



SOITRON*
INSPIRÁRIUM

DATA
CENTER
v2.0

23. 6. 2022
9:00 - 10:00 hod.

**Change in thinking and building
data center network infrastructure**



AGENDA

- Presentation 30 min
- Discussion and summary 20 min

• Microphones are muted



• You can write questions to Q&A



Are you looking to **improve** your IT flexibility?
Is **scaling up** your physical data center **too slow** and cumbersome?

Software-Defined Data Center is **the solution**



Part #1/5

Why Software-Defined Data Center?

- **What is SDDC?**
- **Key components**
- **Benefits and Challenges**
- **Major market players**

What is Software-Defined Data Center?

“ Since the introduction of **server virtualization** years ago, organizations have recognized the value of pooling infrastructure resources. By **abstracting compute resources from physical servers**, server virtualization helps speed provisioning, improve system utilization and reduce hardware expenditures. ”

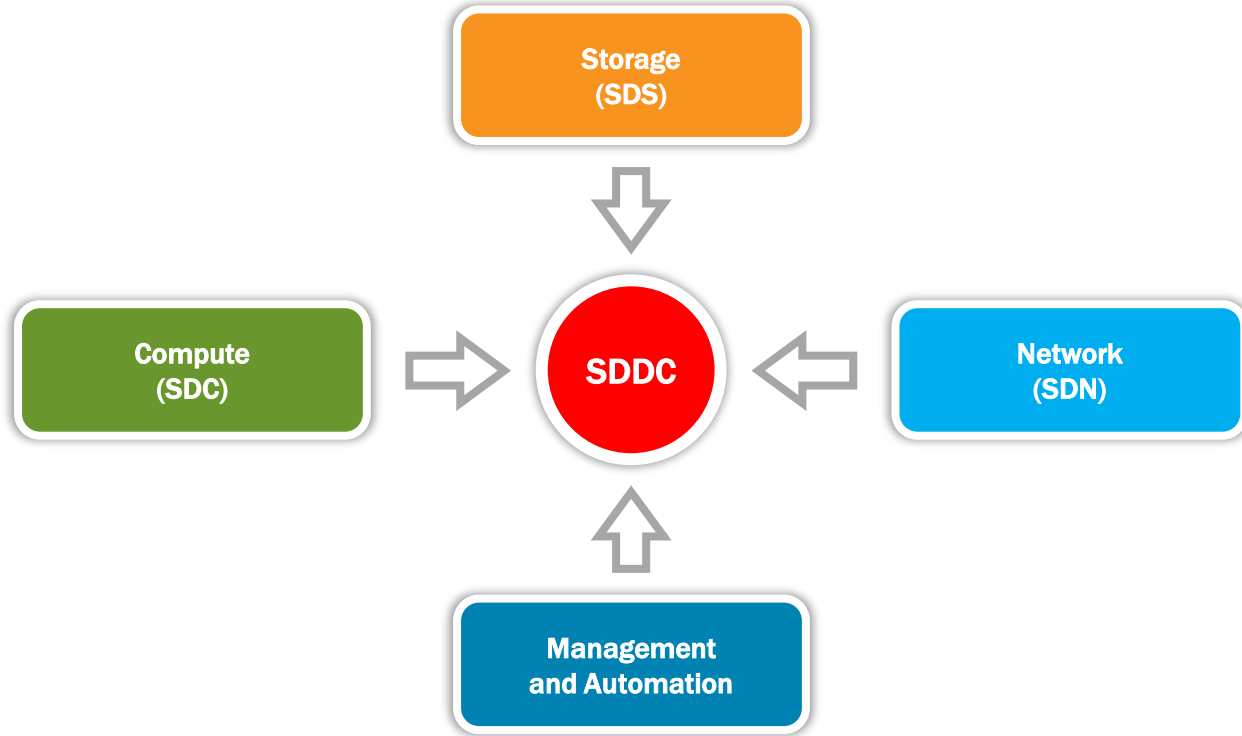


“ The SDDC results from years of evolution in server virtualization. It extends **virtualization from compute to storage and networking resources**, and it provides a **single software toolset to manage those virtualized resources**. Plus, the SDDC enables policy-driven **automation of provisioning and management**, which **speeds delivery of resources and enhances efficiency**. ”

