

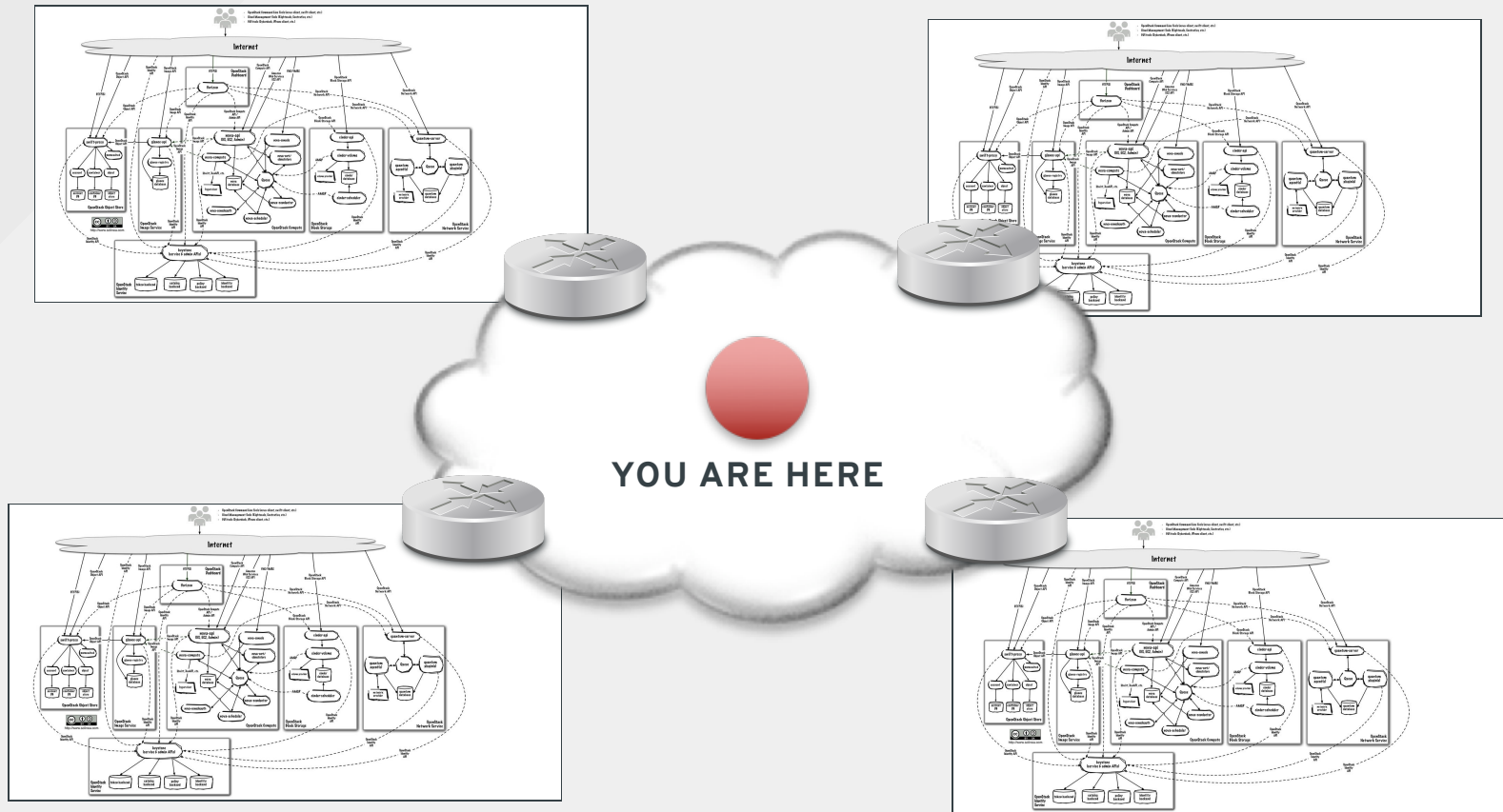
RED HAT  
**SUMMIT**

# EXTENDING FULL STACK AUTOMATION TO THE NETWORK

Peter Sprygada  
Sr. Principal Engineer  
June 30, 2016

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# LETS GET ORIENTED



# WHAT IS “THE NETWORK”?

THE NETWORK IS A **PLATFORM** THAT  
RUNS APPLICATIONS

THE NETWORK IS A **PROVIDER** OF  
CONSUMABLE RESOURCES

# WHY?

"When asked what they felt was the most **immature** component in cloud management, the **overwhelming** response was the **network** at **76%**; compute and storage got 15% and 9% of the vote respectively."

