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Role of Edge Computing in IOT: A Case Study

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ABSTRACT: Internet of Things (IoT) is improving the overall Standard of lives by helping us to connect, measure and control the different parameters of the system in an automated manner. The IoT devices are generating large volumes of data that needs to be processed and on the basis of the results, decisions are made. The IoT devices have limited resource capabilities, so these devices utilize the cloud server's services. The issue of cloud server utilization is that it fails to provide support for real-time and time-critical applications. In order to decrease the response time of the system, another service layer is added to the architecture i.e. Edge computing. The IoT devices will directly send their requests to the edge servers. Utilizing the services of the edge servers will reduce the network traffic to the cloud and response time of the system. This paper presents a detailed survey of Edge-based IoT on various parameters like architecture, bandwidth, security, energy, payload, etc. into consideration.

I. INTRODUCTION

Last decade has seen to the growth of the smart sensors, smart actuators, networking technology, and low-power consuming chips. Thus, leading to increase of data transmission over the internet network. This has certainly put an over burden on existing cloud infrastructure to efficiently manage all such requests at a time. Edge along with Internet of Things (IoT) have emerged as a superior ecosystem i.e. edge-IoT ecosystem that has inherently held the more power and capabilities to other computing paradigms such as, grid computing, cloud computing and fog computing. Obviously, current socio-economic scenario has led to such a novel venture that could be able to increase the speed of social-development upon a surprising ceiling. As, other existing computing solutions are good enough to deal with all these social requests, they lack mainly in two areas e.g. (i) latency to serve/users request and (ii) heavy load on internet network.

Resulting an ineffective closure-start for the futuristic smart socialization. This problem becomes more when the industrial involvement come into the scene. To solve this problem, edge computing has been raised in recent past. It observed that the capability of the edge computing and IoT could be merged to create a new generation of ecosystem which will benefit the overall growth of the information and communication technology-based development. It is already validated that positioning of network end-devices to user/application enhances the speed of response i.e. the network latency is minimized. Further, the data-intensive applications are readily become capable to such interventions which are deployed in practice. Such capabilities could lead the edge-IoT ecosystem to overcome other existing computing paradigms. Moreover, placing the IoT solutions along with the edge computing provides an excellent opportunity to serve localized smart applications. Doing so will reduce the burden of data propagation through the network backhaul. This may drastically lower down the cost of network processing and maintenance while supporting for green computing revolution. Because, lower load on the active network would pass the effect of running the High low power cloud data centres and network base stations in background.

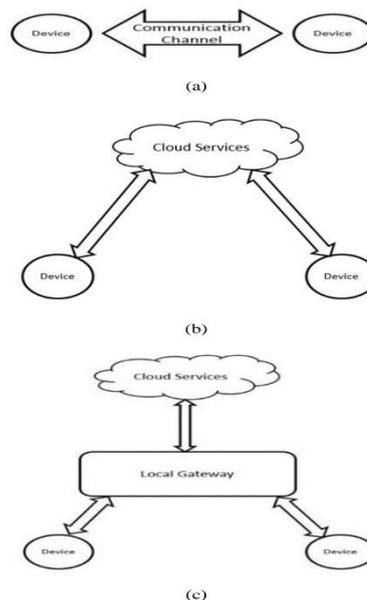
II. METHODOLOGY

IoT is an interconnected ecosystem of uniquely addressable Devices having the capabilities of sensing, computation, and Actuation and the ability to communicate and interoperate Through the internet. The IoT can be defined as a dynamic Infrastructure providing self-identifiable adaptive capabilities in nodes, in order to make

them intelligent. These nodes Recognize the triggers in the surrounding environment and Accordingly react in an appropriate manner. This new Environment will create new application services and each Application service will achieve a common goal. IoT is a growing technology that is increasing its fame in Different areas at a very fast rate. It is expected that number of IoT devices is to increase up to 50 billion connected devices, with Over 200 billion intermediate connections by 2020. The Main aim of IoT technology are as known:

- Integration of the physical and virtual worlds.
- Embedding the intelligence everywhere.
- Effect of the digital transition on technology

The improvement in the areas of sensors, Big Data, Embedded systems, ubiquitous computing, cloud computing, communication networks, and Nano electronics will together facilitate achieving the goals of IoT technology. Figure 1 shows the three different communication models of IoT. In this communication scenario, IoT nodes are having the Capability of exchanging information with each other directly, without involving any other hardware.



