The Root Bridge Election

- Because Spanning Tree selects paths pointing towards the root bridge, it acts as a centre point of the LAN

- Best practice is to ensure a pair of high-end core switches are selected as the 1st and 2nd most preferred Root Bridge

The Root Bridge Election

- You can manipulate the Root Bridge election by setting Bridge priority
- The default value is 32768, with the lowest number being most preferred
- In the case of a tie the switch with the lowest MAC address will be selected
- This is liable to be the oldest switch

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Suboptimal Root Bridge

- All switches are left with the default Bridge Priority in this example
- The switch with the lowest MAC address becomes the Root Bridge
- This is the old switch in the warehouse
- It has low bandwidth links and limited CPU and memory
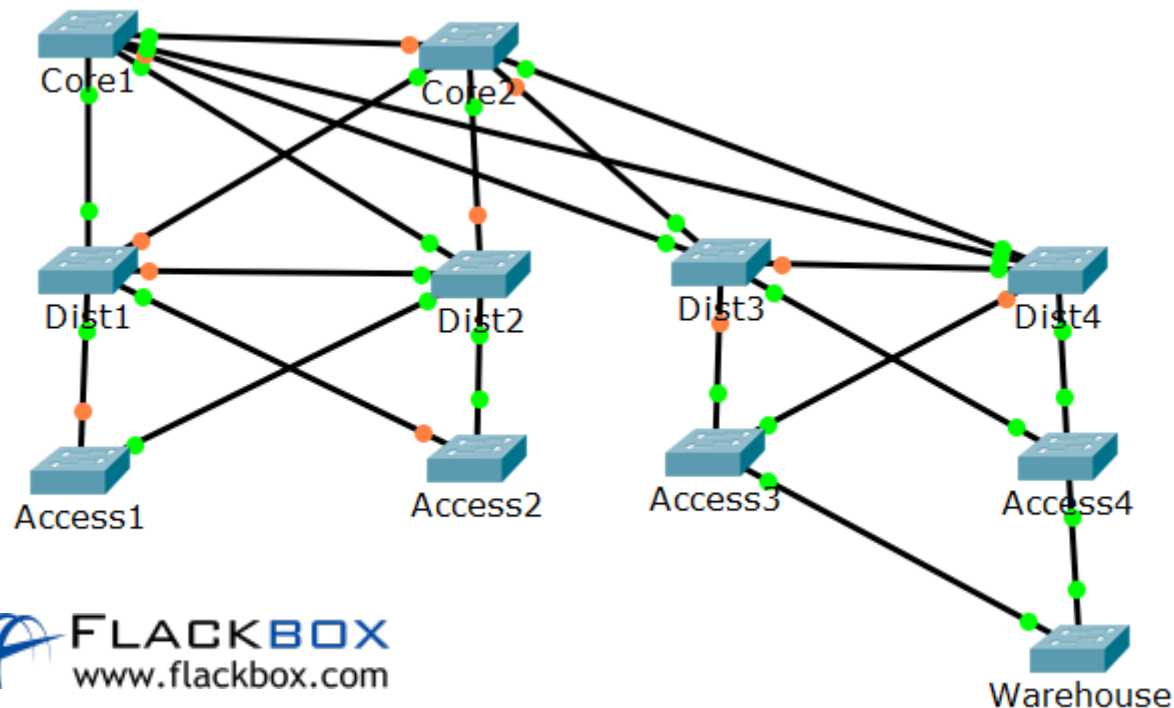
Suboptimal Root Bridge

```
Warehouse#show spanning-tree vlan 1
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority      32769
              Address       0001.634B.E247
              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       0001.634B.E247
              Hello Time    2 sec   Max Age 20 sec   Forward Delay 15 sec
              Aging Time    20


Interface         Role Sts Cost        Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------
Fa0/1             Desg FWD 19          128.1    P2p
Fa0/2             Desg FWD 19          128.2    P2p
```
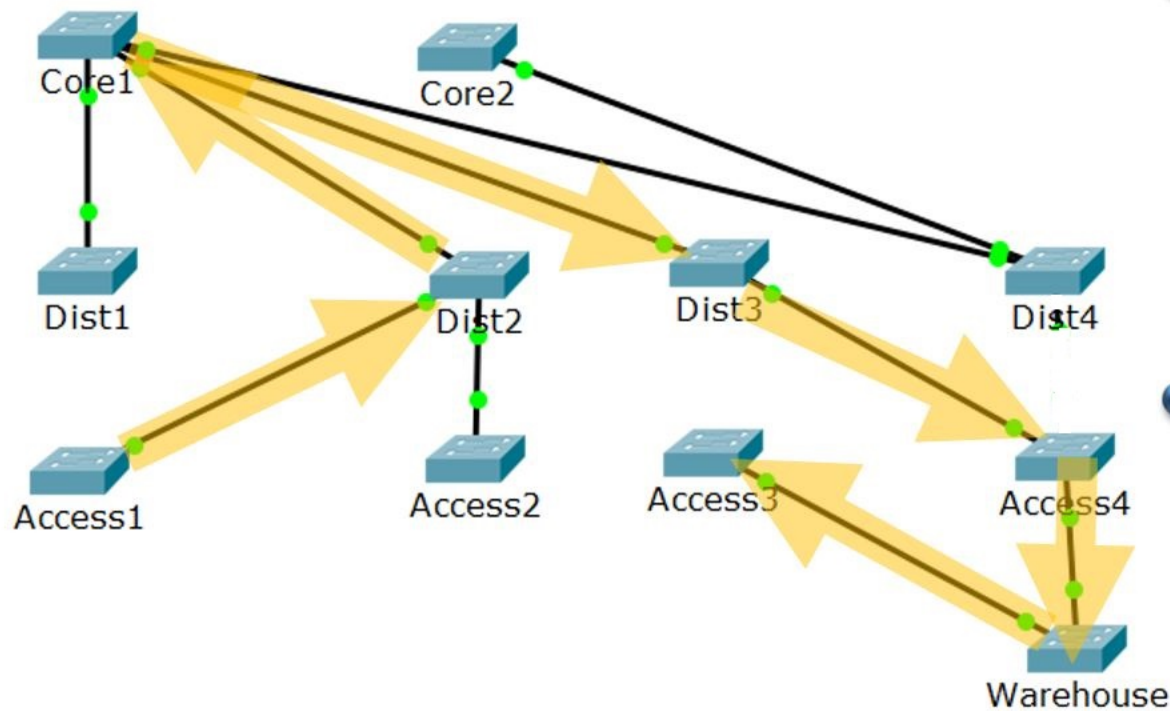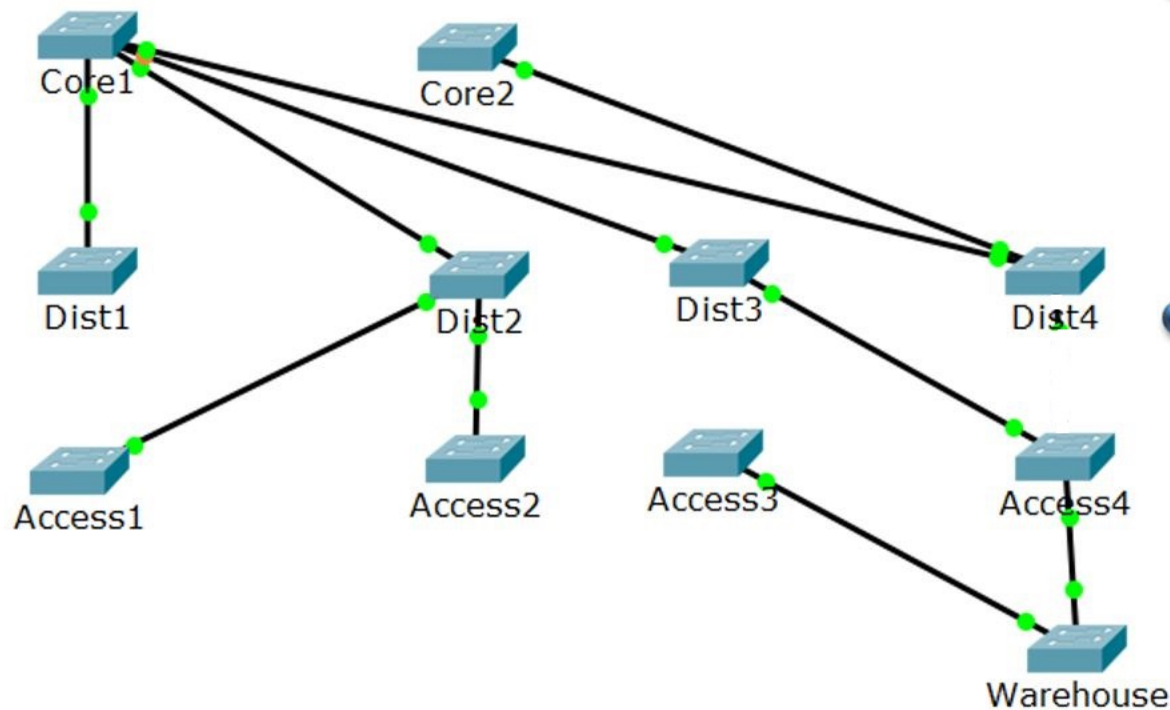
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Suboptimal Root Bridge