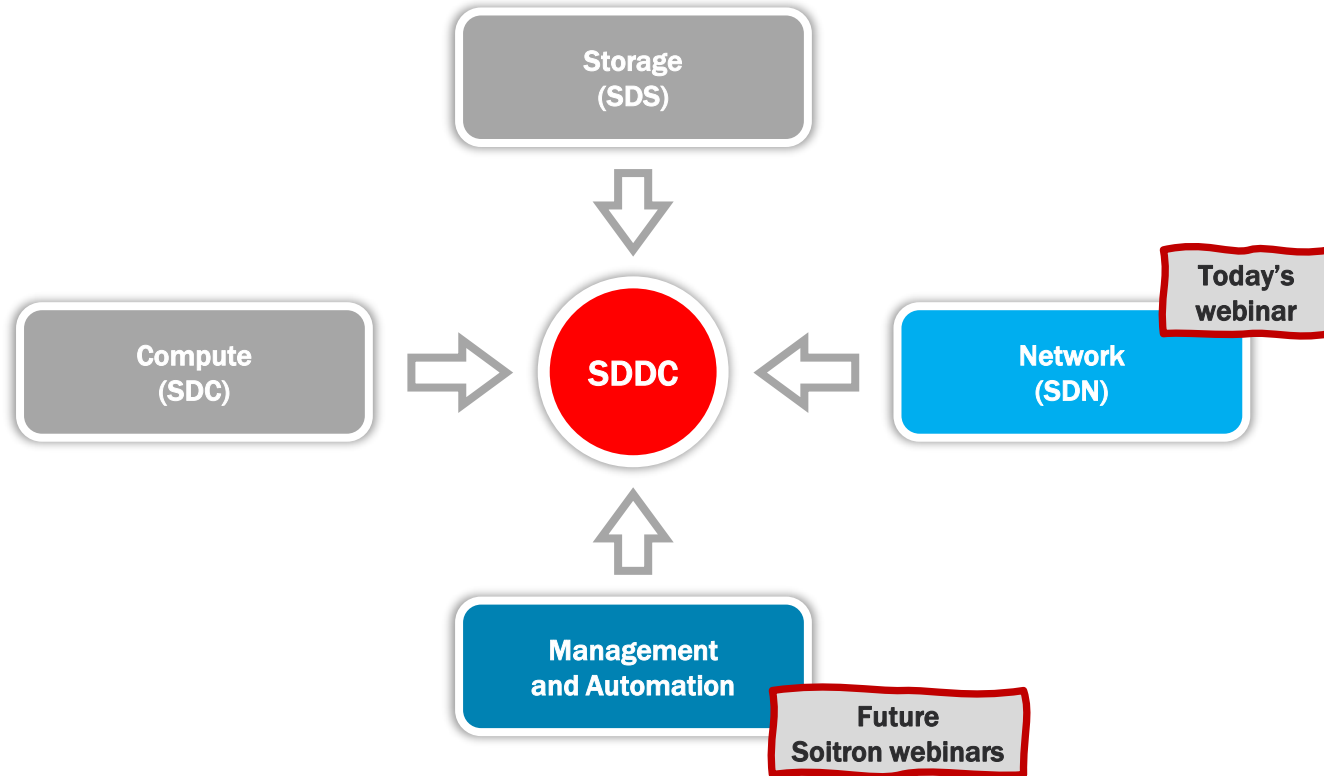
source: IBM



Key components of the SDDC



Key components of the SDDC



Remember

The **first thing** to remember about SDDC:
It's a programmable (**software-defined**) infrastructure with a **single** configuration toolset.

SDDC

The **second thing** to remember about SDDC:
It's a bridge between **compute, storage** and **networking** worlds



SDDC Benefits

Short-terms

- **Speed** - time to provision new resources is drastically reduced
- **Agility** – you can optimize compute, storage and networking without physical changes to the infrastructure

Long-term

- **Reduced Cost** - Pooling resources improves utilization of infrastructure → less infrastructure sits idle
- **Predictability**

Other

- You can run SDDC **on-premise**, private/public **cloud** or **hybrid**
- Adopting an SDDC approach also helps establish a path toward infrastructure and application **modernization**
- **Automation** – DevOps, NetOps

A key factors

- #1 **Separation** of control and data plane
- #2 **Abstraction** of app/services from underlying hardware



Challenges

- Choosing the right SDDC/SDN platforms
- Difficult planning and integration
- New technical skills
- Cross-team agreement
(development, application, networking, security, business...)

A key factor is
change in thinking and building
data center network infrastructure



SDDC networking vendors

Major market players:

- Juniper Apstra
- Arista Cloudvision
- VMware Nsx
- Cisco ACI



JUNIPER
NETWORKS



source: Gartner 2020



Future of Data Center

“ Just as isolated networks evolved into the internet, SDDCs are expected to have a similar impact on computing in the data center.

The ability to abstract the application layer from underlying physical hardware allows an application to be served from multiple data centers.

SDDC provides common virtual (software-defined) infrastructure for migrating computing resources between on-premise, cloud and hybrid data centers.

”

source: techtarget.com



Part #2/5

SDDC Networking

Motivation

- Legacy networking
- SDDC network principles a.k.a. SDN
- Example

Legacy Networking

Configuration on each device (finger defined datacenter)

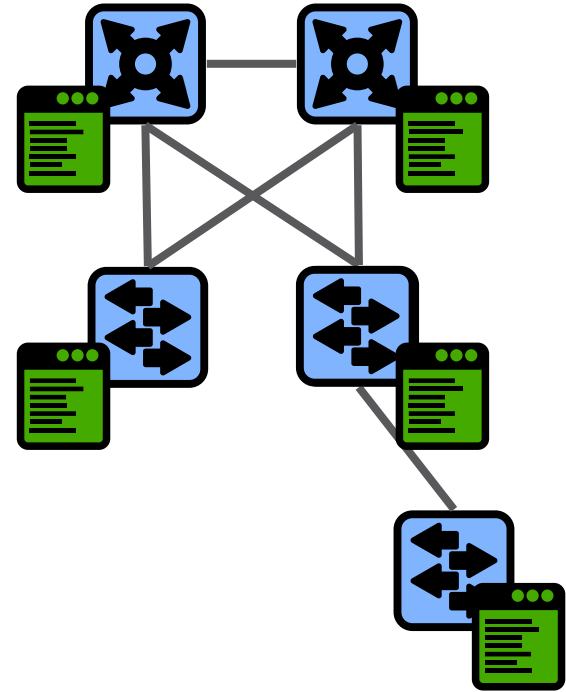
- Basics: AAA, syslog, SNMP...
- L3 config: IP, routing, VRF, HSRP/VRRP...
- L2 config: VLAN, STP, Ether-Channel...
- Other: ACL, PBR, QoS, device hardening...

