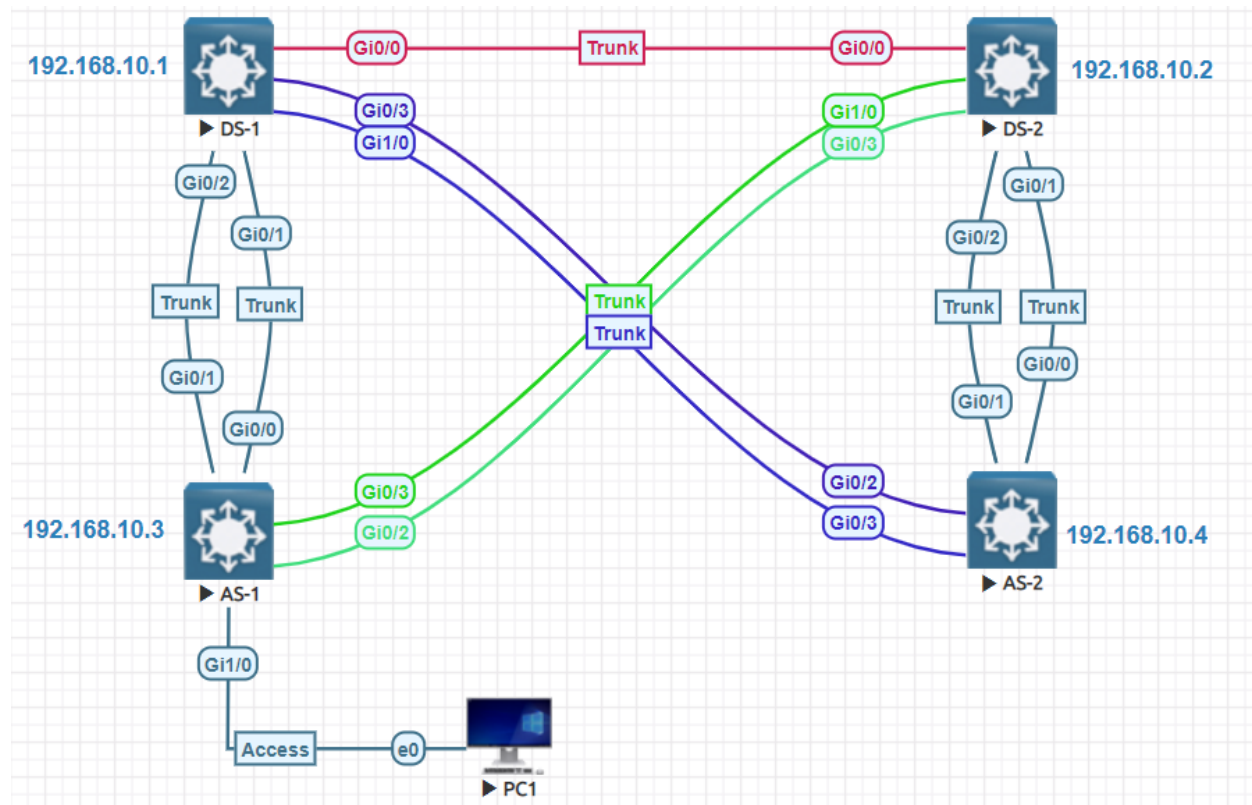


RSTP Lab:



Switch Images	vios_l2-adventerprisek9-m.ssa.high_iron_20190423
Client PC	Linux-Slax-9.11.0 or VPCS
VLANs	VLAN1 and VLAN10
DS-1 VLAN 10 IP Address	192.168.10.1
DS-2 VLAN 10 IP Address	192.168.10.2
AS-1 VLAN 10 IP Address	192.168.10.3
AS-2 VLAN 10 IP Address	192.168.10.4
DS-1 Trunk Interfaces	G0/0, G0/1, G0/2, G0/3, G1/0
DS-2 Trunk Interfaces	G0/0, G0/1, G0/2, G0/3, G1/0
AS-1 Trunk Interfaces	G0/0, G0/1, G0/2, G0/3
AS-2 Trunk Interfaces	G0/0, G0/1, G0/2, G0/3
AS-1 Access Interface	G1/0
Spanning Tree Mode	Rapid-PVST
DS-1 Access Interface	G1/1
DS-2 Access Interface	G1/1
AS-1 Access Interface	G1/1
AS-2 Access Interface	G1/1

DS-1 Basic Configuration

```
DS-1(config)#hostname DS-1
DS-1(config)#spanning-tree mode pvst
DS-1(config)#line con 0
DS-1(config-line)#exec-timeout 0 0
DS-1(config-line)#logging synchronous
DS-1(config-line)#exit
DS-1(config)#interface range g0/0-3, g1/0-3
DS-1(config-if-range)#shutdown
DS-1(config-if-range)#exit
```

