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TOWARDS FOG CENTRIC SECURE CLOUD STORAGE SCHEME

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ABSTRACT

Now a days cloud has become one of the fascinating domain in order to store and retrieve all the data from the remote machines rather from the local machines. In general cloud is always store the data in centralized server and all the users need to connect to the centralized server location for storing or accessing the data to and from the cloud server. Now a days fog computing is increasing its demand for data storage because, the fog computing is deployed at the edge of network, offering low error rates to users. In this project, we investigate an scheme by taking three fog nodes along with data owner and public cloud services(PCS) for storing and accessing the file in a secure manner. The proposed application provide a best feature to store and access the data from the cloud in a secure manner by utilizing the storage space and without wasting the storage space.

1. INTRODUCTION

The rapid rise of the Internet of Things (IoT) as the main connectivity medium for billions of industrial sensors, smart home appliances, and consumer wearable devices, is paving the way for novel communication and computation paradigms that can help scale such unexpected new communications [1], [2]. The resulting IoT data volume is expected to overwhelm the network bandwidth, the storage systems, the compute resources, and the analytics services.Fog or Edge computing were proposed to address the needs to bring the computation closer to the edge of the network taking advantage of the shorter round trip time (RTT) delays to reduce operational. Fog computing paradigm aims at decreasing network congestion while increasing the Quality of Experience (QoE)–faster analysis and shorter computation delays. Fog computing takes advantages of the shorter round trip time delays to minimize the operational cost [5], [6], limit the overwhelming of the core network [7], and reduce computation delays [8].With the ever-increasing wireless and compute capabilities, offloading computation to edge nodes, called cloudlets [9], become an attractive and cheap solution than reaching a distant and often costly cloud.

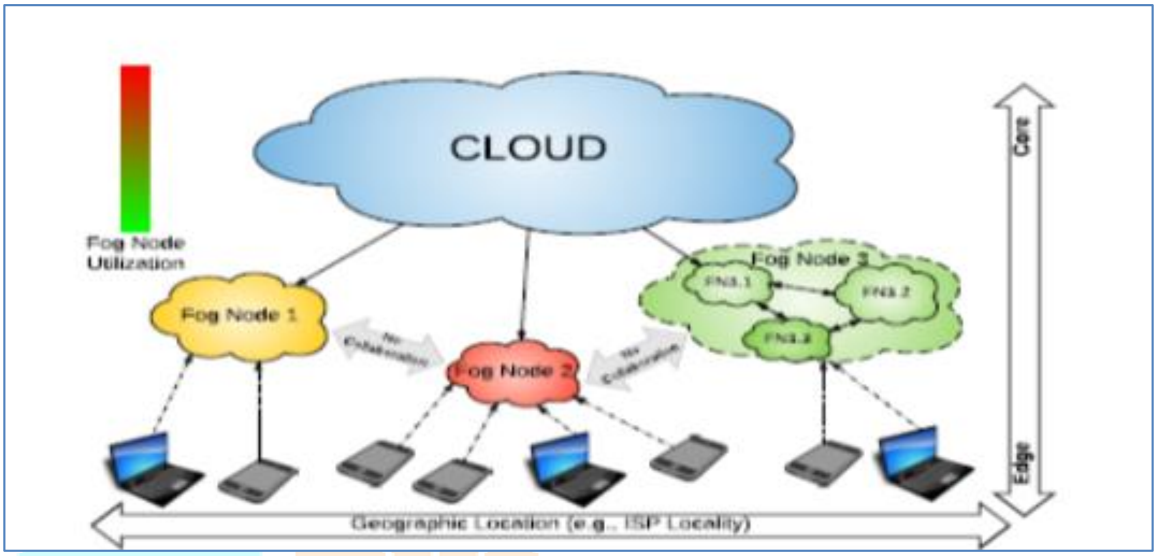


Fig. 1: A Fog computing scenario: fog nodes may have different utilization levels resulting on varying performances (green indicates low and red indicates high utilization levels). While traditional uncoordinated compute resources have been deployed as operational schemes for such fog computing platform, we consider a scenario of coordinated scheme, where such compute resources, called fog nodes, can collaborate by dedicating part of their resources to improve the overall system performance with respect to satisfying all computational requests as shown in Fig. 1. Collaboration between competitive entities is often restricted unless a credit based incentive is ensured and applied in exchange for dedicating resources for foreign fog nodes. They simplify the coordination and the accounting, however in the context of fog computing, ensuring that all providers will be willing to participate in order to help each others is challenging and may not guarantee the system stability.

In this project, we aim at ensuring a fair use of resources across all providers as a mean to increase the overall service utility. We leverage the power-of-two random choices result to design a simple and effective scheduling algorithm for collaborative fog computing. We consider a network consisting of N collaborative fog nodes belonging to different providers and each serving a Poisson flow of computation requests, or tasks. When a given task h reaches a fog node

u 2 N, u polls another node v 6= u at random. The polled node decides to cooperate with a certain probability, which is tuned dynamically. In case of cooperation, if the polled node's service utilization Uv is lower than Uu, h is forwarded to node v. The design of the algorithm is inspired to the results of the analysis of an ideal system with infinitely many nodes loaded with Poisson traffic whose mean can only assume a finite set of values.We first numerically show that in such a system the nodes can cooperate in a fair and optimal way, i.e., they can set their cooperation probabilities in such a way that on the average a node receives the same amount of CPU cycles that the node borrows to other providers.We then propose an algorithm to tune the cooperation probabilities dynamically. Our simulation results show that the tuning algorithm converges and correctly reacts to changes in the loads. In addition, a provider can get the same performance that it would obtain if the resources of the provider were increased of 30 %.

2. LITERATURE SURVEY

Cloud computing is the utilization of processing assets (equipment and programming) that are conveyed as an administration over a system (normally the Internet). The name originates from the regular utilization of a cloud-formed image as a deliberation for the perplexing foundation it contains in framework outlines. Distributed computing endows remote administrations with a client's information, programming and calculation. Distributed computing comprises of equipment and programming assets made accessible on the Internet as oversaw outsider administrations. These administrations regularly give access to cutting edge programming applications and top of the line systems of server PCs.