*2015 SDx Cloud Management Report: OpenStack and More*  
*[sdxcentral.com](http://sdxcentral.com)*

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# CHANGE MANAGEMENT TODAY

Slow

Lacking tools

Superhero

Error prone

Lacking feedback

Uncoordinated

Lacking resources

Manual

Not validated

Cumbersome

Poorly communicated

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**STILL USING USER / PASSWORD AUTHENTICATION  
..... OVER TELNET !?!?!?!?!?**

U

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# DEVOPS MEETS NETOPS



# FROM MOP TO **PLAYBOOK**

Leverage **ANSIBLE** to separate data model from execution to deliver multi-vendor orchestration

The language of **DEVOPS** meets the power of the **CLI**

Enhance network operational models through reliable, scalable, repeatable patterns

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```

! device: $HostnameSpine1
!
! boot system flash0: $CertifiedCode
!
queue-monitor length
!
logging buffered 10000
no logging console
logging vrf MGMT host $$SyslogHostAddress
logging vrf MGMT host $$SyslogHostAddress
logging vrf MGMT source-interface Management1/1
logging format timestamp high-resolution
logging facility local6
!
hostname $HostnameSpine1
ip name-server $DNSHostAddress
ip name-server $DNSHostAddress
ip domain-name $CompanyDomainName
!
ntp source Management1/1
ntp server vrf MGMT $NTPHostAddress1 preferred
ntp server vrf MGMT $NTPHostAddress2
!
snmp-server contact "$SNMPContact"
snmp-server location $Bldg/$floor/$room/$rack
no snmp-server vrf main
snmp-server vrf MGMT
snmp-server source-interface Management1/1
snmp-server community $SNMPCommunity
snmp-server community $SNMPCommunity
snmp-server host $SNMPHostAddress traps
snmp-server enable traps entity
snmp-server enable traps lldp
snmp-server enable traps snmp
!
Interface Ethernet4/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet4/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet4/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
!
interface Loopback0
description Router-ID
ip address $IPAddress/32
!
interface Management1
no snmp trap link-status
vrf forwarding MGMT

```

```

!
Interface Ethernet2/1/2
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!!
Interface Ethernet2/1/3
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!!
Interface Ethernet2/1/4
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!!
Interface Ethernet2/1/5
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!!
interface Loopback0
description Router-ID
ip address $IPAddress/32
!
interface Management1
no snmp trap link-status
vrf forwarding MGMT

```

```

Interface Ethernet3/1/2
description - P2P Link to LEAF switch-2
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
no shut
!
Interface Ethernet4/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
no shut
!
Interface Ethernet4/1/2
description - P2P Link to LEAF switch-2
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet4/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet4/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
logging event link-status
no switchport
ip address $IPAddress/30

```

```

!
Interface Ethernet2/1/2
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet2/1/3
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet2/1/4
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet2/1/5
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30
arp timeout 900
ip pim sparse-mode
ip pim bfd-instance
qos trust dscp
!
Interface Ethernet6/1/1
description - P2P Link to LEAF switch-1
speed forced 40gfull
mtu 9214
logging event link-status
no switchport
ip address $IPAddress/30

```

TRUNCATED FOR  
BREVITY

# ENHANCE NETWORK OPERATIONS

## CONFIGURATION AUTOMATION

- Don't break what isn't broken, its about ***betterment***
- Focus on delivery of execution not the data model

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- Tap into *ephemeral* state for validation
- Fail fast approach to avoid state incongruence

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## CONTINUOUS COMPLIANCE

- Configuration should remain valid until **explicitly** changed
- Maintaining state is key, its not just about configuration



# CONFIGURATION AUTOMATION

```
---
- name: configure network device system services
  hosts: all

  roles:
    - role: bgp
      state: configured
      bgp_as: 65000
      router_id "{{ interfaces.loopback0.address }}"

