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NOVEL TECHNOLOGY IN FOG COMPUTING FOR SECURE DATA SHARING

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ABSTRACT

The cloud computing platform has been used increasingly worldwide due to its efficient data sharing capability. But with the sharing of data cones the several issues like security and privacy. These issues needs to be handled effectively concerning the sensitive data being shared among the several users in the cloud environment. In this paper, we have reviewed five different schemes which are : Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing, Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System, Fog Computing: Security Issues, Solutions and Robust Practices, The Emerging Era of Fog Computing and Networking, Fog computing: The cloud-IoT/IoE middleware paradigm. But these methods have certain limitations in it , so to overcome these a new technique is designed so that the higher efficiency and greater performance can be achieved.

Keywords:
Cloud computing, cloud storage, access control, security, privacy, time-sensitive data, data sharing, encryption, decryption.

1. INTRODUCTION

The day by day increasing use of the Cloud platform has made it possible to share a large amount of data among the worldwide users. But the security and privacy issues need to be handled. Different methods have been used to overcome the security issues. The sharing of data amongst the users has increased worldwide and also use of fog computing has also integrated in day to day life. There should be methodology for this issue.

There are five different schemes discussed in this paper which are : Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing, Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System, Fog Computing: Security Issues, Solutions and Robust Practices, The Emerging Era of Fog Computing and Networking, Fog computing: The cloud-IoT/IoE middleware paradigm.

These numerous schemes are getting used to offer the specified Security and get right of entry to manage centres to the users. But these schemes have some drawbacks in them, so to overcome the limitations a new improved method, "Novel Technology in Fog computing for secure data sharing". This scheme helps to achieve all the limitations of the previous schemes and provides increased security for the confidential data sharing in cloud.

2. BACKGROUND

Many studies have been done on the schemes available and their results have been analysed. These schemes ahre given by different authors. The various schemes discussed over here are : Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing is a method designed to implement in the vehicular environment. This then gives a novel solution for latency and quality optimization task for the Vehicular Fog Computing. [1]. Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System is designed to overcome the imitations of the traditional standalone embedded system. It tries to increase the functionality, flexibility and scalability of the embedded system used in the fog environment [2]. Fog Computing: Security Issues, Solutions and Robust Practices focuses on the data sharing in the fog computing environment. This method focuses on the critical analysis of the fog architecture with respect to security. [3]. The Emerging Era of Fog Computing and Networking enables the use of fog computing network from anywhere and anytime. Nowadays the use of fog computing is increasing on a large scale, so it is possible to share large amounts of data in the fog network [4]. Fog computing: The cloud-IoT/IoE middleware paradigm is a promising approach for the IoT. The IoT works on the principle of machine to machine(M2M). But in this the unintelligent objects become the communication nodes. When the people become part of this, the IoT turns into Internet of Everything(IoE) [5].

This paper introduces five different methods for the secure data sharing and access control facilities for the user. These are : Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing, Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System, Fog Computing: Security Issues, Solutions and Robust Practices, The Emerging Era of Fog Computing and Networking, Fog computing: The cloud-IoT/IoE middleware paradigm.

These are organized as follows.

Section I Introduction.

Section II discusses Background.

Section III discusses previous work.

Section IV discusses existing methodologies.

Section V discusses attributes and parameters and how these are affected on mobility models.

Section VI proposed method and

VII outcome result possible. Finally

section VIII Conclude this review paper

3. PREVIOUS WORK DONE

In the previous research papers discussed here, various schemes have been discussed for the secure sharing of time-sensitive data in the cloud environment that provides the required security and efficiency for data sharing.

Chao Zhu et al. (2018) [1] has proposed the Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing scheme. This provides a novel solution for latency and quality optimized task allocation in Vehicular Fog Computing. In this the task allocation can be adjusted according to the actual requirements of the service latency and quality. Deze Zeng et al. (2016) [2] presented the Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System method. This approach focuses on the drawbacks of the traditional embedded systems. This strategy is designed for minimum task completion time. Bushra Zaheer Abbasi et al. (2017) [3] proposed the Fog Computing: Security Issues, Solutions and Robust Practices for the secure sharing of data in the fog ccomputing. The important security features that can ensure reliability of the system are also highlighted. Harvey Freeman et al. (2016) [4] has presented the The Emerging Era of Fog Computing and Networking that presents the advantages and it gives a fundamental advancement in the state of art computing and networking.

