**Weekly Page View Monitoring and Notification System**

**ABSTRACT**

*In the digital era, monitoring web traffic is very important for system performance optimization, enhancement of user experience, and driving decision-making based on facts. This paper proposes a robust, automated framework using AWS services, like Lambda functions, to process and analyze website page views-both real-time and historical data, driven by a dual objective: proactive system readiness and generating actionable insights through visual analytics.*

**DATABASE CONCEPT**

Data Processing, Automated framework,

**KEYWORDS**

AWS Services, S3 Bucket, Lambda functions, Amazon QuickSight, AWS Simple Notification Services (SNS), event-driven triggers, ETL (Extract, Transform, Load) pipeline.

**INTRODUCTION**

In the era of digital transformation, organizations are increasingly dependent on their online systems to provide uninterrupted services and meet user expectations. Any downtime or performance bottlenecks in these systems can result in significant financial and reputational losses. Effective monitoring of web traffic has, therefore, become a cornerstone for optimizing system performance, enhancing user experience, and driving data-driven decision-making.

This project was inspired by a root cause analysis scenario presented during a professional interview. The question highlighted the need for real-time monitoring and proactive alert systems to address sudden traffic surges. The challenge was to design a solution that not only monitors traffic patterns in near real-time but also analyze historical data for long-term trends and anomalies. This prompted the idea of leveraging AWS services to create a cost-effective, scalable, and automated solution for traffic monitoring and analysis.

The proposed framework is designed to address two critical objectives:

1. Proactive System Readiness: Ensuring that the system can handle sudden spikes in traffic by generating real-time alerts and empowering teams to act before performance issues arise.
2. Actionable Insights through Visual Analytics: Providing an intuitive platform for stakeholders to analyze traffic trends and key performance indicators (KPIs) for better decision-making.

The use of AWS Lambda for processing and Amazon QuickSight for visualization makes the solution both scalable and serverless, eliminating the need for complex infrastructure management. By combining real-time and historical data processing, the project bridges the gap between immediate traffic monitoring and long-term trend analysis, offering a comprehensive approach to system optimization.

This report details the development, implementation, and benefits of the framework, offering insights into how serverless cloud technologies can be harnessed to ensure system resilience and operational efficiency in a dynamic digital environment.

**IMPLEMENTATION**

Figure 1A shows the raw data kept in Amazon S3, which I uploaded manually from Excel. The system uses AWS Lambda functions to ingest, preprocess, and transform the raw website traffic data into a robust, serverless data processing pipeline. After transforming, the processed data is pushed into another S3 bucket for further use.

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**Figure 1A – Getting the data**

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**Figure 1B – Sample S3 Bucket**

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**Figure 1C – User uploaded file (Engagement Overview)**

Figure 1C, snapshot displays the files uploaded by the user and the storage location for the processed files. After performing transformations, the Lambda function saves the files into the designated folder, refer Figure 1D.

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**Figure 1D – Processed CSV file**

Figure 2a shows the processed data is then integrated with Amazon QuickSight for real-time monitoring and actionable insights. This allows users to do live visual analytics and in-depth analysis of the trends in traffic, hence helping them effectively assess the performance of the website. Refer Figure 2b, threshold values can be set up with KPIs and visualizations, such as charts, to trigger alerts when traffic surpasses the threshold values. Users have the flexibility to adjust these thresholds as needed. Over here, I have set the threshold value to 2 million views. Once an alert is triggered, notifications are sent to users or stakeholders in a predefined format via email or text using Amazon SNS.

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**Figure 2a – Integrating processed data into Amazon QuickSight**

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**Figure 2b - Setting up alerts**

**OUTPUTS**

Figure 3A shows a snapshot of the QuickSight Dashboard, which can be used by various teams such as Data Analytics, Web Development, Digital Marketing, IT/Infrastructure, Content Strategy, and Executive Leadership teams.

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**Figure 3A – Web Analytics Dashboard**

Figure 3B is a sample of the notification alert sent by Amazon SNS, indicating that Week 42 (10/14 - 10/20) has exceeded 20 million views.

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**Figure 3B - Weekly Page View Alerts**

**PROBLEM FACED**One limitation was, for testing and analysis, real-time data were not available. In this respect, development of a solution that could analyze historical traffic data was emphasized. A dedicated AWS Lambda function was implemented to monitor weekly traffic patterns against predefined thresholds, detecting anomalies and deviations. Upon identifying any irregularities, immediate notifications were sent via Amazon SNS, enabling teams to take proactive measures.

Additionally, another challenge arose due to the lack of access to Amazon QuickSight under the university's AWS account. This restricted the ability to test and deploy visual analytics features directly within the institutional account.

**SOLUTION**

To overcome the challenge related to real-time data limitation, the system used historical data as the main basis but simulated real-time monitoring by sending alerts on time. These allow organizations to detect and troubleshoot performance bottlenecks in advance, undertake resource deployment at strategic points, and get ready for sudden spurts of traffic. By this, system reliability would be guaranteed with operational continuity, even in the absence of real-time data.

For the QuickSight access problem, a different AWS Free Tier account was created using a personal email address. This allowed the integration of the processed data with Amazon QuickSight to generate live visual analytics, dashboards, and KPIs. By leveraging this solution, the project successfully enabled seamless testing and deployment of analytics features, demonstrating adaptability and resourcefulness in overcoming infrastructure limitations.

Overall, the project puts together historical trend analysis with simulated real-time alert and scalable analytics capabilities that guarantee visibility, timely decision-making, and performance optimization, even with limited resources or access to data.

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**Figure 4 – The Architecture Diagram**

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