

Fog Computing: An Empirical Study

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ABSTRACT

In the Field of Internet of Things (IOT) the devices by themselves can recognize the environment and conduct a certain functions by itself. IOT Devices majorly consist with sensors. Cloud Computing which is based in sensor networks manages huge amount of data which includes transferring and processing which takes delayed in service response time. As the growth of sensor network is increased, the demand to control and process the data on IOT devices is also increasing.

KEYWORDS: Computing, IOT, Server, Layer

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1. INTRODUCTION

To manage the large amount of data a new type of computing model was introduced in January 2014 by CISCO named Fog Computing. In simple terms, fog computing is cloud computing plus Internet of Things.

Fog Computing is a model in which data is processed and applications which are concentrated in devices at the network edge rather than existing almost entirely in the cloud. In general rather than sending the data directly to the cloud from the smart devices it can be manage locally in the smart devices. Fog Computing reduces the latency as a result of local computation while minimizing security risks.

Fog Computing is a distributed computing where the storage and networks, closer to users and anywhere the cloud to things continuum that connects the cloud to things on the edge.

This bridge connect the devices to cloud that generated data like cars, routers or surveillance cameras. It makes IOT and other applications that require real-time interactions.

Fog Computing creates that extension of cloud functionality when you need it and brings that functionality closer to where latency is very important.

In the future 5G networks assure that latency will decrease as low as possible like in sub-milliseconds so that the fastest network facility can be provided. For that 5G networks must support Fog computing.

Fog Computing is a platform which is virtually generated that gives the functionality to process, manage and other network services to the data between the cloud computing and a device.

Some Advantages of Fog Computing are as follows:

1. It reduces the load on the network as the amount of data which is travelling through a network is reduced because of the computation is conducted at a network edge near IOT devices.
2. It is reliable as it provides the mobility functionality to all the smart phones, laptops and many more physical or virtual with IOT applications.
3. In the fog computing structure, devices provide context awareness relating to data created by the sensor with them. The device plays a role in combining the data at a sensor using position application context.

2. Architecture of Fog Computing

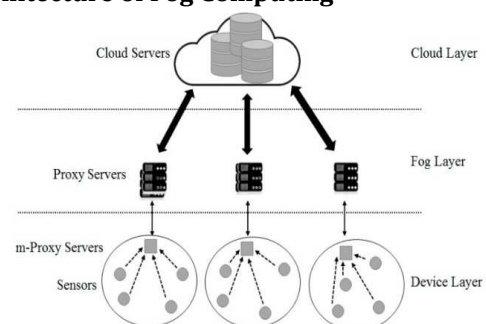


Fig 1: Working of Fog Computing

The Highest level is the Cloud Computing Layer which receives the information from the Middle Layer known as Fog computing consists of Proxy Servers. The Highest level Layer is used to manage and mining the data. The Middle Layer provides many services such as calculation, saving and networking at the edge in IOT devices.

The Last Layer or the Lowest Layer includes m-Proxy Servers with the limited amount of resources which are setup at the store or public facility like café's from the sensors so that IOT devices can collect information's.

As the calculation is done at near edge on IOT devices so that it reduces the amount of data transferring to the cloud and provide services to many devices with wireless connection. For Example, Traffic Control or reduces accident at the highly prone areas from the Cameras and Sensor set at a side of road in Real-time. So that sensors can detect near by objects which are approaching to it closely that can includes pedestrians and vehicles and measure the distance the speed of the objects. So that the sensors can send the signal or information to the smart traffic lights to provide appropriate information.

Also, Fog Computing refers to decentralized computation at the edge of the network. By using the functionality of distributing the data at the edge so that the result will be sent to the cloud not the raw data itself. It helps to increase the bandwidth and computational power in the cloud.

Companies using Cloud Computing for analytics often need it fast. So that the most relevant and recent data can be accessed in real time. As the Company not need to depend upon the globe analyzing in the cloud and sent it back to them instead computation can be done closer to home.

Taking a scenario to analyze to what data do we actually need. So taking the example of Airplanes which are connected with important sensors which are meant to prevent system failure. There are large amount of sensors attach with Airplanes which produces up to 40TB of data per hour of flight. If we calculate this data with and multiply with the numbers of flight hours per day that will result into astonish These sensors provides important information in Flight but the data not being used for analytics on fuel saving and other efficiencies would not be beneficial for being aggregated in the cloud.

So similarly the smart or self-driving cars are also connected with sensors which generates large amount of data which is to be monitor by the IOT devices constantly. If the data consistency in terms of Calculation is slow then it will leads to failure and even more unimaginable painful. Situation for the passengers or the person. So to prevent these situations fog computing leads to manage and computation the data in the devices itself also

3. Fog computing vs. Cloud computing

- Fog Computing provides a mechanism which reduces the amount of data sent to cloud.
- Cloud Computing does not need to provide any reduction in data while sending or transforming the data.
- Fog Computing conservers more bandwidth.

- Cloud Computing conserves less as compared to Fog Computing.
- Fog Computing data is highly secured.
- Cloud Computing data is less secured as compared to Fog Computing.
- Fog Computing provides low latency rate and high response time.
- Cloud computing doesn't provide low latency rate and response time might be slower as because of large amount of data.
- Fog Computing consists of Decentralized in Geo Distribution network.
- Cloud Computing consists of Centralized in Geo Distribution network.
- Number of nodes are very large in Fog Computing but high in Operating Expenses.
- Number of nodes are few in Cloud Computing but low in Operating Expenses.

Cloud computing has become a popular model for reducing cost of business, improvise quality of services, and provide good & secure computing [1].

4. Edge Computing

It is a concept that contrast with Cloud computing. It communicates with the "edge data center" which is located near the devices and then works with the cloud. It is also a Computing Topology concept. It is simply used to process the data where ever or near by the point where data is present in the devices whereas by the implementation/use of cloud computing organization access different application of any communication system using network or internet [2].

There are so many reasons that organizations are turning to cloud services these days- first it is a cost effective method in which you can eliminate capital expenses of buying hardware and software, data centers set-up and run [3].

Fog Computing is also referred to as edge computing and processing the data which is collected from the various devices before sending it to the cloud so that the amount of transmission itself without receiving device control information form the cloud. So that the data transmission not be delay in the devices and can be controlled in real time.

It benefits in terms of all the connections established with low latency connections and increased in the process efficiency. It makes the data filter so that it can be uploaded without any junk or not needed. Provides the better security and privacy control.

It is deeper and faster and also with great business agility with quick development and deployment of applications

5. Future of Fog Computing

Providing with more and better Hardware devices so that the market place can be evolved much faster like the iTunes App Stores or Google Play Store but with the focus on IOT devices. Their must be direction for expanding and identifying the new areas of research and provides more real time cases. It will make a major impact in the IT infrastructure and the network with emerging 5G and AI interactions.

6. Conclusion

In this paper, there is a discussion with the emerging technology and network handling called Fog Computing which handles the data from the IOT devices to process and computation so that the real time response is fast. Also it makes cloud computing concepts clear which helps to maintain the relevant and crucial data in the network. AS the Fog Computing filters the data at the edge of the smart devices before sending to the Cloud. So that spaces can be utilise as much as possible for better responses and fast processes.

7. References

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