1) Internet of things: Vision, applications and research challenges.

AUTHOR: D. Miorandi, S. Sicari, F. De Pellegrini, and I. Chlamtac.

Internet of Things (IoT) is the convergence of the Internet with smart objects or “things belonging to Internet” to exchange the real-world information. Now the Internet is moving out from Internet of people to the Internet of everything. Billions of devices expected to connect to the Internet in future that will require a well manageable mechanism where the objects can sense and behave accordingly by themselves. This project presents how the data/information from smart objects gives rise to the actual discoveries in IoT world. IoT vision is presented with a simple architecture of IoT. Diiferent IoT application domains with their use cases are discussed. Finally, a taxonomy of IoT research areas is presented with different research challenges.

2) An architectural approach towards the future internet of things.

AUTHOR: D. Uckelmann, M. Harrison, and F. Michahelles.

Many of the initial developments towards the Internet of Things have focused on the combination of Auto-ID and networked infrastructures in businessto- business logistics and product life cycle applications. However, a future Internet of Things can provide a broader vision and also enable everyone to access and contribute rich information about things and locations. The success of social networks to share experience and personalised insights shows also great potential for integration with business-centric applications. The integration and interoperability with mainstream business software platforms can be enhanced and extended by real-time analytics, business intelligence and agent-based autonomous services. Information sharing may be rewarded through incentives, thus transforming the Internet of Things from a cost-focused experiment to a revenue-generating infrastructure to enable trading of enriched information and accelerate business innovation. Mash-ups and end-user programming will enable people to contribute to the Internet of Things with data, presentation and functionality.

3) Towards resource sharing in mobile device clouds: Power balancing across mobile devices.

AUTHOR: A. Mtibaa, A. Fahim, K. A. Harras, and M. H. Ammar.

Despite the increased capabilities of mobile devices, mobile application resource requirements can often transcend what can be accomplished on a single device. This has been addressed through several proposals for efficient computation offloading from mobile devices to remote cloud resources or closely located computing resources known as cloudlets. In this project we consider an environment in which computational offloading is performed among a set of mobile devices. We call this environment a Mobile Device Cloud (MDC). We are interested in MDCs where nodes are {\em highly collaborative}. We develop computational offloading schemes that {\em maximize the lifetime} of the ensemble of mobile devices where we consider the network to be alive as long as no device has depleted its battery. As a secondary contribution in this work, we develop and use an experimentation platform that allows us to evaluate a range of computational models and profiles derived from a realistic testbed. We use this platform as a first step in an evaluation exercise that demonstrates the effectiveness of our computation offloading algorithms in extending the lifetime of an MDC.

4) Towards mobile opportunistic computing.

AUTHOR: A. Mtibaa, K. A. Harras, K. Habak, M. Ammar, and E. W. Zegura.

With the advent of wearable computing and the resulting growth in mobile application market, we investigate mobile opportunistic cloud computing where mobile devices leverage nearby computational resources in order to save execution time and consumed energy. Our goal is to enable generic computation offloading to heterogeneous devices that include Cloud, mobile devices, and cloudlets. We propose a generic and flexible architecture that maximizes the computation gain with respect to various objective functions such as, minimizing the response time, reducing the overall energy consumption, and increasing the network lifetime. This novel architecture is designed to automate computation offloading to numerous compute resources over disrupted network connections.

5) Assessment of the suitability of fog computing in the context of internet of things.

AUTHOR: S.Sarkar,S.Chatterjee,andS.Misra.

This work performs a rigorous, comparative analysis of the fog computing paradigm and the conventional cloud computing paradigm in the context of the Internet of Things (IoT), by mathematically formulating the parameters and characteristics of fog computing-one of the first attempts of its kind. With the rapid increase in the number of Internet-connected devices, the increased demand of real-time, low-latency services is proving to be challenging for the traditional cloud computing framework. Also, our irreplaceable dependency on cloud computing demands the cloud data centers (DCs) always to be up and running which exhausts huge amount of power and yield tons of carbon dioxide (CO_2) gas. In this work, we assess the applicability of the newly proposed fog computing paradigm to serve the demands of the latency-sensitive applications in the context of IoT. We model the fog computing paradigm by mathematically characterizing the fog computing network in terms of power consumption, service latency, CO_2 emission, and cost, and evaluating its performance for an environment with high number of Internet. However, it is mentionworthy that for an environment with less percentage of applications demanding for low-latency services, fog computing is observed to be an overhead compared to the traditional cloud computing. Therefore, the work shows that in the context of IoT, with high number of latency-sensitive applications fog computing outperforms cloud computing

3. EXISTING SYSTEM

Till now there is no concept of fog nodes integration in the cloud server, so there are many limitations that occur in the existing networks. The following are the limitations which takes place in the existing cloud server. They are as follows:

LIMITATION OF EXISTING SYSTEM

The following are the limitation of existing system. They is as follows:

1) All the existing cloud servers try to store and access the data in a plain text manner .
2) There is no concept like integrating fog nodes into the cloud computing domain so there is a lot of storage problems occur for the data owners who try to add data inside the cloud server.
3) Also there is no concept of monitoring the space availability for the individual storage locations of cloud by the public cloud admin.
4) All the data stored is plain text manner and hence it is easy for the attacker to create any sort of attack on the sensitive data.

4. PROPOSED SYSTEM

Due to the poor capability and maintenance of storage space by the cloud server, we came with a new concept like fog servers which are deployed at the edge of the network, offering low latency access to users. With the expansion of such fog computing services, different providers will be able to deploy multiple resources within a restricted geographical proximity. In this project, we investigate an scheme by taking three fog nodes along with data owner and public cloud services(PCS) for storing and accessing the file in a secure manner.The proposed application provide a best feature to store and access the data from the cloud in a secure manner by utilizing the storage space and without wasting the storage space.

