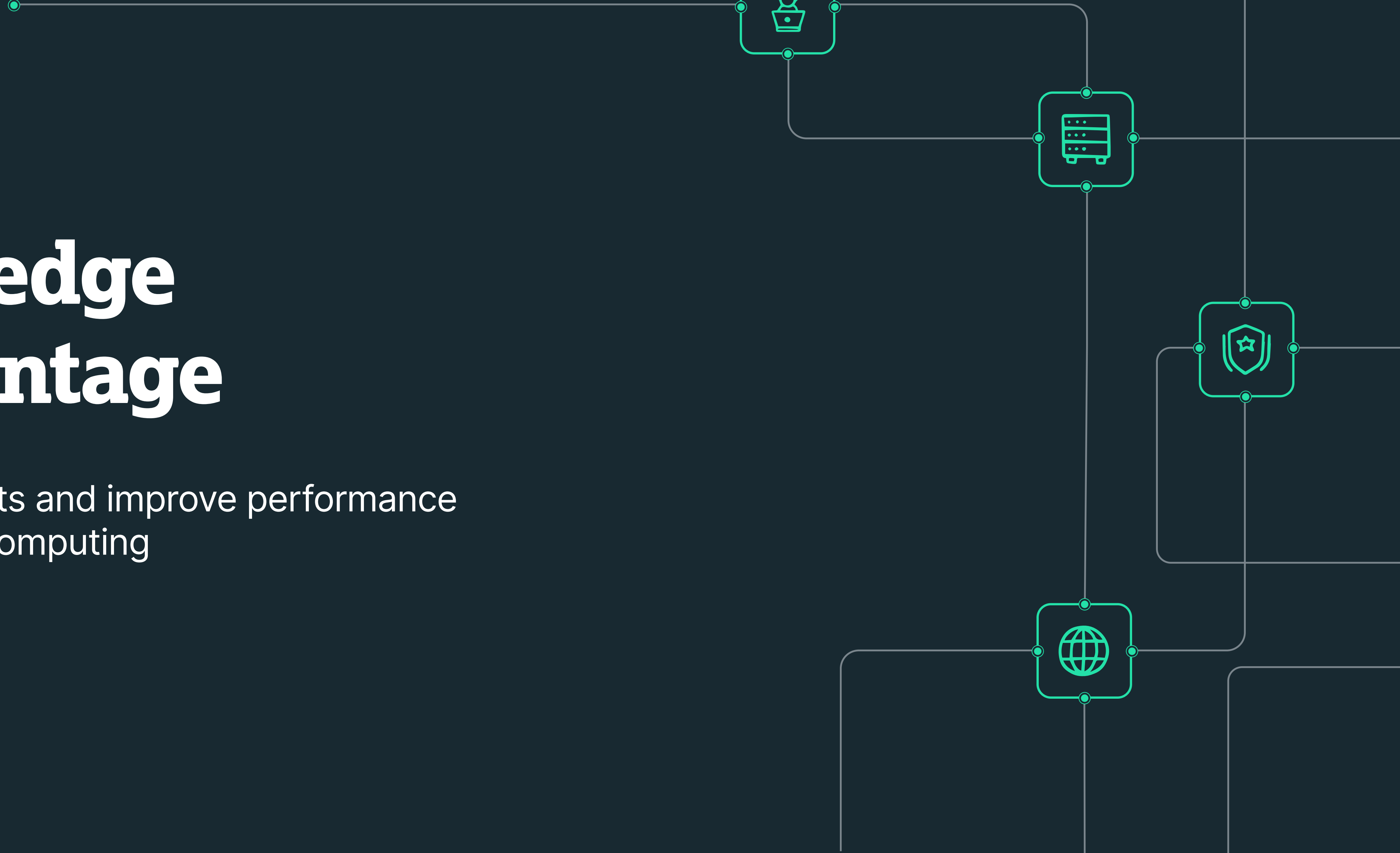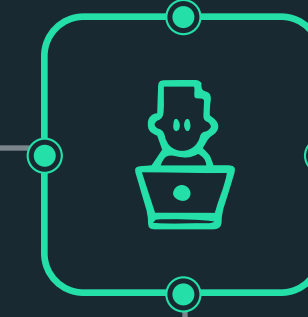# The edge advantage

Reduce costs and improve performance
with edge computing

When edge computing comes up in the news, it's often in reference to evolving, future-looking technology like self-driving cars, smart cities, the internet of things, and more. However, many businesses are using it today to streamline workflows, lower costs, and create more resilient and secure end user experiences — giving them a competitive edge in their market.

