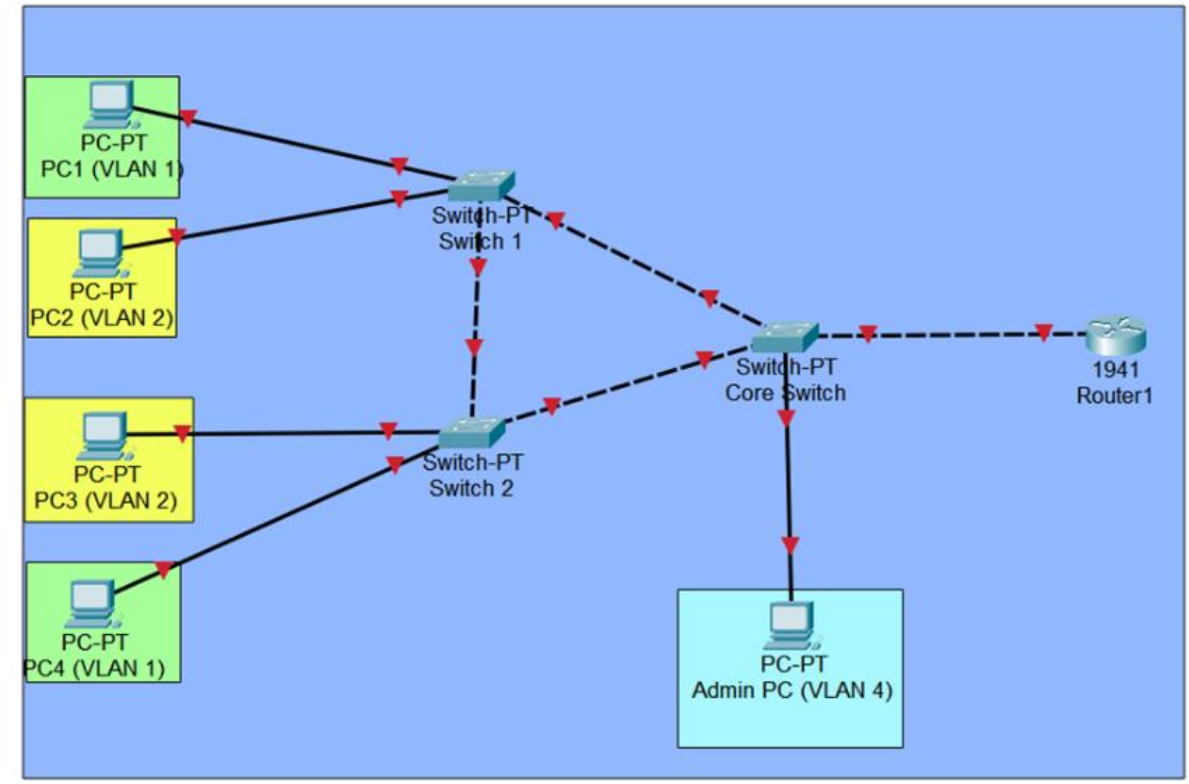
Project 2:

Introduction:

A network topology is provided to you in a PKA file. Your responsibility as the network administrator of this company is to set up the network devices at the branch site based on the given requirements. Specifically, you are tasked with configuring 3 VLANs and implementing inter-VLAN routing in the router. Additionally, you need to configure the switches in the branch office according to the specified requirements for STP and Etherchannel.

Figure 1: The Topology:



Objectives:

- Subnet the provided network and determine the IP address range for each subnet.
- Set up VLANs on all switches.
- Set customized device hostnames.
- Enable SSH in the core switch.
- Configure trunk and access ports on all switches according to the specified requirements.
- Assign switch ports to appropriate VLANs based on the given requirements.
- Configure IP settings for PCs and SVI interfaces of switches, selecting IPs from the correct subnets.
- Enable Intervlan Routing on Router R1.
- Implement STP/Etherchannel as per the provided requirements.
- Conduct connectivity testing.

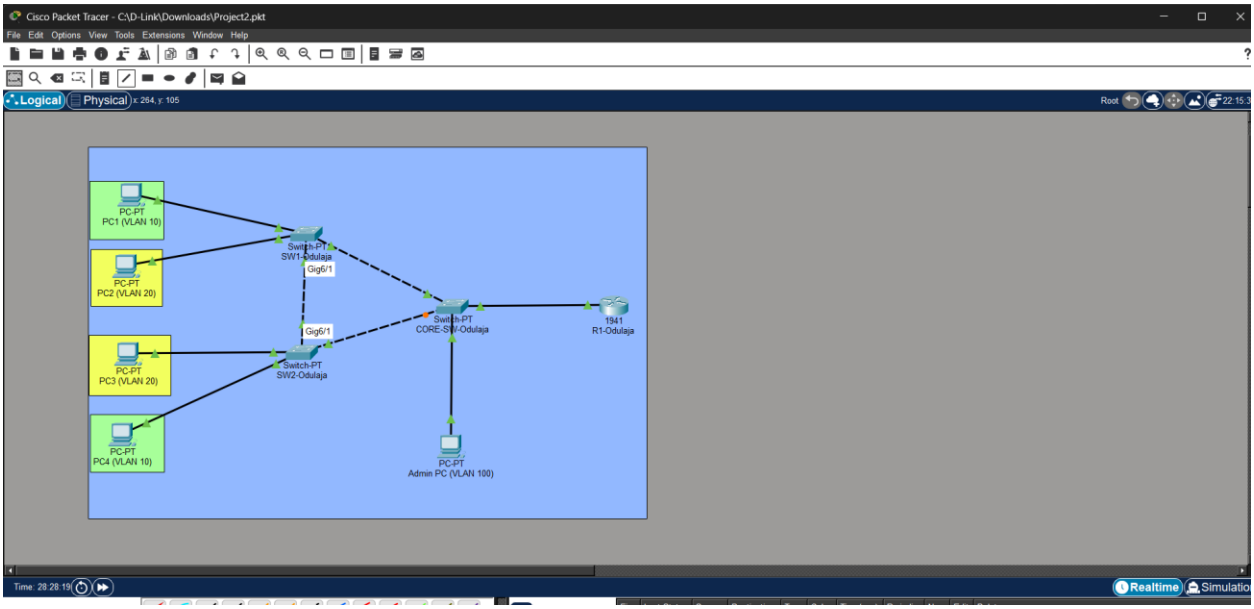
SOLUTION:

Networking Lab Report

Networking Project Report: VLAN, Trunking, STP, and SSH Configuration

Part 1: Network Topology

Label: Final VLAN and Inter-VLAN Routing Topology
Description: This topology connects multiple access switches (SW1-Odulaja and SW2-Odulaja) to a core switch (CORE-SW-Odulaja) and a router (R1-Odulaja) using trunk links and EtherChannel. The Admin PC is placed in VLAN 100 for secure SSH management.



Part 2: VLAN Configuration Verification

Label: VLAN Configuration on Switches
Description: VLANs 10 (Dept1), 20 (Dept2), and 100 (Management) were created and assigned to their respective ports on each switch.

SW1-Odulaja VLAN Configuration:

SW2-Odulaja VLAN Configuration:

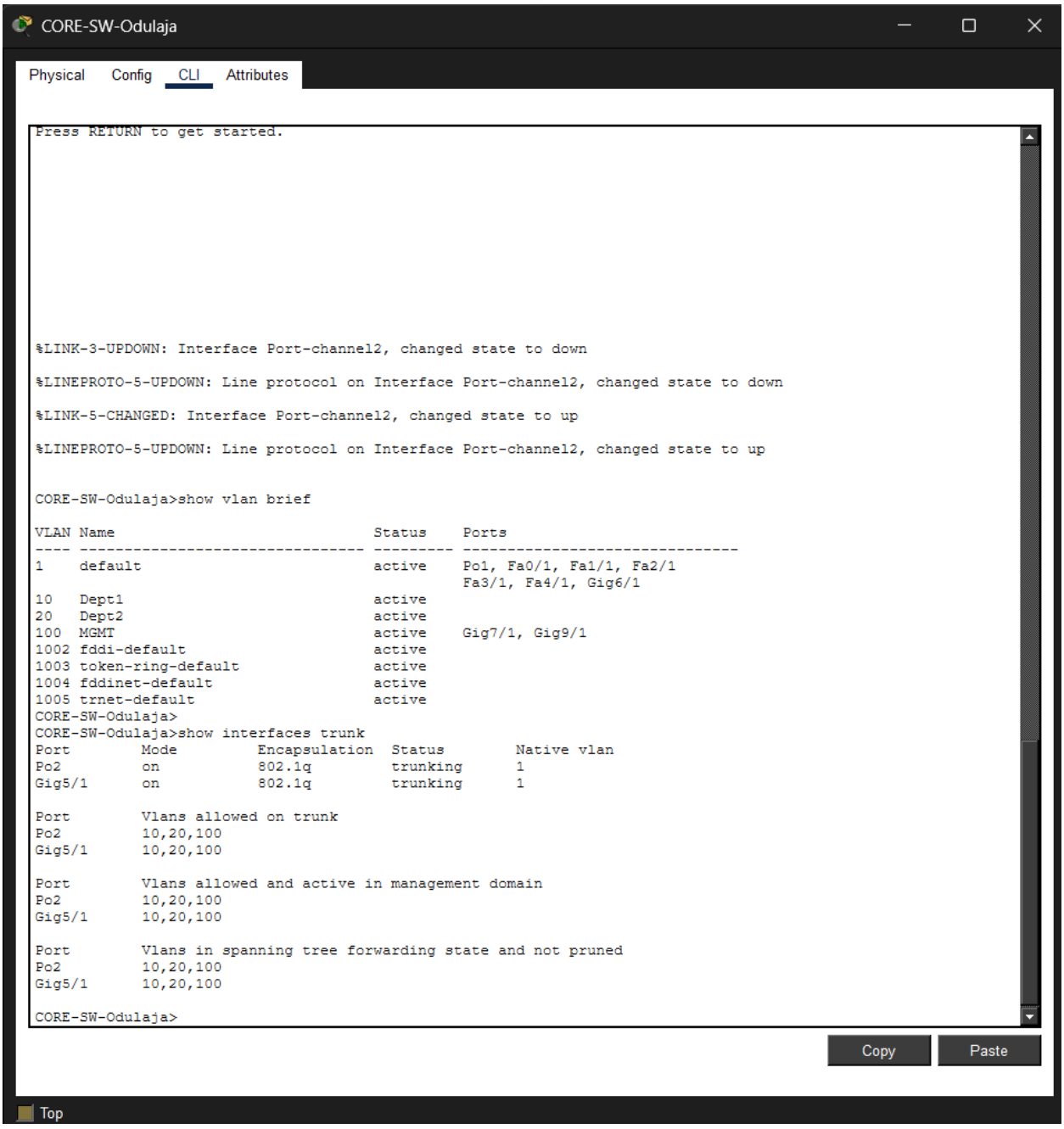
CORE-SW-Odulaja VLAN Configuration:

Part 3: Trunk and EtherChannel Verification

Label: Trunk and EtherChannel Configuration

Description: Trunk ports were configured using IEEE 802.1Q encapsulation to allow VLANs 10, 20, and 100 across links. LACP (802.3ad) was implemented for redundancy and load balancing.