ADVANTAGES OF THE PROPOSED SYSTEM

The following are the advantages of the proposed system. They are as follows:

1. It is an efficient authenticated structure.
2. All the data is stored in a encrypted manner in various partitions of fog server and hence we can able to maintain the data in a proper manner.
3. This will greatly help to reduce the storage problem which is present inside the cloud server.
4. The storage complexity and management of space is properly utilized by the cloud server.

The fog nodes provide a great flexibility for data storage and data sharing for the end users.

5. SOFTWARE PROJECT MODULES

Implementation is the stage where the theoretical design is converted into programmatically manner. In this stage we will divide the application into a number of modules and then coded for deployment. We have implemented the proposed concept on Java programming language with JEE as the chosen language in order to show the performance this proposed protocol. The front end of the application takes JSP,HTML and Java Beans and as a Back-End Data base we took My-SQL Server. The application is divided mainly into following 4 modules. They are as follows:

1) System Construction Module
2) Data Owner Module
3) Fog Nodes Module
4) Public Cloud Server Module

Now let us discuss about each and every module in detail as follows:

5.1 System Construction Module

The system construction module mainly contains the roles like single Public cloud server and multiple data owners who can upload their files into the cloud server and multiple fog nodes for maintaining the files under different locations. Here these fog nodes will have individual storage capability and the system will update all the capabilities periodically.

5.2 Data Owner Module

Here the DO is one who got registered into the application and once they get authorization from PCS they can login into the system and perform some operations like Upload the file,the file can be uploaded in encrypted manner inside the fog nodes which are present in the cloud.The system will verify the size of the data and based on the size the available fog node which can accept the data will be selected and the data will be automatically assigned to that space.

5.3 PCS Module

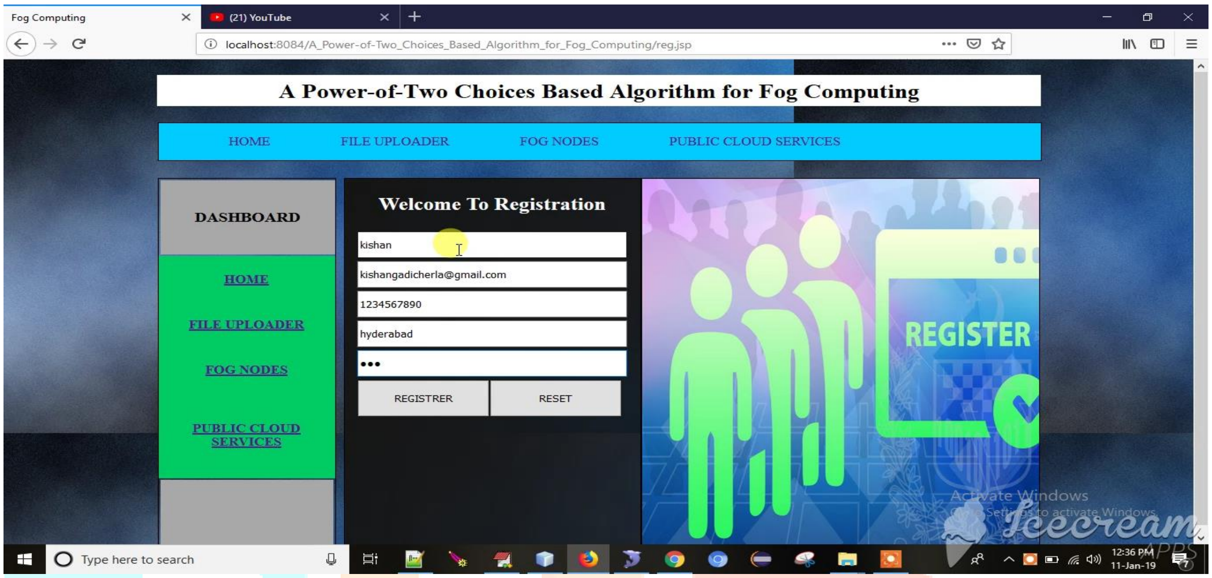
Here the PCSvis a person who initially login into the application and once they get login they can authorize the data owners who are present in the application and they will control the onwers and the fog nodes.This can see the storage capability of all the fog nodes and it can see the difference in space periodically.

4.8.4 Fog Nodes Module

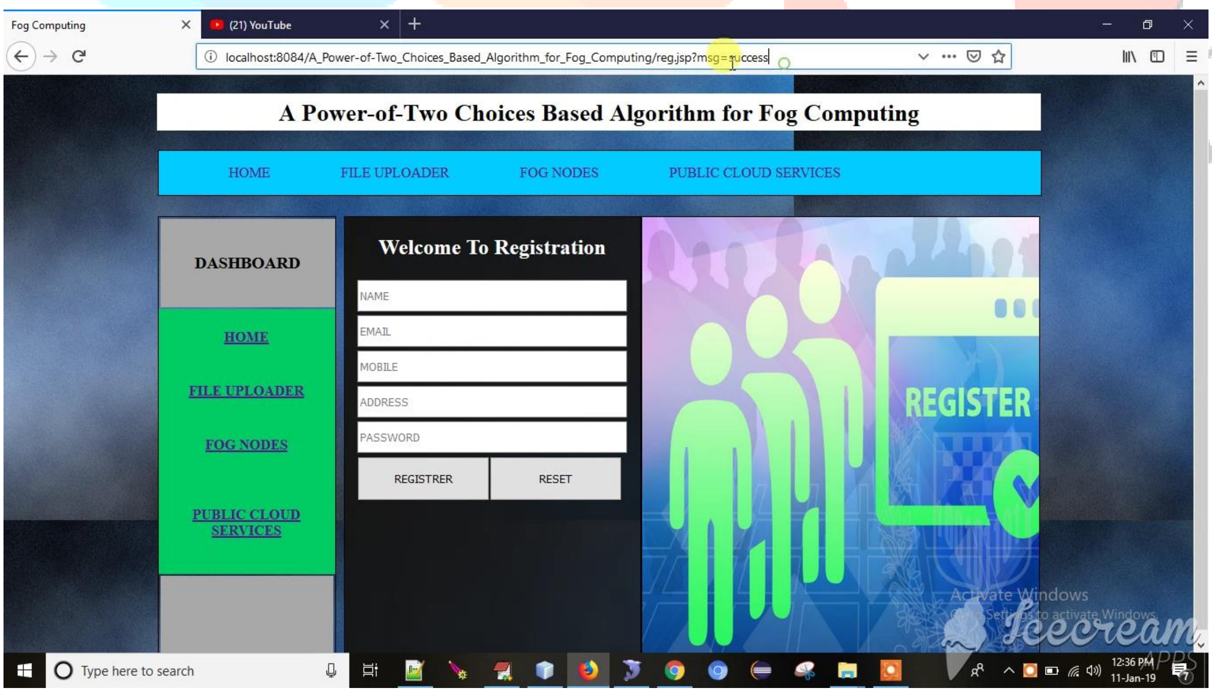
Here we try to add nearly three fog nodes which are used for storing the files which is uploaded by the uploader or owner.The fog nodes will have different storage spaces and the system will monitor the fog nodes for storing and retrieving the files in a secure manner.

