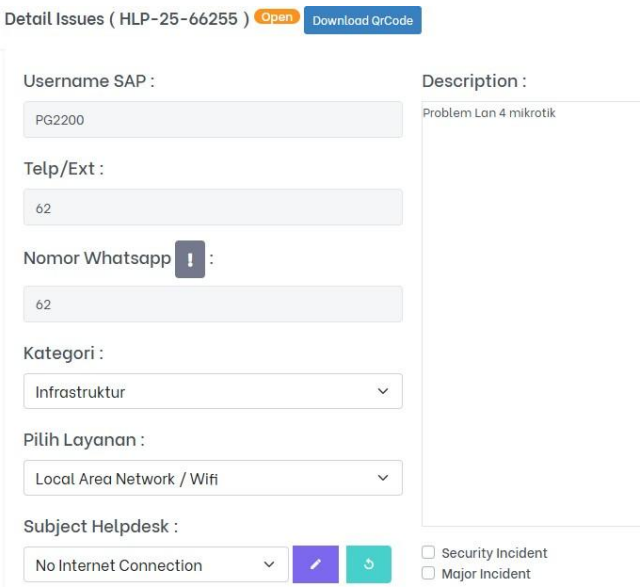

Figure 4. Detail Issue

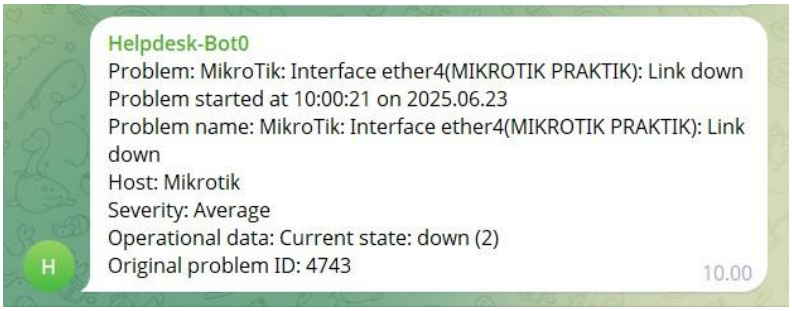

Figure 5. Detail Issue In Telegram Group

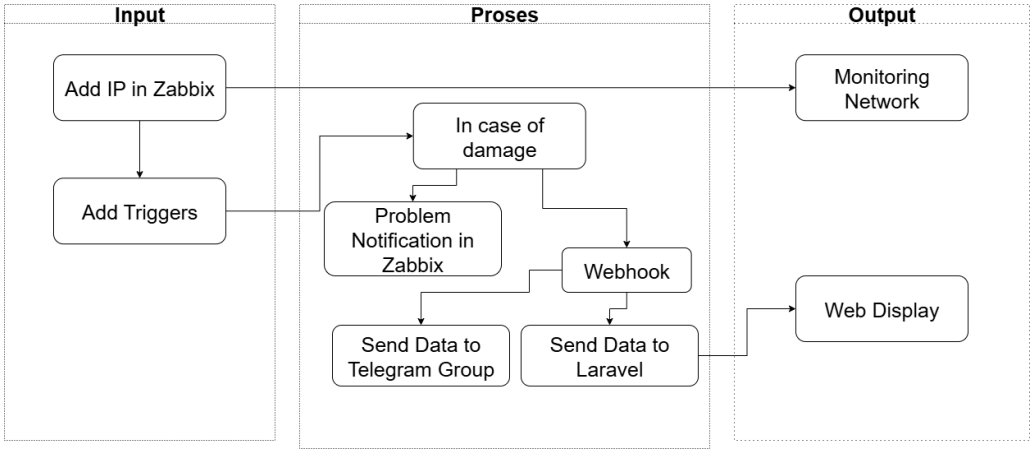

Figure 6. Design Architecture Network Failure Detection Feature

IV. RESULTS AND DISCUSSIONS

This section describes the technical implementation of the backend system for the network monitoring and alert visualization platform, utilizing Zabbix 6.0 LTS as the monitoring tool to detect network issues and service problems in real-time. Zabbix communicates with the backend via webhook notifications (JSON payloads) to a dedicated endpoint in the Laravel 5 (PHP 7.3)-based system, with PostgreSQL 4.8.1 as the database. Zabbix's built-in alerting system handles notifications, and future plans include integrating Redis for background job support. Git+GitHub is used for version control [21], with deployment managed through ngrok V3 [22], [23], and API documentation provided via Postman [24], [25].

