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Optimizing Cloud Costs through Serverless Computing in the Google Cloud Platform

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Abstract- **The research project has discussed serverless computing to be an important aspect that poses be crucial in optimising the cost for Google Cloud Platforms. This seeks to highlight the benefits of serverless computing by observing its advantages such as automatic scaling, cost efficiency, focus on core business logic and event-driven architectures. Moreover, the research project has also predicted the challenges and reduced them ethically such as cold start, debugging and testing and vendor lock-ins. This has been done by allowing best practices such as mentoring and analysing usage, function performance optimization and opting for the right provider and the right plan to set up an efficient cloud architecture.**

Keywords: **Serverless Computing, Google Cloud Platform, Cost Optimization, Cold Start, Scalability, Best Practices.**

I. INTRODUCTION

The following research project will provide a vivid explanation of optimising cloud costs with the help of serverless computing in the Google Cloud Platform. The intricate use of serverless computing will be used meticulously to optimize the costs in Google Cloud Platform and thus grant the developers. Additionally, serverless computing will have the capability to automatically level up the chances of services up or down depending upon the situation like website traffic and others. Moreover, the project will also depict about understanding of serverless computing and its advantages that will be observed in a prolonged sense. The research project furthermore, will highlight the challenges faced by it during its implementation and will support it with best practices. This will seek to aid effectively to manage the overall cloud costs in Google Cloud Platform also abbreviated as "GCP".

II. DESCRIBING SERVERLESS COMPUTING

The following section explains the concept of serverless computing probably. Serverless computing is defined as a cloud-based model that is constructed in such a manner that it uplifts the possibilities of development and optimal running of the applications.[1]. These developments and applications deviate away from the need for catering with optimal management for the servers. At the same time, serverless computing has the power to benefit the developers to build applications faster. This is obtained by deleting the needs for them and thus managing the overall landscape. However, with serverless computing, the costs can be optimized for services like Google Cloud Platform also known as GCP. However, in the context of services and cost optimization, the users and the developers get paid only for the resources and the execution of the code that gets generated about the provision of its services.[2]. Additionally, Google Cloud Functions along with Cloud Run and App Engine stand to be essential elements which togetherly contribute to Google Cloud Platform's serverless computing success.

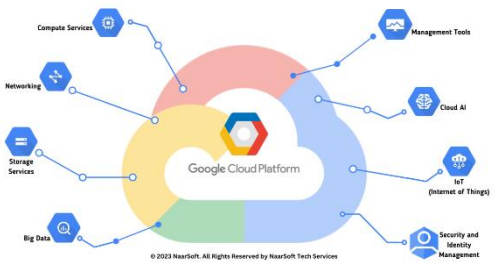

Figure 1: Highlighting Google Cloud Platform

III. STATING THE ADVANTAGES OF SERVERLESS COMPUTING

This section describes the advantages of serverless computing which is being to be of paramount importance. These advantages are explained below.

Cost Efficiency: This part states that serverless computing is considered to be cost-efficient for proposing with predictable workloads. It is done by using a pay-per-use model. This model is used to advantage the organisations to only pay for the resources that are used thereby helping to ignore wasting resources during off-peak times.[3].

Observing for Automatic Scaling: In terms of automatic scaling, serverless computing stands to be a vital feature which helps applications like Google Cloud Computing to handle unpredictable website traffic. It also has the potential to manage patterns and spikes which are in demand.

Focusing on Core Business Logic: Fostering the offloading landscape, the developers of Google Cloud Platform resonate on creating additional features and functionalities which tend to drive the business values rather than just getting down with the operational tasks[4].

Enabling Event-Driven Architecture: The serverless computing services of Google Cloud Platform have been successful in constructing event-driven architecture like HTTP. This enables the architecture to become flexible for sustainable integration and getting familiarised with it.

