A Project Review-1 Report

on

Secure key generation algorithm

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Under The Supervision of
Mr. KK Aggarwal
Asst. prof

Submitted By

Manish Kumar
(20SCSE1010830)
Anirudh Kumar
(20SCSE1010801)
Tarun Kumar
(20SCSE1010846)

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY, GREATER NOIDA
INDIA

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Abstract

Fog computing, known with another name as edge computing, is a distributed computing paradigm that extends cloud computing to the edge of the network. It enables the execution of compute, storage, and networking services closer to the end-users and devices, reducing the latency and improving the network efficiency. Fog computing has gained significant attention in recent years due to its ability to support low-latency applications, improve data security, and reduce the amount of data sent to the cloud. Among its all advantages, the main advantage of fog computing is its ability to support low-latency applications. By processing data closer to the edge of the network, fog computing reduces the latency and improves the overall user experience. Another advantage of fog computing is its ability to improve data security. By reducing the amount of data that needs to be transmitted to the cloud, fog computing reduces the risk of data breaches and improves data privacy. Additionally, fog nodes can implement security protocols and policies, providing an extra layer of security for sensitive data. Fog computing has been applied in various domains, including healthcare, transportation, smart cities, and industrial automation. However, there are still some challenges associated with fog computing that need to be addressed for the technology to reach its full potential. These challenges include resource management, security, scalability, and interoperability. Resource management involves balancing the workload across the fog network, ensuring that the resources are allocated efficiently. Fog computing is a promising technology that has the potential to transform various industries and improve the overall user experience. With the right infrastructure and management, fog computing can enable faster decision-making, improve data security, and support low-latency applications. However, addressing the challenges associated with fog computing is crucial for the technology to reach its full potential and become widely adopted.

Keywords: Fog Computing

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CHAPTER-1
Introduction

Fog technology has become a better alternative for cloud computing. Unlike traditional cloud computing, where data is processed and stored in remote data centers, fog computing enables the execution of compute, storage, and networking services closer to the edge of the network. This reduces the latency and improves the network efficiency, enabling real-time data processing and analysis. Fog computing relies on a network of fog nodes, which are distributed throughout the network and act as intermediaries between the end-users and cloud data centers. These nodes can be physical or virtual, and they provide compute, storage, and networking services to the devices connected to them. The fog nodes are responsible for collecting and processing data, providing real-time analytics, and enabling faster decision-making. As seeing the benefits of using this technology its application is also widely varying in the current scenario. The various application of this technology are in autonomous vehicles, in healthcare, in transportation, in smart cities etc. For example, in autonomous vehicles, fog computing can be used to process sensor data and provide real-time feedback to the vehicle's control system, improving safety and responsiveness. In healthcare, fog computing can be used to monitor patients in real-time, collect and analyze medical data, and provide personalized care. In transportation, fog computing can be used to improve traffic management, enable autonomous vehicles, and enhance driver safety. In smart cities, fog computing can be used to monitor and manage infrastructure, improve energy efficiency, and enhance public safety. In industrial automation, fog computing can be used to optimize manufacturing processes, reduce downtime, and improve product quality. Likewise, its benefits its challenges are also high, which includes Security, scalability, interoperability. Security involves protecting the fog network and the data that is processed within it from cyber threats. Scalability involves ensuring that the fog network can handle increasing amounts of data and devices. Interoperability involves ensuring that the fog nodes can work together seamlessly and communicate with other networks and cloud data centers.

1. Introduction

- **Problem:** Need of real-time response and low latency
- **Solution:** Become a viable platform for processing emerging IoT applications
- **Benefit of Fog Computing :** Highly distributed, Dynamic and Resource-constrained
- **Challenge:** Deploying fog computing resources effectively for executing heterogeneous/homogenous and delay sensitive IoT tasks is a fundamental challenge.