Pros

- Simplicity

Cons

- Too many configurations
- Risk of misconfiguration (human error, forgotten config)
- Common Data and Control plane



SDDC network principles

Configuration for whole **fabric** in one place

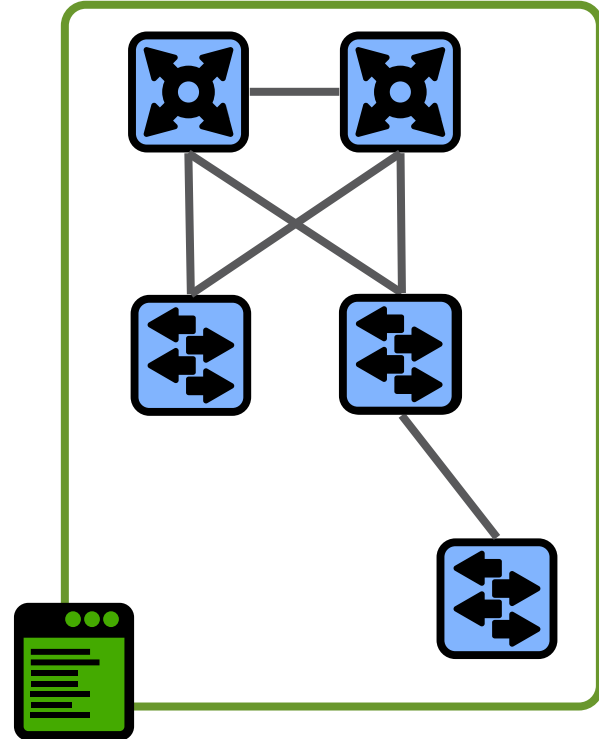
- All settings represented as an object model
- Configuration accessible through GUI, Rest API and CLI
- Faster and unified configuration with less mistakes

Pros

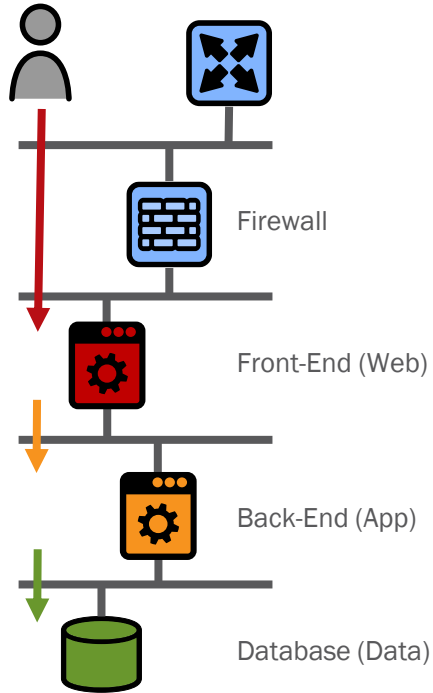
- One configuration view
- Rest API -> automation
- Control and Data plane

Cons

- Complexity
- Long learning curve*



Legacy vs Software-Defined Networking



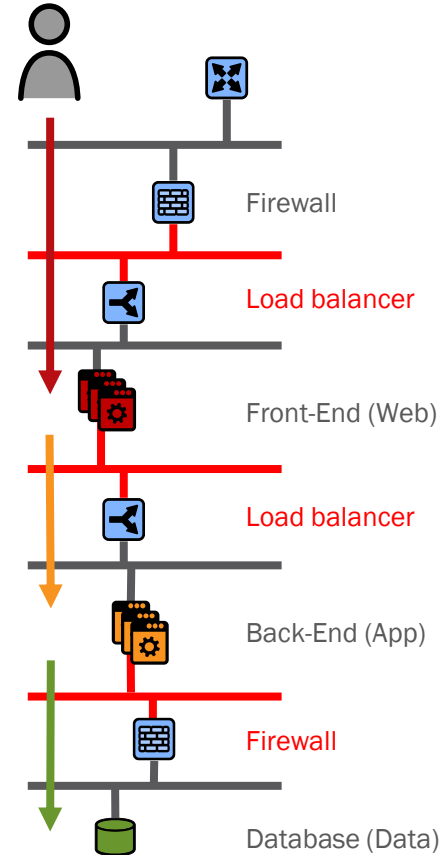
Request change:

- Additional FE and BE servers
- LB for FE and BE required
- FW in front of DB layer

