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Whitepaper

Edge Computing

Data Processing Over the Edge

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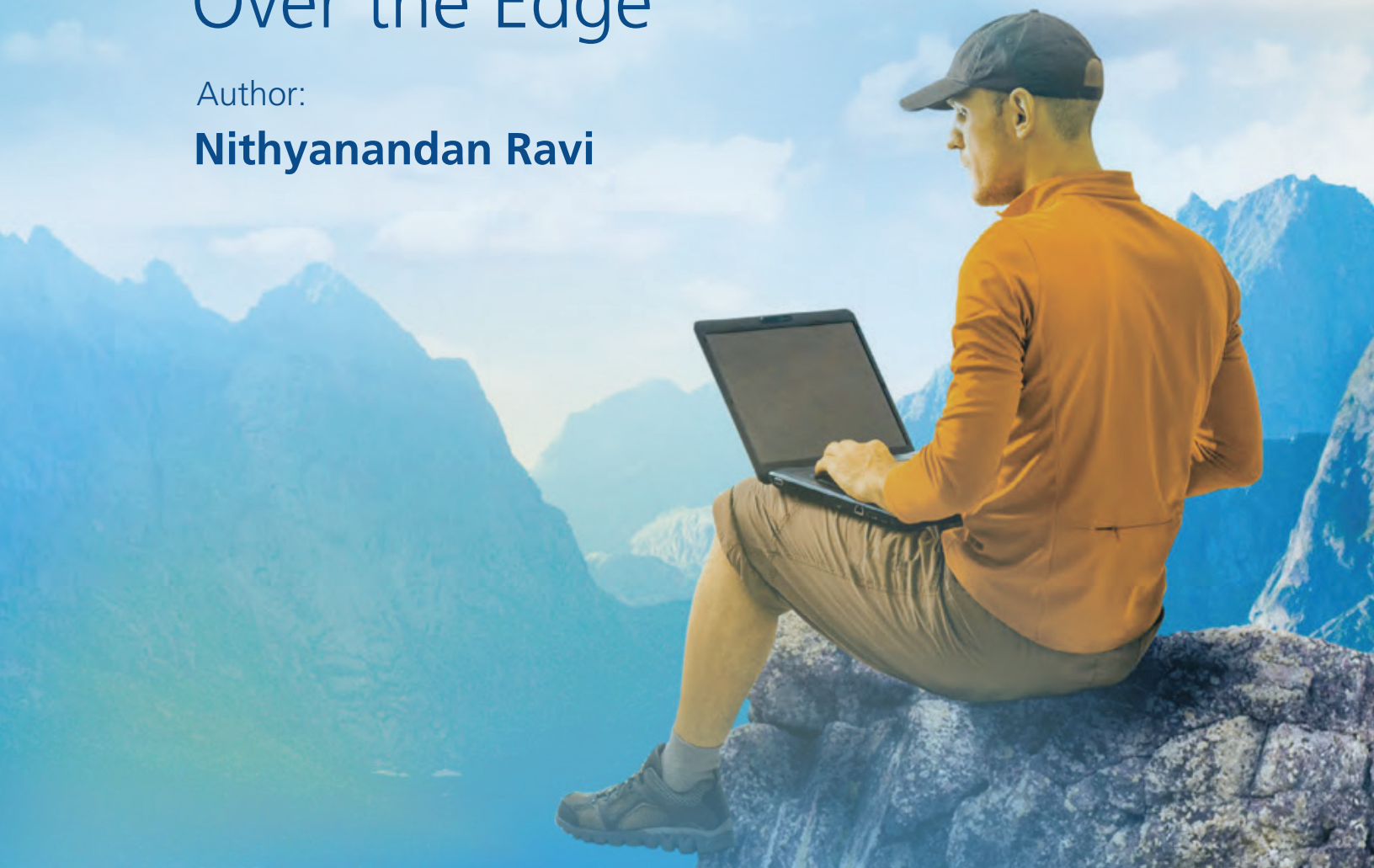