CORE-SW-Odulaja Trunk Links and EtherChannel:



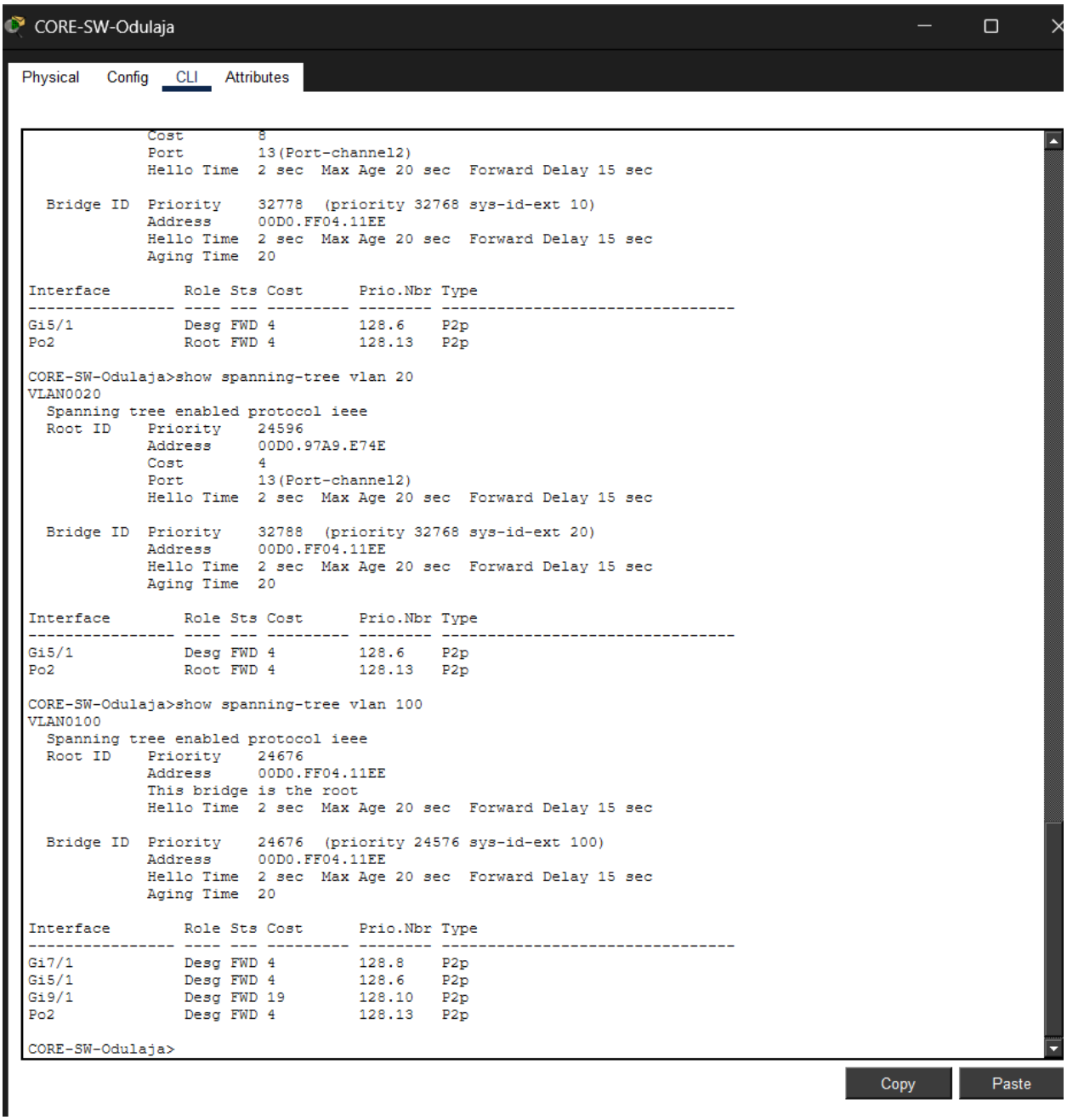
SW1-Odulaja EtherChannel Summary:

SW2-Odulaja EtherChannel Summary:

Part 4: Spanning Tree Protocol (STP)

Label: STP Root Bridge Configuration

Description: STP was verified for VLANs 10, 20, and 100 to ensure loop prevention and redundancy. SW1 is root for VLAN 10, SW2 is root for VLAN 20, and CORE-SW is root for VLAN 100.