So what is this kind of edge computing? Simply put, it's the next iteration of cloud computing — and it's growing quickly, driven by the exponential growth of data and the increasingly savvy demands of customers. After reading The Edge Advantage, you'll understand the challenges of traditional cloud computing and how edge computing was designed to address them. You'll learn when it makes sense to move workloads to the edge, explore edge-ready use cases, and find out how to get started.

Cloud computing

Cloud computing concentrates resources in a small number of large data centers in remote locations. Overall, it's good for general purpose applications that require centralized IT, computing and storage, processing power for machine learning, hyper scale capabilities, and broad reach. Although space and utilities are cheaper under this centralized model, it moves data further from end users and can result in the following challenges:

○ **Latency:** As more data is produced at more remote locations, the distance between the source of the data and the processing of the data often grows. This results in greater latency and a less optimal user experience (UX) and customer experience (CX).

○ **Data/bandwidth:** More data requires more bandwidth, ingestion, and egress, which all increase costs. In addition, not all data has the same value and needs to be processed or stored in the cloud.

○ **Privacy and security:** Consumer privacy is becoming increasingly important and is at odds with sending and storing all data in a central place. Companies need to protect their own data, as well as consumers' personally identifiable information (PII).

○ **Limited resilience:** If connection to the cloud goes down, the app or the site goes down, resulting in a bad UX and CX, as well as lost revenue.

In the next section, we'll explore how edge computing can help solve for these constraints. But it's important to note that edge computing and cloud computing are complementary — each has its strengths and appropriate applications.
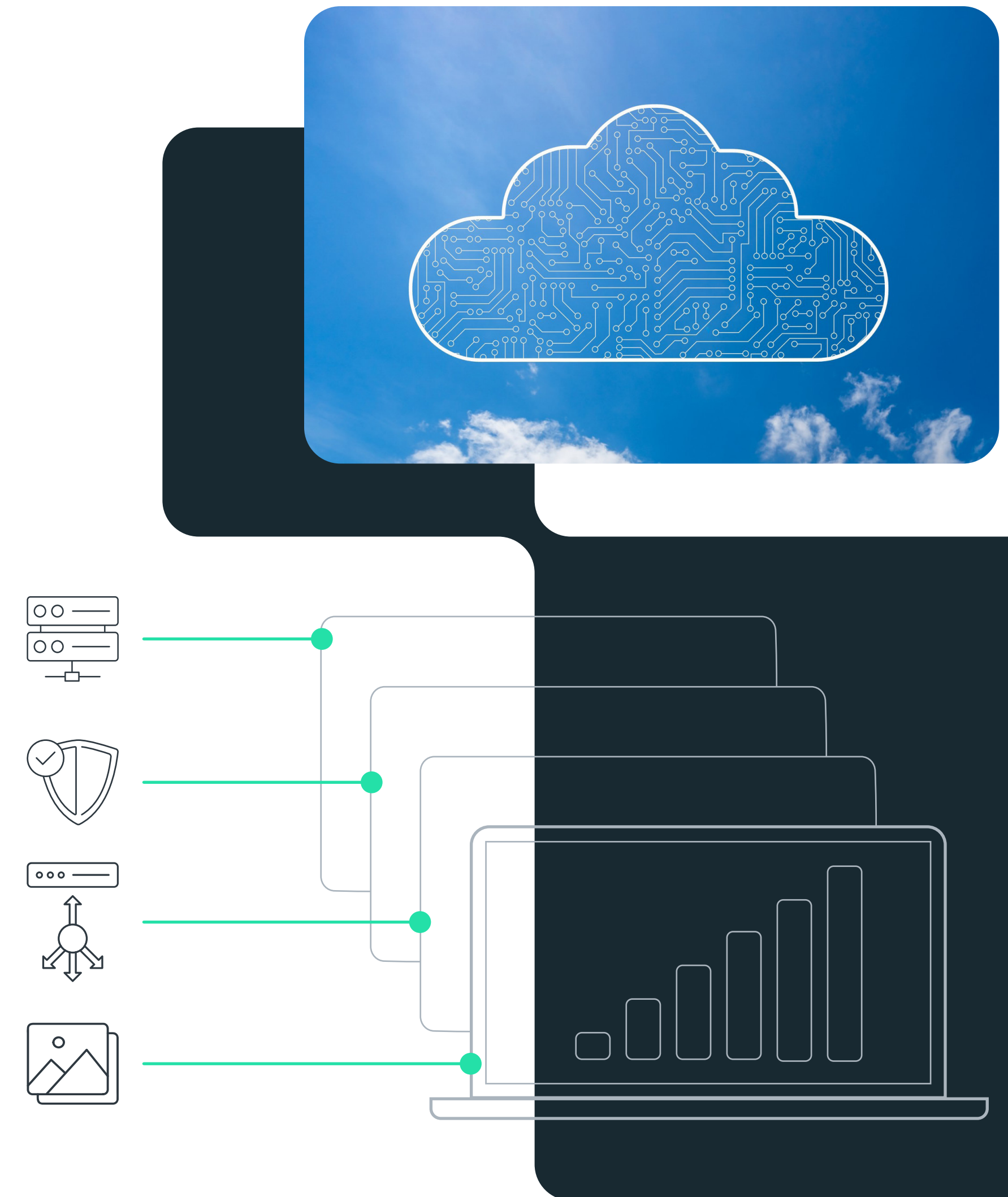
Edge computing