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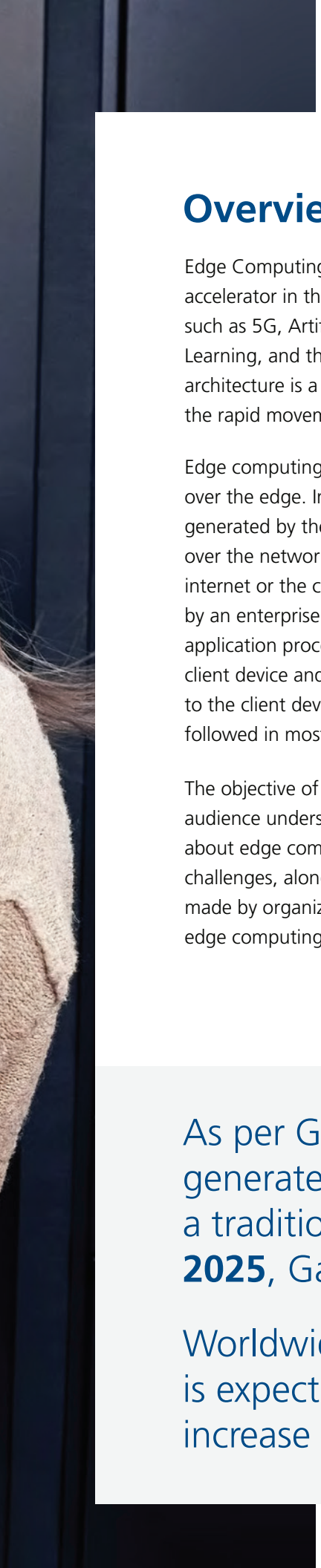


Overview

Edge Computing is becoming a key accelerator in the growth of technologies, such as 5G, Artificial Intelligence, Machine Learning, and the Internet of Things. Edge architecture is a differentiator as it supports the rapid movement and use of data.

Edge computing is all about data processing over the edge. In enterprise computing, data generated by the device get transferred over the network (through WAN such as the internet or the corporate LAN) and stored by an enterprise application. Enterprise application process the data sent by the client device and provides the data outcome to the client device. This approach is widely followed in most business applications.

The objective of this paper is to help the audience understand unknown facts about edge computing, the benefits, and challenges, along with considerations to be made by organizations who are looking for edge computing use cases.

Why Consider Edge Computing

For years, many organizations have moved their data to the cloud. The cloud is an earthbound infrastructure managed inside locations around the globe and made accessible by the internet. When migrating to the cloud, some of the considerations made are which data to send, the distance between the cloud locations and the users that access them, and technologies that can mitigate the latency along the way.

The enterprise computing model transfers all the data from the network edge to the cloud data centers for processing. This may create a latency problem and outstrip the network bandwidth capacity. To remediate the issue, it might be best to process data closer to the edge client. This proximity to data at its source can deliver strong business benefits, including faster insights, improved response times, and better bandwidth availability. Recognizing that cloud is a good start but not a final goal. Organizations are now shifting their focus from a centralized cloud which was located somewhere, to a decentralized model – Edge cloud.

As per Gartner, "Around **10%** of enterprise-generated data is created and processed outside a traditional centralized data center or cloud. By **2025**, Gartner predicts this figure will reach **75%**"

Worldwide spending on edge computing is expected to be **$176 billion in 2022**, an increase of **14.8% over 2021**

Edge Computing: Challenges

The increasing number of IoT and connected devices has put significant pressure on IT organizations to rethink the way of their computing, storage, graphics, and network infrastructure. Such infrastructure must support hyper-scale performance, nearly infinite storage capacity with high IOPS (Intput/Output Operations Per Second) and low latency, turbo-speed graphics processing, and ubiquitous, reliable connectivity.

Security

As the data processing moves to the edge, processing goes beyond the multiple physical and virtual layers of network security offered by the centralized computing model. If not protected, the edge might become vulnerable to security exploits and malware infections.