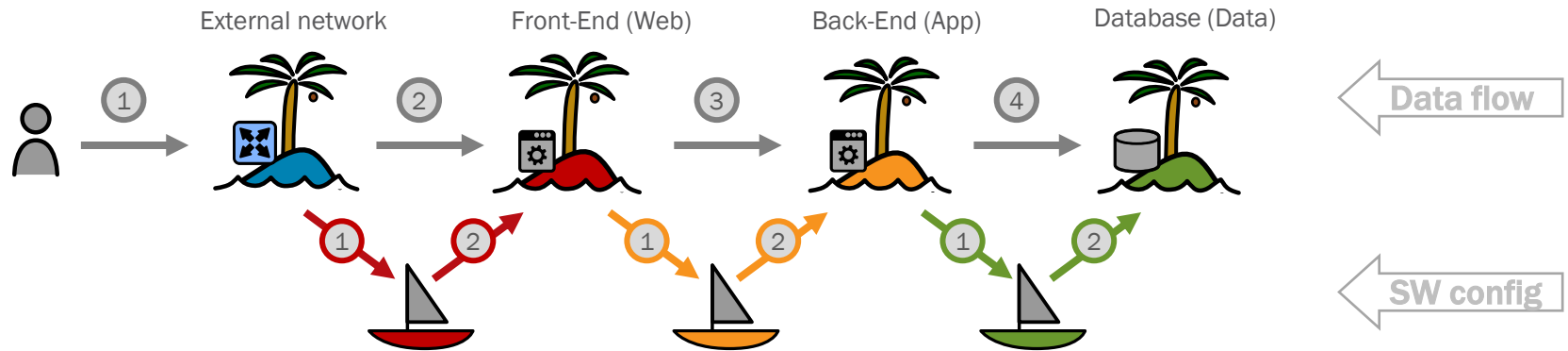
Data flow change

Solution:

- FE -> new LB -> **new VLAN required**
- BE -> new LB -> **new VLAN required**
- DB -> new FW -> **new VLAN required**
- **L3 reconfiguration** for FE and BE servers
- App/Server/Net admins not happy



Legacy vs **Software-Defined Networking** (high-level of abstraction :)

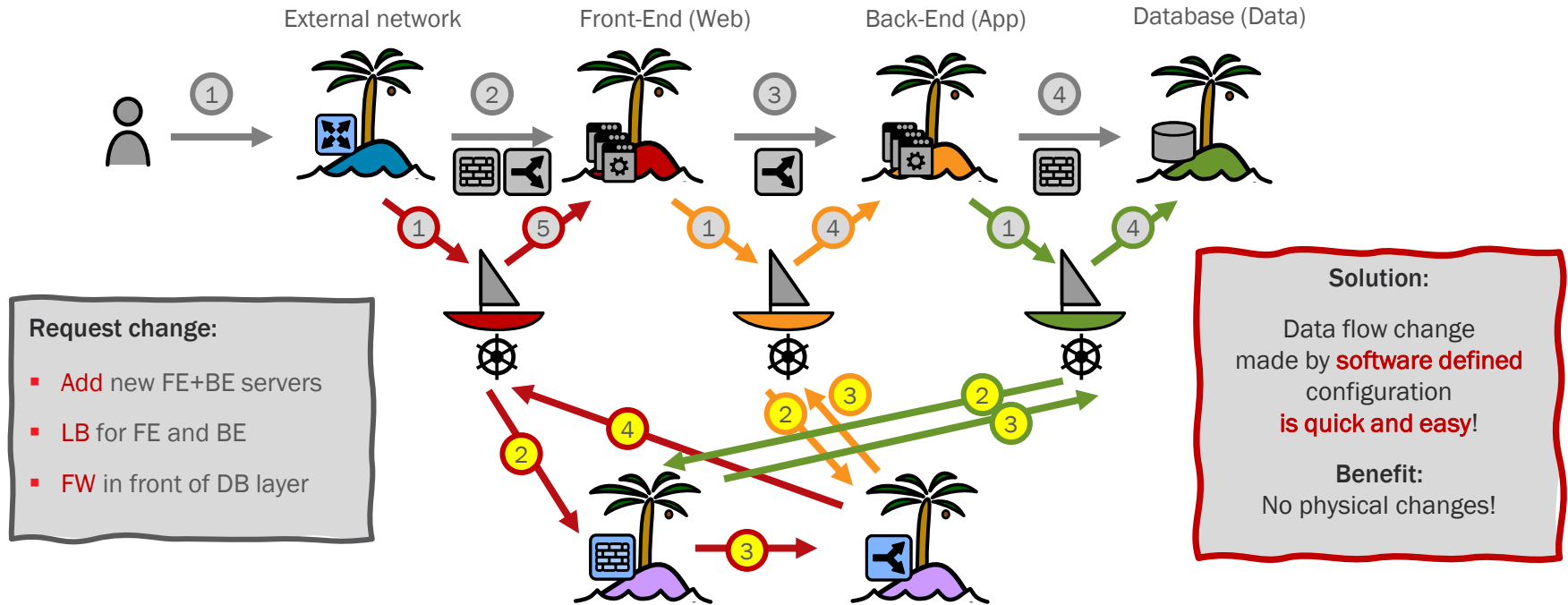


SDN feature

One-arm connection for all devices!
No routing on server side (Default GW only).



