



Thriving on the edge

insights to extract maximum value from edge computing

Several years ago, a prominent software engineer coined the term ‘data gravity.’ Dave McCrory was referring to the idea that applications and services tend to form wherever large amounts of data exist. Until the past several years, those producing the greatest ‘gravity’ were data centers and — more recently — clouds. But, as the world connected billions of devices through IoT infrastructures, new clusters of data are rapidly forming ‘on the edge.’

Of course, the pandemic greatly accelerated the generation of data at the edge, as corporations and governments scrambled to enable remote workers and develop new ecosystems to connect with the customers and citizens they serve. This was already underway with IoT-fueled trends — such as Industry 4.0 — but the pandemic compressed seven years of digital growth into a 12-month span in 2020-21.

The edge computing trend is only accelerating. [Industry observers predict](#) that more than 75% of all data will be processed at the edge by 2025, along with 30% of workloads. These growth metrics are incredible, and they make edge computing one of the most abrupt and game-changing shifts in the history of IT.



Two core questions: What is edge computing and why is it growing so fast?

‘The edge’ is simply the place where data is generated. From an IT perspective, it’s where the action lies for any connected organization. It’s the deployment of processing power right where data is generated and collected, so decisions can be made instantly, and actions taken in real-time. For example, new automotive designs include a bevy of sensors to collect data for driver assist or autonomous driving capabilities.

Manufacturing equipment is loaded with sensors to collect performance and maintenance data. The same is true for implanted healthcare devices, oil rigs, mine shafts and construction sites. The edge is any location where human or machine interactions occur and where data is generated. At a high level, edge computing is growing so rapidly because it solves both bandwidth and latency problems while enhancing data security and privacy— which are two primary concerns enterprises will have as more data is generated by millions of connected devices.

Looking deeper, edge computing is growing rapidly for other reasons, as well. The first reason is simple physics. Sending data from devices in the field to data centers takes time and requires bandwidth. Even if latency is measured in milliseconds, it can mean the difference between good and bad outcomes. For example, the importance of quick decision-making or action-taking for passengers in autonomous cars, patients using implanted devices or workers in a mine. Small delays can literally be life-threatening.

The second compelling reason is basic economics. The one resource no enterprise or person can buy — no matter how much wealth they have — is time. When data is processed at the edge, there’s less need for (costly) bandwidth. Decisions are made instantly, averting the cost of disasters or providing revenue-generating competitive advantages. When you apply these principles to a massive manufacturing operation or global supply chain, the savings become game changing.

A third driver of edge computing is compliance to data privacy laws. There are stringent laws that require data to be stored and protected within the geographic area where it is generated. It’s also a best practice from a security perspective to expose fewer volumes of high-value data to data centers or cloud storage devices.



The increasing ubiquity of edge computing

The evolution of enabling technologies — like IoT, 5G networks, satellite mesh and artificial intelligence — will improve the power, momentum, value and adoption of edge computing. As enterprises gain access to more capacity, power, robust networks and smarter machines, the applications for edge computing will expand rapidly. Here are some examples:



Manufacturing and industrial processes

The rapid adoption of IoT has resulted in millions of connected devices in factories. Massive amounts of data are being collected on equipment performance, production lines, product quality and other metrics. Moving all this data to a central data center or cloud for processing can result in unacceptable delays and costs, triggering many manufacturers to process that data at the edge for faster decisions and actions. This is especially valuable in operations where automated assembly lines move rapidly and require real-time interventions to solve maintenance issues and other problems. Other applications include preventive maintenance, energy efficiency and customized production.

On many occasions, Mindtree has been able to connect decades-old technology within the smart, connected ecosystem using IoT technology at the edge, allowing manufacturing plants to make a transformative shift without purchasing new technology.

Virtual and augmented reality

Virtual reality (VR) and augmented reality (AR) are used to train, guide and protect workers in industrial settings that require real-time processing of large data sets. Lags in data analysis can easily result in costly or dangerous delays – and latency in the delivery of data can make daily activities and processes tiresome or impossible. Industrial workers use VR/AR tools to access instructions for complex tasks and learn new skills and new processes, and these tools rely on fast loading 5G or edge computing technologies. Other businesses can apply VR/AR technologies to enable customized experiences, such as health consultations, fitness instruction and personalized shopping displays.

