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Research paper

A Study on Data Security In Fog Computing

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Abstract

During the years, Cloud Computing is a popular paradigm which provide access to configurable resources on devices at any time,with on demand. Cloud Computing provides many benefits to enterprises by reducing the cost and allowing them to concentrate on their core business. Apart from this , the Development of Internet of Things came into existence, where the cloud divulge a long distance between users and its environment. Cloud Computing is also referred as heavy computing and dense form of computing power. In Spite of this a new computing has been proposed called Fog Computing also known as Fogging, which overcomes the problem of cloud. Fog computing which majority supports the concepts of Internet of Things(IoT), where many IoT devices are used by users on daily basis which are connected to each other. Fog Computing is also an extended version of cloud computing.

Keywords: *Fog Computing, IoT, Cloud Computing, Edge Computing*

1. Introduction

Fog Computing is a term created by Cisco that refers to the extension of cloud computing for connecting the enterprise's network. Also referred as Edge Computing or fogging, which provides greater operation on compute, storage and network services between users and cloud data centers. Fog computing is a decentralized architecture,which stores the data in between the origin and source of cloud infrastructure, which results in reducing data traffic and improves the performance of computing in storing large volumes of data. Cloud Computing suffers from main six disadvantages like downtime,code space,vulnerability,etc..,which with Fog computing can solve them, by providing advantages to individuals and enterprises by offering high efficient computing resources at affordable cost.

2. Survey Details

The Characteristics of fog computing relates the following technologies , located at the edge of the network with heterogeneous end user support. Edge computing has its own computing , networking and storage services[2,3].It will operate in single hop from device to fog node. Highly virtualized platform,offers inexpensive deployment in terms of hardware and software.

Fog System is a small computing resources when compared to cloud but it can be increased on demand process. Fog is dense and can sparsely distributed based on geographical location. It also supports machine-to-machine communication and wireless connectivity. Fogging concept is mainly used for the purpose of mobile and portable devices in IoT. It enhances local data and communication exchange services. Local business (shopping mall, logistic companies,etc.)are the service providers.

The hardware used for fogging is Wireless multi point interface which is used for connecting stations programming , operator consoles and other devices in the family. Fogging provides a close relation to the users and can be reached through wireless connection(WI-fi).

Fig1. Fog deployed with Mobile.

The architecture of Fog system is likely to have the services same like cloud. It is composed of infrastructure , platform and software as service, along with the inclusion of Data Services.

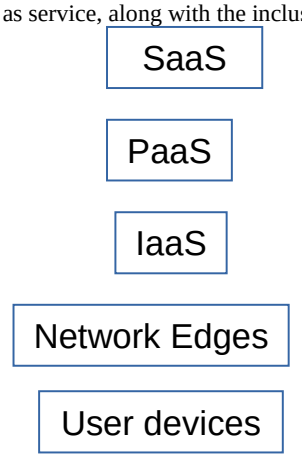

Fig2.Technical architecture of Fog Computing

Further the architecture is grouped in to three layers called cloud(SaaS,IaaS,PaaS) layer, Fog Network and IoT(user Devices). Fog network layer supports any devices like switches,routers, servers and even cameras which can become fog node with computing and storage connectivity[5].They can act independently, server-client architecture or making a cluster. The basic idea of fog network is to connect the cloud directly to mobile user.

3. Related Work- Fog Applications and Data Security

Fog computing supports a new set of applications and services in different platforms. Applications include Smart Cities, Smart Switching Systems, Smart Home Appliances . Production fog applications are rapidly growing in manufacturing , oil and gas ,transportation and mining and even in public sectors. This makes it much easier to manage huge amount of data's that will be generated in a fully connected world. This idea is not to replace the cloud rather it helps in reduce the processing and bandwidth of cloud systems which overcomes the difficulty of looming bandwidth and bottlenecks[6].

3.1 Data Security

Fog Computing provides a larger amount of securing in data ,as the data are encrypted through deception and decoy technology, which means confusing the attacker by fake files. So if the user want to access a file, a trap file will be created and it is identified and deleted by the original user. Fogging is very much useful in protecting smallest resources constrained devices. It is also helpful in keeping security credentials and software up to date. Fog nodes can differentiate users based on their MAC address, user request tracking and identifies the local area network. Since the fog focus on mobile users, it keeps track of 4G frequently.

3.2 Deception (Decoy) Technology in Fog Computing

The Decoy technology is very useful as it deceives malicious insiders. Deception technology enables a more proactive security by seeing to deceive the attackers. This is achieved by identifying unauthorized usage of attacker. The cloud security may deliver unbound amounts of fake information to the attacker ,by securing user's original data in two ways,

a)validating when an abnormal information access is occurred.

b)Confusing the attacker by giving duplicate or fake data called decoy documents. When the decoy technology is used with user profiles, it is possible to know the suspected behavior of users and attacks. This way application deceives malicious users to behave the way and avoid insider theft attack.

Data can be secured in Fog computing in an efficient way by using some methodologies of Local Area Network which incorporates the accessing power of cloud system. Another important term energy can be reduced (power) with workload allocation ,in terms of mobile phones with a technique called call graph to offload computation to edge servers. This helps fog platform by reducing communication cost and delay.

4. Conclusion

In this study, it has been given the overview of fog computing and its definition , origin and how security is been provided. Fog computing is not a replacement of cloud rather it is an extended version to cloud system to support the security as well the platform. Above said technology allows application to keep spurious information in the file system to swindle inside the data attacks. As the IoT is emerging ,fog plays an vital role in working with IoT. Future work will be based on fogging and its implementation.

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