Legacy vs **Software-Defined Networking** – data flow change



Legacy Networking vs Software-Defined Networking summary

Legacy Networking

Pros

- Many “legacy admins” resources
- Straightforward change (easy to imagine)

Cons

- Data flow change needs (very often) network topology change at physical layer
- IP config and routing table change on servers

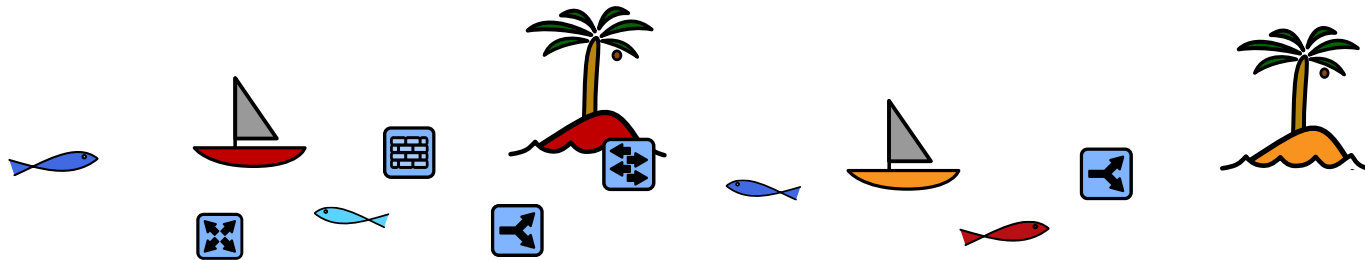
Software-Defined Networking

Pros

- Data flow change without physical topology change
- Change made by GUI or (preferred) automation tools

Cons

- Complexity (difficult to imagine)
- Long Learning Curve



Part #3/5

SDDC Networking

Cisco ACI

- Cisco ACI
- Under the hood
- Terminology
- Cisco ACI and boats – what's common?

Cisco ACI

- Cisco ACI is a **Software-Defined Networking** solution designed for Data Centers
- Cisco ACI is **Application Centric Infrastructure** architecture

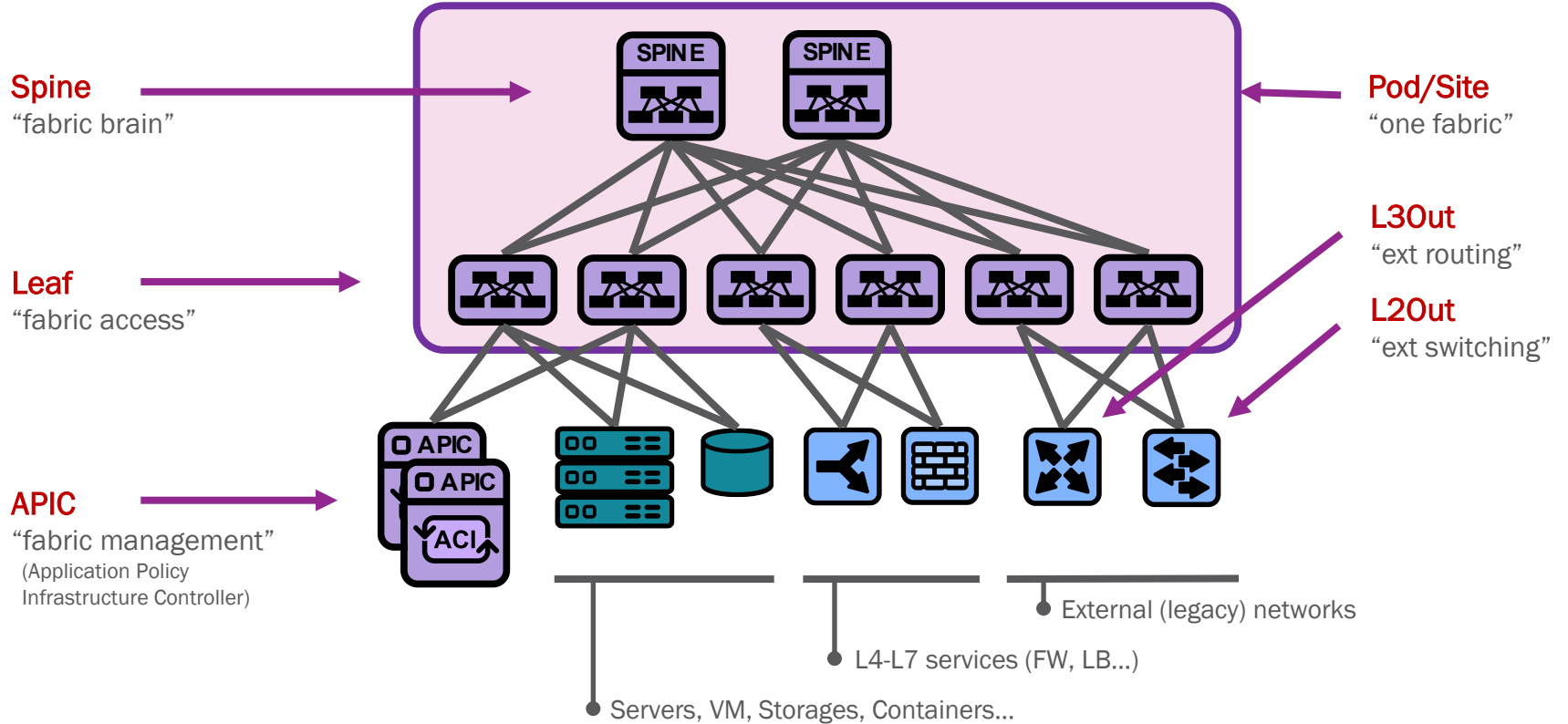
- Based on **ACI Fabric OS** (same system in whole fabric) and **Nexus 9000 switches** family
- Underlay protocols unify ACI policies for **on-premise**, **cloud**-based and **hybrid** environments

