STRUCTURAL DESIGN AND UTILITIES OF EDGE COMPUTING

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Abstract:

Cloud Computing is a technology, which involves sharing the resources of both hardware and software to the customers through the Internet with the reduced cost and time. But still it has many security and time related issues. To overcome the difficulties faced by the cloud many new technologies are found. In that the new technology named Edge computing most over satisfy the customers need with secured manner and within the time constraint given by the customer. In Edge the data are not accessed in the main server of the cloud instead they process it in the nearby data centres, so the time saved and security is also maintain only in the prescribed range resources. This paper includes the architecture and functions of the Edge computing, which gives new ideas to the researchers in the Edge filed.

Key Words: Cloud Computing, Edge Computing, Data centre

I. Introduction:

Cloud computing technology is used in various fields for various purposes, for example Email reading, commercial Purposes, business fields etc.[1] Now a days its usage make tremendous help for the customers, in the meantime more connections are needed to solve the customer need within the time. To solve this problem a technology introduced called Edge computing. There is no standard architecture for Edge computing. This paper analyses the edge architecture and its functionalities and it gives new ideas to the researchers.

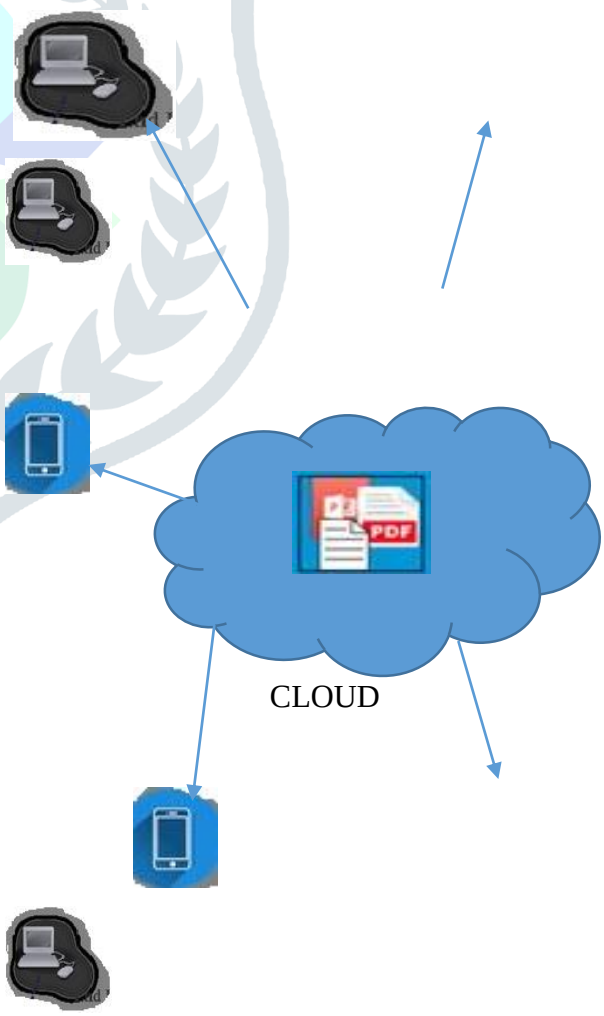

Fig 1 Cloud with end devices

II STRUCTURE OF EDGE COMPUTING

Edge Computing allows computations to be performed at edge of the network. Here the Edge devices not only request the data but also provide the content to other users. It is a two way devices.

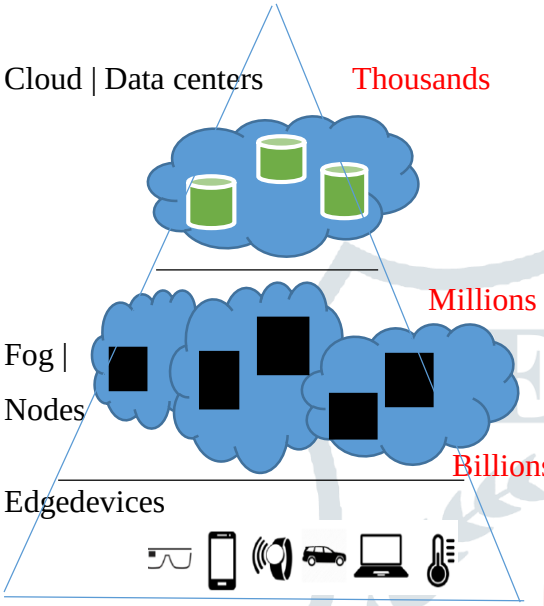

Fig 2. Cloud / Fog / Edge

SDN in Edge Computing

To overcome the difficulties in cloud computing Edge computing come with the solution, that is Software Defined Network (SDN)[2]. SDN contains multi controllers instead of the single controller in the cloud architecture. SDN is a programmable hardware device which controls overall network[3] [16] It reduces the complexity in accessing the server, and quality of Service Performance also increased.