CORE-SW-Odulaja
Physical
Config
CLI
Attributes
Cost 8
Port 13(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)
Address 00D0.FF04.11EE
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
Gi5/1 Desg FWD 4 128.6 P2p
Po2 Root FWD 4 128.13 P2p
CORE-SW-Odulaja>show spanning-tree vlan 20
VLAN0020
Spanning tree enabled protocol ieee
Root ID Priority 24596
Address 00D0.97A9.E74E
Cost 4
Port 13(Port-channel2)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32788 (priority 32768 sys-id-ext 20)
Address 00D0.FF04.11EE
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
Gi5/1 Desg FWD 4 128.6 P2p
Po2 Root FWD 4 128.13 P2p
CORE-SW-Odulaja>show spanning-tree vlan 100
VLAN0100
Spanning tree enabled protocol ieee
Root ID Priority 24676
Address 00D0.FF04.11EE
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 24676 (priority 24576 sys-id-ext 100)
Address 00D0.FF04.11EE
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
Gi7/1 Desg FWD 4 128.8 P2p
Gi5/1 Desg FWD 4 128.6 P2p
Gi9/1 Desg FWD 19 128.10 P2p
Po2 Desg FWD 4 128.13 P2p
CORE-SW-Odulaja>
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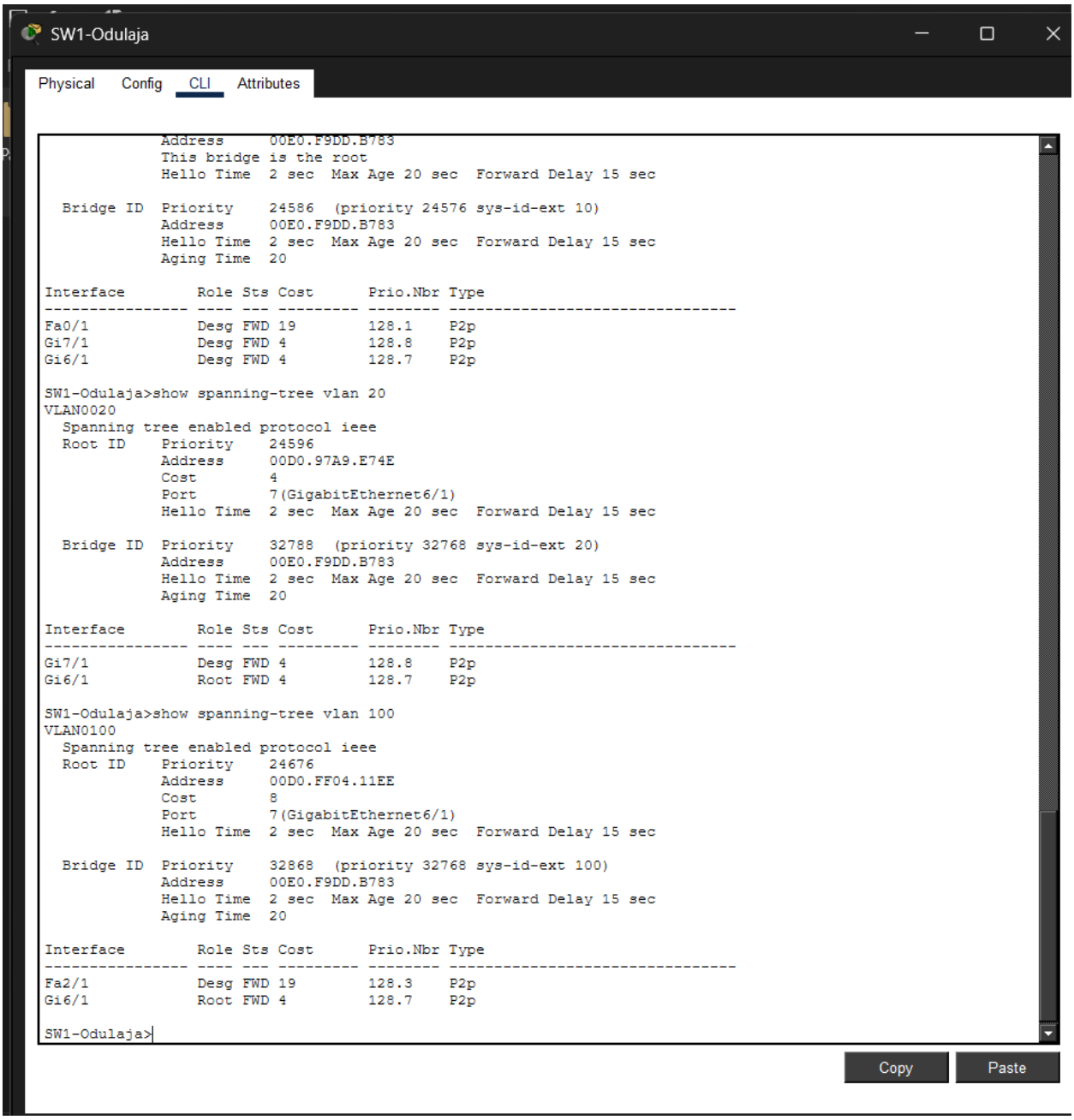
SW1-Odulaja
Physical
Config
CLI
Attributes
Address 00E0.F9DD.B783
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 24586 (priority 24576 sys-id-ext 10)
Address 00E0.F9DD.B783
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
Fa0/1 Desg FWD 19 128.1 P2p
Gi7/1 Desg FWD 4 128.8 P2p
Gi6/1 Desg FWD 4 128.7 P2p
SW1-Odulaja>show spanning-tree vlan 20
VLAN0020
Spanning tree enabled protocol ieee
Root ID Priority 24596
Address 00D0.97A9.E74E
Cost 4
Port 7(GigabitEthernet6/1)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32788 (priority 32768 sys-id-ext 20)
Address 00E0.F9DD.B783
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
Gi7/1 Desg FWD 4 128.8 P2p
Gi6/1 Root FWD 4 128.7 P2p
SW1-Odulaja>show spanning-tree vlan 100
VLAN0100
Spanning tree enabled protocol ieee
Root ID Priority 24676
Address 00D0.FF04.11EE
Cost 8
Port 7(GigabitEthernet6/1)
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32868 (priority 32768 sys-id-ext 100)
Address 00E0.F9DD.B783
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
Fa2/1 Desg FWD 19 128.3 P2p
Gi6/1 Root FWD 4 128.7 P2p
SW1-Odulaja>
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Part 5: Router-on-a-Stick Configuration