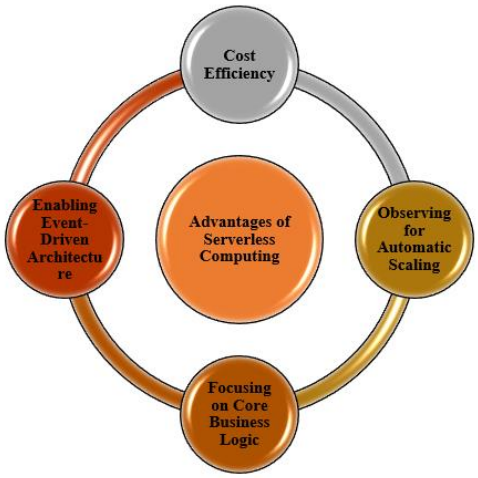

Figure 2: Discussing the advantages of serverless computing

IV. UNDERSTANDING THE CHALLENGES WHILE ALLOWING SERVERLESS COMPUTING TO THE GOOGLE CLOUD PLATFORM

The following section delves deep into identifying challenges which are found while applying serverless computing to the Google Cloud Platform. These challenge news to be predicted at the initial stages so as to minimise the chances of errors and thus maintain the reputation of the organisations.

Vendor lock-in: Vendor lock-in is considered to be a significant challenge as it is considered to be expensive to get shifted to a different serverless platform. This makes the organisations sometimes much more complicated to get switched to either alternate providers or on-premise solutions. Organisations need to consider multi-cloud strategies to mitigate this type of challenge.[5].

Debugging and Testing: In germs debugging and testing, it is also observed as an important challenge as the developers are fostered with limited opportunities in order to identify the problems and bottlenecks which they do not control the provider's servers. This results in troubleshooting being much more critical so the developers need to apply effective strategies to limit this kind of challenge[6].

Cold Start Latency: Cold start latency refers to a vital challenge because the delay mainly occurs in cases when a new function gets invoked for the first time. It is mainly linked with the serverless functions when the function remains idle for a specific amount of time. This results in taking a longer time to execution of the code leading to potential performance problems.

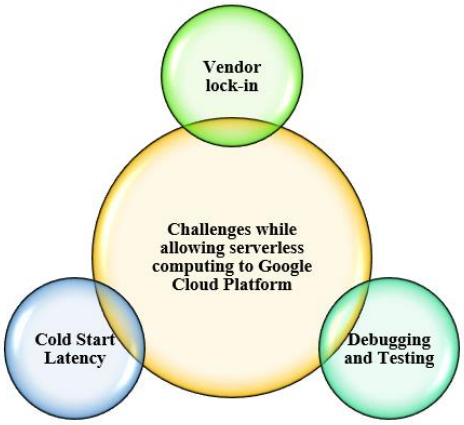

Figure 3: Depicting the challenges while allowing serverless computing

V. ILLUSTRATING THE BEST PRACTICES FOR COST OPTIMIZATION

This section deals with the best practices which are responsible for cost optimization. These best practices are discussed below.

Optimization of Function Performance: Optimisation of performance performance helps to improve cost optimization by developing the execution speed and minimising cold start time[7].

Monitoring and Analysing Usage: The monitoring tools of GCP aid in keeping a track record and utilisation of serverless components.

Selecting the right provider and plan: Selecting the right provider and the right plan benefits to execute for fulfilling the needs and preferences of the resource consumption for identifying the inefficiencies.

VI. CONCLUSION

This research project has analysed that serverless computing has been detrimental to optimize the cost for Google Cloud Platforms. This has been achieved by having a detailed idea and knowledge of the advantages of using serverless computing such as cost efficiency, automatic scaling, core business logic and event-driven architecture. It has also viewed the challenges like vendor lock-in, debugging and testing and cold start which need to be mitigated to promote sustainable results. Furthermore, the research project has illustrated the best practices for cost optimization which are optimization of function performance, monitoring and analysing usage and thus selecting the right provider and plan. Therefore, this has gauged Google Cloud Platform to get benefitted and gets recommended for every organisation to use serverless computing to get the best out of it.

Abbreviations and Acronyms

- GCP- Google Cloud Platform
- HTTP- Hyper Text Transfer Protocol
- DB- Database
- CR- Cloud Run
- GCF- Google Cloud Functions
- AE- App Engine

Units

- Time is measured in seconds
- Memory is measured in bytes
- Execution time is measured in milliseconds
- Storage is computed in bytes.

Equations

- The cost equation for serverless pricing: Cost = [Number of executions X Price per execution], C = [NE X PPE]
- Cold Start Latency (L) = [Distance (D) / Speed (S)], where L is measured in seconds, D is measured in meters and S is again measured in meters.

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