III. DIFFERENCE BETWEEN CLOUD COMPUTING AND EDGE COMPUTING

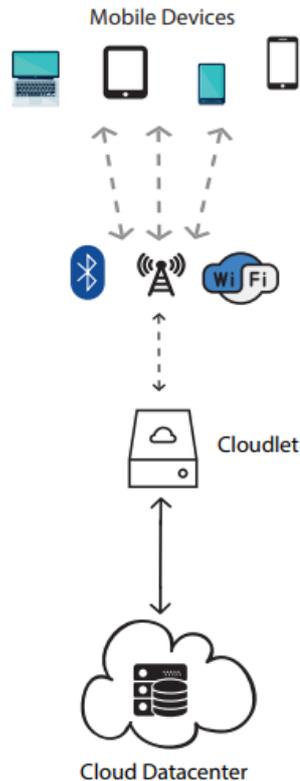
Edge computing is a better version of Cloud computing that reduces latency by bringing the services near to the end-users. Edge computing reduces the load of a cloud by providing resources and services within the Edge network. However, Edge computing complements Cloud computing by improving the end user service for delay-sensitive applications [27]. furnish application, data computation, and storage services to the end users are provided by edge. Despite these service similarities, several differences exist between these two growing computing paradigms. The major difference between Edge computing and Cloud computing is the location of the servers. The services in Edge computing are located in the Edge network whereas the services in the Cloud are located within the Internet.

The availability of the Cloud services within the Internet depends on the distance of multi-hop between the end user and the Cloud servers. The significantly high distance between the mobile device and the Cloud server induces high latency in Cloud computing as compared to the low latency found in Edge computing. Similarly, Cloud computing has high jitter whereas Edge computing has very low jitter. Unlike the Cloud computing, Edge computing is location-aware and high support mobility. Edge computing uses a distributed model for server distribution as compared to Cloud computing that uses a centralized model.

Mobile edge-computing using IoT

Mobile Cloud Computing (MCC) generally add all the benefits of mobile computing. The main focus of cloud computing is allow isolated virtualized computing, storage and communication resources that leverages end users [37]. Amazon EC2, Microsoft Azure, Google, and Aneka are cloud computing infrastructures and platforms. Mobile cloud computing allows resources on demand, such as network, storage and computing resources in a mobile environment

[61]. MCC also focuses on resource management that could easily be manageable [37]. In a MCC infrastructure the centralised cloud servers are located faraway from end devices, therefore are less productive in computation intense environment. For example, mobile applications connected to the cloud may encounter network latency or disconnections while mobile applications are used.



III. CONCLUSION

This paper has investigated the suitability of edge computing for emerging IoT applications. Specifically, we evaluated the performance of edge computing for mobile gaming as a representative scenario of new applications incorporating physical sensory inputs in addition to those explicitly generated by the user. The obtained results have shown that edge computing is necessary to enable fast-paced interactive games. Although regional data centers allow to significantly reduce network latency, only hosting resources at the edge allows a satisfactory quality of experience for gaming. Furthermore, increasing the computational capabilities of the servers in the cloud does not compensate for the decrease in network latency. Therefore, deploying even limited computing resources at the edge helps improve the quality of experience in the considered use case. An interesting future research direction is represented by a large-scale evaluation of mobile gaming based on the edge computing paradigm. Such a study could consider, for instance, online multiplayer games. It would also be interesting to compare the performance of different edge computing architectures for specific application scenarios. We hope that this paper will encourage further research in this direction.

