

# EDGE COMPUTING

## 1. What is edge computing?

Edge computing is a distributed computing framework that brings enterprise applications closer to data sources such as IoT devices or local edge servers.

## 2. When this edge computing introduced?

- Edge Computing was introduced in 2010.
- After introducing 5G, edge computing is growing more. Powerful processors and energy efficient devices, edge computing will become a significant technology in the market.
- The explosive growth and increasing computing power of IoT devices has resulted in unprecedented volumes of data. And data volumes continue to grow as 5G networks increase the number of connected mobile devices.

## 3. Why we need Edge Computing?

In cloud computing, data storage and processing occur in a centralized cloud-based data centre. Data transforms back and forth via internet from these data centres. Due to long distance travel of data, bandwidth is poor and network latency increases.

## 4. Why is it important?

- **Reduced Latency:** Crucial for real-time applications (e.g., autonomous vehicles, industrial automation).
- **Bandwidth Efficiency:** Less data needs to be sent to the cloud, saving on bandwidth costs.
- **Improved Reliability:** Even with intermittent cloud connectivity, edge devices can function.
- **Enhanced Privacy:** Sensitive data can be processed locally, reducing the risk of exposure.

## 5. What will be the result of edge computing introduced in a project?

If data centre is created near the data generating source, then

- network latency will be reduced
- network's bandwidth will be optimised
- data processing time will be reduced
- sensitive data processed in local will be secured and privacy is ensured.

## 6. What does a good edge computing model possess or how can it be identified?

An effective edge computing model should address network security risks, management complexities and the limitations of latency and bandwidth. A viable model should help you:

- Manage your workloads across all clouds and on any number of devices

- Deploy applications to all edge locations reliably and seamlessly
- Maintain openness and flexibility to adopt to evolving needs
- Operate more securely and with confidence

## 7. What are the varieties of edge computing?

- cloud edge
- IoT edge
- mobile edge

## 8. What are the key capabilities of edge computing?

### Key Capabilities of Edge Computing:

#### 1. Massive, Efficient Software Updates:

- Imagine needing to update software on thousands of devices spread across a city or factory. Edge computing lets you do this quickly and automatically, without needing a huge IT team running around.
- **Think of it as:** Easily updating apps on thousands of phones, but for industrial machines or city sensors.

#### 2. Flexible and Adaptable Technology:

- Because there are so many different types of devices (sensors, cameras, machines), edge computing uses open-source technology. This means it can work with almost anything and you're not locked into one company's system.
- **Think of it as:** A universal adapter that can connect to any device.

#### 3. Strong Security:

- Edge computing helps make sure that the right software is running on the right device, and that everything is secure. You can set rules and policies to protect your data.
- **Think of it as:** A security guard that makes sure only authorized people and programs are allowed in.

#### 4. Reliable and Expert Support:

- Implementing edge computing can be complex, so you need a partner with experience. They can help you set up and manage your system, and make sure it's working at its best.
- **Think of it as:** Having a skilled guide to help you navigate a complicated project.

