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Limitation of Cloud Computing

Lecture (6)

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Limitations of Cloud Computing

- Latency: In the traditional cloud computing model applications send data to the data Centre and obtain a response, which increases the system latency. For e.g. High speed autonomous driving vehicles require milliseconds of response time.
- Bandwidth: Transmitting large amount of data generated by edge devices to the cloud in real time manner will cause great pressure on bandwidth.
- Availability: As more and more Internet services are deployed on the cloud,the availability of the services has become an integral part of daily life.Therefore, it is a big challenge for cloud service providers to keep the 24*7promise.Energy: With the increasing amount of computation and transmission,
- energy consumption will become a bottleneck restricting the development:of cloud computing centres.

Need for Edge Computing

Powers the next industrial revolution, transforming manufacturing and services

Optimizes data capture and analysis at the edge to create actionable business intelligence.

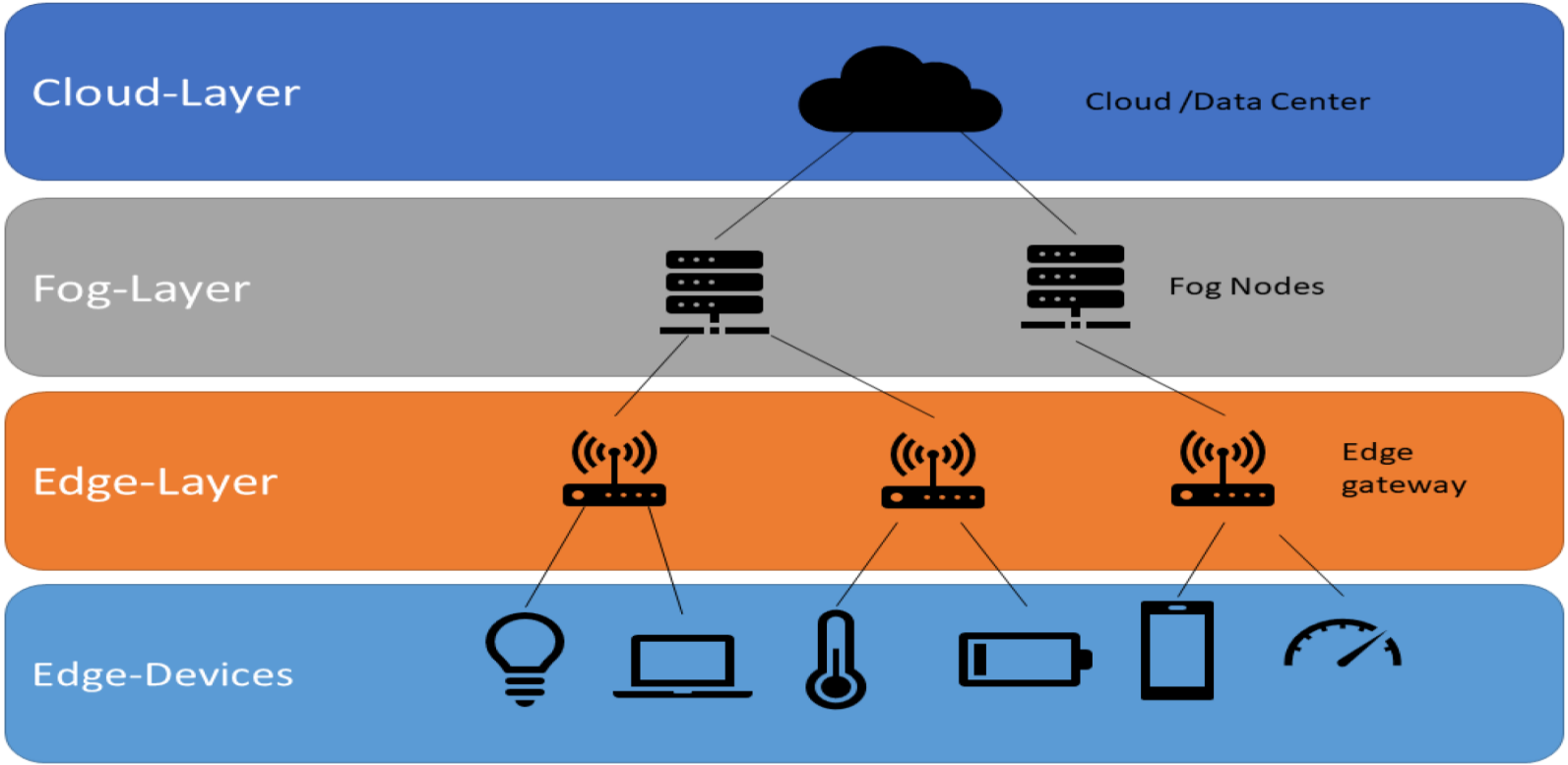
Creates a flexible, scalable, secure, and more automated technology, systems, and core business process environment.