Zabbix serves as an external, real-time monitoring engine that interacts with the backend via webhook mechanisms, automatically sending problem data when anomalies like packet loss, latency spikes, or device downtime are detected. This integration eliminates the need for manual issue reporting, improving response times and accuracy in handling issues. The system is designed to detect network failures automatically, logging issues and sending alerts without requiring user input.

The Laravel-based application is deployed on a publicly accessible web server, allowing seamless integration with Zabbix through webhook communication. Zabbix is configured to send incident data to a specified endpoint in the Laravel application. When the webhook is received, Laravel processes the data and stores it in the PostgreSQL database for further tracking and visualization. This allows efficient management of network incidents, from detection to resolution.

During the development phase, a MikroTik RB750 router was used as the main network gateway, and the system was tested to evaluate its real-time monitoring behavior [26], [27], [28]. Zabbix was configured to monitor network devices like MikroTik routers using SNMP (Simple Network Management Protocol) and the Zabbix Agent protocol [29], [30], [31]. Key metrics such as latency, CPU usage, memory load, packet loss, and bandwidth were continuously monitored. When any predefined thresholds were breached,

such as network cable disconnections or latency spikes, Zabbix would generate an alert and forward the event data to the Laravel system.

The system implements the following key functions:

a. Real-time network failure detection: Zabbix detects network issues such as cable disconnections or downtime and automatically creates an incident ticket in the Helpdesk TI PKG V2 system.
b. VIP monitoring and early detection: The system prioritizes incidents affecting high-level users, such as executives, and immediately escalates these issues to ensure prompt resolution.
c. Automated issue tracking and notification: The system automatically generates incident tickets and logs them in the helpdesk interface, reducing manual input and speeding up response times.

In addition, a new feature was implemented to send notifications to a Telegram group. When a network issue is detected, the system automatically sends a real-time alert to a Telegram group, ensuring that the network support team is immediately notified. This allows IT staff to receive notifications directly on their mobile devices, ensuring quicker response times even when they are away from their computers. The integration with Telegram groups ensures that the team can stay informed and act on critical issues more efficiently.

The system was tested under various network failure scenarios, such as simulated cable disconnections and router downtime, to validate the effectiveness and speed of the automation process. During testing, Zabbix successfully detected issues, sent webhook alerts to Laravel, and automatically generated tickets within the helpdesk system. Additionally, Telegram notifications were successfully sent to the designated group, allowing the network staff to respond to incidents swiftly.

Future testing will include further validation to assess system scalability, performance under high traffic conditions, and overall reliability. These tests will focus on ensuring that the system remains stable and responsive as network traffic increases, and that the Telegram group notifications function smoothly, even with a larger volume of incidents.

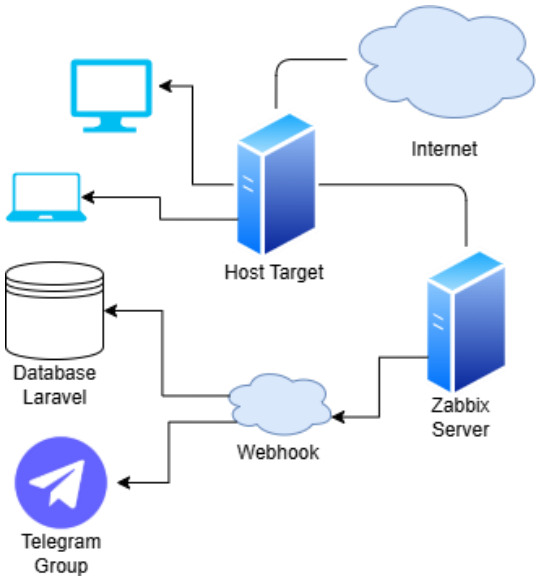

Figure 7. Network Topology

V. CONCLUSIONS AND RECOMMENDATIONS

The development of the automatic network fault detection feature in the Helpdesk TI PKG V2 application at PT Petrokimia Gresik has successfully addressed the limitations of the previous system, which relied heavily on manual incident reporting and verification. By integrating Zabbix as a real-time network monitoring tool and connecting it to the Laravel-based Helpdesk system via webhook, the application can now detect anomalies such as cable disconnections and automatically generate tickets without user intervention. The implementation of this automation has significantly improved the response time, reduced the workload for IT administrators, and ensured faster handling of critical issues especially for high-priority users such as executive staff. Overall, this project enhances the reliability and efficiency of IT support services through proactive incident management and automation..

