

Informed Judgement Report: (RNMS-PR) Remote Network Monitoring System with Promstack on Raspberry-PI

Executive Summary

This report outlines the development of a remote network monitoring system integrating Raspberry PI and Promstack. Promstack is the developed software framework that integrates Prometheus, Node Exporter, BlackBox Exporter, SNMP Exporter, and Grafana together. Since monitoring is a necessary component to establish analysis and maintain the health and security of networks, it is intended to use the monitoring system in various environments, such as education, business, and service. We focused on the design and implementation process, while paying attention to functional requirements, ethical, pro-social, economic, and human-centered considerations.

Ethical Considerations

Key Dilemmas and Decisions:

- **Data Security:** Our project addresses critical ethical considerations surrounding data security in network monitoring systems. To ensure the confidentiality and integrity of user data, we implemented robust security measures, including SSH and ZeroTier, following industry best practices ([Source 1], [Source 2]). This is achieved through restricting access to the authorized users only. Additionally, we added configurations to SSHD configuration file to enhance the security.
- **Accessibility:** Our project addresses critical ethical considerations surrounding accessibility in network monitoring systems. By ensuring that only local users can directly connect to the private network with the local server, who have permission granted by the owner and authenticated, a concern highlighted by ([Source 3]). To address this, the project utilized ZeroTier and SSH capabilities enhancing user authentication and safeguarding against unauthorized access.

Socio-Economic Impacts

- **Job Creation:** Our project contributes to job creation in both the network monitoring and cybersecurity industries, which correspondingly supports the increasing economic growth. The demand for system administrators, system monitoring specialists, network analysts, and data analysts has considerably increased, since the metrics gathered by the monitoring system will require skilled professionals for thorough analysis and usage, as shown by the field growth study ([Source 4]).
- **Economic impact:** Governments are interested in the development and deployment of network monitoring systems to stimulate the growth of cybersecurity industry, which in turn would lead to the strengthening of the governments' national cyber security ([Source 5]).
- **Environmental Sustainability:** The project achieves environmental sustainability by taking into consideration low power consumption, and low electronic waste [Source 6].

Political Dimensions

- International Relations: The deployment of network monitoring devices involves significant political considerations, including the diplomatic relations between nations and the national security. We noticed the potential political and diplomatic consequences of deploying a far-reaching monitoring system, which would result in complications in the relations between nations ([Source 7]).
- National Security: Network monitoring systems may be seen as critical infrastructure for national security, however laws and regulations should be enforced by Governments to control the deployment and usage of these systems ([Source 8]). To address these concerns, we adopted responsible deployment and usage practices to mitigate any possible risks.

Human-Centered Aspects

- User Interface: Our project prioritized user's experience through the development of a Webpage with thoughtful design and easy to use features. The webpage development was guided by the best practices ([Source 9]). Additionally, a GitHub repository was created with the necessary files, guidelines, and updates for more technical interface for the users.
- Real-Time Feedback: Our project provided real-time feedback to users in form of graphs showing metrics about network performance, empowering users to address network issues, decreasing the downtime, and improving the overall performance of the network ([Source 10]).

Conclusion

The remote network monitoring system is designed to address current network monitoring challenges while taking ethical, societal, and economic factors into consideration. This commitment is evident in the project's approach to design and implementation.

References

- [Source 1]: Article on the importance of data security in Network Monitoring Systems (<https://www.linkedin.com/advice/3/what-security-implications-network-monitoring>).
- [Source 2]: Article on SSH security best practices (<https://tailscale.com/learn/ssh-security-best-practices-protecting-your-remote-access-infrastructure>).
- [Source 3]: Article on how to ensure privacy while using network monitoring systems (<https://www.linkedin.com/advice/1/how-can-you-ensure-digital-privacy-while-wyvae>).
- [Source 4]: Article on Network Analysts Job Growth. (<https://www.zippia.com/network-systems-analyst-jobs/trends/>)
- [Source 5]: Analysis article on network monitoring industry growth (<https://www.fortunebusinessinsights.com/network-monitoring-market-108432>).
- [Source 6]: Study on power consumption of different Raspberry PI models (<https://www.pidramble.com/wiki/benchmarks/power-consumption>).
- [Source 7]: Article on Surveillance threats to privacy (<https://www.ohchr.org/en/press-releases/2022/09/spyware-and-surveillance-threats-privacy-and-human-rights-growing-un-report>)

- [Source 8]: Article about Data Breaches in 2023
(<https://hbr.org/2024/02/why-data-breaches-spiked-in-2023>)
- [Source 9]: Documentation on Grafana dashboard building best practices
(<https://grafana.com/docs/grafana/latest/dashboards/build-dashboards/best-practices/>)
- [Source 10]: Article about Real-time Network Monitoring
(<https://obkio.com/blog/real-time-network-monitoring/>)