Monitoring of Cloud Resources through Dashboard

Kartik Katti, Jayasimha S R

ABSTRACT: ***Dashboards are thought of as a single point of reference usually for sales or performance. Organizations are now adapting to data dashboards or information dashboards. Identifying what is an information dashboard and what is not might get confusing at times, an information dashboard can be thought of as a set of items that represent any resource, which allows the targeted audience to understand or gain useful insights regarding the data being displayed. This paper discusses about an informational dashboard that can be used by organizations to have a consolidated view of status of all the processes, health of cloud resources and various other operational information spread across multiple platforms for central monitoring and support.***

KEYWORDS: ***Information dashboard, central monitoring, cloud resources***

I. INTRODUCTION

Dashboards are essential tools that are used in every organization and are not limited to any category. The popularity and necessity of dashboards have made it essential to tailor these dashboards per the business need. Building a dashboard is not a straightforward task, it requires a lot of thinking and planning from deciding on what to present, what data is to be collected, how the data is to be collected and how to categorize the items on the dashboard. Every organization makes use of dashboard in one or the other form, it can be used to monitor employee performance, academic growth of a student, monitoring the financial growth of the organization or even more technical aspects such as monitoring the logs, monitoring the status of various processes running across various platforms [1-3].

Information dashboards these days is a key tool for understanding as well as extracting knowledge and facilitating decision making based on large organizational datasets, but these can take any number of forms. Information dashboards could be built to achieve various goals. The vast scope of dashboards and the different contexts in which these are used makes it difficult to give the dashboard a proper definition. Every organization makes use of several components spread across multiple platforms. To be able to monitor the status of each component on every platform, is of utmost importance. The dashboards can support both run-time and static information [4-6].

Looking for operational information within the organization for everyday tasks manually will require a lot of human effort and is a time-consuming process, thus having dashboards that display or presents the information clearly under one single screen with context will be of highly beneficial. Extracting critical information by searching exhaustively may cause unforeseen damage to operations, hence having such data readily available will prove to be very helpful [7, 8].

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In this context, we are talking about a dashboard that is used to monitor the health and status of EC2 instances, messages available in SQS queues and, also check and monitor daemons running on these EC2 machines to help the product support team in an organization.

II. RELATED WORK

In the paper [9] discusses a framework that collects data from various analytics sources such as Google Analytics, JSON files as well as Excel files and combine the data to form a customizable dashboard that suits the business need. This framework makes use of two configuration files, one file for generic meta-information and the other for individual services, to configure the dashboard. Our framework is based on the plugin architecture, which allows easy addition of new data sources. The paper [10] discusses how Information Extraction technologies can prove to be beneficial to combine different collections of documents and formulate the knowledge extracted from it, bringing information together from different domains and put combine them with organisational knowledge. After doing so a verity of techniques for visualization can be applied on top of it to explore information based on context. In [11] the authors present a prototype that uses a similar approach of gathering status and health information of resources and components from various platforms and present this information on to a single dashboard and describe an architecture that can be used to make configurable dashboards that are capable of handling heterogeneous data regardless of their origin. [12] In this paper the authors discuss about setting up a private cloud for collecting and filtering raw data and a web-based dashboard is also developed that contains static numbers and related charts. [13] This paper proposes a dashboard that considers the huge amount of sensors that a heterogeneous and also discusses the level of difficulty involved in creating a combination of sensor data, and how fixed structure dashboards are inefficient in coping up with the increasing amount of mappings. Because of these limitations, idea to develop of a dashboard that is dynamic in nature is presented, this dashboard is capable to visualize any amount of data from heterogeneous sensors. In [14] the authors discuss that general purpose interfaces rely on manual visualization and interaction specifications and propose that automated designs can increases information exploration speed, decreases efforts in learning, also help facilitate effective decision making, it further talks about features that are complementary linked: highlighting, comparison and filtering. The automated design approach will simplify the design and reduce the effort to create the dashboard.

In the paper [15] it is discussed about how organizations are dependent on cloud resources, because of this dependency and high demand, organizations are facing a new problem of high energy consumption. The paper identifies various levels of energy consumption in cloud and measures that help reduce the consumption as energy consumption can directly escalate operational cost.

III. PROPOSED METHODOLOGY

The working process of this dashboard is straightforward and simple. The information is extracted regarding the instance health, IP of the instance, number of messages available in the queue, with the help of the IP address, log in to the instance, and find the daemon processes running on that instance. Once all the information is available, push this data to the firebase database. Firebase is a real-time database that is suitable in cases where the frequency of data flow is high and its ability to store the data in JSON format makes it easy for the front end team. The front end is constantly listening to the database and if there is any change in the database it is immediately reflected on the dashboard.

