DELL Technologies

Whitepaper

An Edge Field Guide: Five Practical Principles for Successful Edge Deployment

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Abstract

The Edge exists wherever the digital world and physical world intersect, and data is securely collected, generated and processed to create new value. Success with Edge technologies requires strategic planning, technical innovation and educated risk-taking. This paper describes five key principles for successful Edge technology deployments.

Executive summary

Edge is a rapidly evolving technology landscape that is increasingly critical to businesses. Creating success at the Edge requires careful consideration of business and technology objectives. Included in this white paper are guidance for mapping technologies at the Edge to business outcomes as well as a series of principles to keep in mind when planning Edge deployments.

The principles presented here are built on nearly a decade of designing, building and operating service platforms and Edge functions in organizations from startups to global enterprises.

Audience

This guide is for Dell Technologies partners and enterprise technologists, system architects, and system operators working with Edge technologies.

Acknowledgments

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Forge **your own journey** to success.

Introduction: Charting your unique course to the Edge

Mobile computing. Point-of-sale terminals. Intelligent robots. Self-driving cars. Virtual reality. Chatbots. The evidence of new and emerging Edge use cases — driven by customer demands and business applications — is all around us.

Digital businesses must be able to define, build and protect their Edge — all without adding complexity or sacrificing consistency.

Because every organization is unique, no two Edge implementations are the same, which means that great attention must go into planning. Starting points may vary, business priorities may demand course adjustments and what worked in one organization may not succeed in another.

After nearly a decade of designing, building and operating service platforms and Edge functions in organizations from tiny startups to major global enterprises, we've developed these five practical principles for successful Edge deployments. They are provided to help you chart your own Edge-technology strategy, based on solid fundamentals.

In addition to the five principles, keep in mind the following advice when planning your own unique path:

- **Start by paying close attention to trends and changes in your own industry and listening to your customers**. Their experience should be your highest priority and guide any discussions. Additional areas like business process optimization, business intelligence and improved productivity should inform the prioritization.
- **Communicate early and often with key stakeholders, and when possible aim for an early win**. It's critical to create and communicate an agenda that will build momentum around the vision, getting participating teams engaged.
- **Look at your Edge deployment as a collection of micro-journeys**, including milestones such as getting developers to adopt standard error logging, standardizing data-at-rest encryption and consolidating reporting. This leads to agility, measurable progress and faster response to business changes.
- **Finally, don't be afraid to implement new ideas and disrupt from within**. Forge your own journey to success.

The five guiding principles of Edge technology

Define your Edge wherever your business is happening — from IoT to applications to smart devices.

Principle 1: Define your Edge.

The Edge exists wherever the digital and physical worlds intersect and data is securely generated, collected, processed and used to create new value. Edge might include Internet of Things (IoT), connected cars and smartphone apps, but more importantly, it's where your business happens.

Bringing compute, storage and networking closer to the data improves the customer experience by enabling faster insights from more data on their device of choice. This also opens a new world for businesses to monetize data and applications, or for public sector organizations to improve health and safety.

Describing Edge in terms of what it enables can help IT professionals find common ground with business users during the earliest planning phases of Edge implementations. This enables productive strategy and roadmap conversations with business owners.

In addition, beginning by discussing the Edge in terms of outcomes can help IT professionals conceptualize the optimal data workflows and functions without being constrained by implementation limitations.

Once the business outcomes are defined, it's up to the IT professionals to dig deeper into some of the considerations for making the idea a reality. These include:

- **Adopting new data architectures** with the flexibility to handle multiple types of data shared across different applications and platforms
- **Building cloud-native, platform-independent applications** capable of moving freely across Edge, core and hybrid cloud environments
- **Maintaining consistent Edge data processing** functionality at the Edge as well as across hybrid clouds
- **Ensuring data governance and security** are portable across Edge and hybrid cloud environments

Being agile and **responsive** is business critical.

Principle 2: Build your Edge incrementally.

With most technical innovations, iterative development is the norm, with a focus on starting small (for example, with a proof-of-concept) and scaling up. Since Edge deployments can get large quickly, as business needs emerge and evolve rapidly, it is important to be agile and responsive. The recommended approach is to build Edge deployments one successful functionality at a time so as to build a positive perception of Edge deployments among the lines of business. This helps prove the value proposition and keep you in control of the pace of deployment and the subsequent return on investment (ROI).

To build Edge incrementally, do the following:

- **Define the kind of insights and activities the organization requires and work backward to map business data to Edge data**. This "walking backward" exercise helps chart the transformations that need to be applied to Edge data to turn it into business data and can identify potential gaps. Adding new data incrementally avoids having to massively redesign Edge data pipelines; extraction, transformation and loading (ETL) processes; and Edge data stores.

- **Define the integration points between layers, services, applications and so on**. Then, share the definitions with other stakeholders as early as possible in the development cycle. This focuses on the system functionality as opposed to the individual components, leads to finding design gaps early in the development cycle and ensures everyone is on the same page with the implementation.
- **Define data security, compliance and governance parameters upfront**. Consider documenting industry-specific compliance requirements, analyze and label data based on business sensitivity, and implement stated processes and procedures of data handling. Adding any of these toward the end of the development cycle will likely cause churn, significant disruption and unforeseen legal liabilities.
- **Build for today, but design for three to five years from now**. Technology inflection points, changing business trends and market disruptions happen with regularity. Building with the future in mind helps designs stand the test of time. One way to handle this would include establishing a field upgrade plan upfront, aligning with long-term growth objectives and leveraging open data platforms.