The number of devices connected to the internet is expected to reach **50 billion** worldwide at the end of **2030**, according to the latest research from Strategy Analytics

Compliance

When edge data is collected at the edge servers, it needs to be checked for compliance and regulations based on location or governance.

Network Bandwidth

As more computing happens over the edge, it leads to requirement of bandwidth expansion.

How to choose right edge computing strategy for your business

With the growing importance of edge computing use cases, organizations should look for infrastructure solutions that meet the performance, utility and resiliency required out in the field, from a remote office to a battlefield across the globe. Those solutions must deliver an experience steeped in reliable and consistent availability, easy deployment, quick time to value, and cloudlike benefiting include cost efficiency, flexibility, and scalability.

What applications, services, or business strategies are planned for the edge computing platform?

Leaders should explore whether there are any existing 5G, Artificial Intelligence\Machine Learning, and Internet of Things initiatives that will benefit from edge processing.

How much importance is the latency for your organization?

Latency decreases as you push computing closer to the edge. If you have an application that requires ultra-low latency and high bandwidth, you might consider edge as a solution.

Are any changes required for the organization's operating model to move to edge computing?

Edge computing is majorly supported for operational technology. The leader should explore options on who will own and manage the edge environment.

What are the business goals organization wants to achieve?

Latency, security, cost, bandwidth, and privacy are some of the issues associated with artificial intelligence and machine learning task that edge computing can mitigate, and leaders should consider them.

How will we secure the edge and address maintenance?

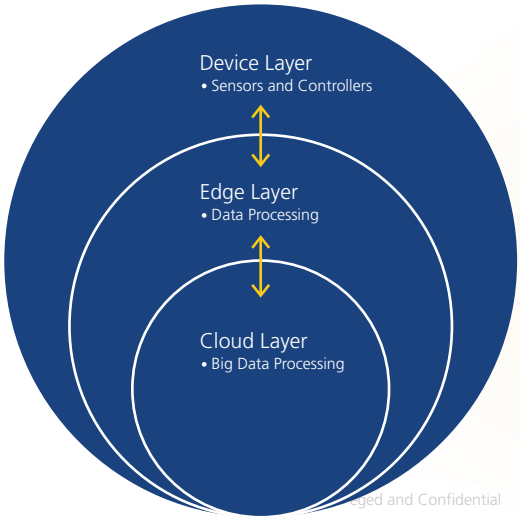
Maintaining an edge solution may require a heavy element of labor. Edge computing workloads and systems will be the targeted attack like any other system. Security measures such as data-at-rest encryption, hardware and software attestation, and boot time integrity checks to consider.

How to find the right partners?

Based on the business goal of the organizations, organizations should carefully analyze the partner and choose the partners who need their business goals.

Benefits of edge computing

In today's competitive landscape, everything is about network performance." By 2023, more than half of new enterprise IT infrastructure deployed will be at the edge rather than corporate data centers, up from less than 10 percent today, according to IDC. The number of apps at the edge will increase 800 percent by 2024, IDC predicts."



With edge computing placed near the edge of the data, below are some of the benefits organizations can look for:

Reduced latency

Edge computing reduces latency by moving processing closer to the network edge and increases the processing speed.

Scalable and sustainable

Data on edge, directly on or near the source of the data, not only increases the efficiency and speed, but it also reduces unnecessary network burden and data traffic waste.

Edge computing can locally perform a lot of data computations. Allows businesses to decide which services to run locally and which ones to send to the cloud, which helps in reducing the operational costs.

Reliability and resiliency

Edge device's ability to locally store and process data ensures no data loss or operational failure in the event of limited internet connectivity. Edge computing further enhances resiliency by reducing a central point of failure. A failure at one edge device will not affect the performance of other edge devices in the ecosystem and thus improve the reliability of the entire connected environment.