- Cisco ACI solutions:
 - One operation model - same config steps for 4 or 40 switches
 - Zero-trust network architecture
 - provides network environment for Containers / VMs

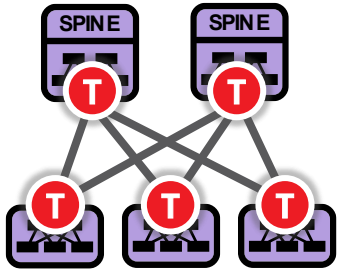
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Cisco ACI - Fabric

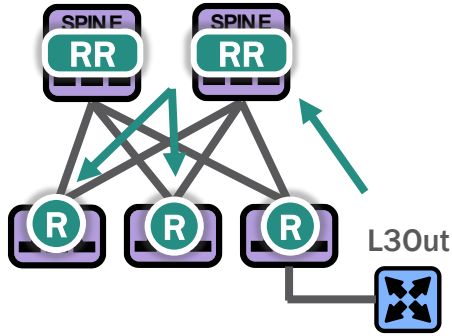


Cisco ACI - under the hood



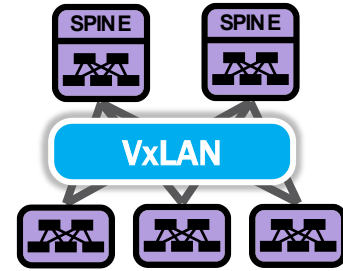
Underlay protocols

- IP reachability between nodes
- ISIS routing between TEPs
- Forwarding control plane isolation



External Routing protocols

- Redistribution of ext. routes
- MP-BGP routing (spines = RR)



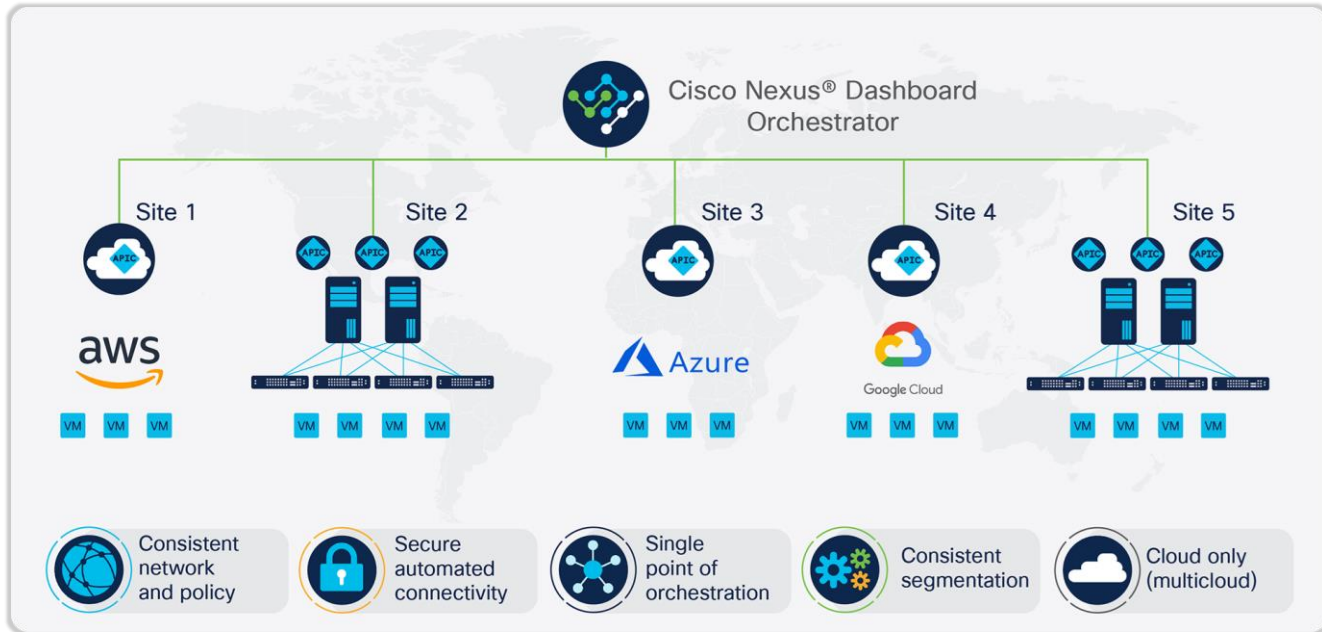
Overlay protocols

- L2 / L3 segmentation
- VxLAN evpn tunneling
- Connecting endpoints between leaves, pods or data centers