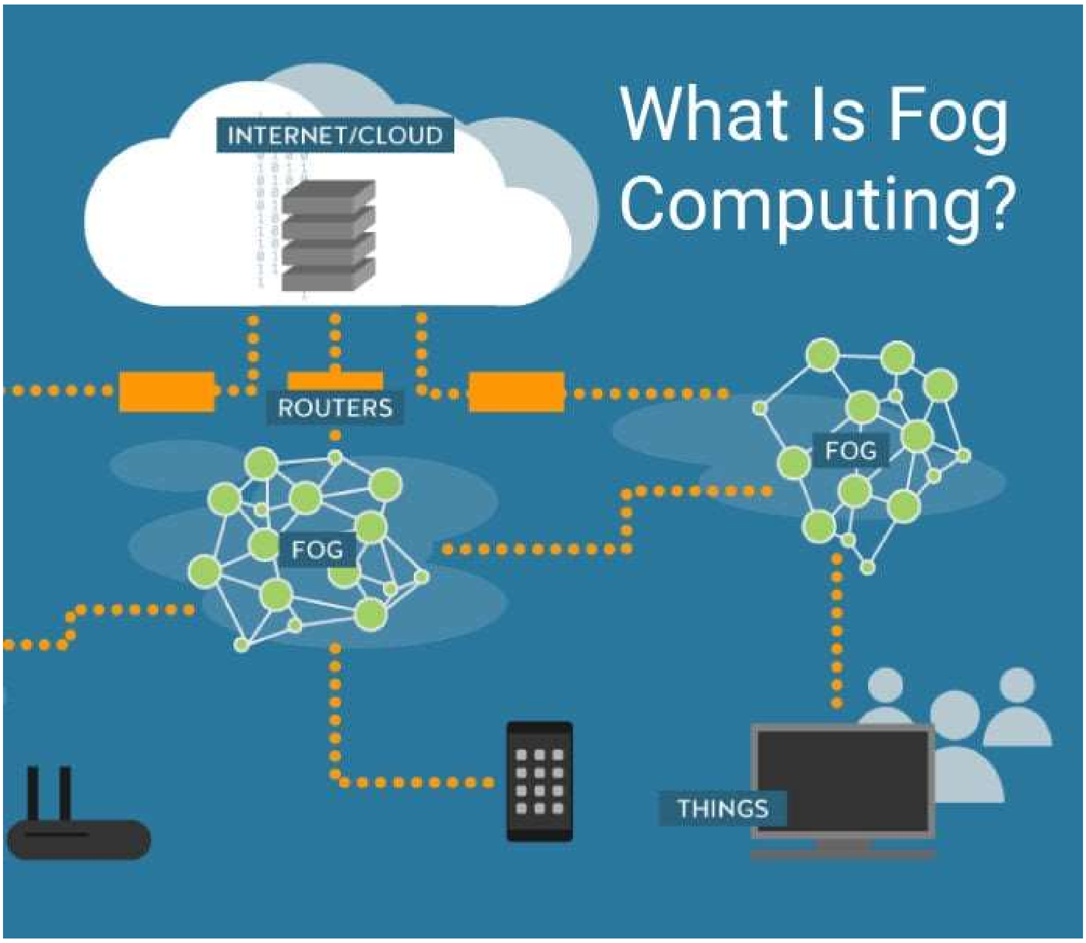
2. Related Work

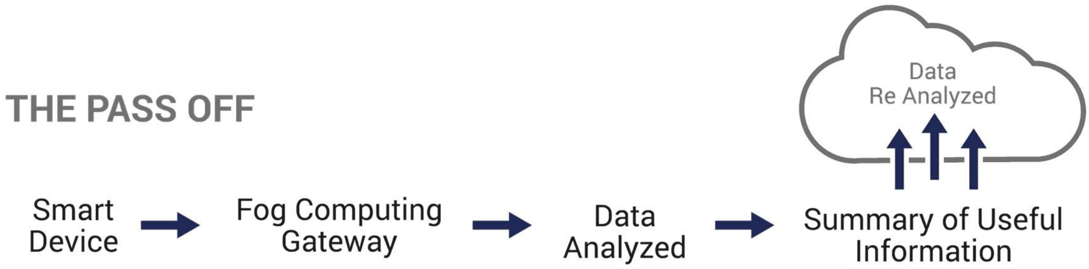
- **Delay aware algorithm** – Due to the importance of the response time for IoT application requests, many researchers have considered this aspect in their optimization goals

- **Energy efficient algorithm** – Energy efficiency is one of the major concerns in IoT ecosystem. Therefore, minimizing energy consumption of the FNs is considered to be one of the objectives in recent studies.
- **Joint delay-aware and energy efficient algorithm** – Considering both of the delay requirement of IoT tasks and the energy consumption of FNs has become an active research area nowadays.

3. System Model

- The high-level **System Architecture** of the IoT-fog – cloud environment, which consists of four parts, namely **IoT devices, gateways, fog environment and cloud environment**.





