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Feedback-Based Resource Utilization for Smart Home Automation in Fog Assistance IoT-Based Cloud

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ABSTRACT

In this article, the proposed feedback-based resource management approach provides data processing, huge computation, large storage, and networking services between Internet of Things (IoT)-based Cloud data centers and the end-users. The real-time applications of IoT, such as smart city, smart home, health care management systems, traffic management systems, and transportation management systems, require less response time and latency to process the huge amount of data. The proposed feedback-based resource management plan provides a novel resource management technique, consisting of an integrated architecture and maintains the service-level agreement (SLA). It can optimize energy consumption, response time, network bandwidth, security, and reduce latency. The experimental results are tested with the IFogSim tool kit and have proved that the proposed approach is effective and suitable for smart communication in IoT-based cloud.

KEYWORDS

Cloud, Feedback-Based Approach, Internet of Things, Service-Level Agreement, Smart City, Smart Home

1. INTRODUCTION

The IoT applications, such as smart home, smart cities, health care applications, require quick data processing. The challenging task is to improve the performance of IoT-based cloud. The IoT devices are facing a lot of problems (Atzori et al., 2010). Data processing causes delay and increases the response time especially while transferring data to cloud and from cloud to the IoT devices and applications because of its effect on the performance of the IoT-based cloud. An integrated architecture of feedback-based approach in IoT environment is a solution to decrease latency. The Feedback-based assistance is used in IoT-based cloud environment can act as the edge of the network. The Feedback-based assistance improves the performance of the system, while transmission of data and network bandwidth maintains the SLA. It provides the quality of service (QoS) and optimizes energy consumption. Even though the IoT devices collected huge amount of data from different sources like Big data, it needs to support the feedback-based resource management system. The IoT devices maintain huge number of servers to attain high processing power (Manyika, 2011). It continuously collects the data. While processing the data, there is a necessity for the feedback-based resource management system, which in turn helps in the incessant exchange of data in IoT-based cloud environment. It is mostly required for efficient decision-making in real-time applications. After data collection and aggregation in the IoT environment, it can provide assistance for data that are stored and processed in cloud servers (Mallikarjuna et al., 2011).

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Cloud computing can be considered as demand-based and high-scalable service with a capacity to process a large amount of data. It can be a pay-based service to reduce the cost and develop IoT-based applications. Data processing in cloud computing from different data sources can be processed at different sites. It cannot meet the requirements of huge IoT applications. When a large amount of data are processed, cloud computing does not process the huge amount of data at the required speed due to low latency. The IoT devices cannot receive the data when there is communication failure. The feedback-based resource management system supports the network of actuators and sensors. In this approach, the application components are feedback-based data server, smart gateways dedicated to IoT-based Cloud. This is achieved byIoT-based requirements, such as wide geographical distribution and low latency, feedback-based resource management system, which provides an integrated architecture between cloud and IoT and thereby manage the servers, interface heterogeneity and communication protocols (Bu, Y., 2010). The end devices sending data continuously between clouds create the bottleneck for the cloud. To solve this issue, the feedback-based resource management approach processes the received data nearest to the data sources and improves the scalability of the system. Hence, it need not burden the cloud for data processing.

Feedback-based resource management approach filters the data and processes considerable data to the edge of the device. In this approach, resource management is the major part and encompasses several components that can consistently manage the resources and maintain the SLA in terms of satisfying QoS constraints, decreasing the wastage of resources. In this process, information of the monitoring services is maintained, and it can find the best applicant for hosting the corresponding application. This approach provides the novel resource management technique for data processing in smart communication IoT-based cloud. The feedback-based resource management approach improves resource provisioning policy and the performance of the IoT devices and optimizes the resource management system. It maintains the SLA and reduces the QoS parameters (response time, latency, energy consumption, network bandwidth, and security). The aim of this approach is the quick processing of user tasks, thereby improving user satisfaction. It can fulfill customer needs. The proposed application has been verified with the IoT-based smart applications. The remaining paper is structured as follows: Section 3 describes the proposed approach, section 4 illustrates the experimental setup and results in evaluation, and section 5 ends with a conclusion and future scope.

2. RELATED WORK

Feedback-based resource management environment is growing rapidly in IoT-based cloud (Atzori et al., 2010), but different research issues are discussed and most of the research issues are pending (Manyika, 2011). This section describes the existing research on feedback-based resource management using IoT-based cloud. B. Mallikarjuna and P.V. Krishna (2018) proposed task allocation using bee colony optimization model for effective load balancing in cloud computing, which is an iterative approach. The advantage of this model is the feedback-based resource utilization and it proved to be an effective scheduling strategy and obtains the minimum makespan value in the cloud environment. The future direction of this approach is suitable for IoT-based cloud environment and proves the various QoS metrics (Mallikarjuna & Venkata Krishna, 2018). In Fog computing, the edge of the devices suffers from various QoS metrics such as network bandwidth, energy consumption, latency, response time and security (Bu, Y., 2010). The major QoS metrics are not satisfied by the IoT-based cloud environment energy consumption and security challenging issues solved by using feedback-based resource management for IoT and Big data analytics (Bu, 2010; Bonomi et al., 2012).

Mallikarjuna et al. (2018) proposed osmosis load balancing of tasks for resource management using semipermeable membrane. This model is suitable for homogeneous and heterogeneous environment to reduce task migration which is achieved using chord overlay concept. The hidden principle of this concept contains feedback-based approach. The future scope of this approach is better resource utilization to satisfy QoS parameters (Mallikarjuna & Krishna, 2015). Krishna and

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