



# Reduce Complexity in the Data Center with the **Right Architecture**

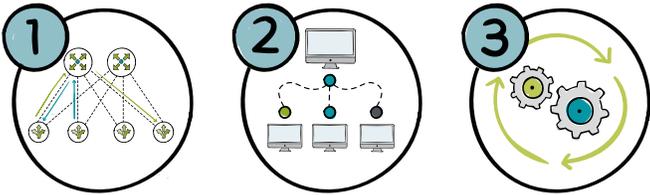
Shifting traffic patterns in the data center are forcing a re-think of data center architecture

Step 1 of the series: **How to Architect the Right Data Center, Right Now**

# Reduce Complexity in the Data Center with the Right Architecture

As application development methodologies evolve to create software that focuses on scaling out rather than up, the demands on the network have changed. These distributed applications may reside across multiple places in the data center, creating new challenges and increasing network complexity. IT teams need to be vigilant about simplifying architectures and operations as the technological landscape changes.

There are essentially three ways to simplify:



## Collapse

Data center networks have historically been based on a three-tier campus architecture. However, the pressures of distributed applications, combined with the need for predictable east-west traffic, have led us to collapse the data center architecture into just two tiers. This not only reduces complexity by making traffic patterns between endpoints more predictable, it also reduces the number of components to manage and monitor.

## Abstract

Though we may still have to manage several devices, if we can do things like create an overlay to simplify virtual network management, we can make our jobs easier. Our underlay, or physical switching and routing infrastructure's configuration, can remain relatively static; changes to the overlay virtual network can be made as fast and as frequently as needed to keep up with application needs.