- Traffic from a PC connected to Access1 to another PC connected to Access3 goes along the path Acc1 > Dist2 > Core1 > Dist3 > Acc4 > Warehouse > Acc3

- This is 7 hops, including through the old switch in the warehouse

Suboptimal Root Bridge

- All traffic between different pairs of distribution switches will go over an indirect path and transit the old switch in the warehouse

- This is likely to congest its links, CPU and RAM and will lead to suboptimal performance

Core1
Core2
Dist1
Dist2
Dist3
Dist4
Access1
Access2
Access3
Access4
Warehouse

Root Bridge Primary Configuration

```
Core1(config)#spanning-tree vlan 1 root primary
```

- Configures the Core1 switch to be the Root Bridge
- This will set a Bridge Priority of 24576

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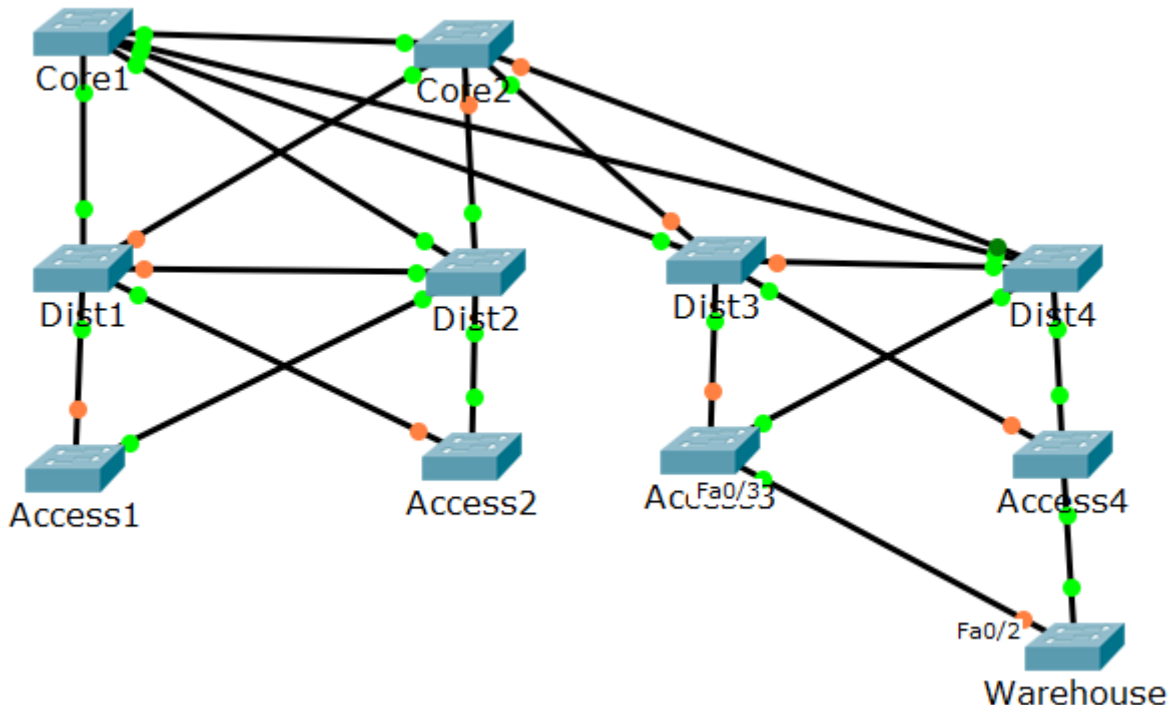
Root Bridge Primary Verification

```
Core1#show spanning-tree vlan 1
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0090.0CA0.3902
             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     0090.0CA0.3902
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------
Gi0/2            Desg FWD 4         128.26   P2p
Fa0/21           Desg FWD 19        128.21   P2p
Fa0/24           Desg FWD 19        128.24   P2p
```

