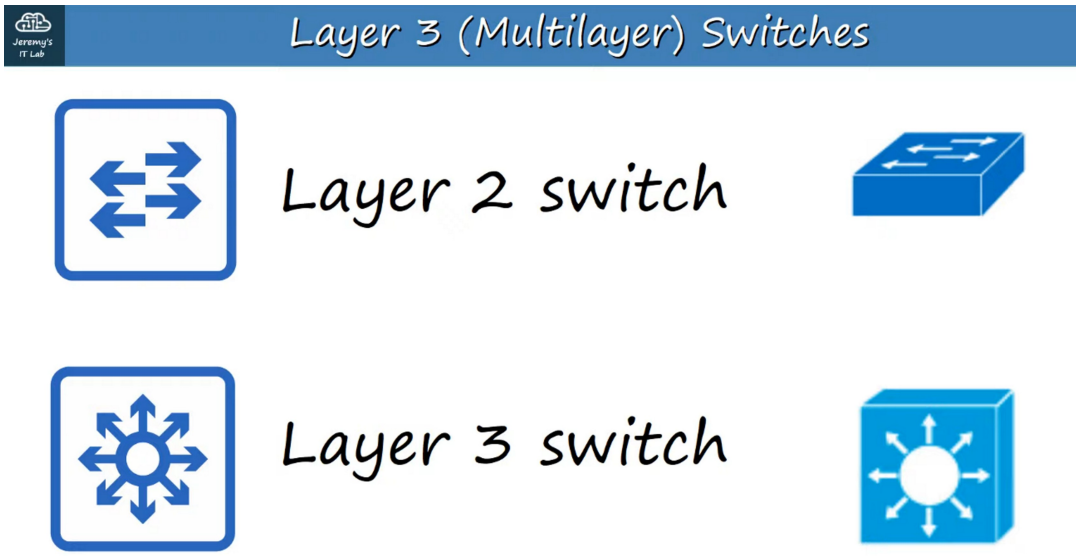
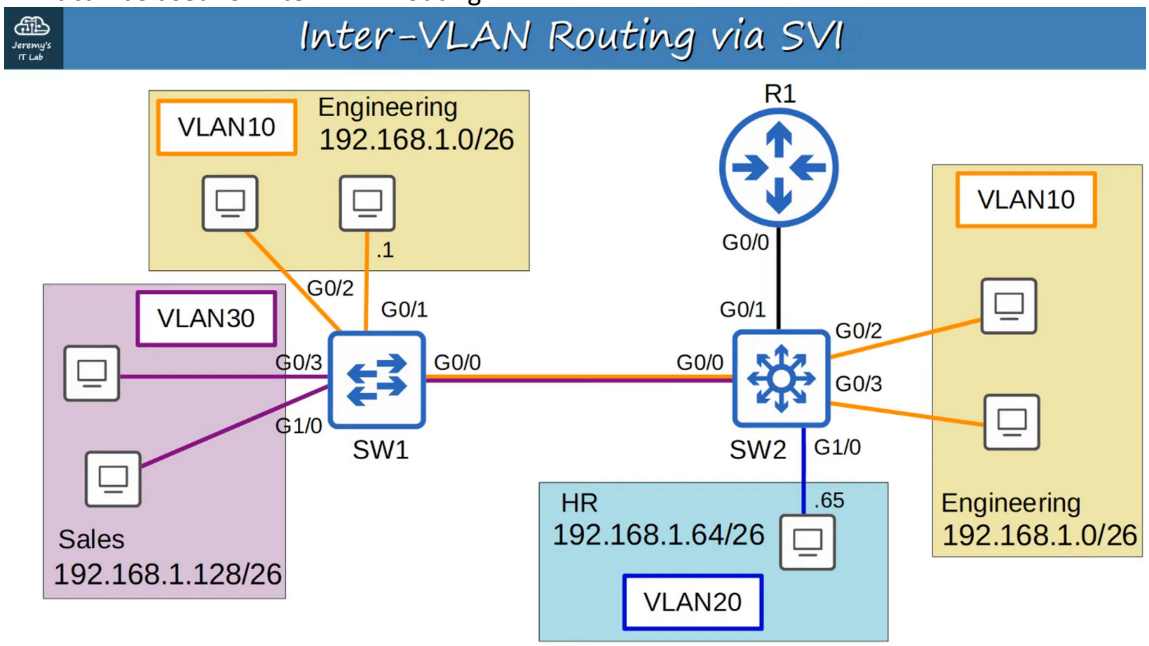
Friday, November 28, 2025 6:19 PM