So now we know that consumers expect increasingly personalized and immersive experiences, which means applications require more data processing and logic in real time. We know that while the central cloud is great for processing large amounts of data, the additional back-and-forth trips increase latency and drive up costs. And we know that with consistent performance becoming table stakes, holistic reliance on the central cloud can mean trouble if a server goes down.

Where does edge computing fit in? Edge computing helps mitigate these obstacles by decentralizing the data processing. At its core, edge computing is the processing and synthesis of data closer to end users, where the data is created and compiled, rather than in the central cloud.

This distributed approach enables developers to execute complex logic at the edge for faster and more personalized user experiences. Edge computing also supports (increasingly common) API-heavy workflows by acting as a central tool to fetch data from multiple backends and services and dynamically stitching them together into one cohesive experience. The edge computing approach mitigates many of the challenges of cloud computing.

Offloading infrastructure management to a cloud provider — also known as serverless — can bring even greater benefits. Serverless refers to the increasingly popular execution model where the cloud service provider manages infrastructure, providing computing resources on demand for their customers. This allows developers to focus on building applications, sites, and microservices rather than capacity planning and maintenance. When serverless and edge computing are combined, companies can deploy complex logic closer to their end users for reduced latency, lower costs, and greater support of API workflows.

Companies often experience improvement in the following areas:

Speed: Processing data closer to the source results in faster performance and response times with virtually no latency, which is necessary to enable real-time decision making.

Cost: Offloading workloads from the origin and reducing roundtrips decreases public cloud spend, which continues to grow with data exponentially.

Privacy/security: Identifying and authenticating traffic well before it gets to your network ensures privacy of PII and sensitive corporate and customer data.

Resilience: Edge computing has the ability to process some data even if the connection to the core goes down, so sites and apps can continue to deliver a seamless customer experience and generate revenue.

Use cases

A challenge many companies have with edge computing is visualizing the possibilities of what they might do with data to improve business processes and customer experience. Here are just a few of the use cases being used today:

○ **Edge authentication:** Digital publishers are now authenticating subscribers, and retailers are authenticating buyers at the edge for a faster login experience. In addition, leveraging JWT tokens to modify headers and other authentication regimes help maintain a consistent experience across domains and sections of infrastructure.

○ **Redirects at scale:** Servers that have to handle millions of requests for old and non-canonical URLs can be unnecessarily burdened. This is especially true with on line retail and user-generated content (UGC) applications. An edge lookup enables the shifting of all static redirects to the edge, thereby reducing traffic to origin for lower infrastructure costs. Fewer trips to origin also means less latency, ensuring customers can access the pages faster.

○ **A/B testing:** Online retail and SaaS companies frequently run tests to optimize their customer touchpoints and improve conversions. Developing an in-house testing solution allows for greater customization vs. an out-of-the-box solution. With edge computing, developers can rapidly push out new tests and adjust them as needed based on near-instant insights, all of which improves CX and helps drive higher conversion rates. Moving application logic to the edge also lowers costs by reducing the number of requests to origin.

- **Waiting room:** Many online retail and travel & hospitality companies utilize waiting rooms to manage traffic bursts and provide a better user experience. Assigning waiting room tokens at the edge minimizes returns to origin for reduced operational costs and a better customer experience.

- **API gateways/GraphQL:** Companies offering a public API often have an API gateway that sits in front of their backends that is responsible for authentication, rate limiting, request validation, batching/debatching, and caching and routing. A gateway on the edge im proves scalability and enables increased cacheability for content that was not previously cacheable.