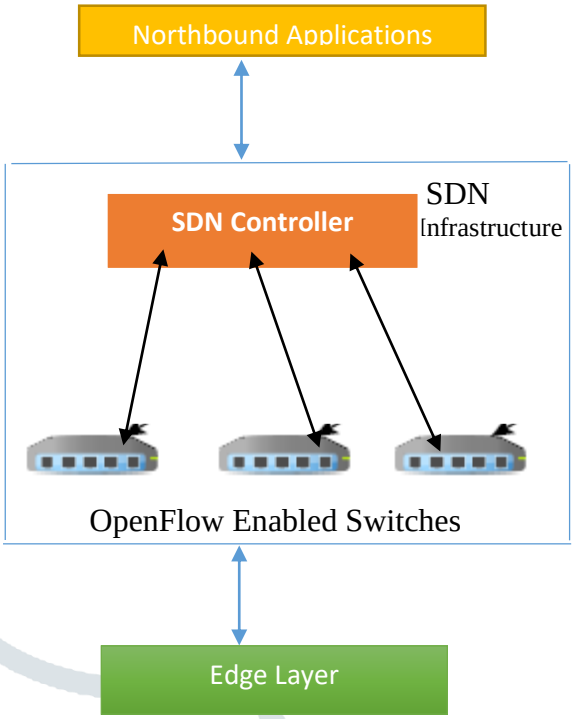

Fig 3 SDN architecture for Edge computing

In the SDN architecture there are layers, they are

- NorthBound Applications
- SDN Infrastructue
- Edge Layer

The Bottom Layer contains the edge devices like Mobile, Car watch etc they seek services from the server. [4] An Intermediate layer contains the controller and openflow switches. The Upper layer consists of customized and virtualized North bound applications that define the behaviour of the mechanism.

All operations of SDN and the flexible communication between the controller and the switches are carried out with the OpenFlow protocol [6], [7] which is currently developed by Open Networking Foundation (ONF) [8]. OpenFlow represents the main functionalities of SDN such as managing the flow tables on the forwarding nodes, populating them, defining flow rules, gathering statistics and many other managerial operations [9].

III. Utilities of Edge computing

There are many advantages in implementing this Edge computing technology, they are

1 **Flexibility and Low Barrier over Innovation**: The old-style infrastructure of the network is limiting for innovations because there is a small area for innovation when the hardware has the accountability of both control and sending layers [10]. By decoupling the control and forwarding layer,

SDN provides flexible programmable interface that enables innovation. As the combination of cloud and edge servers demands high flexibility because of the increasing number of devices, SDN can treat network as a elastic software [11]. With the help of centralized controller and user-implemented northbound applications, the large scale environment can be managed in every level of transposition

2. **Virtual Machine Mobility**: Virtual machine (VM) relocation is a technique that is normally employed in datacentres for effective operation in terms of energy consumption and load distribution [12]. Within the context of Edge Computing, ability to roam VMs over the edge infrastructure whenever needed provides fine control and optimization possibilities over the whole system. VM movement can be activated by the user movement, energy conservation, reducing the traffic load or service replacement [13].

3 **Interoperability**: As the interest in IoT increases, there are and will be many players and vendors around. In order to support interoperability between the devices belonging to different vendors and mitigate the complexity caused by the heterogeneity of Edge Computing, there should be a vendor independent environment.[15] As a result of the immense work on the standardization by ONF, SDN leads to a network environment which eradicates dependency on vendors [14]. Since SDN is able to manage the heterogeneous environments, distinct Wireless Sensor Network (WSN) and Body Area Network (BAN) setups with different types of sensors can operate in a single environment without any complications.

4) Lower Cost Solutions: Keeping pace with the increased number of mobile devices requires a large number of network nodes to be installed at the edge. In addition to the edge servers, network functions that are provided by each middle box are also essential for managing and operating the immense mobile traffic generated at the edge. Traditional network design introduces hardware based solutions for managing the network and executing network functions which are expensive and difficult maintain. The smooth collaboration of NFV and SDN does not only improve the service orchestration, but also eliminates the requirement for updating the forwarding devices and integrating new protocols. These operations within the traditional

network infrastructure, where the control plane is also hardware-based, result in high costs for the service providers.

IV. Conclusion

Edge computing is a term bringing the computational resources to the closeness of the end devices. The end devices needed the closest network to serve their need within short duration, the Edge computing solve the need of these devices. To overcome the technical barriers in the network programmability we have the solution SDN. This paper review the concept Edge Computing with SDN, its architecture and the functionalities clearly. This paper gives more ideas to the researchers to create innovative programs in this field.

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