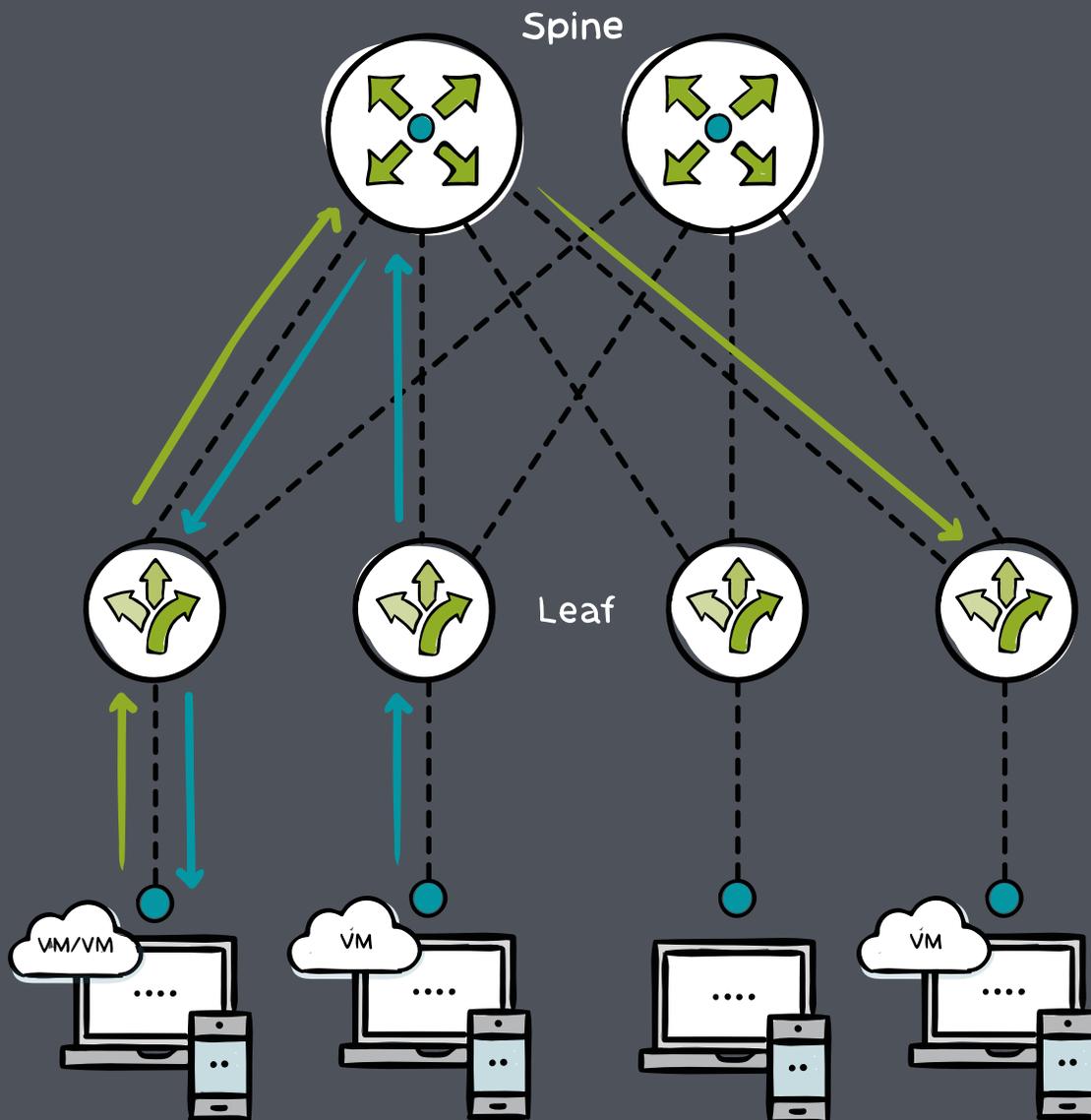
## Automate

The third way to simplify is to automate tedious and repetitive tasks to increase agility and improve accuracy when making changes. **Zero-touch provisioning (ZTP) allows you to automate Day One provisioning and configuration tasks on our switches and routers.**



# Spine/Leaf Topology

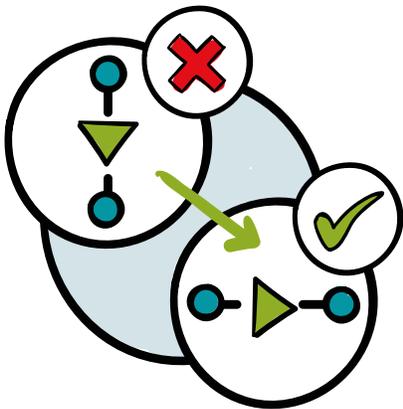
Figure 1:



# Traditional Multi-Tier Approach

The rapid pace of innovation and deployment in application development puts tremendous pressure on IT infrastructure teams, who are expected to keep pace with developers continuously creating and iteratively updating applications