



DoyleResearch

Moving to Distributed Clouds: Opportunities and Challenges

By: Lee Doyle, Principal Analyst at Doyle Research

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Executive Summary

Digital transformation is enabling IT organizations in every industry to provide better products and customer experiences, as well as improve efficiency. The ability to analyze and actionize critical data is a key part of this transformation and much of this data resides in distributed locations (e.g. IoT) well beyond the centralized data center or public cloud. Edge-based applications for example, with their large data sets and specific latency/security requirements, introduce demands for a robust cloud environment at the edge.

The rise of distributed applications and computing will challenge IT organizations to implement a distributed cloud architecture – especially those that need to operate on a national or global scale. But designing and operating a distributed cloud is complex due to the unique environments at each leading cloud provider (e.g. AWS, Azure, Google), as well as the particular aspects of an enterprise's edge computing and private cloud deployments.

Delivering the benefits of distributed cloud requires a new architecture and concept. IT organizations need to combine the richness and agility of IaaS resources with the security, visibility and control of a dedicated network and security layer. For digital transformation at the edge, they need a simple approach to infrastructure and application management with full cloud agility and scalability.

Through applying a new architecture for network and application infrastructure, distributed cloud can provide a consistent operating model across multiple cloud environments and heterogeneous edge locations. It enables applications to talk to each other regardless of location or type of cloud. And it provides IT organizations the flexibility to easily migrate workloads, to scale resources up or down and the automation tools to operate at scale.

Volterra provides a cloud-native SaaS-based solution to deploy, connect and manage large numbers of applications across multiple clouds and at the edge. Volterra provides operationally consistent application visibility and a full stack of network and security functionality. It provides the benefits of simplified operations, faster time-to-service and improved protection/compliance.

Operating in Distributed Cloud Environments

The rise of IoT, edge applications and multi-cloud computing are distributing applications and data across multiple locations in many enterprise organizations. These new distributed workloads require IT organizations to think differently about how to connect, operate, manage and secure their associated infrastructure and services.

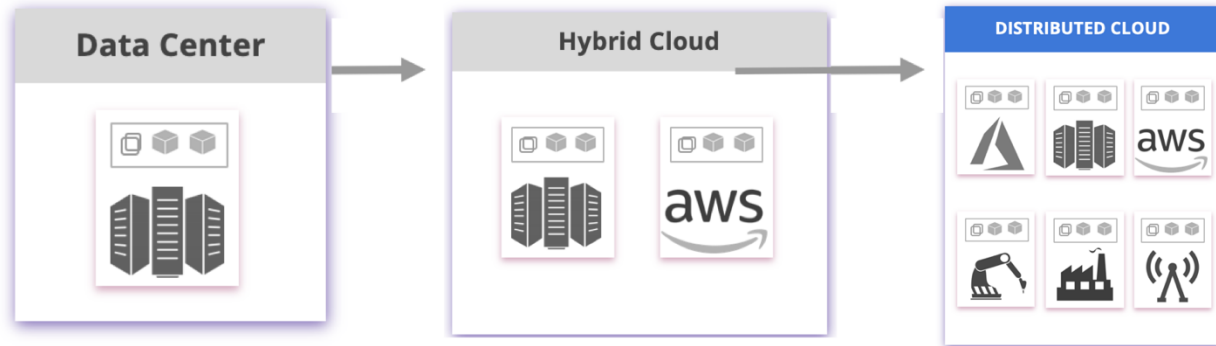
For example, according to Gartner, over half of enterprise-generated data will be produced and processed outside traditional data centers or a single centralized cloud by 2022, compared to just 10 percent today. By 2025, they forecast that number will climb as high as 75-90 percent.

To meet the requirements of distributed workloads, the leading public cloud (IaaS) cloud providers have created specific edge-based services to provide an initial approach to distributed clouds - including:

- AWS Outposts
- Azure ARC
- Google Anthos

Each of these platforms come with a unique architecture and operational model – and of course, each brings their pricing model, strengths and weaknesses. Over time, organizations are likely to deploy multiple edge computing options, as well as private and public clouds, to create a distributed cloud to meet their specific requirements for cost, performance, reliability and security. See Figure 1

Figure 1
Migrating to the Era of Distributed Cloud



Challenges of Operating a Distributed Cloud

Multi-cloud deployments are being driven by a need to maximize availability and reliability for applications, as well as ensure compliance where needed. However, multi-cloud deployments are complicated by security and connectivity problems due to differences between cloud providers. Similarly, IT organizations are challenged to deploy edge applications with their unique infrastructure and management requirements.

