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Real Time Monitoring and Data Visualization using Synclite

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ABSTRACT: Our project offers an overview of automated real-time monitoring. Real-time monitoring presents a challenge in terms of data consolidation and data visualization. We have seamlessly integrated our project with the latest technology Synclite ,which effectively addresses the challenge of data consolidation, especially when scaling up. We provide an agent that collects data from various resources through either a software application. After consolidation, this data is displayed in user-friendly dashboards and charts using grafana. This approach enhances system performance by promptly detecting anomalies and setting up alerts.

KEYWORDS: Grafana (visualization tool) Synclite(consolidator and logger), Grafana(visualization web application)

I.INTRODUCTION

This project presents a new intelligent monitoring and event management method. The priorities of highly classified data centers encompass not only the maintenance of the highest level of reliability and operational availability but also fast monitoring. These elements collectively enhance energy efficiency. This project serves as a versatile use case for technology that can find applications in various fields. The fundamental concept behind this project involves monitoring the performance of devices by generating utilization data. Using Synclite, databases would be created for each nodes/machine after it is been logged. This data is then consolidated into a unified database, and data analytics are performed. We are using PostgreSQL as a destination database. These analytics are presented using dashboards and easily readable graphs. Showing utilization of machine metrics using grafana tool. This approach aids in formulating strategies and improving system performance.

II.LITERATURE REVIEW

Real-time monitoring and data visualization play crucial roles in various domains, including healthcare, finance, manufacturing, transportation, and environmental monitoring. Real-time monitoring involves the continuous collection, processing, and analysis of data from various sources in real-time or near-real-time. It enables organizations to monitor the performance, status, and behavior of systems, processes, and environments as events occur. Real-time monitoring systems typically use sensors, IoT devices, data streams, and telemetry systems to gather data. Data visualization is the graphical representation of data to communicate information effectively and facilitate understanding. It involves creating visualizations such as charts, graphs, maps, and dashboards to present data patterns, trends, and insights. Data visualization techniques help users explore and analyze large datasets, identify anomalies, and make data-driven decisions. For the survey, we studied different papers regarding the recent trends in data monitoring and visualization.These include[1] and [2].we also referred to [6] for understanding the data easily and representing this data on dashboards using the Grafana tool. The paper also gives the comparison between the features of different types of data visualization tools like PowerBI, and Tableau with Grafana and concludes with the result of when and why the Grafana data visualization tool needs to be used.These papers provided us with the necessary information to carry out the development process. The major reference for the paper was [1].This paper presents a new intelligent monitoring and event management method for data center physical infrastructure based on multilayer node event processing. We also reviewed some papers regarding the implementation of POSTGRES [3],[4] and [5]. The in-depth survey of these papers revealed some useful and informative results for our research. The brief overview of each is as follows: [1] & [2]: The increasing demand for cloud services and web applications has led to the need for extensive complex data centers. This paper analyzes methods to achieve energy efficiency in data centers for sustainable development of ICT and low-carbon green IT structures. The structure utilizes the most recent energy-saving techniques like virtualization, cloud computing, and green metrics. A new intelligent monitoring and event management method for data center infrastructure based on