LAYER 3 (MULTILAYER) SWITCHES

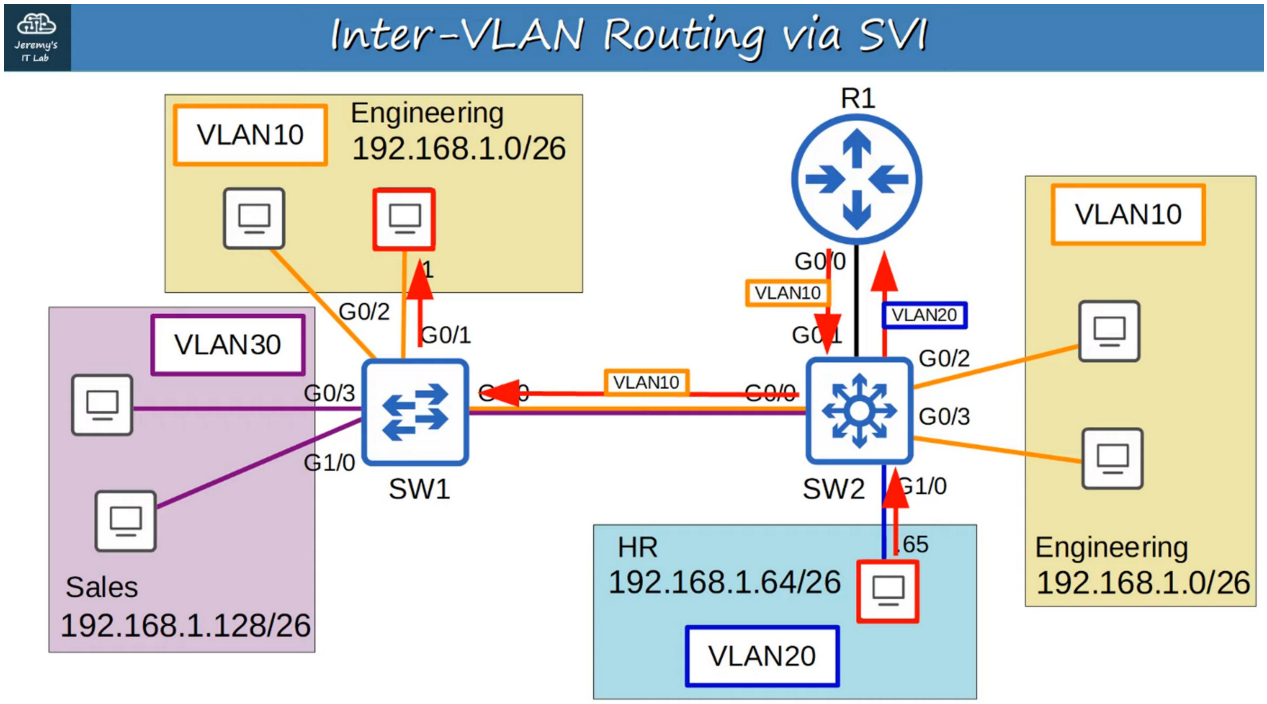


- A MULTILAYER SWITCH is capable of both SWITCHING and ROUTING
- It is LAYER 3 AWARE
- You can assign IP Addresses to its L3 Virtual Interface, like a router
- You can create Virtual Interfaces for each VLAN, and assign IP addresses to those interfaces
- You can configure routes on it, just like a ROUTER
- It can be used for inter-VLAN routing