6. EXPERIMENTAL RESULTS

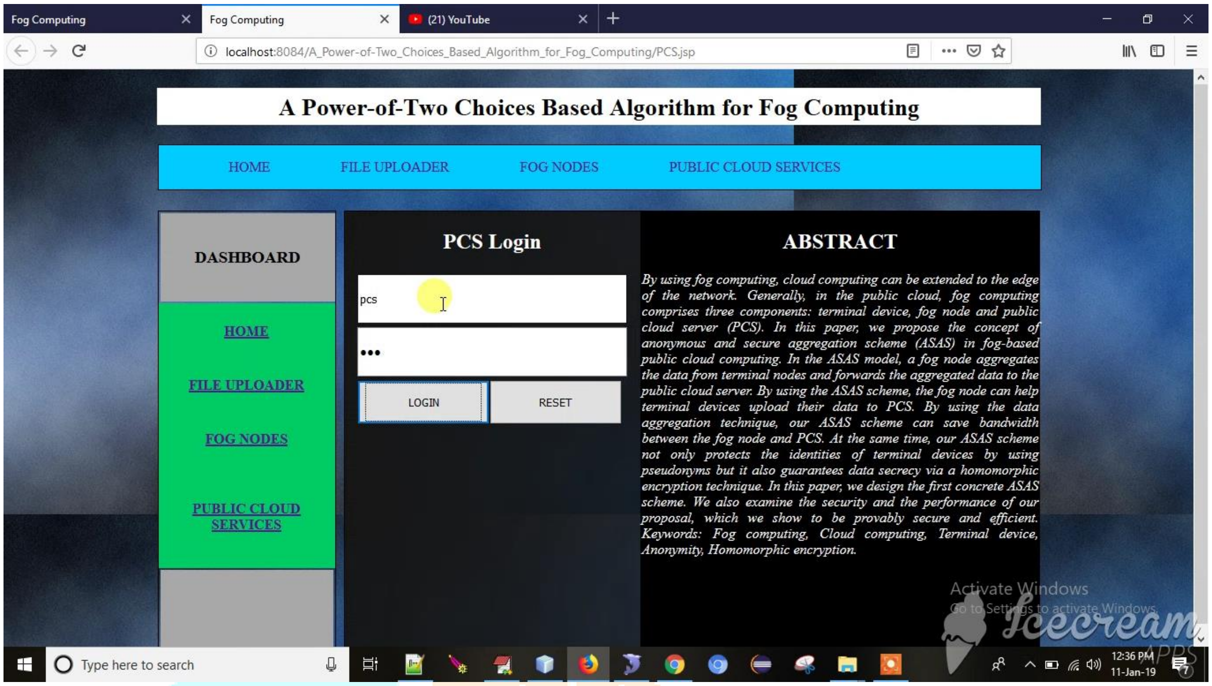
1) HOME PAGE



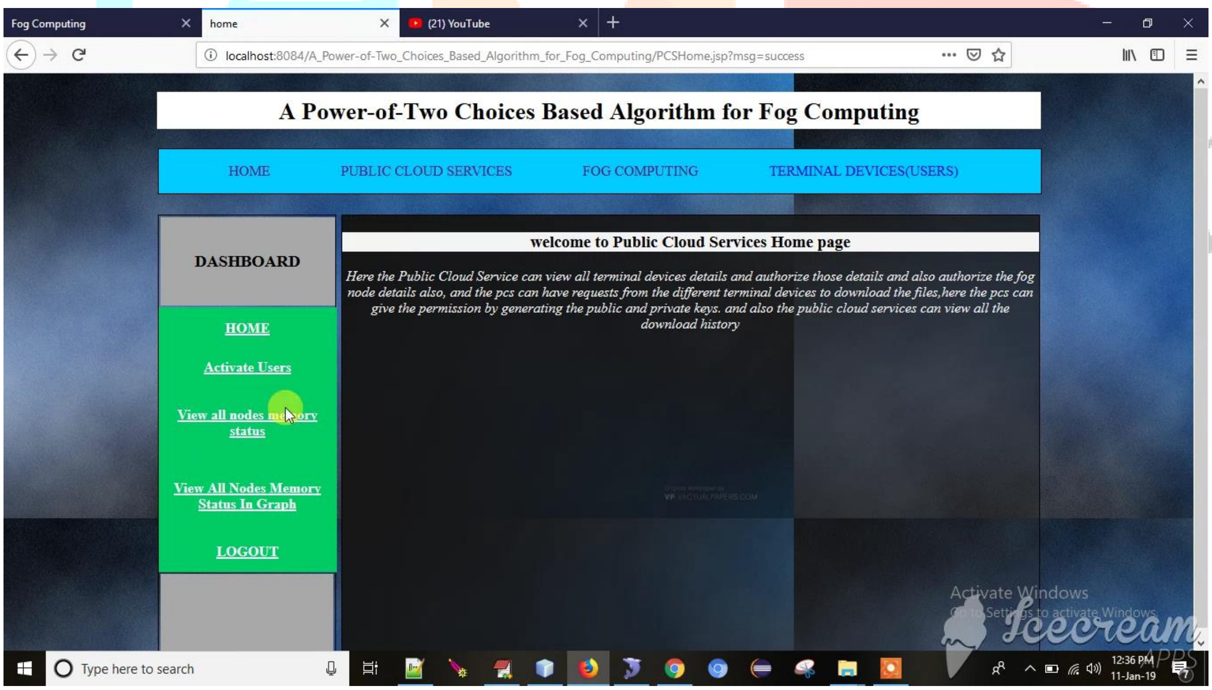
