

# Comparison of Divergent Technologies of Fog Computing

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**Abstract:** *The Fog computing technology is used for security and an extension to cloud computing. Fog Computing provides services to near edges which are end users through Internet. The applications of fog computing exist in mobile networks as well as in optimization of websites. This new technology provides low latency and location awareness and has wide-spread geographical distribution, supports mobility. The important task of fog is to position the data near the user that is the edge of the network. Fog Computing is also known as Edge Computing. This paper discusses the wide spectrum of fog computing technologies and its relation with cloud computing.*

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

## 1. Introduction

Instead of using a personal computer to store and manage data, nowadays cloud computing is done where data can be managed on remote servers using Internet services. The problem with cloud computing is that due to remote locations the response time factor comes into light.

So to resolve this issue to some extent fog computing came into limelight. Fog computing also known as Edge Computing takes into account services to end users at the edge of the network as a lot of bandwidth is required in cloud computing. Another factor is distributed system in which data is stored on different locations and processed from that location due to the availability of Internet nowadays which is growing on a large pace. In this processing the quality of the transference is also affected.

With the development of smart cities and wireless networks, usage of Internet is becoming more popular. So the concept of fog computing is referred as extension of cloud computing as the core of the network is shifted to edge of the network.

So fog computing helps in covering all these criteria's as fog computing provides proximity to end-users, low latency, location awareness, heterogeneity.

## 2. Techniques Used

### 1. Data Security

In this paper the security issues are the major concern while transferring data over the Internet using Cloud Computing. All the personal and business information stored and processed has to be secured and that any other ambiguous person should not infringe into that area.

For this purpose Fog Computing technology is used to provide security to the data and make it reliable. The end user will also be relaxed while sharing such information via Internet.

Other techniques discussed in this paper use Fog computing for optimizing the website performance [1].

### 2. Data Access Patterns Monitored

Cloud computing guarantees to essentially change the way we utilize PCs and get to and store our own and business data [2]. This paper proposes an alternate approach for securing information in the cloud utilizing decoy technology. At the point when unapproved get to is suspected and afterward checked utilizing challenge questions, user dispatches a disinformation assault by returning a lot of bait data to the assailant. This secures against the abuse of the client's genuine information. Tests directed in a neighbourhood record setting give confirm that this approach may give extraordinary levels of client information security in a Cloud situation

In this paper, Fake records put away in the Cloud nearby the client's genuine information additionally serve as sensors to recognize ill-conceived get to. Once unapproved information get to or introduction is suspected, and later checked, with test inquiries for example, we immerse the malignant insider with counterfeit data keeping in mind the end goal to weaken the client's genuine information. Such preventive assaults that depend on disinformation innovation could give phenomenal levels of security in the Cloud and in informal organizations.

### 3. CUSUM change point detection algorithm

Cloud computing is utilized as a conveyance stage which is a promising route for putting away client information and gives a protected access to individual and business data. The clients are furnished with on-request benefits through the Internet. Be that as it may, it likewise includes dangers like information burglary and different assaults. By performing such assaults, the interlopers can peep into archives which can brings about abuse of information furthermore translation of exceedingly private information for unlawful purposes. For securing client information from such assaults another worldview called fog computing can be utilized. This method can screen the client action to distinguish the authenticity and keep from any unapproved client get to.

A model is created using fog computing and decoy technology which detects the insider theft attacks [3]. Past strategy used to secure information was encryption procedures however in this examination work the system utilized is CUSUM change point location calculation for distinguishing the variations from the norm in client conduct profile. Diverse situations are considered by shifting the quantity of clients and their relating examples were investigated. Utilizing CUSUM, time, load and normal change in client profile or get to conduct is assessed. The idea of fog computing is restricting the client information a protected topographical areas

#### 4. Vehicular Traffic

This application expand the inspiration and focal points of Fog computing, and dissect its applications in a progression of genuine situations, for example, Smart Grid, savvy activity lights in vehicular systems and programming characterized systems. Security and protection issues are further uncovered by Fog registering worldview [5]. The paper research the stealthy elements of this assault by looking at its CPU and memory utilization on Fog gadget.