REFERENCES

1. Ray, P., & Dash, D. (2019). Edge computing for Internet of Things: A survey, e-healthcare case study and future direction. *Journal of Network and Computer Applications*, 140(2019), 1–22. <https://doi.org/10.1016/j.jnca.2019.05.005>
2. Ai, Y., & Zhang, K. (2018). Edge computing technologies for Internet of Things: a primer. *Digital Communications and Networks*, 4(2018), 77–86. <https://doi.org/10.1016/j.dcan.2017.07.001>
3. EL-SAYED, H. E. S. H. A. M., & SANKAR, S. H. A. R. M. I. (2018). Edge of Things: The Big Picture on the Integration of Edge, IoT and the Cloud in a Distributed Computing Environment. *IEEE Access*, 6(2018), 1706–1717. <https://doi.org/10.1109/ACCESS.2017.2780087>

4. Pan, J., & McElhannon, J. (2017). Future Edge Cloud and Edge Computing for Internet of Things Applications. *IEEE Internet of Things Journal*, 2327–4662(2017), 1–11. <https://doi.org/10.1109/JIOT.2017.2767608>
5. Sun, X., & Ansari, N. (2016). EdgeIoT: Mobile Edge Computing for the Internet of Things. *Internet of Things*, 2016, 22–29. <https://doi.org/10.1109/MCOM.2016.1600492CM>
6. Premsankar, G., & Di Francesco, M. (2018). Edge Computing for the Internet of Things: A Case Study. *IEEE INTERNET OF THINGS JOURNAL*, 5(2018), 1275–1284. <https://doi.org/10.1109/JIOT.2018.2805263>
7. YU, W. E. I., & LU, C. H. A. O. (2018). A Survey on the Edge Computing for the Internet of Things. *IEEE Access*, 2018, 6900–6919. <https://doi.org/10.1109/ACCESS.2017.2778504>
8. Zada Khan, W., & Ahmed, E. (2019). Edge Computing: A Survey. *Elsevier*, 2019, 1–39. <https://researchgate.com>
9. Ren, J., & Pan, Y. (2018). Edge Computing for the Internet of Things. *GUEST EDITORIAL*, 2018, 6–7. <https://researchgate.com>
10. Amin Kar, H., & Rather, G. M. (2019). A Survey on Edge-Based Internet-of-Things. *International Journal of Computer Networks and Applications*, 6(2019), 100–109. <https://doi.org/10.22247/ijcna/2019/190369>
11. Salman, O., & Elhaj, I. (2020). Edge Computing Enabling the Internet of Things. *IEEE*, 2020, 603–608. <https://IEEE.com>
12. Goyal, S., & Sharma, N. (2020). Salman, O., & Elhaj, I. (2020). Edge Computing Enabling the Internet of Things. *IEEE*, 2020, 603–608. <https://IEEE.com>. *9th IEEE International Conference on Communication Systems and Network Technologies*, 2020, 72–77. <https://doi.org/10.1109/CSNT.2020.14>
13. ANSARI, N., & SUN, X. (2017). Mobile Edge Computing Empowers Internet of Things. *IEICE Transactions on Communication*, 2017, 1–16. <https://doi.org/10.1587/transcom.2017NRI0001>
14. Abbas, N. (2016). Mobile Edge Computing: A Survey. *Uio: Department of Informatics*, 2016, 1–62. <https://IEEE.com>
15. Porambage, P., & Okwuibe, J. (2018). Survey on Multi-Access Edge Computing for Internet of Things Realization. *IEEE Access*, 2018, 1–31. <https://IEEE.com>
16. Rahman, H., & Rahmani, R. (2019). The Role of Mobile Edge Computing Towards Assisting IoT with Distributed Intelligence: A Smart Living Perspective. *IEEE Access*, 2019, 33–45. https://doi.org/10.1007/978-3-319-93491-4_2



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