Label: Inter-VLAN Routing Verification

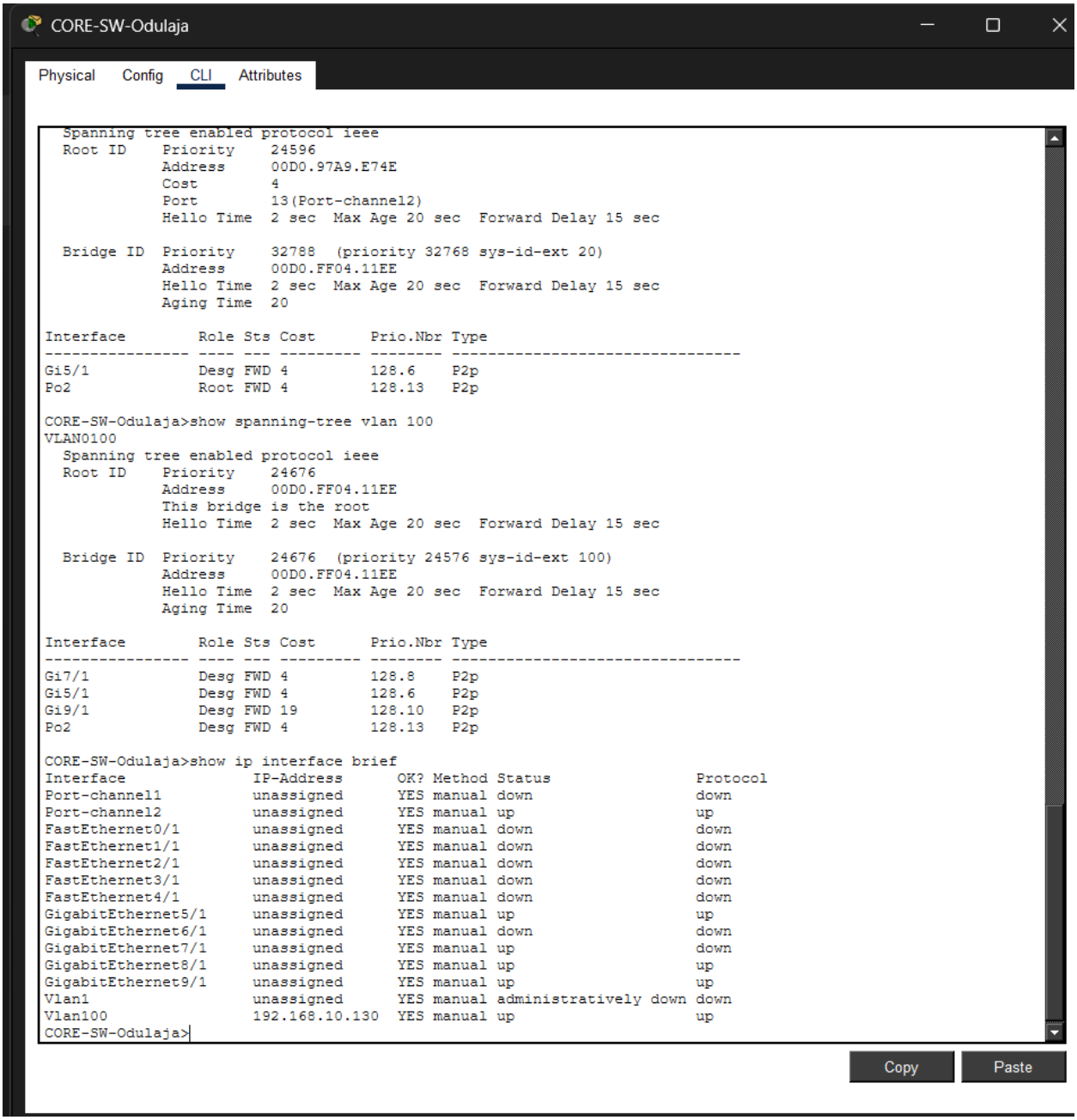
Description: Router R1-Odulaja subinterfaces were created for each VLAN to enable inter-VLAN communication.