- **Content stitching:** Personalized recommendations are important for customers of online retail and travel & hospitality companies. By deploying logic at the edge to stitch together general and user-specific data into one combined request, more content can be cached to reduce trips to origin and lower infrastructure costs. Content stitching simplifies work across multi-cloud environments and serving this combined content from the edge also results in faster load times.
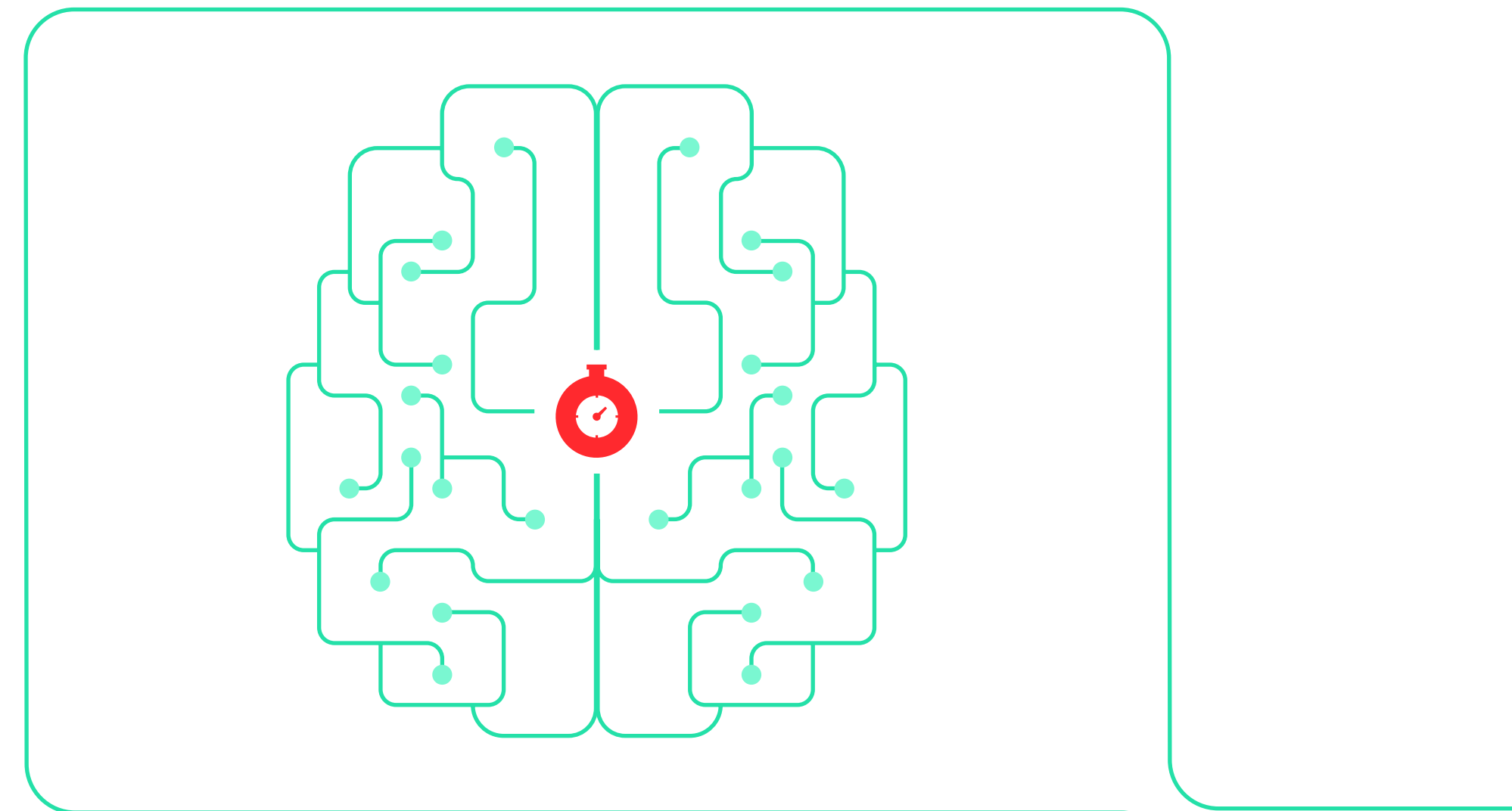
Closing

This is just the beginning for edge computing and the accelerated shift to remote work and ecommerce has further increased interest. A growing number of developers are starting to build applications closer to end users to address their most latency-sensitive use cases. They're realizing significant cost savings from fewer trips to origin and taking advantage.

If edge computing is something you're considering, Fastly can help you find opportunities to solve your unique business problems at the edge with plenty of guidance and support to help you get started. Since we released Compute@Edge™ in late 2019, we've helped customers launch global production workloads for many use cases from website personalization to enhanced API performance and JWT token redirects. The results have been impressive — and they're not limited to just these examples.

Getting started

To get started, sign up for our free trial and experience the edge advantage for yourself.

Free Trial