

Edge, Fog and Cloud Computing

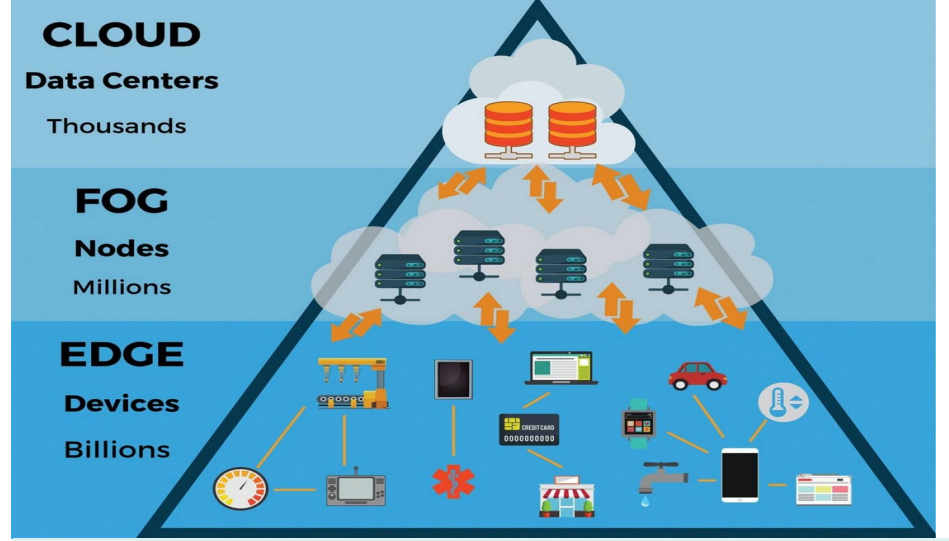
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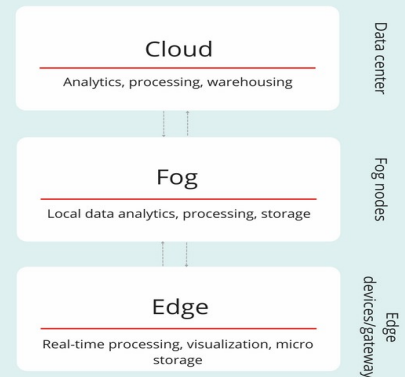
February 27, 2018



- Edge Computing
- Fog Computing
- Cloud Computing



IoT data layers



Edge Computing

- Edge computing is a distributed computing model that involves processing data at or near the edge of the network, close to where the data is generated. This is often done to reduce the latency and bandwidth requirements of transmitting data to a central location for processing. Edge computing devices can be small and low-powered, such as sensors or mobile devices, or they can be larger, more powerful devices like routers or gateways.

Devices

- **Microcontrollers:** These are small, low-power computing devices that are used for simple data processing and control tasks. They are commonly used in embedded systems and IoT devices.
- **Raspberry Pi:** This is a single-board computer that is popular among hobbyists and makers. It is relatively low-cost and can run various operating systems, including Linux and Windows.
- **Smart sensors and cameras:** These devices are used to capture data from the physical world, such as temperature, humidity, light, motion, and images. They often have built-in processing capabilities to analyze data locally and reduce the amount of data sent to the cloud.
- **Wearables:** These are small computing devices that can be worn on the body, such as smartwatches, fitness trackers, and medical monitors. They often use sensors to collect data and have wireless connectivity to communicate with other devices.
- **Examples of edge computing devices** are microcontrollers, Raspberry Pi, and small embedded systems.

Fog Computing

- Fog computing is a variation of edge computing that focuses on bringing computation closer to the data source, rather than at the very edge of the network. It involves deploying computing resources, such as servers or gateways, in between the edge and the cloud to process data closer to the edge devices. This approach reduces the amount of data that needs to be transmitted to the cloud, improving response times and reducing bandwidth costs.

Devices

- Edge gateways: These are computing devices that connect edge devices to the cloud and act as a bridge between the two. They can perform data preprocessing, filtering, and aggregation to reduce the amount of data sent to the cloud.
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- Network switches and routers: These devices are used to manage network traffic and ensure reliable and efficient communication between edge and cloud devices. They can also perform some computing tasks, such as packet inspection and routing.
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- Edge servers: These are small-scale servers that are located closer to the edge than the cloud. They can run applications and services that require low latency or high availability, such as video streaming and real-time analytics.
- Examples of fog computing devices are gateways, switches, and routers.

Cloud Computing

- Cloud computing is a centralized computing model that involves the delivery of on-demand computing resources, such as servers, storage, and applications, over the internet. The cloud can be accessed from anywhere with an internet connection and offers a highly scalable and flexible computing environment. Cloud computing can be divided into three main models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). IaaS provides access to virtualized computing resources, PaaS provides a platform for developing and deploying applications, and SaaS provides access to software applications over the internet.

Devices

- Examples of cloud computing devices are servers, clusters, and data centers.
- Virtual machines: These are software-based computing environments that can run on physical servers in a data center. They are used to host applications, services, and data storage for multiple users.
- Container platforms: These are lightweight virtualization technologies that allow applications to run in isolated environments, called containers. They are popular for deploying microservices architectures and DevOps practices.
- Cloud services: These are pre-built computing services that are offered by cloud providers, such as Amazon Web Services, Microsoft Azure, and Google Cloud Platform. They include services for computing, storage, networking, security, and analytics, among others.