Part 6: Management and SSH Access

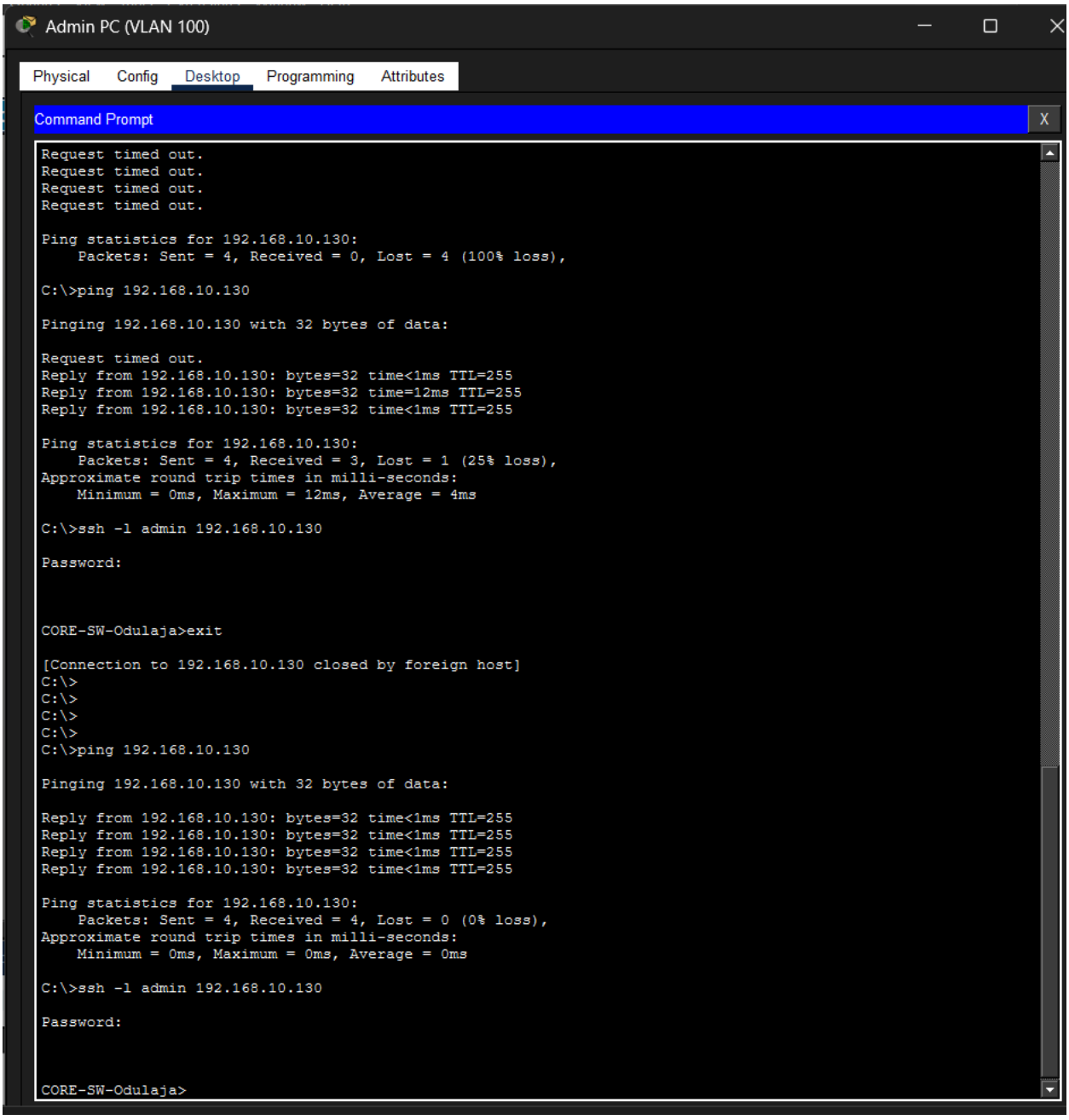
Label: Secure SSH Access Verification

Description: SSH was configured on CORE-SW-Odulaja for remote administrative access using domain branch.local and username admin. RSA keys were generated and SSH version 2 enabled.

CORE-SW-Odulaja SSH Configuration:



Admin PC SSH Login and Ping Test:

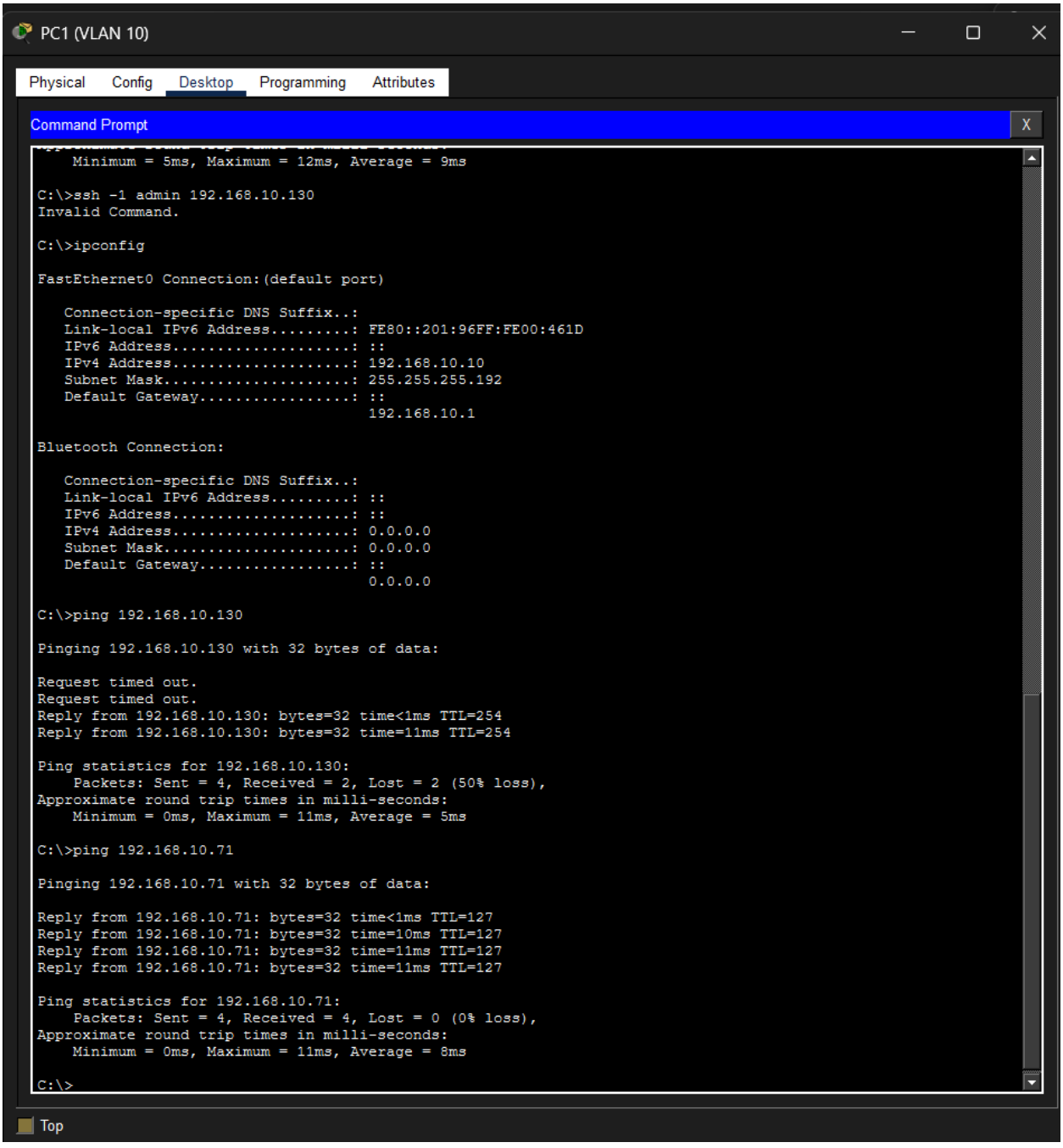


Part 7: Connectivity and Testing

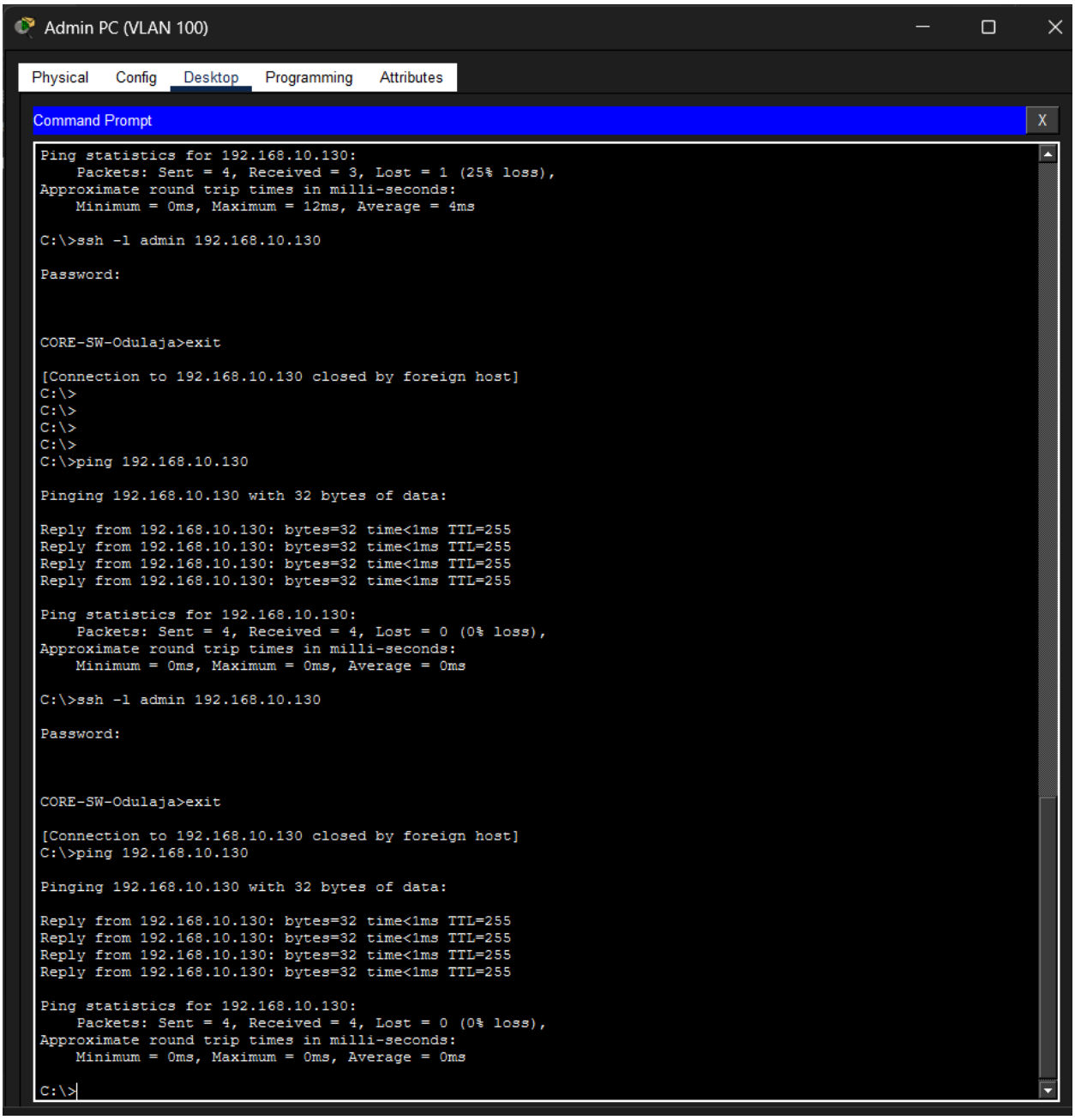
Label: Ping and Connectivity Tests

Description: Successful ping tests were conducted between PCs in different VLANs and between Admin PC and Core Switch to confirm inter-VLAN routing and management connectivity.