Optimal Root Bridge
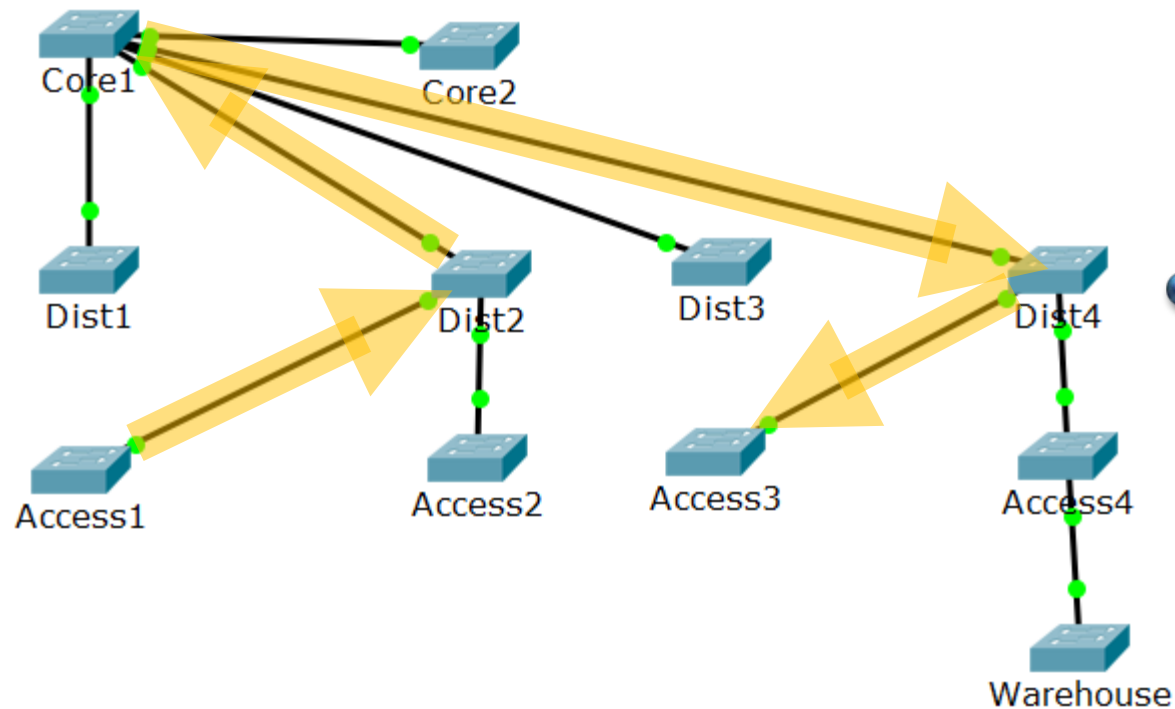
- Traffic from a PC connected to Access1 to another PC connected to Access3 goes along