DATA OWNER/DATA USER REGISTRATION NEEDS THE FOLLOWING



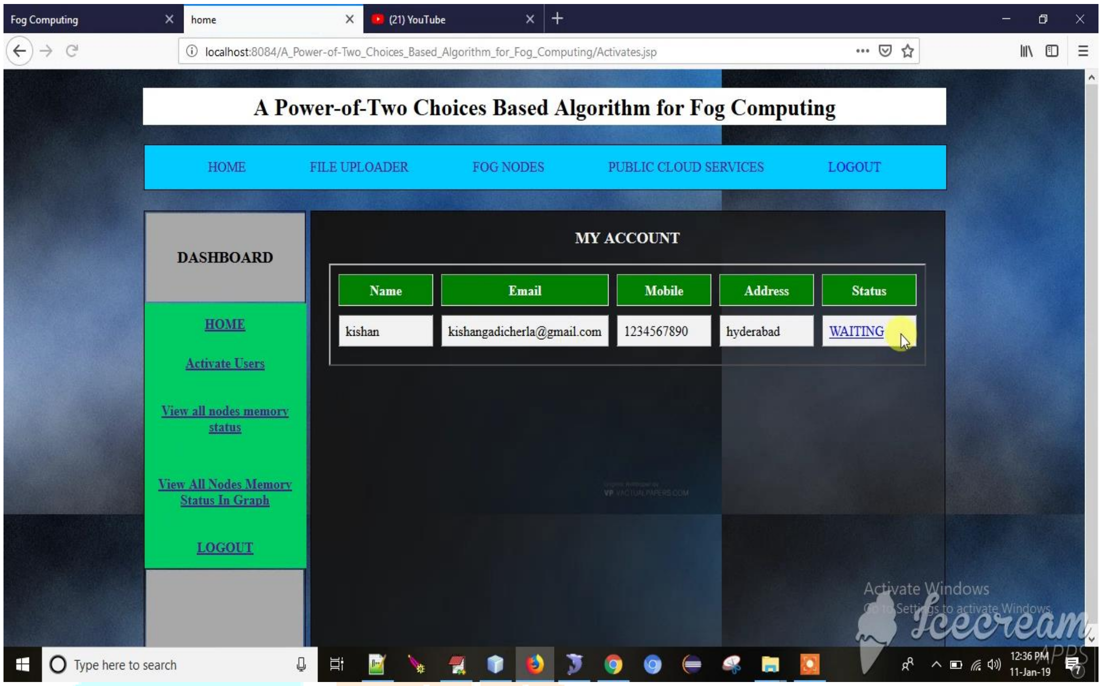
PUBLIC CLOUD LOGIN

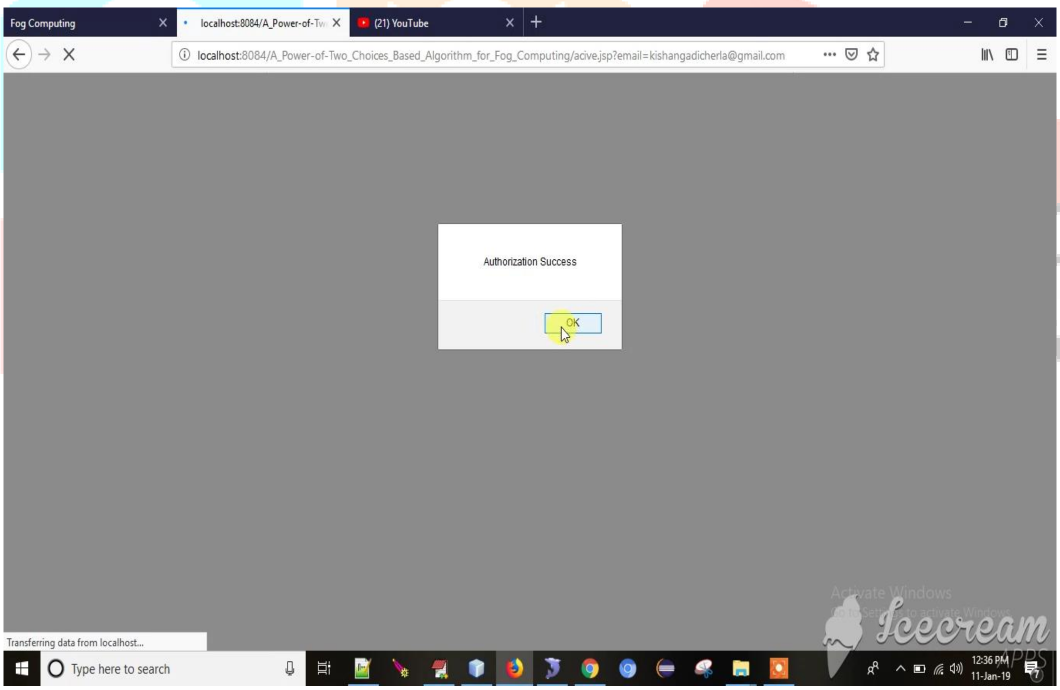


