



Driving data center innovation with Microservices

QTS balances speed and resiliency in the development and delivery of SDP

Executive Overview

To maintain a competitive edge in an increasingly digital world, businesses continue to turn to technology to help them improve their products and business efficiencies. Microservices enables organizations to increase the speed and frequency with which they can develop and introduce application updates to customers. QTS adopted this dynamic deployment model to boost the speed, flexibility and resiliency with which it creates and rolls out enhancements to its proprietary Service Delivery Platform (SDP). With Microservices, QTS can continually empower its customers with new opportunities to remotely visualize, control and manage their data center environments.

Keeping pace in an innovative business landscape

The ability to quickly and safely improve products and services to enhance business outcomes has never been more essential. According to a McKinsey study, [84%](#) of executives believe their future success relies on continued innovation. Yet the ability to innovate is only a piece of this puzzle. The speed at which businesses develop and deliver these innovations must also be a priority for organizations looking to gain and maintain a competitive edge while bolstering their customers' capabilities.

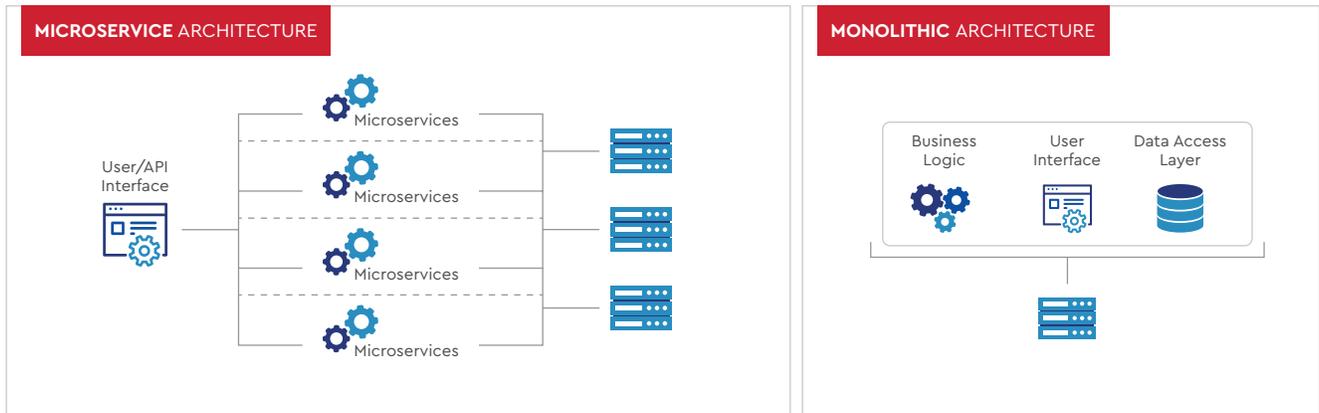
Microservices has emerged as a way for businesses to speed the development and deployment of new products and features. By separating large software applications into smaller, more manageable functional components, Microservices allows developers to independently innovate features without impacting the integrity of the entire application. It also enables more frequent updates with little to no downtime for customers.

Netflix was [one of the first adopters](#) of this deployment approach. The streaming media giant systematically broke apart its application into more than 500 Microservices and APIs to more easily manage the application and deliver an improved and highly available experience for its nearly 200 million subscribers.

Today, companies continue to adopt Microservices for their ability to balance speed and resilience in the software develop and release cycles. In fact, IDC predicted that Microservices architectures would support [90%](#) of all applications by 2022.

QTS Data Centers, a leading provider of hybrid colocation and mega scale data center solutions, has transformed the infrastructure behind its value-driven Service Delivery Platform (SDP) to accelerate the pace at which it can deliver key data center insights that help customers remotely manage their spaces. Microservices enables this speed on two fronts: more rapidly developing SDP enhancements and deploying them more quickly and frequently.

Differences Between Microservices and Monolithic Architectures



The value of Microservices

By managing applications as a series of smaller functional pieces, Microservices transforms software development and deployment, allowing businesses to be more nimble and resilient as they develop and enhance applications.

This is a dramatic about-face from the traditional, Monolithic approach to software development which builds and delivers software as a single, large code repository. Over time, as the application grows larger and more complex, the ability to manage and update it becomes more complicated and time-consuming. The inherent interdependencies of the Monolithic model further affect the agility and flexibility of the development process, making it difficult for multiple developers to work in tandem. Ultimately, this impedes engineering and makes it more cumbersome to react to customers' evolving needs.