VI. REFERENCES

[1] S. Syofian and A. Winandar, "Aplikasi Helpdesk Mendukung Sistem Ticketing," *J. Teknol. Inf.*, vol. 4, no. 1, pp. 1–7, 2017, [Online]. Available: http://ejournal.urindo.ac.id/index.php/JTI/article/view/264/239

[2] R. Tarigan, I. Kusosi, and A. Usri, "Perancangan Aplikasi Helpdesk Ticketing System Pada PT. Indonesia Nippon Seiki," *J. Sisfokom (Sistem Inf. dan Komputer)*, vol. 11, no. 1, pp. 9–18, 2022, doi: 10.32736/sisfokom.v11i1.1271.

[3] M. N. Wahyuddin and D. P. Putri, "Designing a helpdesk ticketing system to improve the efficiency of IT support services on an XYZ company-based web-site using the Laravel framework," *MATRIX J. Manaj. Teknol. dan Inform.*, vol. 14, no. 1, pp. 9–24, 2024, doi: 10.31940/matrix.v14i1.9-24.

[4] Y. S. Ritonga, M. N. Fauzan, and R. Habibi, "Helpdesk Ticketing System," *Ijirt (International J. Innov. Res. Technol.)*, vol. 9, no. 10, pp. 557–560, 2023, doi: 10.13140/RG.2.2.15203.43044.

[5] C. Macrae, "The problem with incident reporting," *BMJ Qual. Saf.*, vol. 25, no. 2, pp. 71–75, 2016, doi: 10.1136/bmjqs-2015-004732.

[6] M. F. Mohd Fuzi, N. F. Mohammad Ashraf, and M. N. F. Jamaluddin, "Integrated Network Monitoring using Zabbix with Push Notification via Telegram," *J. Comput. Res. Innov.*, vol. 7, no. 1, pp. 147–155, 2022, doi: 10.24191/jcrinn.v7i1.282.

[7] R. Rinaldo, "Implementasi Sistem Monitoring Jaringan Menggunakan Mikrotik Router Os Di Universitas Islam Batik Surakarta," *Emit. J. Tek. Elektro*, vol. 16, no. 02, pp. 5–12, 2016, doi: 10.23917/emitor.v16i02.5786.

[8] S. Sukaridhoto ST. Ph.D, "Buku Jaringan Komputer II," p. 129, 2016.

[9] R. Olups, "Zabbix 1.8 network monitoring : monitor your network's hardware, servers, and web performance effectively and efficiently," *Eur. Univ. Inst.*, no. 2, p. 410, 2010, [Online]. Available: https://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:32016R0679&from=PT%0Ahttp://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012PC0011:pt:NOT

[10] P. A. Safitri and A. Prapanca, "Sistem Layanan Pengaduan Kekerasan Seksual Berbasis Bot Telegram dengan Webhook Communication di Universitas Negeri Surabaya," *J. Informatics Comput. Sci.*, vol. 5, no. 03, pp. 272–281, 2023, doi: 10.26740/jinacs.v5n03.p272-281.

[11] J. K. Adangbain and E. S. Bata, "Pemanfaatan Bot Telegram Sebagai Media Informasi Dan Layanan Akademik Dengan Metode Webhook," *Semin. Nas. & Konf. Ilm. Sist. Informasi, Inform. & Komun.*, no. SE-, pp. 106–112, 2021, [Online]. Available: https://publikasi.uyelindo.ac.id/index.php/semmau/article/view/255

[12] F. Barros, "Advanced Oracle monitoring agent for Zabbix," 2022.

[13] A. Shokhin, "Network monitoring with Zabbix," *Thesis*, no. May, 2015, [Online]. Available: https://core.ac.uk/download/pdf/38124402.pdf

[14] S. Sotnik, V. Manakov, and V. Lyashenko, "Overview: PHP and MySQL Features for Creating Modern Web Projects," *Int. J. Acad. Inf. Syst. Res.*, vol. 7, no. 1, pp. 11–17, 2023, [Online]. Available: www.ijeais.org/ijaisr

[15] Q. H. Nguyen, "Building a Web Application With Laravel 5," pp. 1–35, 2015, [Online]. Available: https://core.ac.uk/download/pdf/45601782.pdf

[16] D. M. Kuliah, "Aplikasi Help Desk Departemen Teknologi Informasi Pt . Pusri Palembang," 2016.

