

Edge Computing

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Abstract—This research is a useful summary about Edge Computing and its concepts, and how this technology is currently helping different data transmission infrastructures to be more efficient, secure and faster, while also implementing an ease way to work with IoT and 4.0 Industry. In addition, this article also talks about the current situation of Edge Computing in Costa Rica. In this way, providing useful results on how this technology is currently applied and the benefits it brings when applied to a technological system compatible with it.

Index Terms—Data transmission; IoT; 4.0 Industry; Costa Rica

I. INTRODUCTION

With the rise of IoT and 4.0 industry, the increase in the number of connected devices around the world and the large amount of data that these devices produce becomes a big problem for data centralization and management, Edge Computing comes to solve this problem with an interesting solution.

It is introduced what Edge Computing is and how this technology solves a major problem of how data is manipulated in the tech industry for greater efficiency. Also, about the situation in Costa Rica regarding Edge Computing and how this technology is used in this country.

This research contributes to the understanding of Edge Computing technology, and how this technology is capable of solving many problems with intelligent, safe and efficient solutions, providing the user, company or country with an infrastructure capable of taking advantage of the technologies applied to their systems.

II. DEFINITION

According to [1] the term Edge Computing refers to:

Edge computing is a distributed computing framework that brings enterprise applications closer to data sources such as IoT devices or local edge servers. This proximity to data at its source can deliver strong business benefits, including faster insights, improved response times and better bandwidth availability.”

In this way, it is understood that applying edge computing results in superior manageability and response times, being beneficial for structures where scalability is a determining point when applying different technologies, thus allowing to reduce resource consumption.

On the other hand, the rise of the Internet of Things and the 4.0 industry are key determinants that edge computing is continuing to grow steadily, while the exponential growth of connected devices around the world is a problem for today’s infrastructures. Since, managing this large number of linked devices and their data is a complex and heavy task, this is where Edge Computing offers a solution to support the efficiency of these systems that are responsible for centralizing and processing data. As show in fig. 1, with Edge Computing, data is processed and analyzed closer to where it was created, because that means data doesn’t have to travel to the cloud or a data center to be processed. Another benefit is the fact that the latency when working with these systems is significantly reduced [1].

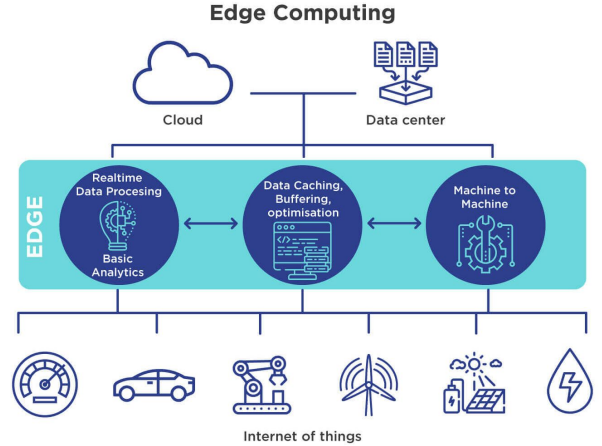


Figure 1: Edge Computing architecture

III. HISTORY

History of Edge Computing. This is a cite [2].

IV. CONCEPT

Edge Computing technology is based on the collection and processing of data locally, in order to reduce return traffic to the central cloud, using technologies such as: wireless sensor networks or networks and ad-hoc processing and making use of the IoT where the edge devices, which are the ones in charge of collecting large amounts of data and then sending them to the Data Centers or to the cloud for processing.

A. Edge Gateway

It can be a device or software, which is used as a bridge to connect the cloud and controllers, sensors and smart devices.

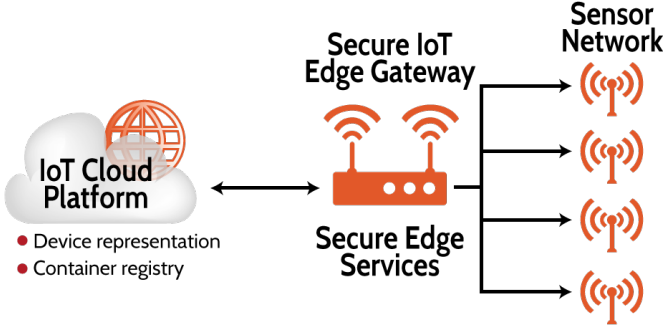


Figure 2: Edge Gateway

B. Edge Devices

Refers to any device that generates or collects data, for example: Sensors, industrial machines, and more devices related to the use of the Internet.