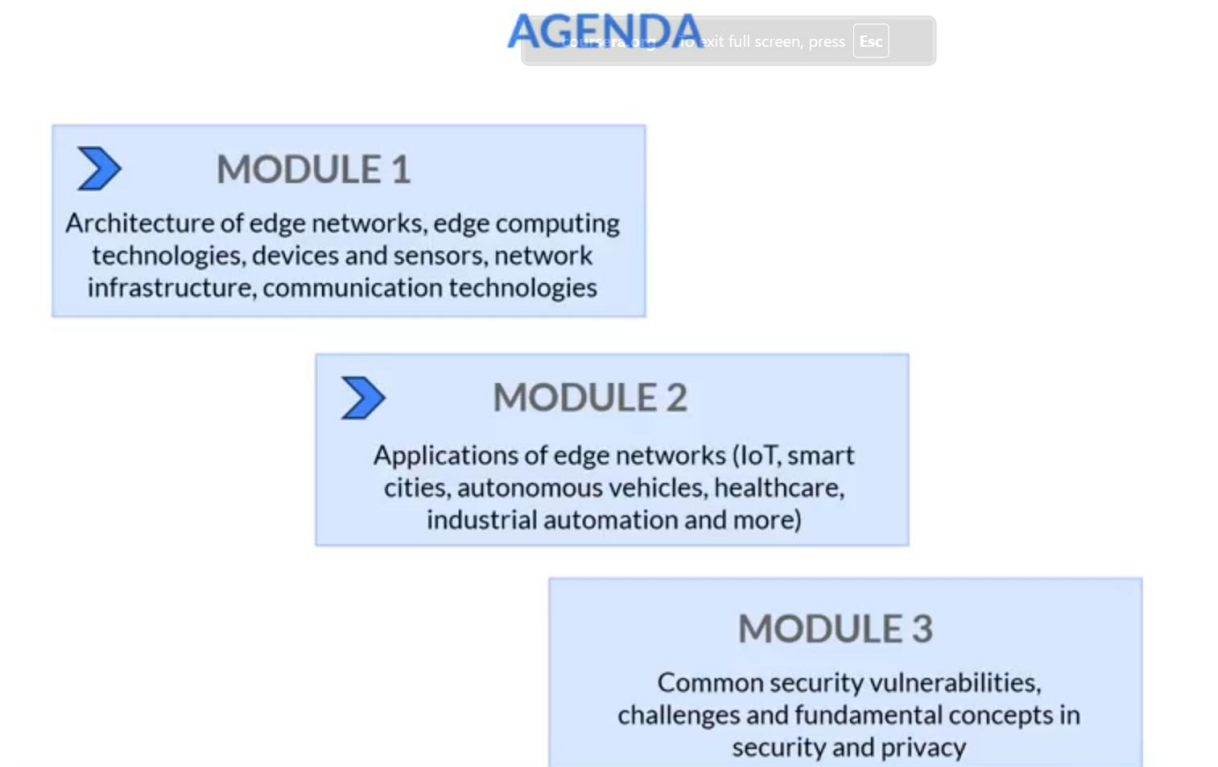
Essentially, edge computing allows you to manage a large amount of devices, and data processing, that are located far from a centralized data centre, in an efficient, secure, and scalable way.

Reference:

- [What Is Edge Computing? | IBM](#)

## Edge Computing Course: [Edge Computing Fundamentals | Coursera](#)

### 9. Agenda of the course:



### 10. What will I learn in this course?

- Upon completion, learners will be able to:
- identify key architectural components of edge computing networks
- compare various types of devices and sensors utilized in edge computing
- identify challenges associated with edge networks
- compare key principles of cybersecurity
- identify potential security vulnerabilities in edge networks
- list security protocols
- explain data privacy and confidentiality

### 11. what are the modules and what they cover, what I am supposed to dive deep into?

- In Module 1, you build the foundation by exploring **edge computing architecture**, communication technologies, and the devices that power them. From edge nodes and gateways to lightweight protocols like **MQTT** and **CoAP**, you master the components needed to optimize real-time data processing and reduce network congestion.
- In Module 2, the narrative intensifies as you delve into edge applications across healthcare, IoT, automation, and smart cities. You confront unique challenges, from safeguarding patient data in hospitals to synchronizing distributed data in industrial

systems. Privacy and security concerns take center stage, pushing you to develop innovative solutions to protect sensitive information and ensure operational efficiency.

- Finally, Module 3 places you at the heart of the action, defending edge networks against sophisticated threats. Armed with cybersecurity principles, you tackle vulnerabilities like **device tampering** and **DDoS attacks**, deploy secure protocols such as **TLS** and **SSH**, and implement advanced measures like **Two-Factor Authentication** and **Single Sign-On** to protect both data and users.

## 12. Key terms to learn:

- edge devices, edge data centers, edge Computing software, network connectivity, quality of service, distributed data management, edge to cloud integration, and management and monitoring tools.

## 13. What is edge computing?

- Edge computing is a distributed computing paradigm that processes data closer to the data source, reducing the need for centralized cloud computing.
- This proximity to data sources, such as IoT devices and sensors, enables real-time data analysis and actions, leading to improved responsiveness and efficiency.
- Edge devices are small computing devices placed close to data source like sensors, cameras or variables. They process data locally, reducing latency, and improving responsiveness. Edge devices play a critical role in enabling efficient and rapid data processing right where it's needed most. An edge data center is a compact and self-contained

## 14. What are the 3 tiers of edge computing?

There are three tiers to edge computing,

- The first layer: the sensors and internet of things, IoT devices, collect and perform some basic processing on raw data.
- The middle layer: consists of edge nodes and servers. They are located strategically near the devices in order to perform higher-level processing and decision-making.
- The third layer: the cloud or central data center takes care of source-intensive tasks like advanced analytics, machine learning, and long-term data storage that may not be practical at the edge.

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## 20. Read later:

- [What Is Edge Computing? Everything You Need to Know](#)

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