[17] D. Effendi, "PERANCANGAN SISTEM PELACAKAN SOFTWARE BERLISENSI DAN HELP DESK SYSTEM (Studi Kasus : PT . PUPUK KUJANG CIKAMPEK JAWA BARAT)," pp. 51–62.

[18] M. Susilo and A. Gunaryati, "Pendekatan Knowledge Management System Berbasis Framework Laravel dan Container untuk Kinerja Helpdesk pada BMKG Pusat Meteorologi Penerbangan," *J. Teknol. Inform. dan*

Komput., vol. 9, no. 2, pp. 630–644, 2023, doi: 10.37012/jtik.v9i2.1672.
[19] S. Steinke, "Simple Network Management Protocol-SNMP," *Netw. Tutor.*, pp. 495–498, 2020, doi: 10.1201/9781482280876-123.
[20] M. A. Aris Widya and P. Airlangga, "Pengembangan Telegram Bot Engine Menggunakan Metode Webhook Dalam Rangka Peningkatan Waktu Layanan E-Government," *Saintekbu*, vol. 12, no. 2, pp. 13–22, 2020, doi: 10.32764/saintekbu.v12i2.884.
[21] H. Borges, A. Hora, and M. T. Valente, "Understanding the factors that impact the popularity of GitHub repositories," *Proc. - 2016 IEEE Int. Conf. Softw. Maint. Evol. ICSME 2016*, no. Dcc, pp. 334–344, 2017, doi: 10.1109/ICSME.2016.31.
[22] R. Parlika, D. C. M. Wijaya, T. A. Nisaa', and S. Rahmawati, "Sistem Integrasi BOT Register Terhadap Website Pengolah Data Menggunakan Akses NGROK," *J. Ilm. SINUS*, vol. 19, no. 2, p. 1, 2021, doi: 10.30646/sinus.v19i2.531.
[23] A. Widyanto, Y. Aprizal, and A. Wardani, "Pengenalan dan Pengaplikasian Tunelling (ngrok . com) Bagi Siswa," pp. 240–245.
[24] R. Krosnick, "Postman Flows: A Visual Programming Tool for Building API-Powered Apps and Workflows," *Proc. IEEE Symp. Vis. Lang. Human-Centric Comput. VL/HCC*, pp. 356–358, 2024, doi: 10.1109/VL/HCC60511.2024.00047.
[25] P. P. Kore, M. J. Lohar, M. T. Surve, and S. Jadhav, "API Testing Using Postman Tool," *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 10, no. 12, pp. 841–843, 2022, doi: 10.22214/ijraset.2022.48030.
[26] A. Robbahul Barra, R. Sujatmika, and I. Umami, "Sistem Keamanan Jaringan Komputer Bridge Firewall Menggunakan Router Board Mikrotik Rb750," *J. Teknol. Dan Sist. Inf. Bisnis-JTEKSIS*, vol. 4, no. 1, p. 427, 2022, [Online]. Available: https://doi.org/10.47233/jteksis.v4i2.561
[27] Meidya, "Laporan Tugas Akhir 2020 Laporan Tugas Akhir 2020," *Katalog.Ukdw.Ac.Id*, pp. 1–3, 2020, [Online]. Available: http://katalog.ukdw.ac.id/id/eprint/6167%0Ahttps://katalog.ukdw.ac.id/6167/1/62170056_bab1_bab5_daftar pustaka.pdf
[28] M. Husnaini, W. Bagye, and M. Ashari, "Implementasi Fitur Layer 7 Protocols Mikrotik Rb750 Di Smkn 1 Narmada," *J. Inform. dan Rekayasa Elektron.*, vol. 2, no. 1, p. 78, 2019, doi: 10.36595/jire.v2i1.94.
[29] A. Mardiyono, W. Sholihah, and F. Hakim, "Mobile-based Network Monitoring System Using Zabbix and Telegram," *2020 3rd Int. Conf. Comput. Informatics Eng. IC2IE 2020*, pp. 473–477, 2020, doi: 10.1109/IC2IE50715.2020.9274582.
[30] A. Harrison and A. Mutua, "A Multi-Agent Monitoring System for Computer Networks," *Int. J. Comput. Organ. Trends*, vol. 15, no. 1, pp. 33–40, 2025, doi: 10.14445/22492593/ijcot-v15i1p304.
[31] W. H. College and D. Taynor, "IdeaExchange @ UAkron Monitoring a Small Network with SNMP," 2025.