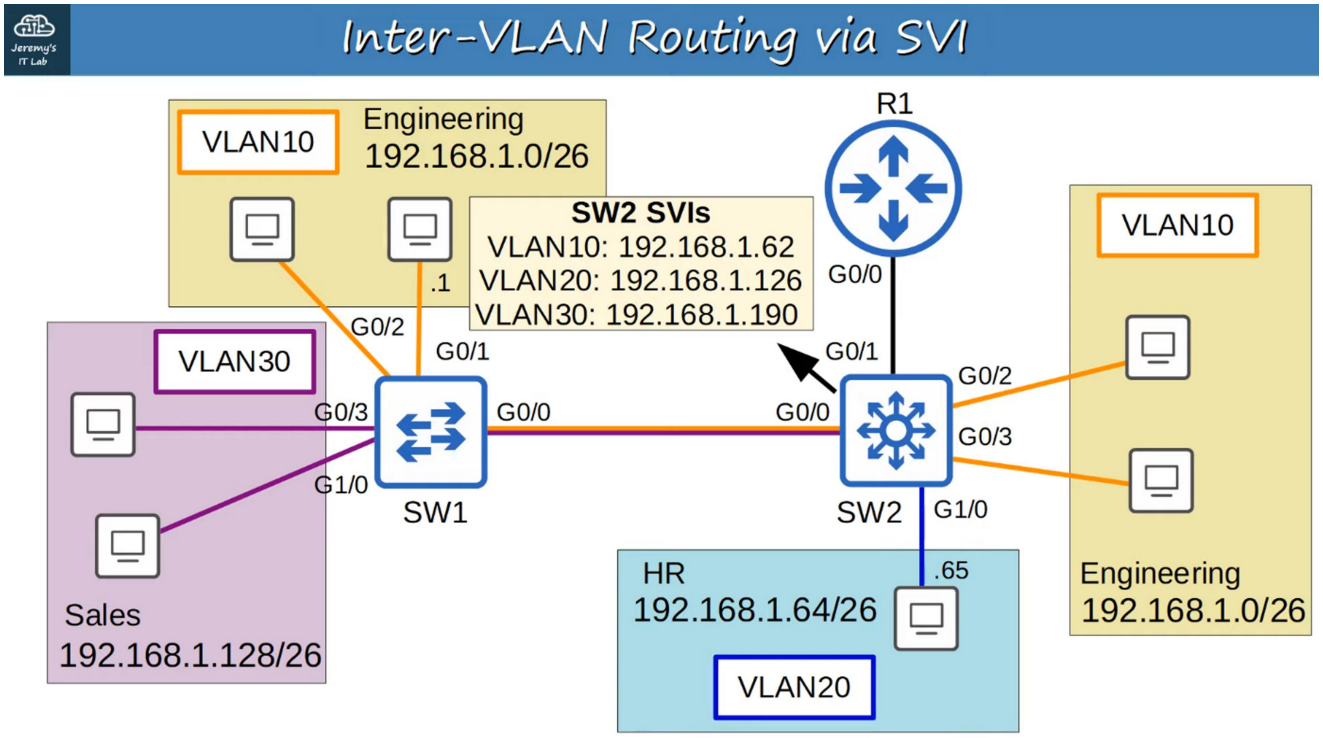


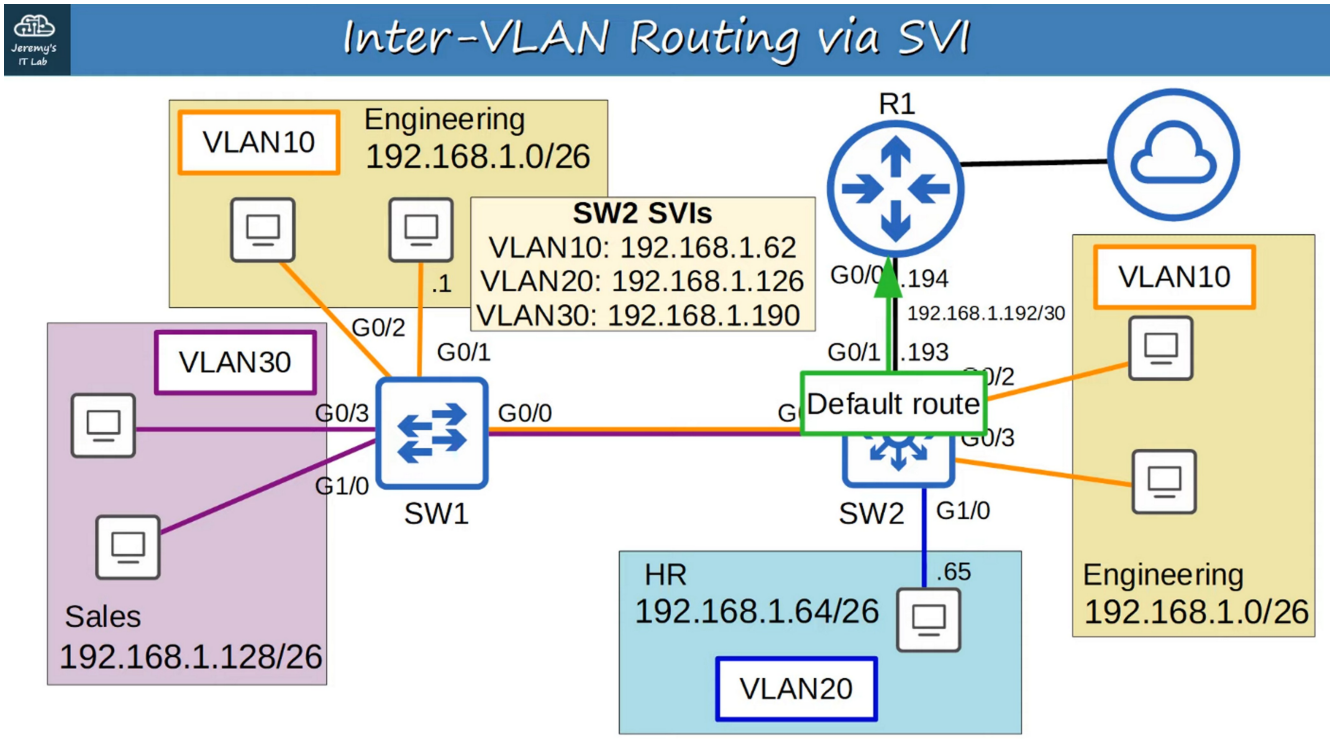
SW2 Replaced with a Layer 3 Switch

Multi-VLAN connections to R1 removed and replaced with a point-to-point Layer 3 connection

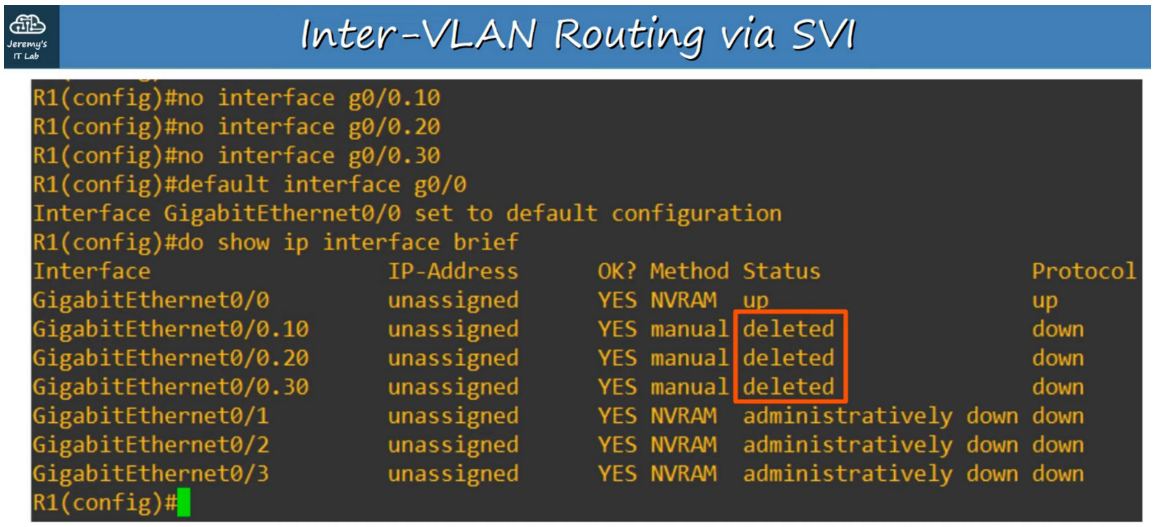


- SVIs (Switch Virtual Interfaces) are the virtual interfaces you can assign IP addresses to in a MULTILAYER SWITCH.
- Configure each HOST to use the SVI (NOT the ROUTER R1) as their Gateway Address
- To send traffic to different SUBNETS / VLANS, the PCs will send traffic to the SWITCH, and the SWITCH will route the traffic.





Clearing R1 configuration to set to work with the Layer 3 Point-to-Point connection



#no interface : removes the VLAN interface

#default interface g0/0 : resets the g0/0 interface to it's default settings

Then configure the default R1 G0/0 interface's to IP address : 192.168.1.194 (as per the network diagram)

Configuration of SW2 to use SVI and the Layer 3 Point-to-Point connection with R1

Inter-VLAN Routing via SVI

```
SW2(config)#default interface g0/1
Interface GigabitEthernet0/1 set to default configuration
SW2(config)#ip routing
SW2(config)#interface g0/1
SW2(config-if)#no switchport
SW2(config-if)#ip address 192.168.1.193 255.255.255.252
SW2(config-if)#do show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  up                    up
GigabitEthernet0/3     unassigned      YES unset  up                    up
GigabitEthernet0/1     192.168.1.193   YES manual up                    up
GigabitEthernet1/0     unassigned      YES unset  up                    up
GigabitEthernet1/1     unassigned      YES unset  up                    up
GigabitEthernet1/2     unassigned      YES unset  up                    up
GigabitEthernet1/3     unassigned      YES unset  up                    up
GigabitEthernet2/0     unassigned      YES unset  up                    up
GigabitEthernet2/1     unassigned      YES unset  up                    up
GigabitEthernet2/2     unassigned      YES unset  up                    up
GigabitEthernet2/3     unassigned      YES unset  up                    up
```