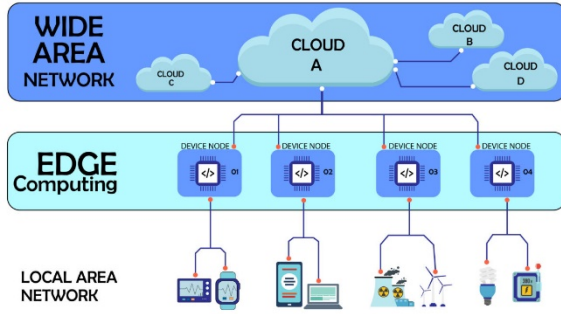


Figure 3: Edge Devices

It is responsible for processing and storing part of the data they emit on the devices themselves, without sending them directly to the cloud.

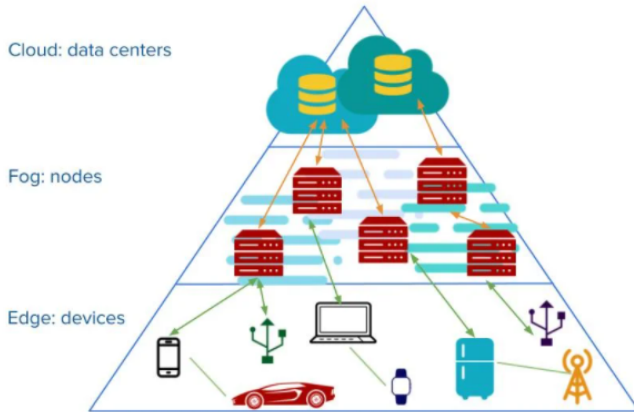


Figure 4: Edge Devices relationship

C. Data Security and Privacy

Through the Edge Computing nodes travel data that involves the privacy of the client that uses this infrastructure,

providing the necessary security to this data is something that this technology must meet to be applicable in a real environment.

On the other hand, conventional data protection methods are not fully functional in Edge Computing, since it is an infrastructure that works so close to the data source that it is difficult to provide security to this system due to the increase in vulnerabilities.

However, there are processes through which solutions to these problems can be found, one of these is to make the user the one who encrypts the data and then sends it through the internet, thus granting privacy and security to their data. Other concepts, such as the migration of data security solutions from other computing paradigms to Edge Computing, parallelize the distributed computing architecture, limited terminal resources, edge big data processing, highly dynamic environment and other characteristics have helped make security more reliable and lightweight on this infrastructure [3].

D. Speed and Efficiency

Cloud Computing over time and the increase in the amount of data handled by the internet has had a deterioration in its speed, to the point that by 2022 there are many systems that use Cloud Computing that have relatively high response times, being something very dangerous if this were to happen in a real-time system that needs an almost immediate response.

According to [3] Edge Computing offers a solution for the speed and efficiency:

It emphasizes proximity to users and provides users with better intelligent services, thus improving data transmission performance, ensuring real-time processing and reducing delay time. Edge computing provides users with a variety of fast response services, especially in the field of automatic driving intelligent manufacturing, video monitoring and other location awareness, rapid feedback is especially important.

In summary, Edge Computing offers the user a much more efficient and faster experience when communicating with different services through the web and other interconnection systems such as real-time technologies that keep people's lives safe, like an automated car as show in fig. 5.

E. Scalability

V. APPLICATIONS

Edge Computing applications.

VI. EDGE COMPUTING IN COSTA RICA.

Applications such as Uber, Didi, Waze or also the new technologies of electric vehicles with automatic driving or artificial intelligence systems, work as edge devices that are responsible for obtaining data to process them through

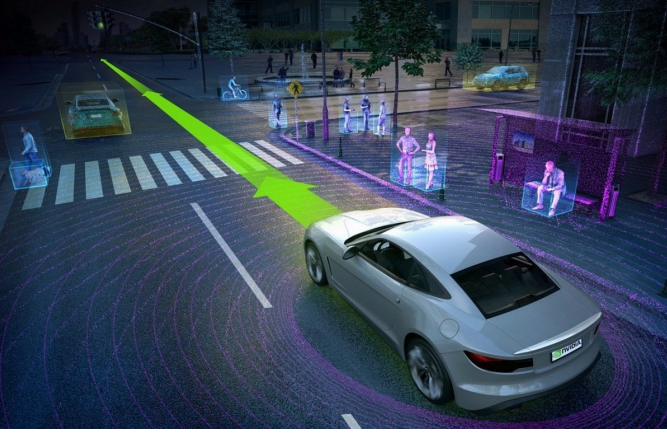


Figure 5: Car as an Edge Device

technologies such as edge computing, and then use the information obtained. to make decisions or improve the operation of some systems. all these technologies are in operation in Costa Rica.

VII. CONCLUSION

A conclusion to the paper.

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