The sheer size of a Monolithic application also makes implementing changes a lengthy and risk-ridden endeavor. Introducing new features or debugging existing code requires a long maintenance window, which equates to hours of downtime for customers. To complicate the process more, the coding dependencies woven throughout the application can impact the start-up chain and threaten the integrity of the entire application. This means additional downtime for customers as the engineering team finds and fixes the issue.

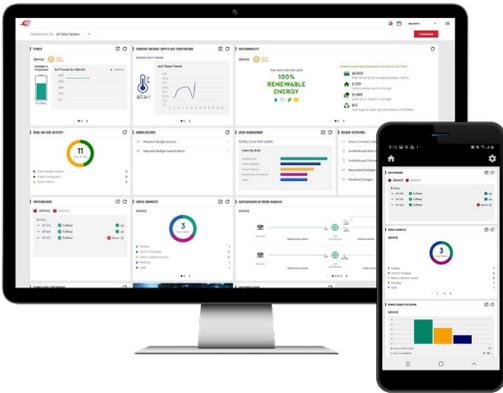
Because of these risks and the large maintenance window, businesses that utilize a Monolithic architecture generally follow a yearly or semiannual release cycle. This limits a company's ability to provide customers with new features, improvements and updates, and inherently does not support ongoing innovation or a world-class customer experience.

Microservices buoys QTS' commitment to data center innovation and transparency

For QTS, delivering an unparalleled customer experience is rooted in innovation that integrates advanced technology and the expertise of its people. Using SDP, QTS provides its customers with full transparency into its digitized data center environment. This real-time insight allows customers to remotely manage and control their environments to promote data-driven decisions and improved business outcomes.

This is a critical differentiator in a COVID-impacted world in which businesses are more reliant than ever on remote accessibility. Case in point, QTS reported a 24% increase in user engagement from the quarter prior to the pandemic. Customers also doubled their utilization time since the pandemic as they spent more time examining power consumption, ordering cross connects and provisioning to clouds from their home offices.

ABOUT SDP



SDP is a digital colocation orchestration platform that delivers complete transparency into the data center. It allows organizations to view and self-manage their environments, exclusively, in real-time from any device. The API-driven platform provides on-demand access to 3D visuals of customer spaces, calculates and displays power distribution, shows asset inventory and rack elevations and a host of other business critical apps.

While its former Monolithic deployment model was working effectively, QTS wanted a more future-focused strategy that allowed its development team to not only react to customer expectations more quickly, but to proactively introduce new SDP features that could further enrich capabilities.

"SDP was designed with our customers in mind," said Brent Bensten, chief technology officer, product and innovation at QTS Data Centers. *"Our goal is to provide our customers with complete visibility into their data center environments, and we wanted a deployment model that would allow us to continually innovate this platform to deliver value to our customers more regularly and with less impact."*

Yet, achieving an accelerated development and release schedule was difficult, if not impossible, with its existing Monolithic model. Running SDP as a single large application with three interconnected tiers—the web server, the business application server and the relational database—hindered its ability to quickly innovate. The myriad of interdependencies made coding a sensitive and slow process as a change to one feature could impact unrelated functions.

Deployments were also lengthy and risk ridden. Regardless of how minor the change, QTS needed to pull SDP offline for hours, impacting customers' abilities to manage their data center environments. These risks made agile development and deployment more difficult and limited the frequency with which QTS could introduce new features to customers.

AN INVESTMENT WORTH MAKING

While the bulk of its peers in the data center space still utilize Monolithic architectures, QTS opted to take a more progressive approach to its deployment strategy to strengthen its position as an industry innovator. Microservices offered opportunities for QTS to future-proof SDP, enabling the organization to roll out new visualization apps and feature enhancements with greater agility and frequency to meet evolving business needs and put updates into customers' hands more frequently and with less risk of downtime.

To fortify its Microservices model, QTS devised an underlying architecture utilizing best-of-breed frameworks and programming languages to support SDP within a distributed architecture. This infrastructure was built to maximize the flexibility, speed and agility of SDP deployments.