DS-1 Trunk Configuration

```
DS-1(config)#interface range g0/0-3, g1/0
DS-1(config-if-range)#switchport trunk encapsulation dot1q
DS-1(config-if-range)#switchport mode trunk
DS-1(config-if-range)#no shutdown
```

DS-1 VLAN & SVI Configuration

```
DS-1(config)#interface vlan 10
DS-1(config-if)#ip address 192.168.10.1 255.255.255.0
DS-1(config-if)#no shutdown
DS-1(config-if)#exit
```

DS-1 Interfaces Configuration

```
DS-1(config)#interface g1/1
DS-1(config-if)#switchport access vlan 10
DS-1(config-if)#no shutdown
```

DS-2 Basic Configuration

```
DS-2(config)#hostname DS-2
DS-2(config)#spanning-tree mode pvst
DS-2(config)#line con 0
DS-2(config-line)#exec-timeout 0 0
DS-2(config-line)#logging synchronous
DS-2(config-line)#exit
DS-2(config)#interface range g0/0-3, g1/0-3
DS-2(config-if-range)#shutdown
DS-2(config-if-range)#exit
```

DS-2 Trunk Configuration

```
DS-2(config)#interface range g0/0-3, g1/0
DS-2(config-if-range)#switchport trunk encapsulation dot1q
DS-2(config-if-range)#switchport mode trunk
DS-2(config-if-range)#no shutdown
DS-2(config-if-range)#exit
```

DS-2 VLAN & SVI Configuration

```
DS-2(config)#interface vlan 10
DS-2(config-if)#ip address 192.168.10.2 255.255.255.0
DS-2(config-if)#no shutdown
DS-2(config-if)#exit
```

DS-2 Interfaces Configuration

```
DS-2(config)#interface g1/1
DS-2(config-if)#switchport access vlan 10
DS-2(config-if)#no shutdown
```

AS-1 Basic Configuration

```
AS-1(config)#hostname AS-1
AS-1(config)#spanning-tree mode pvst
AS-1(config)#line con 0
AS-1(config-line)#exec-timeout 0 0
AS-1(config-line)#logging synchronous
AS-1(config-line)#exit
AS-1(config)#interface range g0/0-3, g1/0-3
AS-1(config-if-range)#shutdown
AS-1(config-if-range)#exit
```

AS-1 Trunk Configuration

```
AS-1(config)#interface range g0/0-3
AS-1(config-if-range)#switchport trunk encapsulation dot1q
AS-1(config-if-range)#switchport mode trunk
AS-1(config-if-range)#no shutdown
AS-1(config-if-range)#exit
```

AS-1 VLAN & SVI Configuration

```
AS-1(config)#interface vlan 10
AS-1(config-if)#ip address 192.168.10.3 255.255.255.0
AS-1(config-if)#no shutdown
AS-1(config-if)#exit
```

AS-1 Interfaces Configuration

```
AS-1(config)#interface g1/1
AS-1(config-if)#switchport access vlan 10
AS-1(config-if)#no shutdown
```

AS-2 Basic Configuration

```
AS-2(config)#hostname AS-2
AS-2(config)#spanning-tree mode pvst
AS-2(config)#line con 0
AS-2(config-line)#exec-timeout 0 0
AS-2(config-line)#logging synchronous
AS-2(config-line)#exit
AS-2(config)#interface range g0/0-3, g1/0-3
AS-2(config-if-range)#shutdown
AS-2(config-if-range)#exit
```

AS-2 Trunk Configuration

```
AS-2(config)#interface range g0/0-3
AS-2(config-if-range)#switchport trunk encapsulation dot1q
AS-2(config-if-range)#switchport mode trunk
AS-2(config-if-range)#no shutdown
AS-2(config-if-range)#exit
```

AS-2 VLAN & SVI Configuration

```
AS-2(config)#interface vlan 10
AS-2(config-if)#ip address 192.168.10.4 255.255.255.0
AS-2(config-if)#no shutdown
AS-2(config-if)#exit
```

AS-2 Interfaces Configuration

```
AS-2(config)#interface g1/1
AS-2(config-if)#switchport access vlan 10
AS-2(config-if)#no shutdown
```