Maintain business and service continuity by building in **protection for data at the Edge**.

Principle 3: Protect data at the Edge.

Recent headlines about ransomware, data breaches and data loss continue to highlight the importance of data protection. Our recommendation is to build in protection for the data at the Edge with a plan that includes maintaining business and service continuity despite one or more Edge sites being compromised.

To protect data at the Edge:

- **Build a separate network fabric for data assurance operations, including backup, restore, archive and snapshot**. This should cover all Edge locations and extend all the way to the core. Depending on service level agreements (SLAs), the data storage network fabric should be hardened and sub-segmented to meet specific operational requirements or for privacy protection. A separate network fabric guarantees that data assurance operations take place regardless of performance hotspots on the main network.
- **Separate metadata on its own higher-performance, more reliable tier**. Most original data reaches peak value within seconds or minutes. But the metadata is often paired with other metadata, generating new metadata without ever updating the original. Because these frequent metadata updates are tied to business processes, slow updates will adversely impact applications. Moving metadata to its own higher-performance infrastructure has a positive impact on overall business performance.
- **Have adequate data protection controls in place before putting the system into operation**. Managing data without adequate privacy protection in place is a disaster waiting to happen. Simply put, trying to define and apply classifications to data in a solution already in place requires massive human intervention versus designing it in at the beginning. Designs, standards, processes and best practices geared toward minimizing the risk of data loss should be baked into the process from the beginning.

Edge technologies enable extraordinary speed for your business and technology innovation.

Principle 4: Maintain consistent standards.

IT professionals are under pressure to respond quickly to changing business needs. At the same time, Edge technologies are rapidly evolving, enabling extraordinary speed for business and technology innovation. However, deploying Edge point solutions using an ad hoc approach can lead to inconsistent standards between Edge, core and hybrid cloud environments, resulting in inefficiencies and dysfunction across the business.

One team needs to strategically stay in control of the pace of innovation, deploying thoughtful Edge solutions that integrate and enable applications and data-focused operations across Edge, core and hybrid cloud environments.

To maintain consistency for Edge sites:

- **Standardize operational processes and tooling between environments**. Using different tools and processes between Edge, core and hybrid clouds introduces complexity and risks.
- **Standardize applications across Edge, core and hybrid clouds**. Design applications that are cloud native and hardware agnostic so they can run in your choice of environments.
- **Strive for a consistent app version**. Maintaining multiple versions of an app increases costs and lengthens test cycles.
- **Decouple software releases from product releases**. This enables the business to control product-release timelines with little or no assistance from IT.

Drive out complexity at the Edge.

Principle 5: Keep it simple.

As with any fast-paced technical domain, rapidly changing business dynamics create conditions for specialized Edge application stacks, highly customized release processes and pipelines, and other deployment decisions that can increase complexity — and sap time and resources from IT.

Building the Edge out incrementally gives you the opportunity to thoughtfully deploy integrated solutions that enhance simplicity — thereby reducing costs and risks.

To drive out complexity at the Edge, create lights-out-capable simplicity:

- **Simplify the compute**. Consistent compute configurations across form factor, hardware, options and so on reduces complexity. Fewer server configurations pay off in reduced operational costs, shorter maintenance windows and more predictable technology refresh cycles.
- **Simplify the network**. Changing network topologies is tedious work that introduces the chance for errors. Simplify the network as much as possible at the Edge, starting with a software-defined network, to give you the greatest flexibility for the future.
- **Simplify storage**. Gartner predicts that more than half of enterprise-generated data will be created and processed at the Edge by 2022.[1] Standardizing on one or two storage technologies simplifies storing these growing volumes of data.
- **Simplify DevOps processes and pipelines**. Because of the lights-out operation of most Edge sites, a good DevOps solution should be largely automated. This can be enabled by containerization and standardizing DevOps across Edge, core and hybrid cloud environments.

[1] Gartner press release, "Gartner Says the Future of IT Infrastructure Is Always On, Always Available, Everywhere," December 2018.

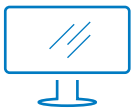
- **Simplify the software**. We recommend deploying only stateless applications at the Edge for easier deployment, highly controllable scaling and much more predictable behavior in situations like service failover and configuration changes.
- **Simplify the data**. Avoid complex data schemas, especially for data sets that are frequently updated. You will also need a well-defined data change governance process that allows you to roll back changes to the last known good point.

Summary

Organizations need to carefully plan their Edge projects. Following our recommendations above will give you a greater chance of success with your Edge deployment.

Whether you're developing retail or manufacturing solutions controlled and orchestrated by Edge technologies, digital cities where Edge solutions improve and automate a host of services, self-maintaining manufacturing lines, or a host of other Edge use cases, Dell Technologies can help you achieve new business outcomes enabled by insights from Edge data.

In addition, Dell Technologies stands ready to help you overcome the challenges of the Edge and seize any opportunity with our broad portfolio of compute, storage, networking and services spanning from Edge to core to hybrid clouds, enabling you to place technology wherever outcomes demand.



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