With a single entry point, the robust architecture centrally manages running instances using industry-leading integration and automation tools to ease maintenance. The built-in automation quickly balances workloads, redirecting requests to the required node regardless of the node receiving request. This infrastructure also allows QTS to easily deploy a specific build of a deployment module and scale it uniformly across any number of nodes to deliver the appropriate



resource capacity to optimize performance. Ultimately, this dynamic architecture enhances the speed in which QTS can move from its repos to deployment. This scalability proved particularly critical to QTS customers during COVID-19 as capacity and demand increased.

A CRITICAL SEPARATION OF FUNCTIONS

With Microservices, QTS is able to break apart SDP into its various modules, creating functional separations that allow each feature to be independently engineered and deployed. Developers can now autonomously write code for a specific SDP module—such as Power Utilization, 3D Mapper and User Management—without impacting other modules within the application.

Microservices also allows QTS to separate the user interface (UI) and the backend business logic to enable changes to one without touching the other. This layered architecture provides a more resilient experience for users and supports QTS' API-first approach.

"We want to effectively deliver the data that's important to our customers," said Bensten, noting that QTS also leverages these APIs within its own implementation of the platform. *"We enable that access first and deliver a user-friendly, AI-backed graphical interface secondarily. This delivers rapid access to the real-time data customers need to make business-enabling decisions about their environments."*

Customers can also set thresholds and automatic notifications to identify faltering equipment or data center fluctuations such as power and temperature spikes. This allows businesses to quickly identify and address issues to produce cost-efficiencies and protect their environments without manually combing through data.

By decoupling features and removing dependencies, Microservices allows each segment to operate independently. This enables developers to work in parallel and facilitates flexible builds of SDP that can be more easily tested and scaled. By isolating modules, QTS can also quickly react to customer needs and proactively offer functionality that can deepen the overall customer experience.

It also allows QTS to introduce new apps, features and updates when ready, rather than waiting for a large, semi-annual release. This more frequent deployment cycle is delivered with little or no downtime to the end user. Additionally, if an issue occurs during the reboot, it only impacts the individual Microservice, allowing QTS to quickly revert to the original version while the error is modified.

"The move to Microservices was an investment in the future of SDP and our commitment to being a world-class technology company," said Bensten. *"The continuous development of SDP, paired with more rapid release cycles allow us to offer more visibility into the data center environment and enrich our customers' experiences."*

MICROSERVICES STRENGTHENS THE SUCCESS OF THE QTS INNOVATION LAB

With SDP deployed using Microservices, the technology company can now innovate more quickly to continually enrich the customer experience. This newfound agility allowed QTS to introduce the QTS Innovation Lab (QIL), an accelerated and dedicated development environment for SDP innovations. Designed to quickly and scientifically evaluate data center-revolutionizing concepts, QIL pairs already digitized data center



MICROSERVICES ECOSYSTEM

- Long standing autonomous teams responsible for each service
- Independent services increase the speed of experimentation
- Services have an independent lifecycle
- Ecosystem enables growth & scale of operation
- Ecosystem enables innovation through composing services
- Services can be built with diverse set of technologies



information with artificial intelligence, machine learning and data analytics to deliver real-time, industry-advancing innovations that forecast and automate data center operations.

"It's a new data center every six weeks now, and we're doing it without massive reconfigurations or long maintenance windows for our customer," said Bensten. "We want to give customers everything we know about their space and deliver it to them as transparently as we see them ourselves. Microservices is the backbone that allows us to rapidly deliver on this promise."

The customer-impacting benefits of Microservices

Microservices provides QTS with a multitude of benefits that allow the organization to continually bolster SDP. Each of these benefits ultimately delivers value to the customer in the form of improved visibility and transparency.

CUSTOMER ADVANTAGES

- Greater Visibility & Control
- Cost Savings, Efficiencies & Controls
- Uninterrupted Access to SDP
- High-Availability Experience

ENHANCED FLEXIBILITY

The decoupled environment offers QTS tremendous flexibility on multiple fronts.

Build in tandem. By segmenting SDP by module and separating the front and back end logic, Microservices remove dependencies and allow QTS to work on multiple SDP initiatives simultaneously without impacting one another's workflows or the efficacy of the larger application. This model also allows QTS to

better leverage the diverse skill sets of its development team, building expertise within each module to more effectively innovate.