Developed due to the exponential growth of IoT devices, which connect to the internet for managing information over cloud.

Promotes an agile business ecosystem that is more efficient, performs faster, saves costs, and is easier to manage and maintain

EVOLUTION

Introduction to step layers



Introduction to Edge Computing

- Cloud, IoT and Artificial Intelligence are a buzzword for edge computing. Simply stated, the decentralization of networks requires Edge Computing. Edge Computing is the next technical breakthrough. The actual sense of the term ‘Edge’ is the place on the earth for the delivery of services. Edge Computing is a distributed computer system which enables data calculation and storage to be too closely linked to the source (where data is necessary). It closes computation as closely as possible so that bandwidth is reduced, response time increased and latency is used. The idea of edge computing assumes that the computation of data is distributed rather than centered at a centralized location.

WHAT IS EDGE COMPUTING ?

- Edge computing is a networking philosophy focused on bringing computing as close to the source of data as possible in order to reduce latency and bandwidth use. In simpler terms, edge computing means running fewer processes **in the cloud** and moving those processes to local places, such as on a user's computer, an IoT device, or an edge server. Bringing computation to the network's edge minimizes the amount of long-distance communication that has to happen between **a client and server**.

Why Edge Computing is Important?

- enables smart applications and devices to react to data very rapidly when data is generated and therefore to eliminate lag time through edge computing. It also allows acceleration of data streams that involves data latency-free real time computation.
- The acceleration of data transmission is still important for the technology of self-driving vehicles, giving companies similar and essential benefits. Efficient large-scale data processing by enabling source-near processing, saving internet bandwidth as well.
- This lowers costs and makes the applications in remote areas available effectively.
- The capacity is to provide the most remote services and data processing makes the sensitive data a protected layer without storing it in the public cloud.

Edge Computing Terms and Definitions

Edge

It highly depends on the use cases. Like in telecommunication, it may be a cell phone or cell tower. Similarly, in the automotive example, it could be a car. In manufacturing, it could be a machine, and in the Information Technology field, it could be a laptop.

Edge Devices

A device which produces data is edge devices like machines and sensors, or any devices through which information is collected and delivered.

Edge Gateway

It’s a buffer where edge computing processing is done. The gateway is the window into the environment beyond the edge of the network.

Edge Computing Terms and Definitions

Fat Client

It’s a software that processes data in edge devices, which is opposite to thin client, which hardly transfers data.

