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**Assessment of the Suitability of Fog Computing in the Context of Internet of Things**

**Abstract:**

This work performs a rigorous, comparative analysis of the fog computing paradigm and the conventional cloud computing paradigm in the context of the Internet of Things (IoT), by mathematically formulating the parameters and characteristics of fog computing – one of the first attempts of its kind. With the rapid increase in the number of Internetconnected devices, the increased demand of real-time, low-latency services is proving to be challenging for the traditional cloud computing framework. Also, our irreplaceable dependency on cloud computing demands the cloud data centers (DCs) always to be up and running which exhausts huge amount of power and yield tons of carbon dioxide (CO2) gas. In this work, we assess the applicability of the newly proposed fog computing paradigm to serve the demands of the latency-sensitive applications in the context of IoT. We model the fog computing paradigm by mathematically characterizing the fog computing network in terms of power consumption, service latency, CO2 emission, and cost, and evaluating its performance for an environment with high number of Internet-connected devices demanding realtime service. A case study is performed with traffic generated from the 100 highest populated cities being served by eight geographically distributed DCs. Results show that as the number of applications demanding real-time service increases, the fog computing paradigm outperforms traditional cloud computing. For an environment with 50% applications requesting for instantaneous, real-time services, the overall service latency for fog computing is noted to decrease by 50:09%. However, it is mentionworthy that for an environment with less percentage of applications demanding for low-latency services, fog computing is observed to be an overhead compared to the traditional cloud computing. Therefore, the work shows that in the context of IoT, with high number of latency-sensitive applications fog computing outperforms cloud computing.

**Existing System:**

The technology of IoT is reliant on cloud computing. Data from the billions of Internet-connected devices are voluminous and demand to be processed within the cloud DCs. Most of these IoT infrastructures, such as smart vehicular traffic management systems, smart driving and car parking systems, and smart grids are observed to demand real-time, low-latency services from the service providers. Since conventional cloud computing involves processing, computation, and storage of the data only within DCs, the massive data traffic generated from the IoT devices is anticipated to experience a huge network bottleneck and, in turn, high service latency and poor Quality of Service (QoS). Moreover, in order to process and serve this high number of requests the DCs are required to be up and running around the clock which results in the consumption of enormous amount of energy and massive emission of CO2.

**Proposed System:**

We analyze the suitability of a recent computing paradigm – fog computing to serve the demands of the realtime, latency-sensitive applications in the context of IoT. Fog (From cOre to edGe) computing, a term coined by Cisco in 2012, is a distributed computing paradigm, that empowers the network devices at different hierarchical levels with various degrees of computational and storage capability. These devices are equipped with an ‘intelligence’ which allows them to examine whether an application request requires the intervention of the cloud computing tier or not. The idea is to serve the requests which demand real-time, low-latency services (e.g. live streaming, smart traffic monitoring, smart parking etc.) by the fog computing devices and the connected work stations and small-scale storage units. However, the requests which demand semi-permanent and permanent storage or require extensive analysis involving historical data-sets (e.g. social media data, photos, videos, medical history, data backups etc.), these devices only act as routers or gateways to redirect the requests to the core cloud computing framework. The focus of this work is to assess the suitability of fog computing in the context of real-time service requests, and compare its performance against the traditional cloud computing frameworks.