PCS HOME PAGE

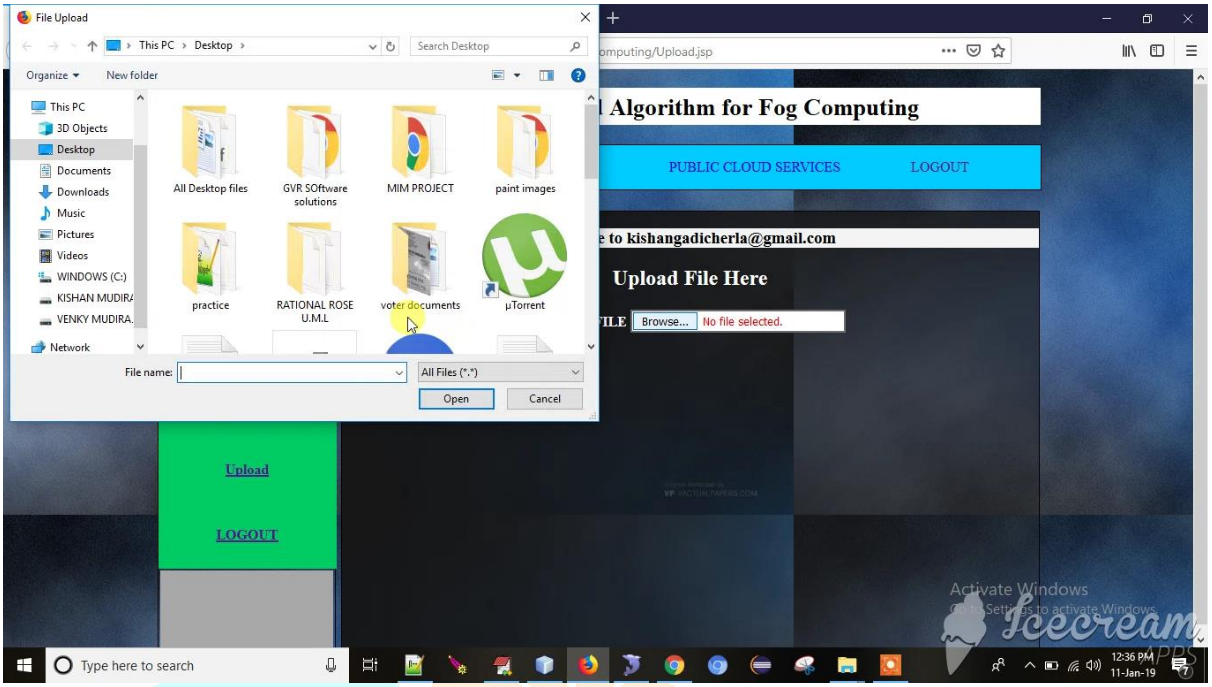


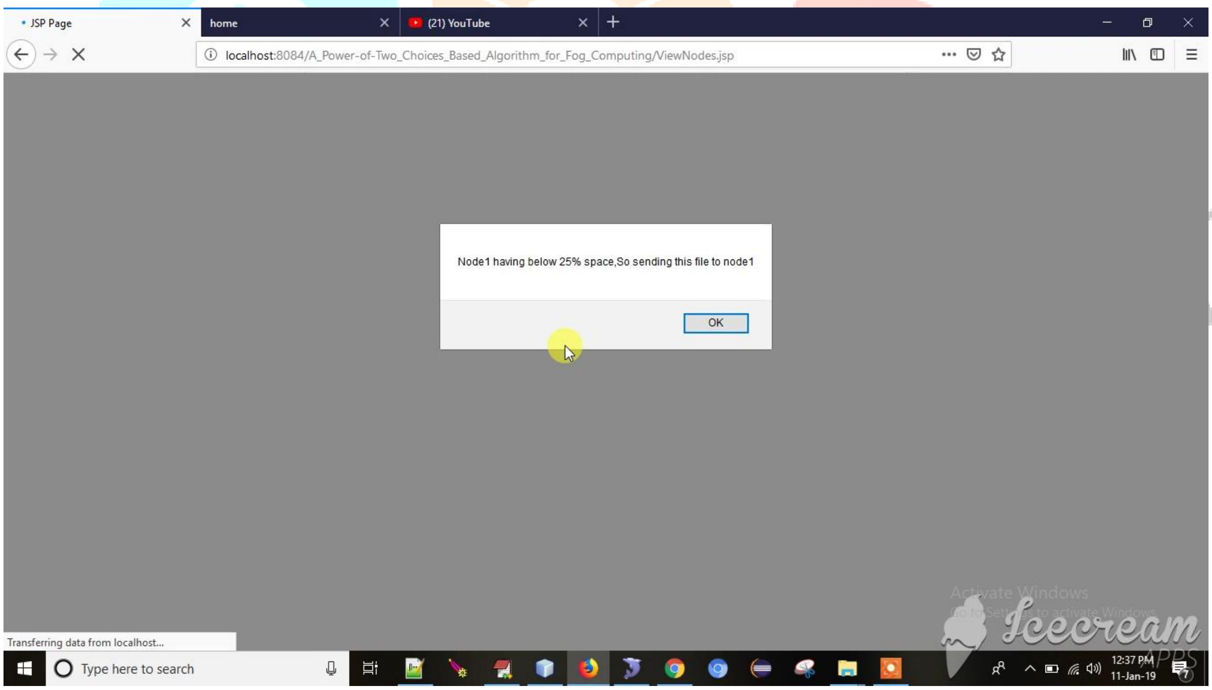
PCS TRY TO ACTIVATE THE REGISTERED USERS