Mohammad Aazam et al. (2016) [5] has presented the Fog computing: The cloud-IoT/IoE middleware paradigm for the evolution in the fog computing network. In this the concept of Internet of Things(IoT) and Internet of Everything(IoE) is elaborated. As the use of fog computing is being increased on a large scale , the need for security and privacy is increased.

4. EXISTING METHODOLOGIES

There are various schemes available which are being used for providing while sharing confidential and time-sensitive data on the cloud. Also these methods are being used for providing security and enabling sharing of data securely in the cloud. These methods discussed over here are : Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing, Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System, Fog Computing: Security Issues, Solutions and Robust Practices, The Emerging Era of Fog Computing and Networking, Fog computing: The cloud-IoT/IoE middleware paradigm.

4.1 Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing,: This method is given to be implemented in the Vehicular Fog Computing environment. It provides a novel solution for the latency and quality optimized task allocation . This scheme is designed to support the mobility of vehicles and including vehicles that generate tasks and others that serve as fog nodes. Specifically, we propose an event-triggered dynamic task allocation (DTA) framework using Linear Programming based Optimization (LBO) and Binary Particle Swarm Optimization (BPSO). The simulation results show that the task allocation in Folo can be adjusted according to the actual requirements of the service latency and quality and it can achieve higher performance compared with the naive approach [1].

4.2 Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System :

Traditional standalone embedded system is limited in their functionality, flexibility, and scalability. Fog computing platform, characterized by pushing the cloud services to the network edge, is a promising solution to support and strengthen traditional embedded system. Resource management is always a critical issue to the system performance. In this method, we consider a fog computing supported software-defined embedded system, where task images lay in the storage server while computations can be conducted on either embedded device or a computation server. It is significant to design an efficient task scheduling and resource

management strategy with minimized task completion time for promoting the user experience. Thus this balances the workload on the client service and servers, resource management and balancing the I/O interrupt requests. [2].

4.3 Fog Computing: Security Issues, Solutions and Robust Practice :

Fog Computing (FC) has extended the services of cloud computing to the edge of the network. It inherits some of the characteristics from cloud computing but Fog Computing also have some distinguished features such as geo-distribution, location awareness and low latency. Along with the inherited characteristics, it also inherits the issues and problems of cloud computing like energy efficiency, resource management and security issues. This method presents the critical analysis of the fog architecture with respect to security. The state of the art work done is critically analyzed on the bases of security techniques and security threats. [3].

4.4 The emerging era of Fog Computing and networking:

This new paradigm is Fog, which distributes computing, control, storage, and networking services closer to end users. Fog is a natural extension of the Cloud, bridging the Cloud and the endpoints to make computing possible anywhere along the continuum from the Cloud down to the end users. A Fog computing platform will allow the same application to run anywhere, reducing the need for specialized applications dedicated just for the Cloud or just for the edge devices. It will enable applications from different suppliers to run on the same physical platform without mutual interference [4].

4.5. Fog computing: The cloud-IoT/IoE middleware paradigm:

This method is used to elaborate the concepts of fog computing. It takes advantage of the Internet of Things(IoT) and Internet of Everything(IoE). As the Internet of Things(IoT) takes advantage of the machine to machine communication(M2M), there are unintelligent objects into it connected. When the people become a part of this, then the Internet of Everything(IoE) comes into it. The IoE brings together people, data, processes, and things, making networked connections more relevant and valuable. In this way, information is turned into actions, creating new capabilities, richer experiences, and unparalleled economic opportunity for businesses, people, and countries. Today, people are connected to the Internet through gadgets like smart phones, personal computers, tablets, and social media and as the evolution continues in the IoE, this connectivity of people would happen in innumerous ways, particularly through various types of sensors.

5. ANALYSIS AND DISCUSSION

The Folo- Latency and Quality Optimized Task Allocation in Fog Computing scheme is novel solution for the latency and quality optimized task allocation in Vehicular Fog Computing(VFC). The task allocation can be adjusted and results show that it can achieve higher performance than the previous methods [1]. Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System is provided to overcome the limitations of the traditional embedded systems. It provides increased functionality, flexibility and scalability than the previous systems [2]. Fog Computing: Security Issues, Solutions and Robust Practices analyses the fog architecture with respect to security and privacy. It provides advantages like geo-distribution, location awareness and low latency. Thus it helps to achieve the security goals in the data sharing environment [3]. The emerging era of Fog Computing and networking provides great advantage in the fog computing environment. The use of fog computing is increasing day by day, so it is essential to handle and address the security and privacy issue [4]. Fog computing: The cloud-IoT/IoE middleware paradigm provides various advantages taking the advantage of IoT and IoE. The IoT and IoE gives a promising approach for the people to share data efficiently [5].