Diverse languages and frameworks. By developing modules independently, developers are not restricted to a single programming language. Instead, they can choose the language that best addresses the needs of a particular SDP module. The same holds true for the frameworks that underly QTS' Microservices architecture. Each tool was assessed and chosen to deliver a specific result. Together these tools support the performance of SDP, now and into the future.

What this means to the customer: This flexibility enables faster development of innovations to strengthen customers' visibility and control of the data center.

FASTER TIME TO MARKET

Microservices also allows QTS to more quickly develop, test and deploy advanced features and updated code. By deploying updates when ready—instead of as part of a large, multi-feature release—QTS can deliver smaller, more incremental changes more frequently to provide ongoing enhancements that are nearly transparent to the user. The ability to deliver code at six-week intervals allows QTS to keep pace with IT advancements, to be more responsive to its customers and to maintain its competitive advantage.

Microservices also allows QTS to more easily involve customers in Beta projects. By readily sharing new ideas with customers, QTS is able to gauge market interest and acceptance of a service or feature, and quickly and easily pivot to adapt features and functionality to address customer feedback.

What this means to the customer: Using Microservices, QTS has increased the cadence of its updates from every six months to every six weeks. This agility and speed to market puts more features in customers' hands more quickly. These continually improving SDP capabilities help customers better visualize, manage and optimize their data center environments for improved cost savings, efficiencies and controls.



HIGHER AVAILABILITY AND LESS RISK

Microservices also offers less disruptions to the customer. By introducing new SDP updates independently, QTS eliminates the large maintenance windows that affect customers' access to SDP. It also minimizes the risk of additional downtime associated with unexpected errors.

QTS' highly automated and redundant architecture also allows it to deploy modules across multiple nodes for further redundancy and an additional separation of services. These smaller releases also help bolster the stability of SDP. While any deployment runs the risk of a failure, QTS' Microservices deployments limit disruptions to only the module being updated to minimize exposure and enable a more rapid restoration. QTS' API-first commitment further increases availability and reduces risk by providing access to data even if the UI goes down.

What this means to the customer: Microservices eliminates large maintenance windows and mitigates deployments risks to provide customers with uninterrupted access to SDP.

PERFORMANCE-IMPROVING AUTOMATION AND SCALABILITY

QTS' Microservices architecture also delivers an intense level of automation. This allows QTS to better allocate and align its resources and seamlessly address evolving SDP requirements. The flexibility of the Microservices deployment allows QTS to quickly and easily scale various SDP components to improve performance. If demand for a particular SDP module, such as Power Utilization, is high, QTS can easily supplement the infrastructure behind that module,

rather than the whole application, to minimize the risk of a capacity-related outage.

The engrained automation also allows SDP to instantly react to pre-determined parameters to notify customers of potential hazards, such as a power spike or low battery, or automatically scale to adapt to flexing environmental parameters such as increased capacity needs. During the pandemic, this automation allowed businesses to easily scale bandwidth to account for increases in demand and the work-from-home landscape.

What this means to the customer: This automation translates to improved performance and availability for SDP users. It ensures customers continue to experience a seamless, high-availability data center experience, regardless of underlying environmental fluctuations.

Conclusion

To support the need for agile innovation, Microservices has emerged as a key differentiator for businesses as they strive to support customers' existing and future needs. QTS' Microservices deployment model supports the organization's progressive IT agenda, allowing it to not only quickly react to customer needs, but to proactively offer valuable solutions at a six-week cadence that enrich the customer experience.

By balancing speed and safety, QTS is able to deliver real-time, on-demand access ongoing innovations that improve customers' abilities to visualize, manage and control the data center landscape. As the COVID-19 pandemic continues to limit companies' abilities—or even desires—to manage the data center onsite, SDP's foundation ensures the opportunity for remote access, as well as continued advancements at breakneck speeds.

ABOUT QTS

QTS Realty Trust, Inc. (NYSE: QTS) is a leading provider of data center solutions across a diverse footprint spanning more than 7 million square feet of owned mega scale data center space within North America and Europe. Through its software-defined technology platform, QTS is able to deliver secure, compliant infrastructure solutions, robust connectivity and premium customer service to leading hyperscale technology companies, enterprises, and government entities. Visit QTS at www.qtsdatacenters.com, call toll-free 877.QTS.DATA or follow on Twitter @DataCenters_QTS.