In late 2019, Volterra partnered with independent research organization Propeller Insights to survey 415 organizations worldwide with regards to their challenges and requirements for multi-cloud and edge computing. The survey found 71% of IT leaders think it's 'very important' to have a consistent operational experience between the edge and public and private clouds.

When asked about the biggest challenges in managing workloads across different cloud providers, IT leaders highlighted as the top problems:

- Secure and reliable connectivity between providers (60%)
- Different support and consulting processes (54%)
- Different platform services (53%)

It is clear that significant issues with secure connectivity, full visibility, complexity and inconsistent service offerings make it difficult to efficiently deploy and operate multi-cloud deployments.

Requirements for Distributed Cloud

Distributed cloud environments will be deployed at many (most) IT organizations over the next few years. These organizations need a plan to manage sprawling deployments that will span edge sites, multiple clouds and data centers/private clouds. As more applications and data get distributed, IT organizations will need to create a logical, distributed cloud environment and operating model to effectively control and operate them.

Distributed clouds must enable deployment of distributed applications and data across heterogeneous clouds and compute instances at scale. IT organizations require a consistent cloud environment and model independent of infrastructure or location. Applications need to be able to talk to each other across heterogeneous clouds and edge sites, with the ability for microservices to easily connect across distributed applications.

A distributed cloud should offer the following capabilities:

- Seamless application-to-application connectivity and security across clouds and edge sites
- A consistent operational model with common infrastructure and services
- End-to-end application visibility and control
- Abstraction and automation of manual deployments and ongoing operational processes
- Fully SaaS-based packaging and operations

In short, IT organizations need the capabilities (e.g. agility, rich service library, control, security and visibility) they have in their public cloud environment extended across the edge and data center, as well as made consistent across cloud providers.

Volterra Distributed Cloud Platform

Volterra is a venture funded start-up based in Santa Clara, CA. Its mission is to deliver a purpose-built solution to solve distributed cloud challenges. Its service offerings provide a cloud-native, SaaS-based solution to deploy, connect and manage applications and infrastructure distributed across multiple clouds and the edge.

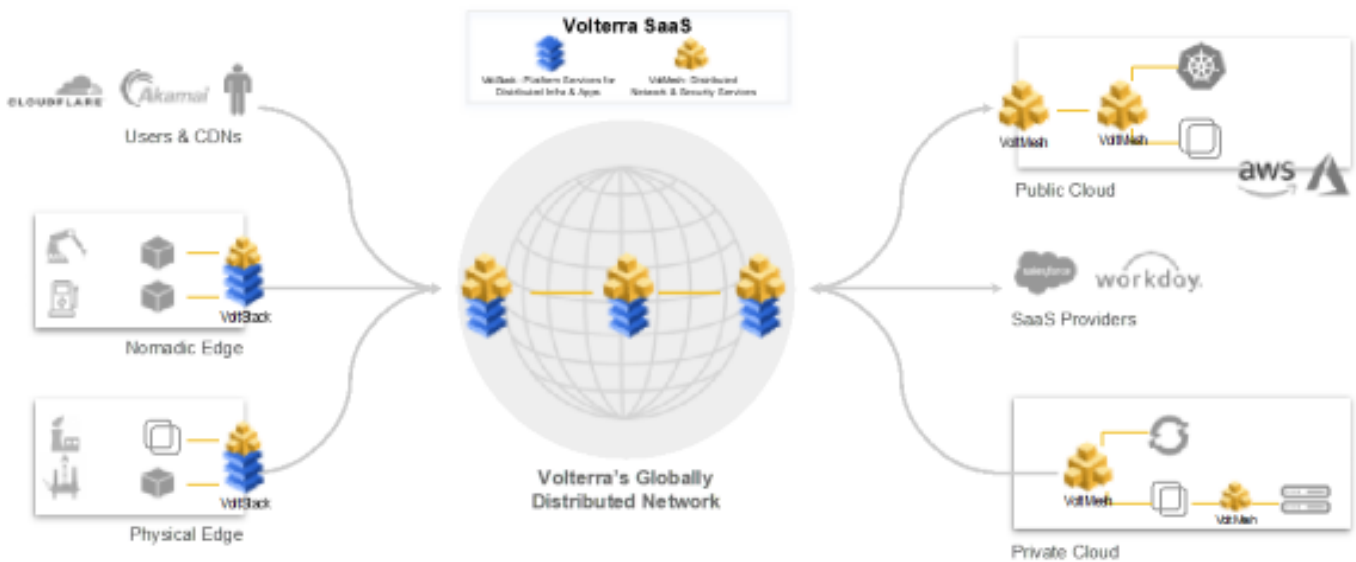
Volterra offers operational simplicity to its customers via a managed SaaS model. Its services provide:

- A unified network, security and API infrastructure stack to simplify service delivery across clouds and the edge
- A distributed application management and infrastructure platform that uses industry-standard Kubernetes APIs to provide a cloud at the edge
- High-performance, secure connectivity across cloud providers using its private global backbone

Volterra's distributed cloud platform consists of three building blocks: VoltStack, VoltMesh and VoltConsole. VoltStack deploys and manages distributed applications across edge sites using Kubernetes APIs. VoltMesh provides high-performance networking and zero-trust security between multiple clouds and edge sites. VoltConsole is a SaaS management console for the centralized operation of VoltStack, VoltMesh and the distributed applications running on them.

Volterra offers a private 10Tbps+ global network (Volterra Global Cloud Network) to privately and securely connect multiple cloud and edge locations. Over 45 customers across the world are now using Volterra's distributed cloud platform. See Figure 2.

Figure 2
Volterra's Distributed Cloud Platform



Volterra Customer Examples

Volterra has a number of enterprise customers with distributed cloud deployments – selected examples as follows.

Large Automobile Manufacturer

A leading automobile manufacturer initiated a high-definition mapping project with the goal of enabling autonomous driving. Due to a high volume of data generated from the vehicles employed in the mapping operation, the manufacturer decided to download the data at the end of each day via connections at their electronic vehicle charging stations.

The company deployed Volterra VoltStack at the edge (select local charging

stations) for vector processing and de-duplication – then upload the refined data to a central database in its private cloud using VoltMesh connected to the Volterra Global Cloud Network.

Large Financial Services Company

This financial services company with tens of thousands of employees required a migration to Microsoft Office 365. For security and compliance reasons, the company needed connectivity on a private (not Internet-based) network with a suite of security services across this private network. It deployed VoltMesh in local Azure instances and then connected to its private backbone – thus implementing a secure network with no exposure to the public Internet.

Conclusions and Recommendations for Using Distributed Clouds

Multi-cloud IT operations are now the norm as organizations of all sizes turn to Amazon, Microsoft, Google and others for their efficient compute platforms. The increased deployment of IoT applications and edge digital transformation of all types is driving the requirements for edge computing. Many of these new applications at the edge have demanding requirements for performance and latency and need a high level of security.

But deploying applications across multiple clouds is complicated as each cloud provider employs a unique networking, security and management environment. At edge locations, it is often difficult to deploy and manage distributed, heterogenous infrastructure. Across these diverse resources and workloads, IT organizations need to achieve consistent security policy, visibility and automation.

To achieve the goal of simpler operation and faster time-to-service, a consistent operational experience is required between the edge and public and private clouds. IT and DevOps teams require the ability to dynamically deploy, scale and migrate applications as their business requirements evolve over time. Automation is a key element needed to enable the wealth of new applications (e.g. IoT) being rapidly deployed.

Distributed clouds provide a new architecture and model for application deployment, connectivity and operations across public, private and edge cloud locations. This architecture enables applications to communicate across multiple locations and provides the automation to rapidly deploy resources and simplify ongoing operations. Simply put, it provides the visibility, abstraction and operational simplicity required by IT organizations.

Volterra provides a distributed cloud platform to deploy, connect, secure and operate applications/data across multi-cloud and edge sites. It provides control, visibility and full application security in distributed, heterogeneous cloud environments. A number of large enterprises across manufacturing, transportation, financial services and retail have already deployed Volterra managed solutions for their distributed cloud applications.

Meet the Author

Lee Doyle is Principal Analyst at Doyle Research, providing client focused targeted analysis on the Evolution of Intelligent Networks. He has over 25 years' experience analyzing the IT, network, and telecom markets. Lee has written extensively on such topics as SDN, NFV, enterprise adoption of networking technologies, and IT-Telecom convergence. Before founding Doyle Research, Lee was Group VP for Network, Telecom, and Security research at IDC. Lee contributes to such industry periodicals as Network World, Fierce, and Tech Target. Lee holds a B.A. in Economics from Williams College.