PC1 Ping Test:



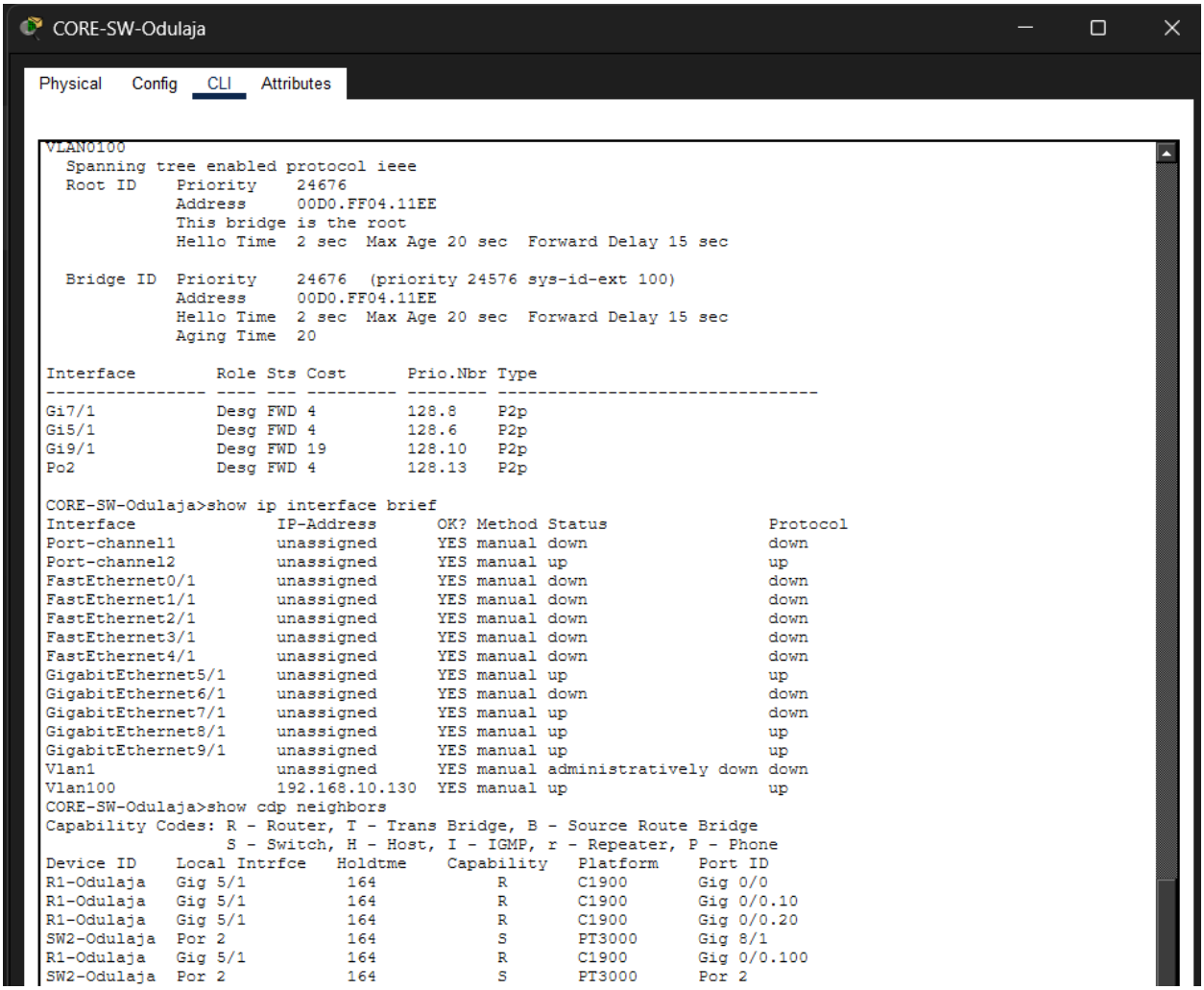
Admin PC Ping and SSH Verification:



Part 8: CDP Neighbor and Running Config Verification

Label: CDP Neighbor Discovery

Description: Cisco Discovery Protocol was used to verify device interconnections and identify connected interfaces.



Part 9: Summary and Conclusion

Summary:
This project successfully demonstrates VLAN segmentation, trunking, EtherChannel (LACP), STP redundancy, router-on-a-stick inter-VLAN routing, and SSH secure management. Each switch and router was configured according to best practices for redundancy, scalability, and security.

Key Achievements:

- VLANs 10, 20, and 100 implemented across three switches.
- LACP EtherChannel created between core and access switches.
- STP verified with distinct root bridges per VLAN.
- Router subinterfaces configured for inter-VLAN routing.
- SSH access enabled and verified from Admin PC.
- Full end-to-end connectivity achieved with redundancy and secure management.