    - role: system
      state: configured
      system_hostname: "{{ inventory_hostname }}"
      system_domain_name: eng.ansible.com
      system_source_interface: "{{ system.source_interface }}"
      system_name_servers:
        - 172.26.1.1
```

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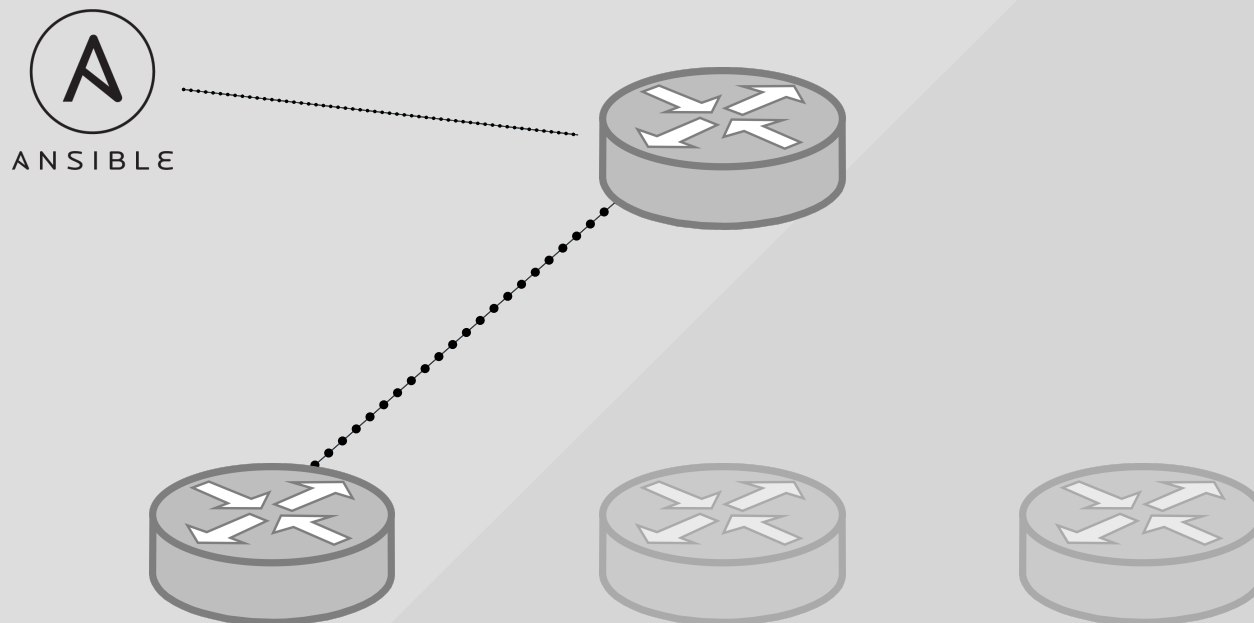
# CONFIGURATION AUTOMATION