driven by customer needs. New models of software development such as microservices architectures put new demands on the network. Up until a few years ago, most data center networks were based on the same three-tiered approach found in campus network design.

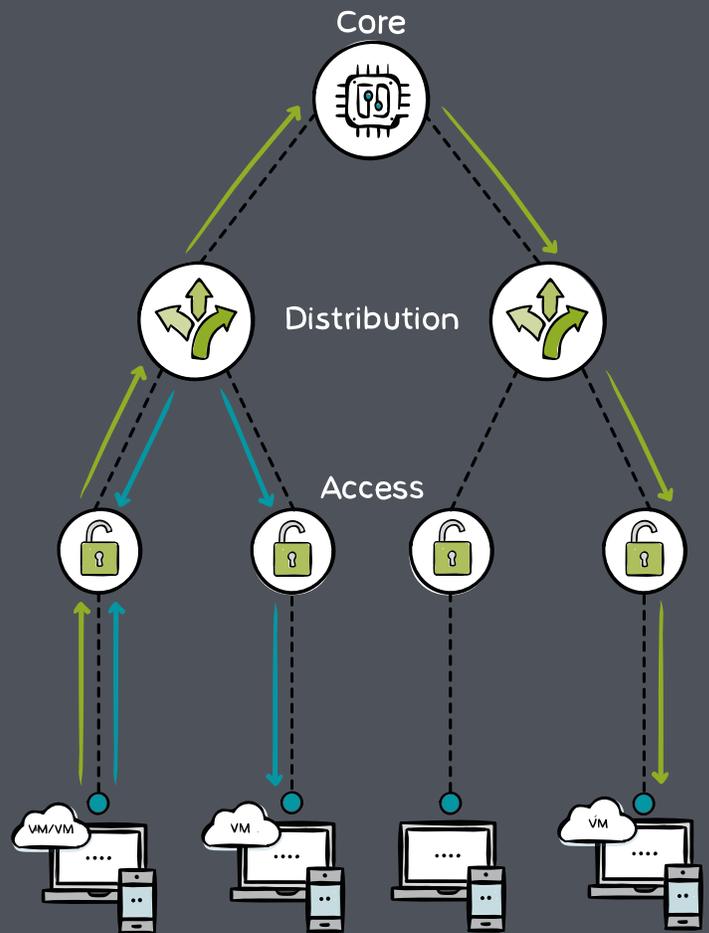
This is fine when most of the traffic is traveling north-south, as in traditional campus networks. But it's not really suitable when the majority of applications and associated workloads need constant east-west or internal communication. East-west traffic dominates in nearly all cloud computing, microservices, virtualization, and big data environments.