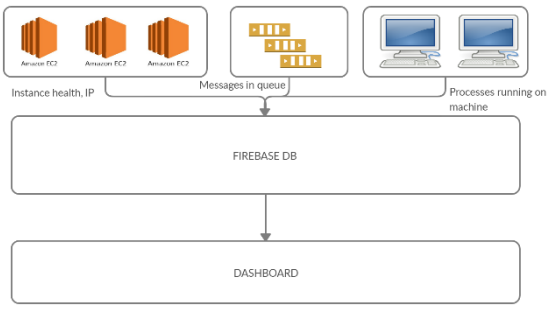

Fig 3.1: block diagram of the proposed system

Figure 3.1 shows the entire flow of the proposed system from collecting the data from various platforms then storing them in the firebase database in JSON format and then finally displaying them on the dashboard. The proposed dashboard gathers multiple pieces of information from various platforms, in the above figure the information on various AWS EC2 instances, SQS queues and daemon services running on multiple machines is collected. Information such as for instance health, instance IP, created timestamp, messages available in the queue, messages in flight, process number, etc. is collected. Once all the necessary information is gathered it is then stored in a database, in this scenario, firebase database is used. Firebase is a highly available database that is most suitable for real-time data. Since the status and health information constantly changes it is more appropriate to have a database that can handle real-time data. Firebase stores data in JSON format, this allows more flexibility than traditional databases. The data while storing in the database itself can be categorized based on platform or region etc. instead of taking care of this while extracting the data from the database, this ability is greatly helpful to reduce complexity on the front end.

IV. CHALLENGES

This section discusses possible challenges or blockers that can occur while making the dashboard.

Extracting relevant information from various platforms in an organization can be challenging, hence having a clear idea of what data is needed is necessary.

Categorizing the data and building a consolidated view is a difficult task, it is necessary to bind similar or related information closely.

Information such as instance health, process status, etc. that change frequently hence it is important to have a database that handles real-time data.

V. RESULT

This section shows how the data is stored in the firebase and how it can be presented on the dashboard.

Fig 5.1: status information of a SQS queue

Figure 5.1 shows status information of a SQS queue stored in firebase database, an SQS queue has various attributes such as created timestamp, environment, number of available messages, etc. all this information is stored in the database in JSON format grouped together by region.

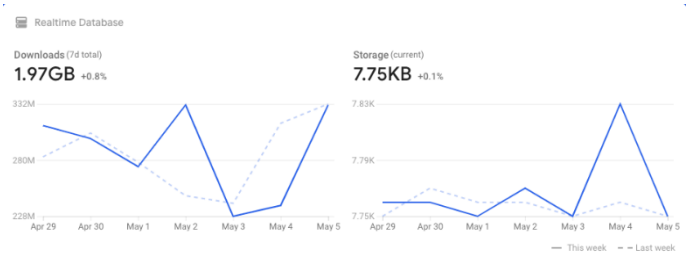

Fig 5.2: monitoring information of firebase database based on the usage

Figure 5.2 shows the daily usage of the database, it is provided by the firebase itself, and hence it is not required to have any metrics to calculate the database usage. Since the front-end extracts data only when there is a change in the database the download rate is less.

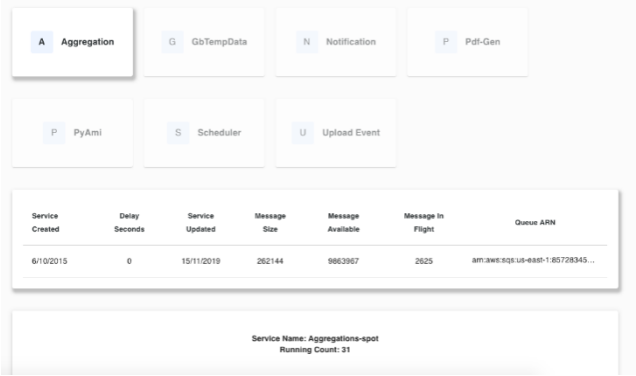

Fig 5.3: displaying queue status information on dashboard

Figure 5.3 shows the dashboard that presents the information related to a SQS queue, it shows various information such as message size, messages available, and messages in flight etc.

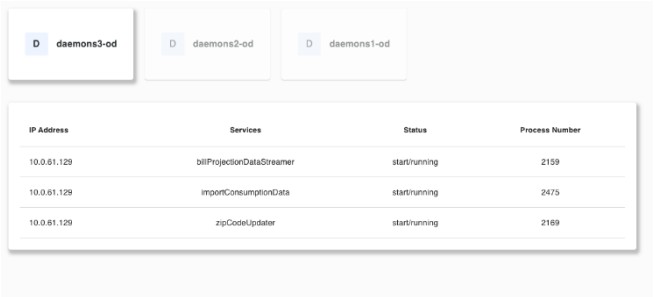

Fig 5.4: status of a process on the dashboard

Figure 5.4 shows the status of daemon services running on various machines, it clearly shows which process is running or is stopped, also gives the information about the IP address of the machine on which it is running.

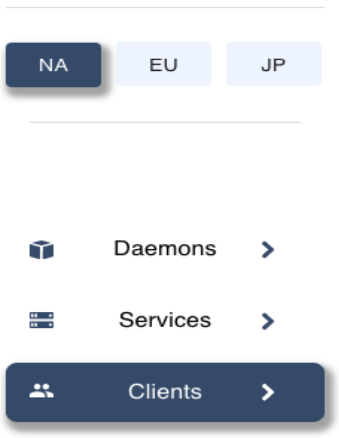

Fig 5.5: categorization based on the region on the dashboard

Figure 5.5 shows how the information can be categorized, it can be based on the region such as North America (NA), European Union (EU), and Japan (JP).

VI. CONCLUSION

Organizations these days make use of n number of resources spread over multiple platforms and monitoring and maintaining these resources is of utmost importance. This data can be in various format, hence storing it in a common format so that it can be easily consumed by the dashboard is necessary. Having a complex mechanism to extract information can be an overhead and also is not feasible to be carried out since the information is frequently updated. Hence employing a simple and straightforward mechanism that can handle such variety of data and presenting a consolidated view of the information can be very beneficial for the organization.

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