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multilayer node event processing improves energy efficiency by providing fast and specific event identification and energy consumption monitoring. Using tree nodes for each device improves information about events in specific nodes, reducing the number of identified events and lowering operating costs. Multilayer nodes significantly reduce unexpected events, identification time, and maintenance response time. This method has a significant impact on the efficient operation of the data center's physical infrastructure. [3],[4] & [5]: Many data migration tools require manual modification of procedures in the source database. PMT is a new tool that can migrate procedures from Oracle to PostgreSQL without manual change. The article introduces the principle of PMT implementation and illustrates the differences between Oracle and PostgreSQL. This study compares MongoDB, Cassandra DB, and PostgreSQL, two popular NoSQL databases, to evaluate their scalability and cost-effectiveness in various cloud and on-premises environments. The results suggest that each system is optimized for specific use cases, emphasizing the importance of a comprehensive assessment of factors beyond scalability and performance. The discussion focuses on the design and implementation decisions for the three-dimensional data manager POSTGRES, focusing on its backend functions, data model, query language, rules system, storage system, and current performance. [6]: The article highlights the benefits of using the Grafana platform for measuring particulate matter, volatile organic compounds, temperature, humidity, pressure, and wind speed. It emphasizes its intuitive features, which are applicable in any research field where large amounts of data are processed, and how they can be displayed. [7]: Grafana is an open-source tool designed for real-time monitoring and visualization. It allows organizations to create interactive dashboards, enabling them to analyze data from various sources in real time. Grafana's strength lies in its ability to integrate and visualize data from various systems, such as servers, databases, IoT devices, and business applications. This unified platform provides holistic insights into infrastructure, applications, and business metrics. Its user-friendly interface makes it accessible to users with varying technical backgrounds. Grafana's intuitive design allows users to easily configure and customize dashboards, ensuring efficiency, performance optimizations, and scalability across various domains, including IT operations, DevOps, business intelligence, and IoT monitoring. [8]: This study aims to develop a solution for monitoring IT infrastructure within businesses, including network peripherals, servers, and in-house application systems. It uses an iterative development method, using Prometheus for data collection and Grafana for real-time visualization. The goal is to have all vital information on a single dashboard related to IT infrastructure, allowing businesses to react and resolve issues that could cause service interruption if not handled properly. The result is a web-based centralized dashboard for monitoring all infrastructure-related, accessible from within the school computer network. This will help businesses maintain system stability and prevent service interruptions if not handled properly.

III.METHODOLOGY OF PROPOSED SURVEY

To perform real-time monitoring and data visualization we will implement the following Basic steps:

- Data collection using software agent: This project involves collecting data from various machines at specific intervals. The parameters currently being used in this case are CPU utilization, disk space, and network throughput. These parameters can be added as per the requirement.
- Using Synclite platform: SyncLite is a powerful, no-code, no-limits, relational data consolidation platform backed by patented technology. SyncLite seamlessly and securely replicates and consolidates real-time data from various data-intensive applications across desktops, smartphones, and edge devices while enabling them for In-App data analytics.
- Data visualization: The dashboards and graphs will be created from the data analytics performed on the data. This will provide users with a clear view of device performance within specific intervals and suggest the necessary changes to improve performance.

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Proposed System:

Flow chart:

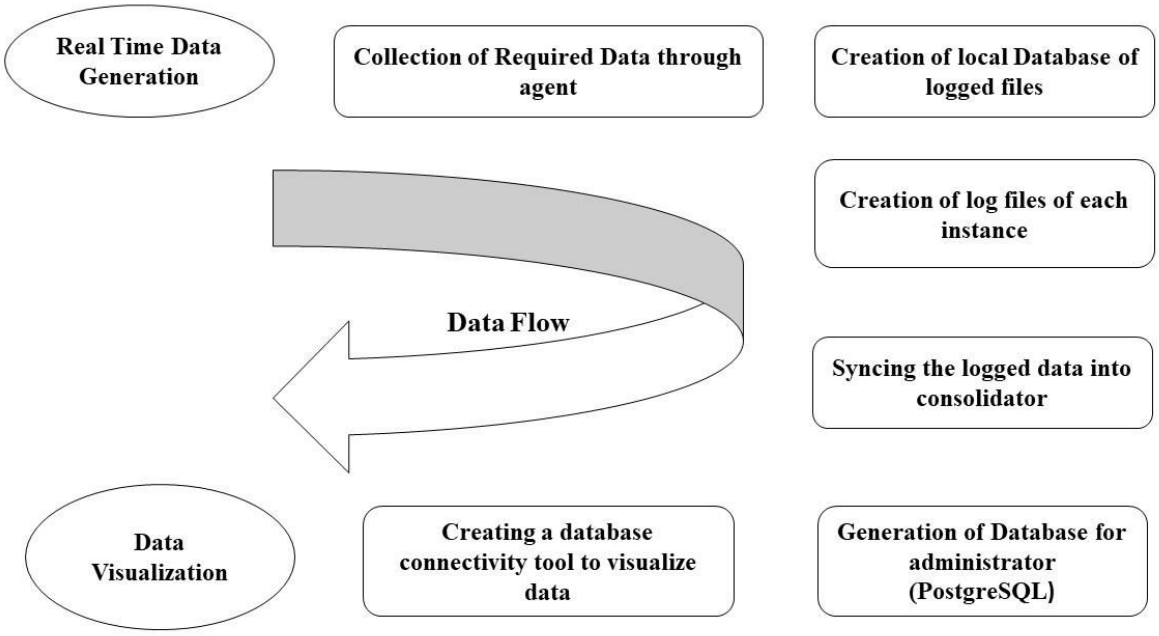
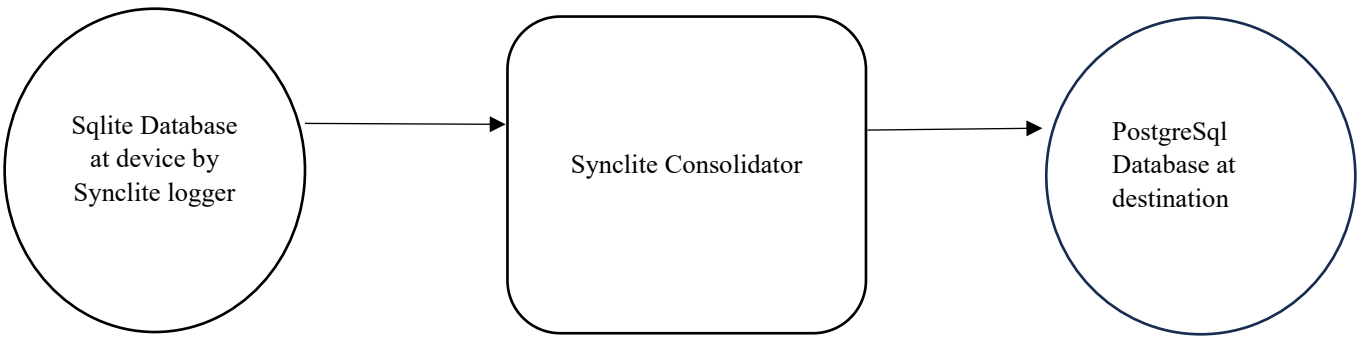


Fig.1.Data flow diagram

How data flow :

1. Data Flow as given in the diagram would start from real-time data generation for machines.
2. We are writing an agent which would be called and it will collect the required data in this case it would be machine utilization such as CPU utilization, RAM usage, Disk Space, and Network throughput.
3. As soon as the function is called local database is created
4. The log file of each instance is created
5. Data is synced in real-time to syncline consolidator
6. Consolidation creates an administrator database (We are using PostgreSQL) A tool that connects the database and UI will flow data and interpret data as we want.

Database migration:



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In conclusion, this project presents a comprehensive plan for the development of an intelligent monitoring . The envisioned system aims to address critical challenges in maintaining reliability, operational availability, and security within these specialized environments.

The objectives of the project include the design and implementation of a robust architecture capable of real-time monitoring, specific event identification. The successful execution of these objectives is anticipated to contribute significantly to the efficiency, security, and sustainability of highly classified data centers.
The anticipated benefits include enhanced real-time awareness, rapid response to critical events, and optimization of energy usage, all of which are crucial for maintaining the integrity of highly classified data center operations.
As we embark on the development phase, the project team is enthusiastic about the potential impact of this intelligent monitoring and event management system. The collaborative effort, coupled with the planned use of cutting-edge technologies, positions the project to deliver a solution that aligns seamlessly with the unique needs of highly classified data centers.

IV.CONCLUSION

The success of this project will not only contribute to advancements in data center infrastructure management but also set the stage for future innovations in the field. The team looks forward to the challenges and opportunities ahead, with the ultimate goal of providing data center operators with a powerful tool to ensure the reliability, security, and efficiency of highly classified data center environments.

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