All provisioned by automation
No manual config or knowledge needed



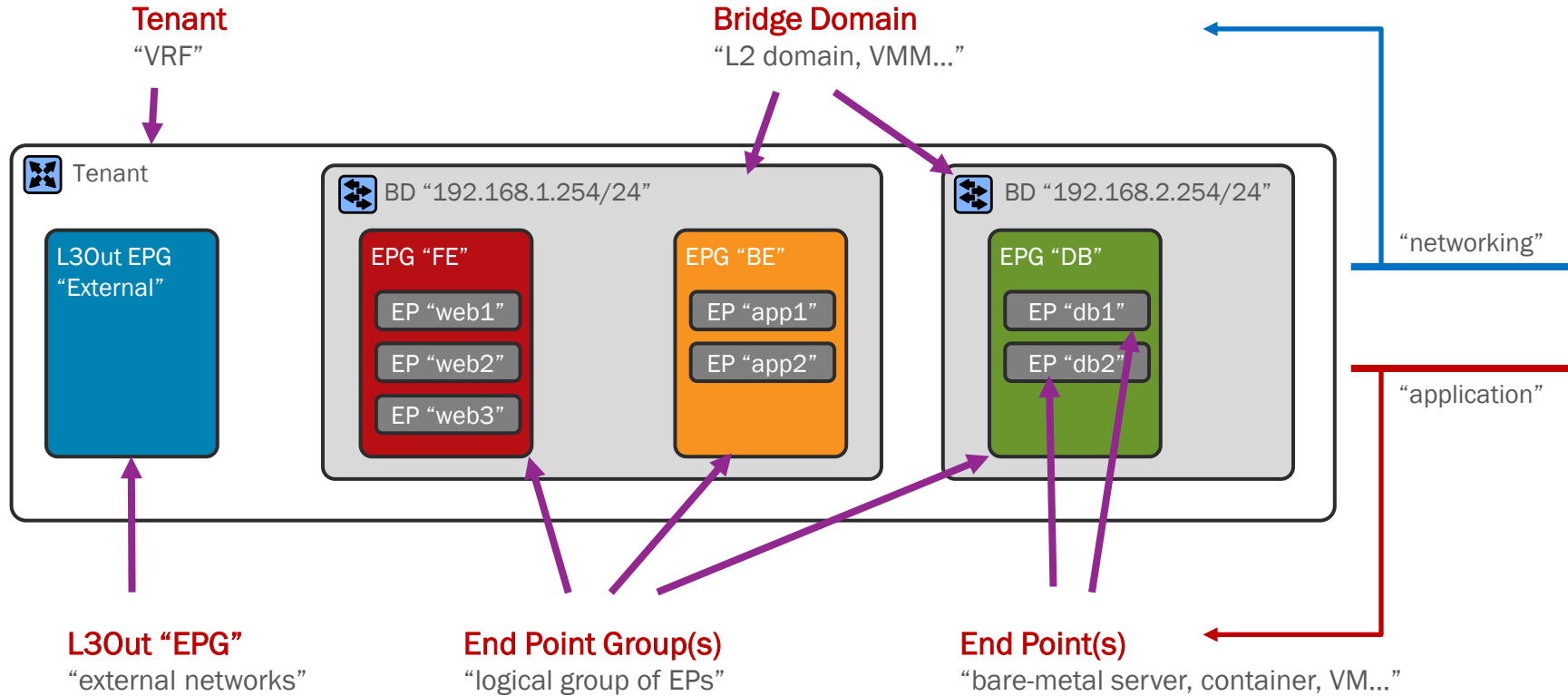
Multi-Site Infrastructure



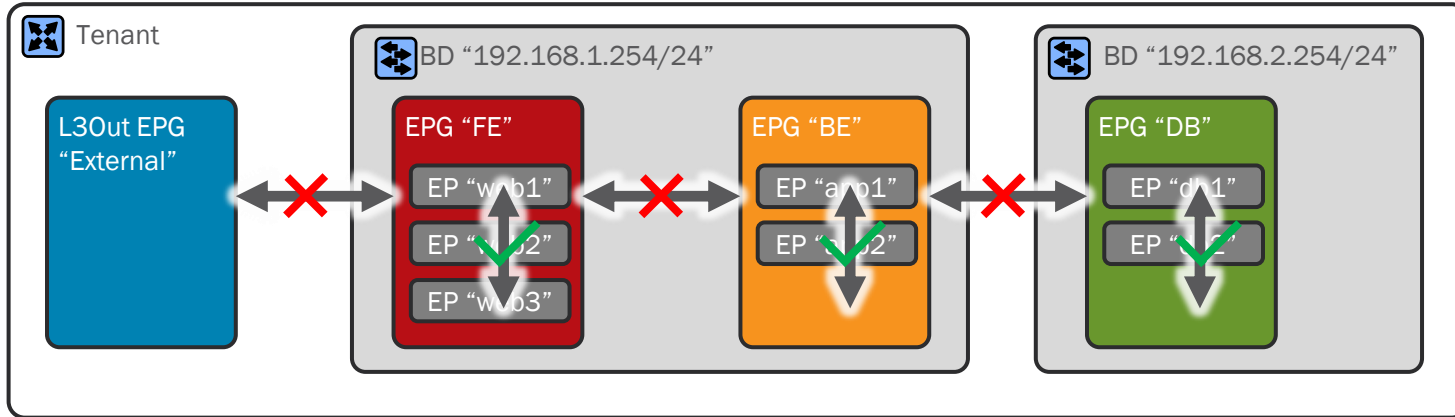
source: Cisco



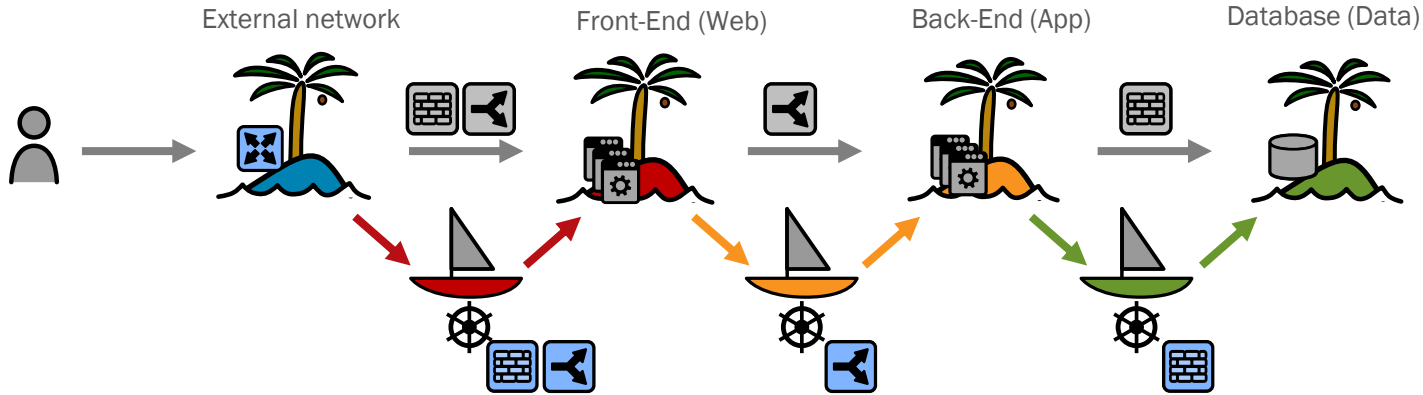
Cisco ACI Terminology – part #1



Cisco ACI Terminology – part #2

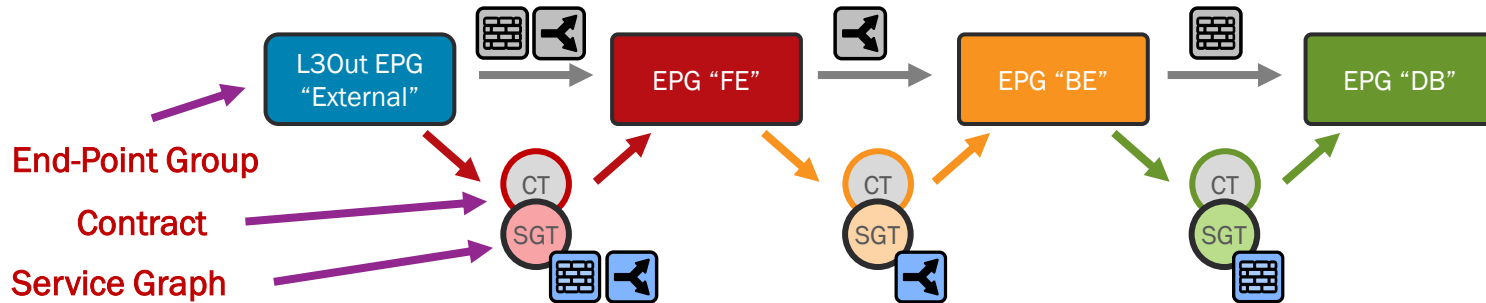


Cisco ACI Terminology – part #3



Abstraction view

ACI object view



Part #4/5

SDDC Networking

Reality and Experience

- **Next Networking paradigm shift**
- **Our insight**

Networking paradigm shift

Digital Transformation

- Deploy resources **faster** and more **flexibly**
 - Create and destroy services as you go
 - Make decisions faster and adapt as needed
- Keep critical assets, including data and systems, **secure**
- Faster repetitive tasks > less mistakes > faster revenue

New challenges

- Technology focus of the teams **overlaps**
- Utilize **automation** tools and processes
- Integrating infrastructure to **DevOps** cycle
 - Continuous integration
 - Continuous delivery



Our insight

- Expectation vs reality
- Test your design, expect problems and stick to vendor validated designs
- Biggest challenge is to communicate new approach, not to build it
- Focus on smooth migration, there is no green field
- Very few engineers update the documentation. Almost nobody reads it



Part #5/5

What's next?...

- **NetOps Automation**
 - Cisco ACI
 - Cisco FMC/FTD
 - F5 LTM, AFM...
- **SDDC and Cloud**
- **VM/container integration**



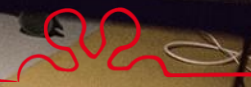
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Praha

Soitron s.r.o.

Pekařská 621/7

155 00 Praha 5

tel.: +420 266199918

Bratislava

Soitron, s.r.o.

Plynárenská 5

829 75 Bratislava 25

tel.: +421 258224111

e-mail: marketing@soitron.com

web: www.soitron.com



Martin Kyrč
Network System Engineer



Roman Panenka
Network System Engineer



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