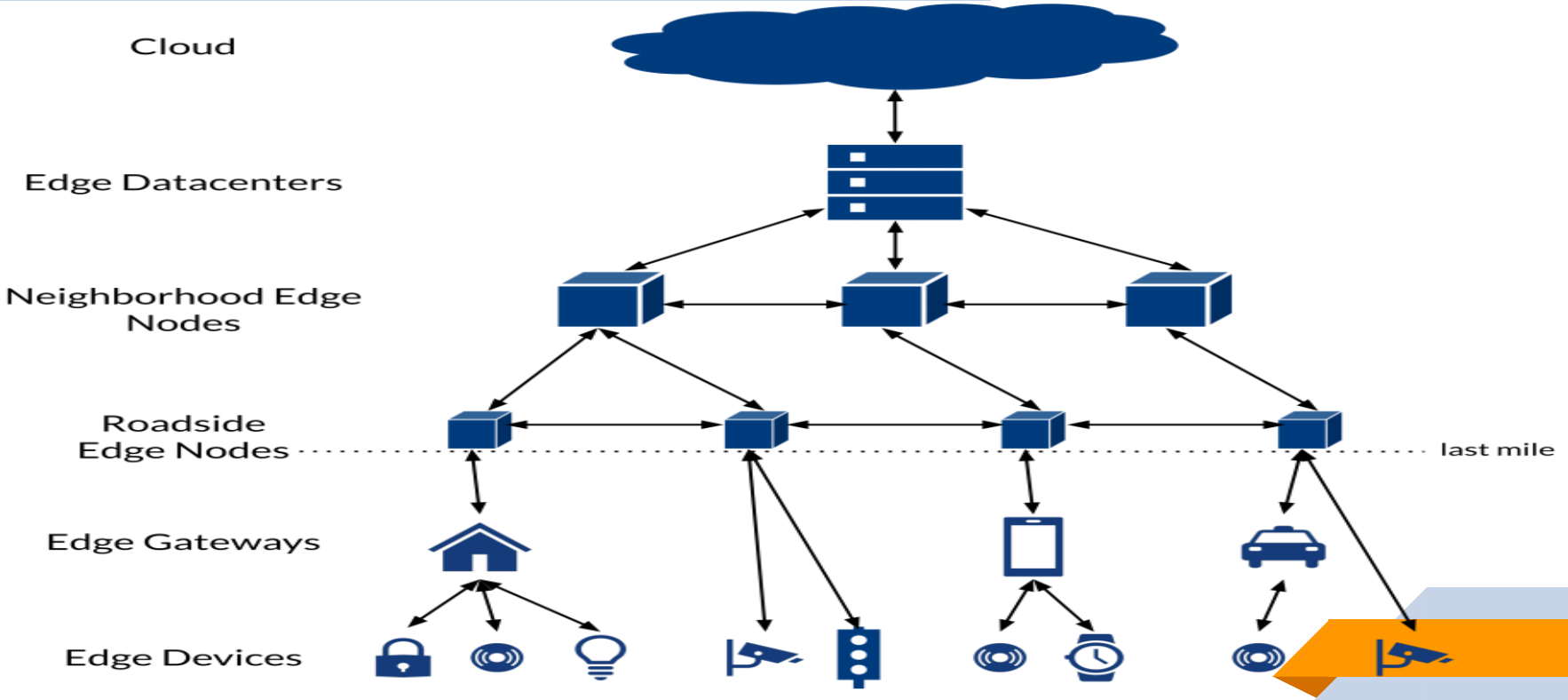
Edge Computing Equipment

Devices like sensors and machines can be outfitted to work in edge computing. Environments by making the internet accessible.

Mobile Edge Computing

It signifies the growth of edge computing systems in telecommunication systems like 5G scenarios.

Architecture of Edge Computing



Architecture of Edge Computing

Here are the key components that form an edge ecosystem:

- **Edge devices:** A special-purpose piece of equipment with limited computing capacity.
- **Edge node:** Any device, server, or gateway that performs edge computing.
- **Edge server:** A computer located in a facility close to the edge device. These machines run application workloads and shared services, so they need more computing power than edge devices.

Architecture of Edge Computing

- **Edge gateway:** An edge server that performs network functions such as tunneling, firewall management, protocol translation, and wireless connections. A gateway can also host application workloads.
- **Cloud:** A public or private cloud that acts as a repository for containerized workloads like applications and machine learning models. The cloud also hosts and runs apps that manage edge nodes.

Edge computing has three primary nodes: **the device edge, local edge, and the cloud**.

Architecture of Edge Computing

Advantages:

Speed

Edge computing has the capability to increase network speed by reducing latency. It greatly reduces the distance it should travel by processing data closer to the source of information.

Scalability

The edge can be used to scale your own IoT network without needing to worry about the storage requirements.

Reliability

Edge computing handles reliability part very well. Since most at times the edge computing does not depend on internet connection and servers it offers an uninterruptible service.

Security

The information present on the cloud has the tendency to get hacked easily. Since the edge computing only sends the relevant information to the cloud this can be prevented

Cost Effectiveness

Using edge computing for IoT allows users to reduce the bandwidth and data storage requirement and replace datacenters with device solutions. So, overall cost gets reduced.

Thank You