Smart cities

National, regional and local government agencies are leveraging edge computing to create smart cities and highly efficient infrastructure, such as roadways with intelligent traffic controls. Edge computing is being used to reduce costs and improve service levels in traffic agencies and private transportation companies. The power of edge computing helps them better manage vehicle fleets and overall traffic flow by enabling instant adjustments based on real-time conditions.

Workplace safety

Edge computing allows enterprises to consolidate data from a variety of sources and generate instantaneous insights into the environment and potential dangers for workers. Data is analyzed at the edge — without the latency of being sent to a central data center — so workers can take action to ensure their safety. Insights can be collected from IoT data generated by environmental sensors, wearables and smart devices, then analyzed and converted into instructions for workers.

Autonomous vehicles

One of the most cited examples of edge computing is autonomous driving. Self-driving vehicles can only operate safely and comply with (ever-changing) regulations when provided with real-time analytics. Even milliseconds of lag time for data to travel to a central location for analysis could be disastrous. This need for instant analysis is complicated by the sheer volume of data generated by vehicles and surrounding sensors. Traditional data processing simply isn't economically or practically feasible. Edge computing provides the best path forward. While this scenario may be exclusive to autonomous vehicles today, the amount of data generated in factories, mines, oil rigs, construction sites, home healthcare settings and other venues will likely make this a common problem for every enterprise to solve.

Physical security

Organizations are deploying edge computing to improve the efficacy of surveillance and authorization systems, such as video monitoring and biometric scanning devices. Identity and access privilege data is being analyzed in real-time to confirm that only authorized individuals are granted access and potential threat actors are denied. Data is being collected and analyzed from a variety of scanners and sensors, including biometric devices that conduct facial recognition or iris scans to confirm worker identities.



The momentum and value of edge computing

The Eclipse Foundation reported in its 2021 IoT and Edge Commercial Adoption Survey that 54% of organizations have deployed edge computing or plan to deploy by end of 2022, while another 30% plan to evaluate it during 2022-23. What's driving this massive movement to the edge? Value. For example, there are millions of connected devices on factory floors around the world connected by industrial IoT. Millions more will be online this year to collect high-value data regarding production lines, equipment performance and finished products. Without edge computing, these massive amounts of data would have to be transmitted to a central location for analysis and storage. Edge computing greatly reduces the cost, latency and security exposure of transmitting that data — and delivers the required processing power precisely where it's needed. This means lower costs, fast decisions and quicker resolution of emergencies or potential problems. It also means that concepts such as predictive maintenance, mass customization, energy efficiency and smart manufacturing are easier to bring to life.

Looking to grow? You need an edge!

Deploying edge solutions for customers over the last several years has made one truth eminently clear: the keys to success in a connected world is adaptability and agility. Edge computing is the greatest driver of those attributes. Enterprise leaders who invest wisely in edge computing and judiciously deploy AI and analytics will be able to respond faster to change and capitalize quicker on new opportunities that arise. They will also have an advantage when it comes to tackling whatever challenge comes next.

Edge computing is revolutionizing almost every industry in the world. If you're ready to explore the possibilities and give your organization the edge in a fiercely competitive world, we can share some valuable insights.

Let's talk.



About Mindtree

Mindtree [NSE: MINDTREE] is a global technology consulting and IT services company that enables enterprises across industries to drive superior competitive advantage, customer experiences and business outcomes by harnessing digital and cloud technologies. A digital transformation partner to more than 275 of the world's most pioneering enterprises, Mindtree brings extensive domain, technology and consulting expertise to help reimagine business models, accelerate innovation and maximize growth. As a socially and environmentally responsible business, Mindtree is focused on growth as well as sustainability in building long-term stakeholder value. Powered by more than 35,000 talented and entrepreneurial professionals across 24 countries, Mindtree — a Larsen & Toubro Group company — is consistently recognized among the best places to work.