Mobility scheme	Advantages	Disadvantages
Folo: Latency and Quality Optimized Task Allocation in Vehicular Fog Computing	This scheme adjusts in the vehicular fog computing and achieves higher performance.	The computations take a bit slower.
Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System	This scheme is efficient in functionality, flexibility and scalability.	The implementation is a bit complicated
Fog Computing: Security Issues, Solutions and Robust Practices	This scheme gives geo-distribution, low latency and location awareness.	The scheme is time consuming for large operations.
The emerging era of fog Computing and networking	This method supports large scale functions.	The complexity increases with the amount of data.
Fog computing: The cloud-IoT/IoE middleware paradigm	This method elaborates and uses the concepts of IoT and IoE.	The implementation takes time.

table 1: comparisons between different security schemes

6. PROPOSED METHODOLOGY

Several different schemes are available for dealing with data sharing in the fog computing environment. These schemes deal with the issues like data sharing and security. But they provide security considering some factors. But the security needs to be provided on every aspect such as in the group sharing in the fog environment. So, here we proposed an "Novel Technology in Fog computing for secure data sharing". This scheme works as follows : The fog computing technology is used on a large scale worldwide. For this it is necessary to protect the data from the intruders. Thus at first when the data is shared, the Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System method is used. This takes advantage of the traditional embedded systems and overcome the previous drawbacks. This gives different advantages like balancing the workload, resource management, balancing the I/O interrupt requests. Next here we use the mutual authentication scheme in fog computing. This helps to identify the fog user and fog server without disclosing the real identity of the user. Thus it helps to achieve higher security and integrity while sharing the data.

The algorithm given below defines the flow of the proposed scheme :

Basic steps of algorithm:

Step 1: The data is being shared in the fog computing network.

Step 2: Then the Joint optimization method is applied over the data.

Step 3: The balanced data is then passed forward towards its receiver.

Step 4: Finally the mutual authentication scheme is applied on the data.

Step 5 : The data shared is thus secure and the intended receiver gets the required data..

Diagrammatic representation of proposed method is shown as follows:

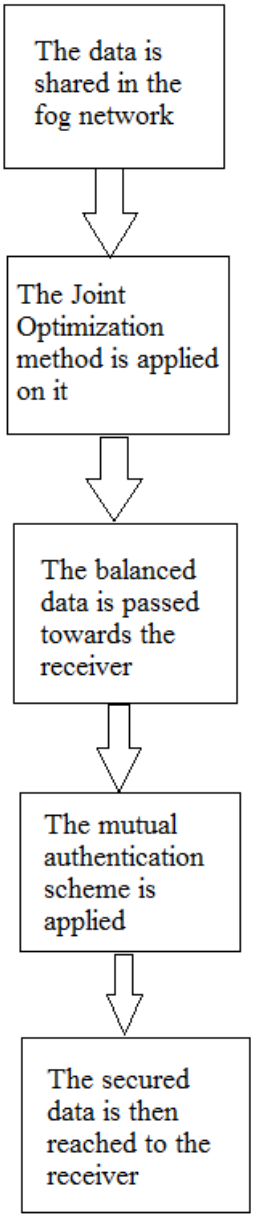

fig 1: flow of the algorithm showing the proposed scheme

7. OUTCOME AND POSSIBLE RESULTS

In this way, the proposed scheme gives a novel solution for the data sharing in the fog computing environment. The load on the network is balanced properly using the Joint optimization technique. The resource management is equally managed. The data then moves forward towards the receiver and then the mutual authentication scheme is applied. This scheme helps to authenticate the fog user with the fog server. Thus the intended receiver gets the required data securely in the computing environment.

8. CONCLUSION

This paper focused on the study of different methods which are being used for sharing sensitive data in the cloud environment. These schemes are : Folo- Latency and Quality Optimized Task Allocation in Vehicular Fog Computing, Joint Optimization of Task Scheduling and Image Placement in Fog Computing Supported Software-Defined Embedded System, Fog Computing: Security Issues, Solutions and Robust Practices, The Emerging Era of Fog Computing and Networking, Fog computing: The cloud-IoT/IoE middleware paradigm. But these schemes have certain limitations in it. So to overcome those we have proposed a "Novel Technology in Fog computing for secure data sharing". This helps to maintain the integrity in data sharing.

9. FUTURE SCOPE

From the observations of the proposed scheme, we can further improve it with less number of complications with less overhead and increased speed.

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