Quality of Service Evaluator

BigDataStack Software Component developed by Atos

The Quality of Service (QoS) Evaluator is part of the Triple Monitoring & QoS Evaluation subsystem of the Data-Driven Infrastructure Management capability of BigDataStack. The component takes an agreement between the service provider and the application developer, describing the expected level of performance of the application as well as the platform services provided by BigDataStack. The service level is described in terms of Service Level Objectives (SLOs). An SLO specifies a constraint on Non-Functional Requirements. An SLO may also describe a business penalty to apply in case of violation. The QoS component will be responsible for managing and evaluating SLOs as well as notifying third parties when any of them is not fulfilled.

Input

The input of the system is twofold:
• Constrains or SLO (Service Level Objective) from the Dynamic Orchestrator component.
• Metrics collected by the Triple Monitoring from a monitoring tool, used for evaluating the SLO fulfilment

Output

QoS violations are published in a queue system where the Triple Monitoring and the Dynamic Orchestrator components are subscribed; the former to compute and publish violation-based metrics; the latter to make decisions as to how to adapt the deployment of the application or service to improve its performance.

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End Users

Developers who want to add QoS evaluation capability to Big Data software applications and systems.

Key Features and Benefits

The purpose of the component is to evaluate and ensure a set of QoS attributes (SLOs) at different layers of the system architecture: applications, data services (e.g., storage, processing) and infrastructure (e.g., networking, computing and storage). The QoS Evaluator receives the metrics collected by the monitoring framework and checks them individually or aggregated. The aggregation of metrics enables the specification of complex SLOs (Service Level Objectives) for elaborated conditions or constraints, such as establishing a relation between SLOs at different levels, such as establishing a relation between the response time of the application (application level metric) and the storage capacity of the system (infrastructure level metric).

Initial TRL

TRL 8

Final TRL

TRL 9

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Essential Information for Users

The QoS Evaluator component deploys as a micro-service in a single Docker container. For this project, the QoS Evaluator has been successfully integrated with the Prometheus-based monitoring system to query performance metrics and to provide QoS violation metrics in return (to be recorded and published together). The component provides two main interfaces to developers, who need to adapt in order to integrate with their software: The application Observer, to subscribe to violation notifications; and the Monitoring adapter to feed the QoS Evaluator with the metrics to evaluate.

Implementation in BigDataStack Use Cases

The three BigDataStack use cases will make use of the QoS evaluation, as all of them need the Data-Driven Infrastructure Management capability of BigDataStack to ensure specific performance constraints in the operation of their analytics applications and processes

Differentiators from competitors in the market

Its open source nature gives the QoS Evaluator the possibility to be adapted and used by developers in many different fit-for-purpose scenarios and solutions.