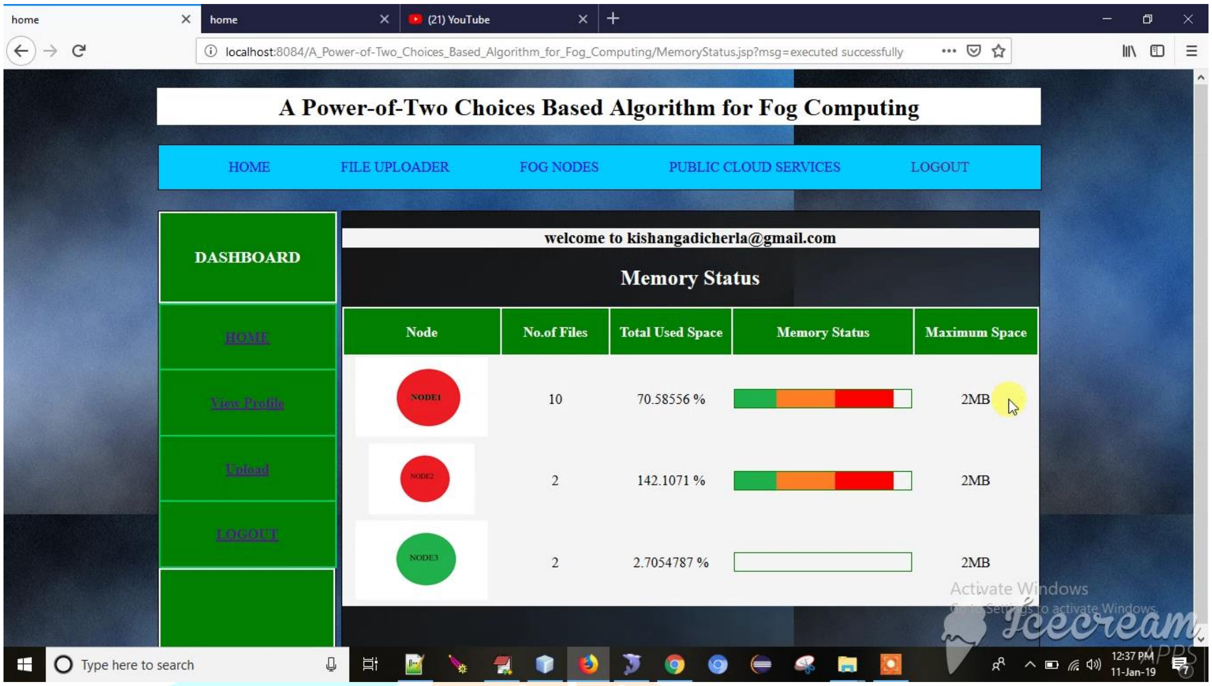


DATA USER UPLOADS A FILE

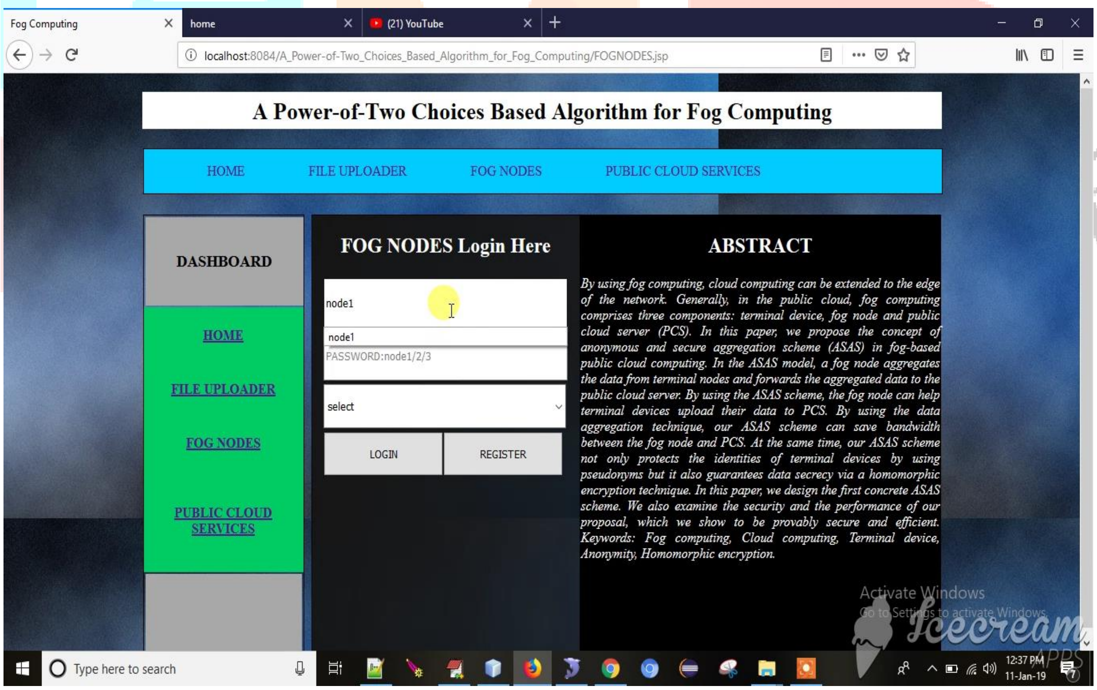




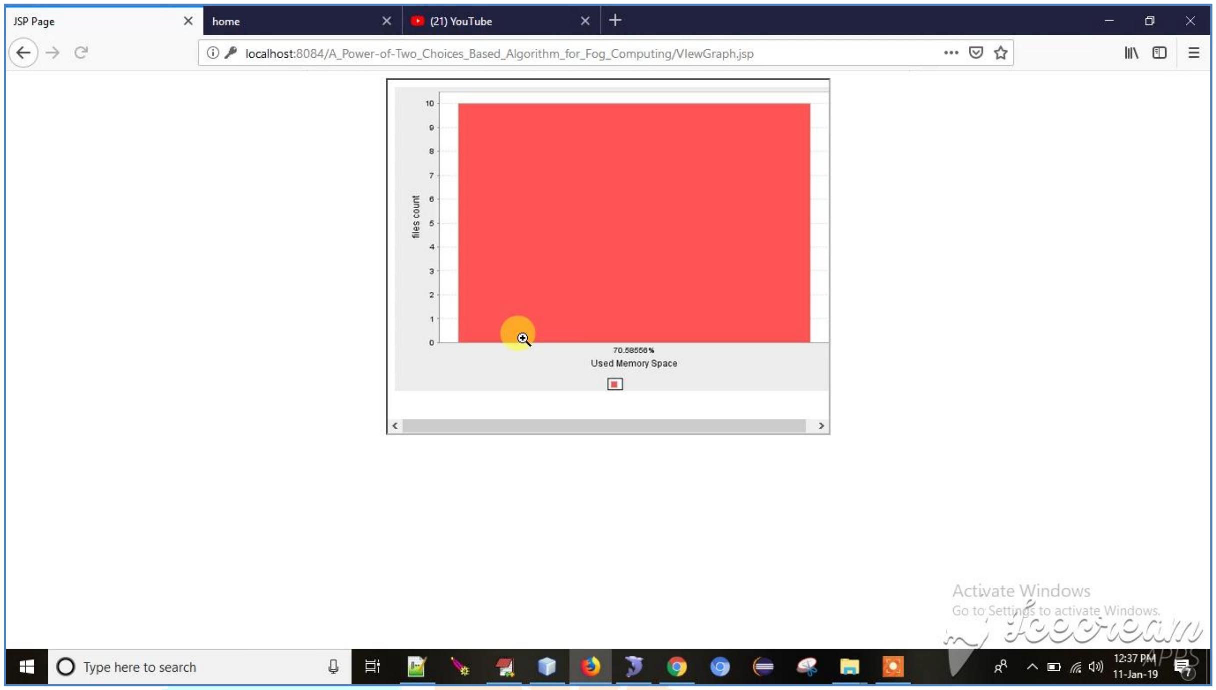
PCS CAN VIEW MEMORY STATUS PRESENT IN THE CLOUD



FOG NODE LOGIN



PCS CAN VIEW GRAPH



7. CONCLUSION

In this project, we have addressed the problem of cooperation among different providers in the context of fog computing. We have addressed cooperation fairness so that a win-win condition can be met. The proposed distributed protocol is based on the power of two model which sows efficient fair collaboration that improves the overall system utilization. This is a first step towards proposing a distributed platform for full cooperative fog computing.

8. REFERENCES

[1] D. Miorandi, S. Sicari, F. De Pellegrini, and I. Chlamtac, “Internet of things: Vision, applications and research challenges,” Ad Hoc Networks, vol. 10, no. 7, pp. 1497–1516, 2012.

[2] D. Uckelmann, M. Harrison, and F. Michahelles, “An architectural approach towards the future internet of things,” in Architecting the internet of things. Springer, 2011, pp. 1–24.

[3] A. Mtibaa, A. Fahim, K. A. Harras, and M. H. Ammar, "Towards resource sharing in mobile device clouds: Power balancing across mobile devices," in Proceedings of the Second ACM SIGCOMM Workshop MCC '13, ser. MCC '13, 2013, pp. 51–56.

[4] A. Mtibaa, K. A. Harras, K. Habak, M. Ammar, and E. W. Zegura, "Towards mobile opportunistic computing," in Cloud Computing (CLOUD), 2015 IEEE 8th International Conference on. IEEE, 2015, pp. 1111–1114.

[5] S. Sarkar, S. Chatterjee, and S. Misra, "Assessment of the suitability of fog computing in the context of internet of things," IEEE Transactions on Cloud Computing, 2015.

[6] L. Xiao, Q. Li, and J. Liu, "Survey on secure cloud storage," J. Data Acquis. Process., vol. 31, no. 3, pp. 464–472, 2016.

[7] R. J. McEliece and D. V. Sarwate, "On sharing secrets and reed-solomon codes," Commun. ACM, vol. 24, no. 9, pp. 583–584, 1981.