```
$ ansible-playbook bgp.yaml -v
1 plays in bgp.yaml

PLAY *****

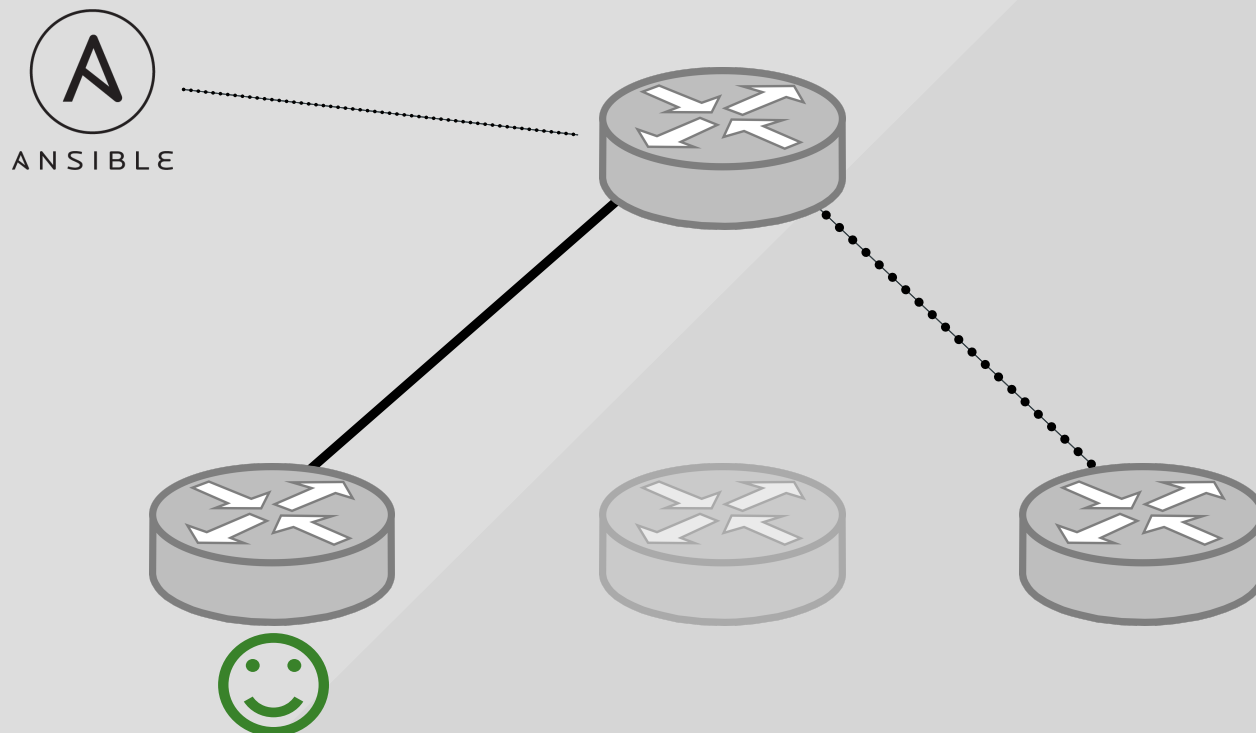
TASK [configure bgp routing process] *****
ok: [srx01] => {"changed": false, "updates": [] }
ok: [nxos01] => {"changed": false, "updates": [] }
ok: [iosxr01] => {"changed": false, "updates": [] }
changed: [eos01] => {"changed": true, "updates": ["router bgp 65000", "router-ip 1.1
.1.1"] }
changed: [ios01] => {"changed": true, "updates": ["router bgp 65000", "router-ip 4.4
.4.4"] }
ok: [clvx01] => {"changed": false, "updates": [] }
```