Before apply **Rapid-STP** on DS-2, issue the debug spanning-tree events command, and then issue the shutdown command for interface g0/0 and observe the output.

```
*Aug 14 07:01:16.770: STP: VLAN0001 heard root 32769-500a.0001.0000 on Gi0/1
*Aug 14 07:01:16.771:      supersedes 32769-500a.0002.0000
*Aug 14 07:01:16.772: STP: VLAN0001 new root is 32769, 500a.0001.0000 on port Gi0/1,
  cost 8
*Aug 14 07:01:16.775: STP: VLAN0001 sent Topology Change Notice on Gi0/1
*Aug 14 07:01:16.777: STP: VLAN0001 new root port Gi0/3, cost 8
*Aug 14 07:01:16.779: STP[1]: Generating TC trap for port GigabitEthernet0/1
*Aug 14 07:01:16.780: STP: VLAN0001 Gi0/1 -> blocking
*Aug 14 07:01:16.781: STP[1]: Generating TC trap for port GigabitEthernet0/2
*Aug 14 07:01:16.783: STP: VLAN0001 Gi0/2 -> blocking
*Aug 14 07:01:16.784: STP[1]: Generating TC trap for port GigabitEthernet1/0
*Aug 14 07:01:16.786: STP: VLAN0001 Gi1/0 -> blocking
*Aug 14 07:01:16.788: STP: VLAN0010 heard root 32778-500a.0001.0000 on Gi0/1
*Aug 14 07:01:16.788:      supersedes 32778-500a.0002.0000
*Aug 14 07:01:16.789: STP: VLAN0010 new root is 32778, 500a.0001.0000 on port Gi0/1,
  cost 8
*Aug 14 07:01:16.793: STP: VLAN0010 sent Topology Change Notice on Gi0/1
*Aug 14 07:01:16.795: STP[10]: Generating TC trap for port GigabitEthernet0/2
*Aug 14 07:01:16.796: STP: VLAN0010 Gi0/2 -> blocking
*Aug 14 07:01:16.797: STP: VLAN0010 new root port Gi0/3, cost 8
DS-2(config-if)#
*Aug 14 07:01:16.798: STP[10]: Generating TC trap for port GigabitEthernet0/1
*Aug 14 07:01:16.800: STP: VLAN0010 Gi0/1 -> blocking
*Aug 14 07:01:16.801: STP[10]: Generating TC trap for port GigabitEthernet1/0
*Aug 14 07:01:16.803: STP: VLAN0010 Gi1/0 -> blocking
DS-2(config-if)#
*Aug 14 07:01:18.788: STP: VLAN0001 sent Topology Change Notice on Gi0/3
*Aug 14 07:01:18.799: STP: VLAN0010 sent Topology Change Notice on Gi0/3
DS-2(config-if)#
```

issue the no shutdown command for interface g0/0 and observe the output.

```
*Aug 14 07:04:49.994: STP[1]: Generating TC trap for port GigabitEthernet0/0
*Aug 14 07:04:50.000: STP: VLAN0001 sent Topology Change Notice on Gi0/0
*Aug 14 07:04:50.002: STP: VLAN0001 Gi0/0 -> forwarding
*Aug 14 07:04:50.007: STP[10]: Generating TC trap for port GigabitEthernet0/0
*Aug 14 07:04:50.012: STP: VLAN0010 sent Topology Change Notice on Gi0/0
*Aug 14 07:04:50.013: STP: VLAN0010 Gi0/0 -> forwarding
*Aug 14 07:04:50.083: STP[10]: Generating TC trap for port GigabitEthernet0/1
*Aug 14 07:04:50.086: STP: VLAN0010 sent Topology Change Notice on Gi0/0
*Aug 14 07:04:50.087: STP: VLAN0010 Gi0/1 -> forwarding
*Aug 14 07:04:50.088: STP[10]: Generating TC trap for port GigabitEthernet0/2
*Aug 14 07:04:50.090: STP: VLAN0010 Gi0/2 -> forwarding
*Aug 14 07:04:50.091: STP[10]: Generating TC trap for port GigabitEthernet1/0
*Aug 14 07:04:50.092: STP: VLAN0010 Gi1/0 -> forwarding
*Aug 14 07:04:50.095: STP[1]: Generating TC trap for port GigabitEthernet0/1
*Aug 14 07:04:50.100: STP: VLAN0001 sent Topology Change Notice on Gi0/0
*Aug 14 07:04:50.101: STP: VLAN0001 Gi0/1 -> forwarding
*Aug 14 07:04:50.102: STP[1]: Generating TC trap for port GigabitEthernet0/2
*Aug 14 07:04:50.104: STP: VLAN0001 Gi0/2 -> forwarding
DS-2#
*Aug 14 07:04:50.105: STP[1]: Generating TC trap for port GigabitEthernet1/0
*Aug 14 07:04:50.107: STP: VLAN0001 Gi1/0 -> forwarding
DS-2#
```