the path Acc1 > Dist2 > Core1 > Dist4 > Acc3
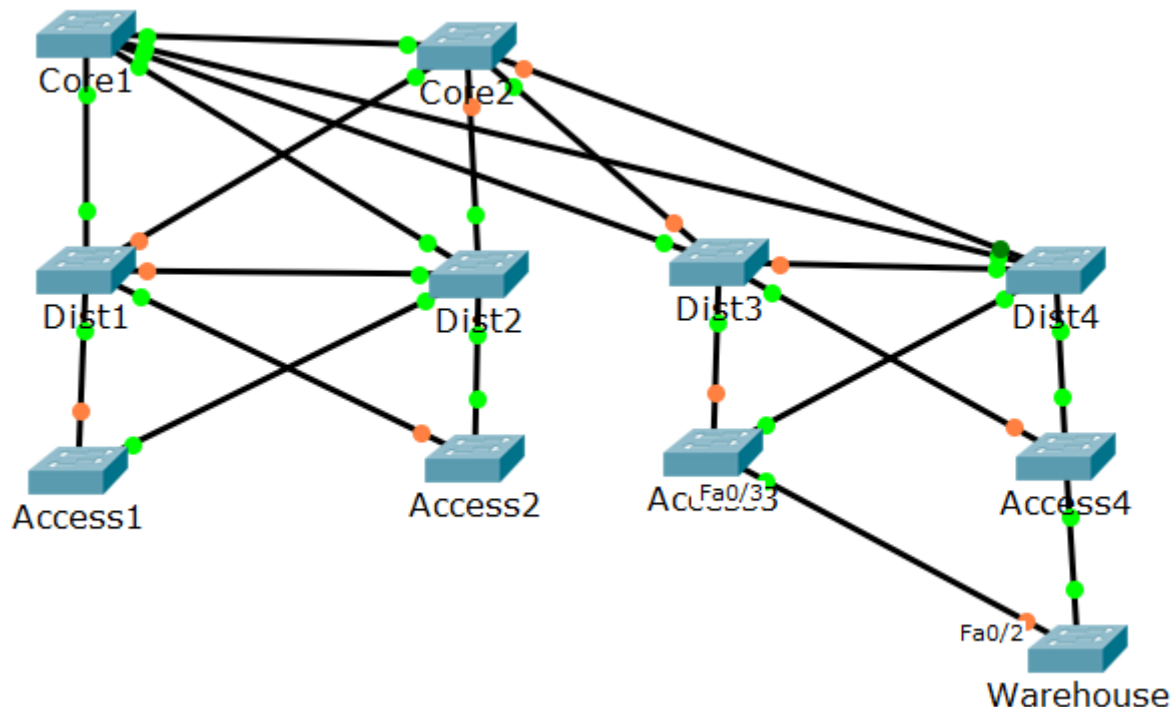- This is 5 hops along the most direct path through the core