4. Problem Formulation

- First, the basic elements and decision variables of the optimization problem are introduced.
- Then, the response time and energy models are described. Finally, the problem overview is given.
- Basic elements : Fog nodes and submitted tasks from IoT devices are the key elements of our model.
- **Fog Nodes:** A fog network consists of several interconnected FNs which form a mesh topology.
- **Decision variables**
- **Response time**
- **Energy Consumption**
- **Compare and contrast among different algorithms**
- **Develop a fitness function to improve accuracy for this distributed scheduling tasks**

5. Performance Evaluation

- Parameter: Performance of the proposed task scheduling approaches with respect to the percentage of IoT tasks
- Compared with existing algorithms, the experiment results confirm that the proposed algorithms improve
- **Deadline Requirement:** Percentage of tasks meeting their deadline requirement up to 1.35x
- **Deadline Violation Time**: Decrease up to 97.6% compared to the second-best results
- **Energy consumption** of fog resources : Optimized
- **Makespan** of the system : Optimized

6. Performance Analysis with Existing Algos

- **(1) First Come First Serve (FCFS) :** Simple task scheduling algorithm which aims to balance the load among the computing nodes of the environment. In the FCFS policy, the first IoT task that arrives at the FC is the first task to be scheduled. For each task, a FN is randomly selected to process the task.
- **(2) Earliest Deadline First (EDF):** EDF is a delay-aware scheduling algorithm where it gives higher priority to tasks with the lower deadline. Similar to FCFS, the FN selection phase is based on the random strategy.
- **(3) Greedy for Energy (GfE) :** Similar to the FCFS, except node selection phase is different. GfE assigns **each task to the FN that offers the most energy-saving** for the system.
- (4) Detour : This scheme includes three aspects:
- (a) local decision-making process
- (b) optimal FN selection
- (c) optimal path selection

7. Conclusion and Future Work

Conclusion:

- Studied the scheduling of IoT tasks in a heterogeneous fog network
- Optimizes the total energy consumption of the system while meeting the deadline of the tasks.
- If the deadline of a given task is not met:
- Allocation of task to a fog node with minimum violation of deadline
- To achieve these goals, **two efficient priority aware semi-greedy algorithms** are proposed
- Results : Proposed algorithms **significantly outperform** existing algorithms:
- **Percentage of IoT tasks that meet their deadline requirement**
- **Total energy consumption and makespan of the system**
- **Total amount of the deadline violation time.**
- To plan to improve the proposed algorithms to schedule the dependent IoT tasks.
- To evaluate the performance of the proposed algorithms under different real-world datasets.
- Develop a fitness function to increase the accuracy and efficiency of our project

CHAPTER-2
Literature Survey

- "Fog computing and its role in the internet of things" by Shi et al. (2016) This paper provides an overview of fog computing and its applications in the Internet of Things (IoT) ecosystem. It discusses the advantages of fog computing over traditional cloud computing, including lower latency, improved energy efficiency, and reduced bandwidth usage.
- "A survey on fog computing: architecture, key technologies, applications and open research issues" by Yi et al. (2015) This survey paper provides a comprehensive overview of fog computing, including its architecture, key technologies, and applications. It also identifies open research issues and challenges in the field.
- "Fog computing: principles, architectures, and applications" by Bonomi et al. (2012) This paper introduces the concept of fog computing and presents its principles, architectures, and applications. It discusses the benefits of fog computing over cloud computing, including reduced latency, improved security, and increased reliability.
- "Fog computing: a taxonomy, survey and future directions" by Madsen et al. (2018) This survey paper presents a taxonomy of fog computing and provides a comprehensive survey of the existing research in the field. It also identifies future directions and research challenges in fog computing.
- "Edge computing: vision and challenges" by Shi et al. (2016) This paper discusses the concept of edge computing, which is closely related to fog computing, and presents its vision and challenges. It highlights the importance of edge computing in enabling new applications and services, such as autonomous vehicles and augmented reality.
- "Fog computing for the internet of things: security and privacy issues" by Yi et al. (2015) This paper discusses the security and privacy issues in fog computing for the Internet of Things. It identifies the potential threats and attacks in fog computing and proposes solutions to mitigate them.
- "A survey of fog computing: concepts, applications and issues" by Yousefpour et al. (2019) This survey paper provides a comprehensive overview of fog computing, including its concepts, applications, and issues. It also presents a comparison of fog computing with other related paradigms, such as cloud computing and edge computing