Use Cases – Edge Computing

1. Edge computing on infrastructure NFV

The main use of NFV technologies is for network virtualization and used by the telecom industry. Having edge computing integrated with network function virtualization allows increased throughput and optimal use and management of network resources.

2. Edge computing on autonomous devices

(Automobile, Agriculture, Forestry, Surveying, Infrastructure, Construction, Mining and Entertainment, Medical):

Drones

Drones used in applications such as surveying, package delivery, and surveillance will leverage low-latency computer vision systems that perform object recognition for navigation within edge computing and then systems on the drone itself. Edge solution reduces the cost of the drones, minimizes their power consumption, and maximizes both battery life and flight time.

Automobile industry

The automobile industry is focused on leveraging edge computing to address many of the ever-evolving challenges. On electric vehicles, leveraging edge computing to help with battery and predictive maintenance status, charging stations' upcoming and utilization of charge, smart traffic management, and vehicle security.

3. Edge computing on immersive experiences

Virtual Reality and Augmented Reality are used industry such as health care, retail, automotive, and education. Immersive experience needs stringent network requirements such as low latency, high reliability, and high bandwidth. While many of us see AR and VR technologies as mainly used for gaming, many industry verticals are looking at these technologies as game changers. AR wearables using edge AI would save power and battery life by processing certain data on the device while using mobile for higher-level processing, storage, and connection to the internet.

Banking

Banks leverage edge technology such as artificial intelligence and machine learning to implement chatbots that respond to customer queries without needing to rely on staff and suggest personalized product and service recommendations on the spot. Banks also use edge technology at ATMs and remote branches.

Banks use edge computing as a way of deploying a more personalized customer experience. For example, facial recognition technology or virtual tellers that previously were impossible due to latency and speed issues are now plausible developments. As a customer walks into a branch, an infrastructure that works close to the edge could instantly provide relevant loan offers, recognizing their face and delivering information to staff.

4. Edge computing on IoT

Some of the industries that use IoT are manufacturing, utilities, gas, agriculture, and mining.

Manufacturing:

Remote operations such as mines or oil rigs have intermittent connectivity to the cloud and need to function autonomously. With edge computing, we can perform time-critical analytics close to the edge. This makes their processor more agile and responsive to changes making faster and more accurate business decisions regarding the factory facility and manufacturing operations.

Healthcare

The amount of data collected from devices, sensors, and other medical equipment is increasing a lot. This enormous data requires edge computing to apply automation and machine learning to access data, validate and identify problem data so that technicians can immediately take required actions to help patients avoid health incidents in real-time.

Retail

For those Retailers working on deploying innovative technologies to enhance the customer experience, reduce cost and increase performance, Edge computing is becoming key destination. Increasing AI and real-time supply chains drives hybrid model edge as common approach. With Edge-enabled intelligent stores, retailers can take real-time decisions from real-time analytics to drive a frictionless customer experience. Processing data at the edge reduces shrinkage, eliminates stockout, and enhances visibility.

Edge Artificial Intelligence integration will allow enhanced experience from parking, experience for use while entering the store, through selecting products, checkouts, and for retailers in warehousing, retail spacing monitoring of inflow and outflow of customers.

Conclusion

Without edge computing, organizations miss a huge opportunity to unlock the potential of data. While centralized cloud has been the go-to option for years, edge computing is the future. Edge computing is not a replacement for processing data in the cloud, instead it complements the cloud by providing ways to maintain data safety, eliminating the cost of transmitting data to and from a data center and allowing real-time applications to get the answers they need much faster than it is processed now. IoT in many iterations, is a driving force. Edge computing is a must-have capability across the organizations and indeed a technology on the rise and leading us to future of data analytics.

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Nithyanandan works as a Technical Architect (Digital Workplace services) at with more than 16 years of experience in design, consulting, implementation, and management of IT Infrastructure, he is responsible for driving RFP/RFQ/RFI to build comprehensive Modern Workplace Solution response and leading large projects in workplace transformation (Cloud, Hybrid, On-premises).