# TEST DRIVEN DEPLOYMENT



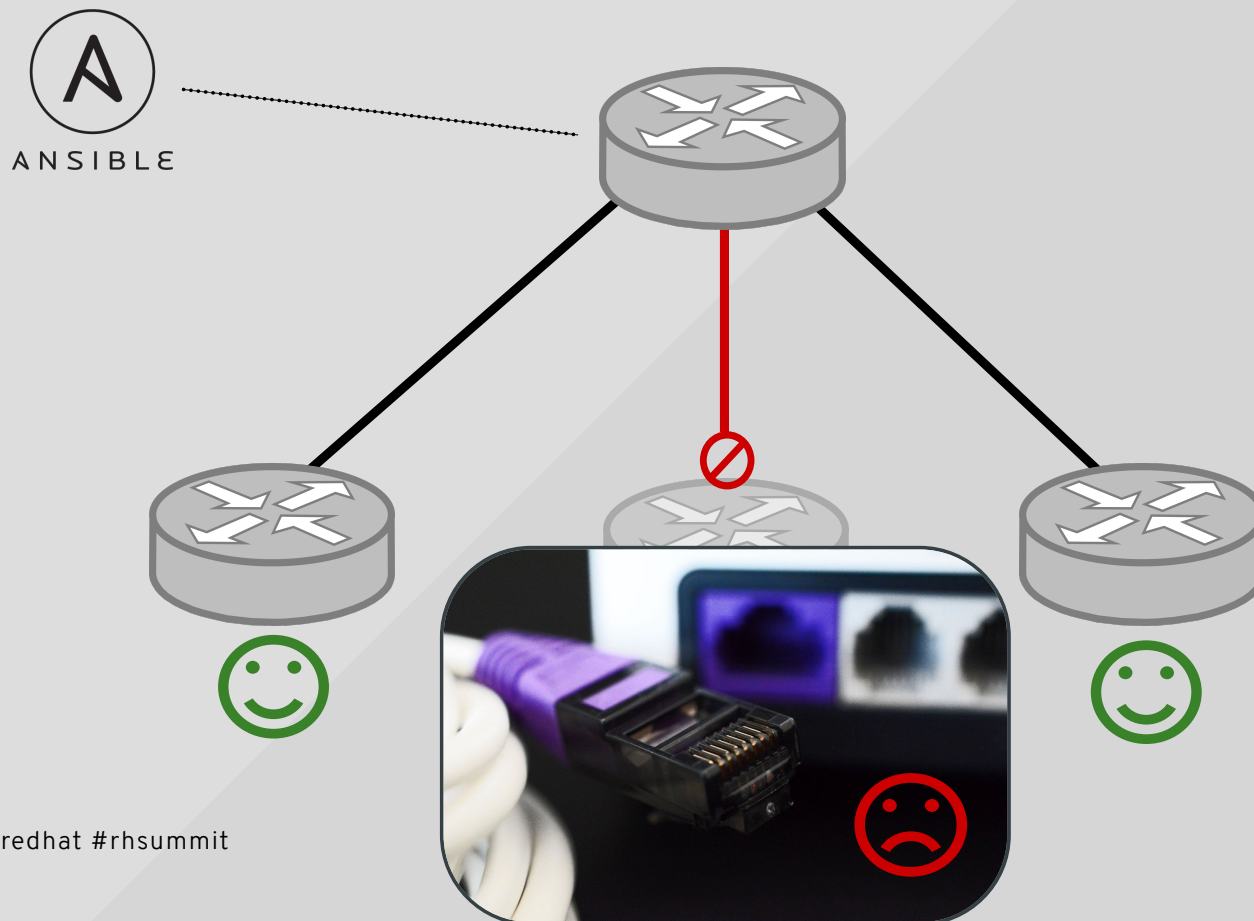
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# TEST DRIVEN DEPLOYMENT



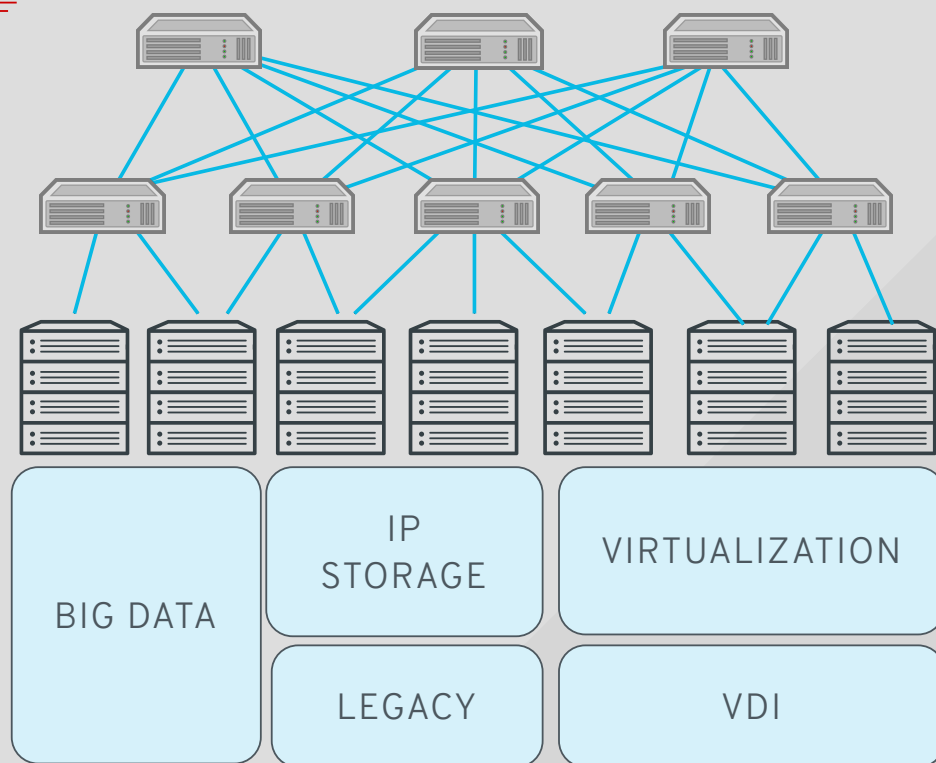
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# TEST DRIVEN DEPLOYMENT



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# CONTINUOUS COMPLIANCE



- Can Big Data reach IP Storage?
- Is the VDI infrastructure alive?
- Are web farms returning HTTP 200?
- Are all legacy applications reachable?
- .....
- Is the network normalized?

# DEMO

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