“default interface ” : resets settings on specified interface to defaults

“ip routing” : IMPORTANT command to enable Layer 3 routing on the SWITCH

“no switchport” : configures the interface from a Layer 2 Switchport to a Layer 3 “routed port”

The sets the Default Route to R1 (192.168.1.194) so that all traffic leaving the network gets routed through R1’s Gateway of Last Resort (aka The Default Gateway)

Inter-VLAN Routing via SVI

```
SW2(config-if)#exit
SW2(config)#ip route 0.0.0.0 0.0.0.0 192.168.1.194
SW2(config)#do show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override

Gateway of last resort is 192.168.1.194 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 192.168.1.194
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.192/30 is directly connected, GigabitEthernet0/1
L        192.168.1.193/32 is directly connected, GigabitEthernet0/1
SW2(config)#
```

Inter-VLAN Routing via SVI

```
SW2#show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Gi0/0                        connected    trunk        auto   auto unknown
Gi0/2                        connected    10           auto   auto unknown
Gi0/3                        connected    10           auto   auto unknown
Gi0/1                        connected    routed       auto   auto unknown
Gi1/0                        connected    20           auto   auto unknown
Gi1/1                        connected    1            auto   auto unknown
Gi1/2                        connected    1            auto   auto unknown
Gi1/3                        connected    1            auto   auto unknown
Gi2/0                        connected    1            auto   auto unknown
Gi2/1                        connected    1            auto   auto unknown
Gi2/2                        connected    1            auto   auto unknown
Gi2/3                        connected    1            auto   auto unknown
Gi3/0                        connected    1            auto   auto unknown
Gi3/1                        connected    1            auto   auto unknown
Gi3/2                        connected    1            auto   auto unknown
Gi3/3                        connected    1            auto   auto unknown
SW2#
```

SVI CONFIGURATION ON SW2 (Virtual LAYER 3 ROUTING INTERFACES)

Jeremy's IT Lab

Inter-VLAN Routing via SVI

```
SW2(config)#interface vlan10
SW2(config-if)#ip address 192.168.1.62 255.255.255.192
SW2(config-if)#no shutdown
SW2(config-if)#interface vlan20
SW2(config-if)#ip address 192.168.1.126 255.255.255.192
SW2(config-if)#no shutdown
SW2(config-if)#interface vlan30
SW2(config-if)#ip address 192.168.1.190 255.255.255.192
SW2(config-if)#no shutdown
```

SVIs are shut down by default, so remember to use “no shutdown”

Inter-VLAN Routing via SVI

```
SW2(config-if)#interface vlan40
SW2(config-if)#ip address 40.40.40.40 255.255.255.0
SW2(config-if)#no shutdown
SW2(config-if)#do show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  up                    up
GigabitEthernet0/3     unassigned      YES unset  up                    up
GigabitEthernet0/1     192.168.1.193   YES manual up                    up
Vlan10                 192.168.1.62    YES manual up                    up
Vlan20                 192.168.1.126   YES manual up                    up
Vlan30                 192.168.1.190   YES manual up                    up
Vlan40                 40.40.40.40     YES manual down                  down
```

Creating an unknown SVI (VLAN 40) and the Status/Protocol is “down/down”

What are the conditions for a SVI to be “up/up” ?

- The VLAN must exist on the SWITCH
- The SWITCH must have at least ONE access port in the VLAN in an “up/up” state AND/OR one TRUNK port that allows the VLAN that is in an “up/up” state
- The VLAN must not be shutdown (you can use the “shutdown” command to disable a VLAN)
- The SVI must not be shutdown (SVIs are disabled, by default)

Inter-VLAN Routing via SVI

```
SW2(config-if)#do show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
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       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
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       a - application route
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Gateway of last resort is 192.168.1.194 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 192.168.1.194
      192.168.1.0/24 is variably subnetted, 8 subnets, 3 masks
C        192.168.1.0/26 is directly connected, Vlan10
L        192.168.1.62/32 is directly connected, Vlan10
C        192.168.1.64/26 is directly connected, Vlan20
L        192.168.1.126/32 is directly connected, Vlan20
C        192.168.1.128/26 is directly connected, Vlan30
L        192.168.1.190/32 is directly connected, Vlan30
C        192.168.1.192/30 is directly connected, GigabitEthernet0/1
L        192.168.1.193/32 is directly connected, GigabitEthernet0/1
SW2(config-if)#
```

The VLAN trunk has been successfully replaced by an Layer 3 SWITCH SVI.

All hosts should be able to connect with each other (tested with “ping”) as well as reach the external internet (via the Cloud symbol attached to R1)