Implement Rapid spanning Tree DS-1, DS-2, AS-1 and AS-2

```
DS-1(config)#spanning-tree mode rapid-pvst
```

```
DS-2(config)#spanning-tree mode rapid-pvst
```

```
AS-1(config)#spanning-tree mode rapid-pvst
```

```
AS-2(config)#spanning-tree mode rapid-pvst
```

```
DS-1#show spanning-tree vlan 1
```

```
VLAN0001
```

```
Spanning tree enabled protocol rstp
```

```
Root ID Priority 32769  
Address 500a.0001.0000
```

```
This bridge is the root
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)  
Address 500a.0001.0000  
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec  
Aging Time 300 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/0	Desg	FWD	4	128.1	P2p
Gi0/1	Desg	FWD	4	128.2	P2p
Gi0/2	Desg	FWD	4	128.3	P2p
Gi0/3	Desg	FWD	4	128.4	P2p
Gi1/0	Desg	FWD	4	128.5	P2p

```
DS-1#show spanning-tree vlan 10
```

```
VLAN0010
```

```
Spanning tree enabled protocol rstp
```

```
Root ID Priority 32778  
Address 500a.0001.0000
```

```
This bridge is the root
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)  
Address 500a.0001.0000  
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec  
Aging Time 300 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/0	Desg	FWD	4	128.1	P2p
Gi0/1	Desg	FWD	4	128.2	P2p
Gi0/2	Desg	FWD	4	128.3	P2p
Gi0/3	Desg	FWD	4	128.4	P2p
Gi1/0	Desg	FWD	4	128.5	P2p
Gi1/1	Desg	FWD	4	128.6	P2p

Spanning Tree Configuration DS-1 and DS-2

```
DS-1(config)#spanning-tree vlan 1 root primary
DS-1(config)#spanning-tree vlan 10 root secondary
DS-2(config)#spanning-tree vlan 1 root secondary
DS-2(config)#spanning-tree vlan 10 root primary
```

```
DS-1#show spanning-tree vlan 1
```

```
VLAN0001
```

```
Spanning tree enabled protocol rstp
```

```
Root ID    Priority    24577
           Address    500a.0001.0000
```

```
This bridge is the root
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority    24577 (priority 24576 sys-id-ext 1)
```

```
Address    500a.0001.0000
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Aging Time 300 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/0	Desg	FWD	4	128.1	P2p
Gi0/1	Desg	FWD	4	128.2	P2p
Gi0/2	Desg	FWD	4	128.3	P2p
Gi0/3	Desg	FWD	4	128.4	P2p
Gi1/0	Desg	FWD	4	128.5	P2p

```
DS-1#show spanning-tree vlan 10
```

```
VLAN0010
```

```
Spanning tree enabled protocol rstp
```

```
Root ID    Priority    24586
           Address    500a.0002.0000
```

```
Cost       4
```

```
Port       1 (GigabitEthernet0/0)
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority    28682 (priority 28672 sys-id-ext 10)
```

```
Address    500a.0001.0000
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Aging Time 300 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/0	Root	FWD	4	128.1	P2p
Gi0/1	Desg	FWD	4	128.2	P2p
Gi0/2	Desg	FWD	4	128.3	P2p
Gi0/3	Desg	FWD	4	128.4	P2p
Gi1/0	Desg	FWD	4	128.5	P2p
Gi1/1	Desg	FWD	4	128.6	P2p

```
DS-2#show spanning-tree vlan 1
```

```
VLAN0001
```

```
Spanning tree enabled protocol rstp
```

```
Root ID Priority 24577
Address 500a.0001.0000
Cost 4
Port 1 (GigabitEthernet0/0)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority 28673 (priority 28672 sys-id-ext 1)
Address 500a.0002.0000
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/0	Root	FWD	4	128.1	P2p
Gi0/1	Desg	FWD	4	128.2	P2p
Gi0/2	Desg	FWD	4	128.3	P2p
Gi0/3	Desg	FWD	4	128.4	P2p
Gi1/0	Desg	FWD	4	128.5	P2p

```
DS-2#show spanning-tree vlan 10
```

```
VLAN0010
```

```
Spanning tree enabled protocol rstp
```

```
Root ID Priority 24586
Address 500a.0002.0000
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority 24586 (priority 24576 sys-id-ext 10)
Address 500a.0002.0000
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Gi0/0	Desg	FWD	4	128.1	P2p
Gi0/1	Desg	FWD	4	128.2	P2p
Gi0/2	Desg	FWD	4	128.3	P2p
Gi0/3	Desg	FWD	4	128.4	P2p
Gi1/0	Desg	FWD	4	128.5	P2p
Gi1/1	Desg	FWD	4	128.6	P2p

```
DS-2#show spanning-tree root
```

Vlan	Root ID	Root Cost	Hello Time	Max Age	Fwd Dly	Root Port
VLAN0001	24577 500a.0001.0000	4	2	20	15	Gi0/0
VLAN0010	24586 500a.0002.0000	0	2	20	15	

```
DS-2#
```