We explore Fog figuring focal points for administrations in a few spaces, and give the examination of the cutting edge and security issues in current worldview. In this situation, two models for Fog gadgets can be created. Autonomous Fog gadgets counsel straightforwardly with the Cloud for occasional reports on cost and requests, while interconnected Fog gadgets may counsel each other, and make coalitions for further upgrades. Next, Fog processing based SDN in vehicular systems will get due consideration. Movement light control can likewise be helped by the Fog processing idea. At long last, portability between Fog hubs, and amongst Fog and Cloud, can be researched.

#### 5. Mobile Edge Computing

Another idea that rose about a year prior, incorporating the IT and the Telecom universes will greatly affect the openness of the Telecom advertise. Moreover, the virtualization upheaval that has empowered the Cloud registering achievement will profit the Telecom area, which thusly will have the capacity to bolster the IaaS (Infrastructure as a Service). The primary goal of MEC arrangement is the fare of some Cloud abilities to the client's vicinity diminishing the inactivity, increasing the accessible transfer speed and diminishing the heap on the center system.

Moreover, IoT can extend the worldview to different regions (e.g. Vehicular Ad-hoc NETWORKS) with the utilization of Software Defined Network (SDN) arrangement to adapt to the difficulties upsetting the IoT genuine organization, as is illustrated in this paper [7].

Cloud, NFV, and SDN are at the base of these progressions. The MEC idea, as of late turning out, goes for applying Fog figuring (Cloud at the edge) to the portable system space. The IoT, which is exceptionally connected with the portable system, will profit by extending the MEC centre idea to different zones (VANET, WSN, etc.).

#### 6. Internet of Things

This paper [4] looks at probably the most encouraging and testing situations in IoT, and shows why current figure and capacity models limited to server farms won't have the capacity to meet the prerequisites of large portions of the applications predicted for those situations. Our examination is especially focused on three interrelated prerequisites: 1) portability; 2) solid control and activation; and 3) versatility, particularly, in IoT situations that traverse substantial land territories and require constant choices in light of information investigation. In view of our examination, this paper uncovers the reasons why Fog Computing is the normal stage for IoT, and talk about the unavoidable interaction of the Fog and the Cloud in the coming years. All the while, this paper surveys a portion of the advances that will need impressive advances to help the applications that the IoT market will request.

Process and capacity assets are turning out to be a great deal more implanted in the system and its impression will in the end reach out from the area of the "things" at the edge of the system up to the Cloud without glitch. This pattern offers astounding open doors, and actually uncovered the drivers for creating Fog Computing. We have demonstrated that a shrewd mix of Fog and Cloud Computing is the most conceivable wager for building a versatile and adaptable stage for IoT.

#### 7. Website Performance Optimization

Fog Computing can also be considered for web enhancement inside setting. This paper [8] proposes to apply existing techniques for web improvement in a novel way, to such an extent that these strategies can be joined with remarkable learning that is just accessible at the edge (Fog) hubs. More dynamic adjustment to the client's conditions (eg. arrange status and gadget's processing burden) can likewise be expert with system edge particular information. Subsequently, a client's website page rendering execution is enhanced past that accomplished by essentially applying those strategies at the web server or CDNs. More dynamic adjustment to the client's conditions (e.g. organize status and gadget's figuring burden) can likewise be refined with system edge particular information.

#### 3. Conclusion

The paper presented a wide range of applications of Fog Computing as an extension service to Cloud Computing paradigm to ensure reliability and at the same time more effective communication for client services. Fog computing has emerged as a solution to the problems of storage, latency, heterogeneity of data, security vulnerabilities and reliability issues for clients. The paper summarizes the significant work that has been done by researchers so far for the fog computing paradigm and its application areas.

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