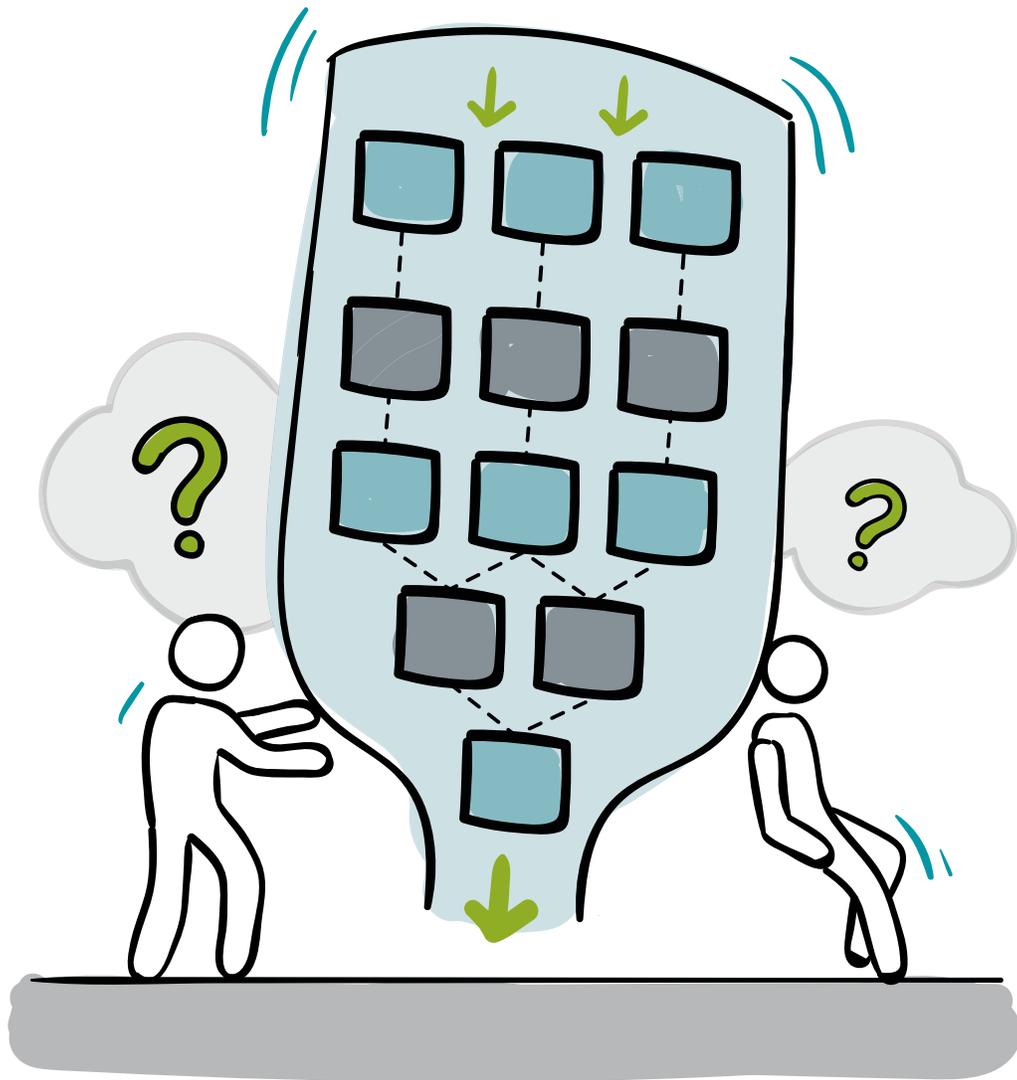


This has been a driving force behind the move to two-tier or spine/leaf architectures. Two-tier architectures reduce complexity by flattening the architecture so that any server node is no more than two hops away from any other server node, as shown in Figure 1.

Multi-tier data center network architectures were optimized for the older north-south traffic patterns, directing traffic from the data center to the end user, not east-west between nodes. In this old design, Layer 2 VLANs would traverse the server access switch to the aggregation layer and then potentially up to the core layer, as shown in Figure 2.

Figure 2:





**As you can see, this design introduces complexity, as packets need to traverse several hops before reaching their destination. The more hops and blocked ports from protocols like STP between the different applications, the more complexity these applications are subjected to, contributing to unpredictable performance and user access to those applications.**

IP fabrics are becoming increasingly popular in the data center, because they allow you to achieve massive scale and easily utilize overlay networks, increasing agility and enabling secure multitenancy for your users and applications.

While most architects starting fresh would choose L3 over L2, the reality is that legacy applications and equipment exist in their data centers.

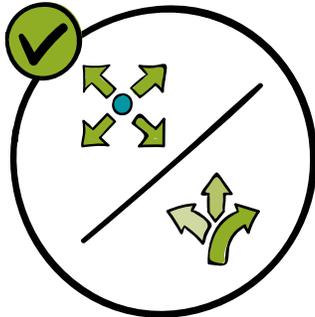
For enterprises with applications that depend on L2 connectivity, EVPN-VXLAN stretches L2 domains across routed interfaces. The coexistence of L2 and L3 makes EVPN-VXLAN the ideal technology to facilitate the transition from traditional to more simplified and modernized data centers. By removing an entire network tier, as well as creating an IP fabric abstraction, we've simplified data center operations and made the network much more efficient. The fabric consists of multiple direct paths of high bandwidth in a non-blocking architecture, removing any potential transmission slowdown caused by blocking protocols such as STP. This approach also allows you to build networks with standard protocols, preserving the possibility for multiple vendors in the network, either as preferred customer practice or to reduce vendor lock-in.

# Checklist

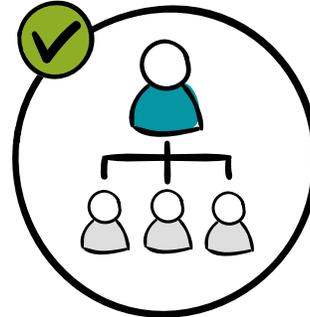
Use this checklist to ensure you consider the key aspects of data center network architecture design.

## Getting Started Today

Choose from the other guides available in this series to learn more about how to architect the right data center, right now.



Use a spine/leaf topology for constantly changing application requirements.



Use an IP fabric to bring fungibility to the network.



Zero-Touch Provisioning can be enabled through orchestration solutions.



EVPN-VXLAN is becoming an industry standard created with popular network protocols. Using open and common network standards helps to avoid vendor lock-in.

## Data Center Fundamentals

For more detailed information on re-architecting your data center, see the following:

- Day One: Data Center Fundamentals book: [download now](#)
- What is a Data Center Fabric: [click here](#)
- Data Center Switching Architectures: [click here](#)
- Juniper Networks at Tech Field Day: [view here](#)
- Try Contrail Enterprise Multicloud: [here](#)

**Step 2: Security Considerations When Redesigning Your Data Center Network:** [click here](#)

**Step 3: Advanced Monitoring and Analytics for Your Data Center:** [click here](#)

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