[8] J. S. Plank, "T1: Erasure codes for storage applications," in Proc. 4th USENIX Conf. File Storage Technol., 2005, pp. 1–74.

[9]Kulkarni,A.Forster,andG.Venayagamoorthy,"Computationalintelligenceinwirelesssensornetworks:Asurvey, " IEEE Commun. Surv. Tuts., vol. 13, no. 1, pp. 68–96, First Quarter 2011.

[10] Z. Xia, X. Wang, L. Zhang, Z. Qin, X. Sun, and K. Ren, "A privacypreserving and copy-deterrence content-based image retrieval scheme in cloud computing," IEEE Trans. Inf. Forensics Security, vol. 11, no. 11, pp. 2594–2608, Nov. 2016.

[11] J. Shen, D. Liu, J. Shen, Q. Liu, and X. Sun, "A secure cloud-assisted urban data sharing framework for ubiquitous-cities," Pervasive Mobile Comput., vol. 41, pp. 219–230, 2017.

[12] Z.Fu,F.Huang,K.Ren,J.Weng,andC.Wang,"Privacy-preservingsmart semantic search based on conceptual graphs over encrypted outsourced data," IEEE Trans. Inf. Forensics Security, vol. 12, no. 8, pp. 1874–1884,

Aug. 2017.

[13] J. Hou, C. Piao, and T. Fan, "Privacy preservation cloud storage architecture research," J. Hebei Acad. Sci., vol. 30, no. 2, pp. 45–48, 2013.

[14] Q. Hou, Y. Wu, W. Zheng, and G. Yang, "A method on protection of user dataprivacyincloudstorageplatform,"J.Comput.Res.Develop.,vol.48, no. 7, pp. 1146–1154, 2011.

[15] P. Barham et al., "Xen and the art of virtualization," ACM SIGOPS Oper. Syst. Rev., vol. 37, no. 5, pp. 164–177, 2003.

[16] G. Feng, "A data privacy protection scheme of cloud storage," vol. 14, no. 12, pp. 174–176, 2015.

[17] Z. Fu, X. Wu, C. Guan, X. Sun, and K. Ren, "Toward efficient multikeyword fuzzy search over encrypted outsourced data with accuracy improvement,"IEEETrans.Inf.ForensicsSecurity,vol.11,no.12,pp.2706– 2716, Dec. 2016.

[18] Z. Fu, K. Ren, J. Shu, X. Sun, and F. Huang, "Enabling personalized search over encrypted outsourced data with efficiency improvement," IEEE Trans. Parallel Distrib. Syst., vol. 27, no. 9, pp. 2546–2559, Sep. 2016