Root Bridge Failover

- If the Core1 switch fails, we want to ensure traffic still goes through the most direct centralised path
- We need to configure Core2 to be next most preferred as the Root Bridge
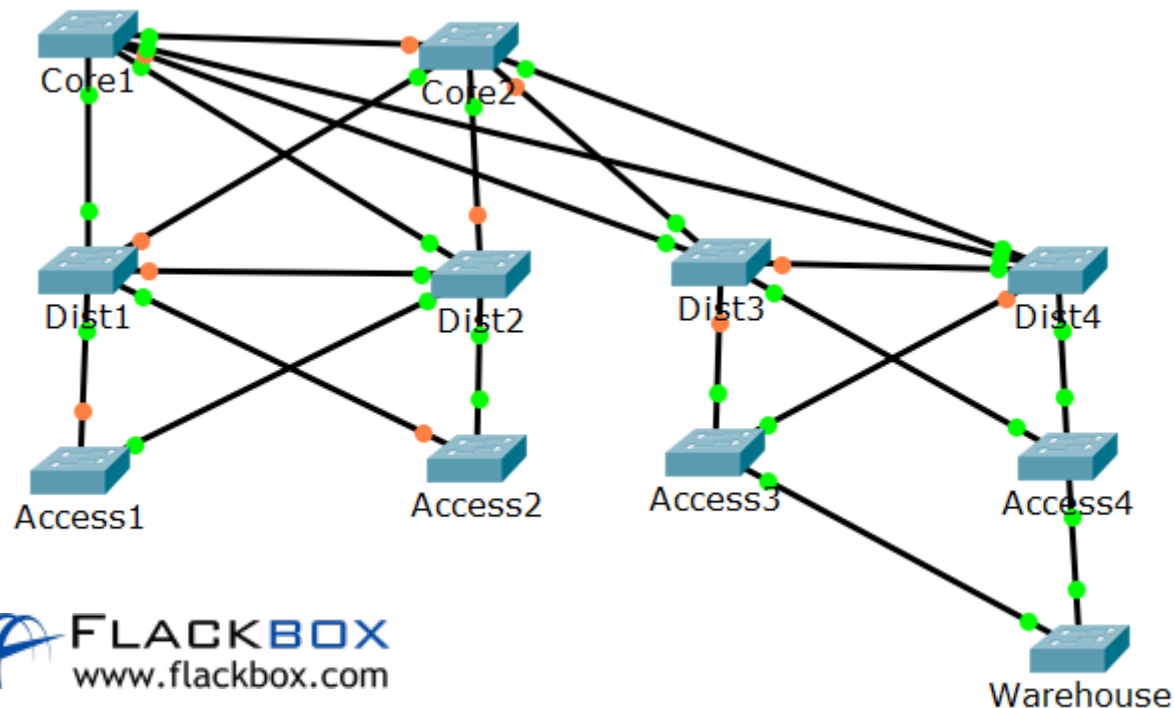
```
Core2(config)#spanning-tree vlan 1 root secondary
```


- Configures the Core2 switch to be the next most preferred Root Bridge after Core1
- This will set a Bridge Priority of 28672

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Root Bridge Secondary Verification

```
Core2#show spanning-tree vlan 1
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority      24577
             Address       0090.0CA0.3902
             Cost          4
             Port          26(GigabitEthernet0/2)
             Hello Time    2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority      28673  (priority 28672 sys-id-ext 1)
             Address       0090.0C16.7A9B
             Hello Time    2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time    20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- ------------------------
Fa0/24           Desg FWD 19        128.24   P2p
Fa0/21           Desg FWD 19        128.21   P2p
Gi0/2            Root FWD 4         128.26   P2p
```

spanning-tree vlan <id> priority

- Alternatively to using the `spanning-tree vlan <id> root primary` and `secondary` commands, you can set an exact value

- These commands have the exact same effect (use one or the other):

```
Core1(config)# spanning-tree vlan 1 root primary
Core1(config)# spanning-tree vlan 1 priority 24576
```

- And these:

```
Core2(config)# spanning-tree vlan 1 root secondary
Core2(config)# spanning-tree vlan 1 priority 28672
```

spanning-tree vlan <id> priority

- Valid values are 0 – 61440
- The value must be an increment of 4096
- (0, 4096, 8192 etc. are okay, entering 5000 will return an error message)
- Setting an exact value provides more granularity than the `primary` and `secondary` commands