Overview

This report presents a comprehensive walkthrough of the planning, configuration, and implementation of a complete enterprise network environment for Campbell & Starr Super Bread-makers. The network has been set up to support secure communications, centralized management, redundancy, automated IP assignment, and controlled user access. The solution was built using a virtualized environment to replicate real-world enterprise infrastructure.

Network Architecture Summary

- **Virtualization Tool:** Oracle VirtualBox
- **Network Mode:** Internal Network (CampbellStarrNet)
- **IP Scheme:** IPv4 - 192.168.100.0/24 (Main) and 192.168.200.0/24 (Backup)

Virtual Machines Configured:

- **DC01** – Windows Server 2022: AD DS, DNS, DHCP, File Server
- **DC02** – Windows Server 2022: Secondary Domain Controller, Redundancy
- **ClientPC01** – Windows 11 Pro: Domain-joined user workstation
- **ClientPC02** – Windows 11 Pro: Domain-joined user workstation

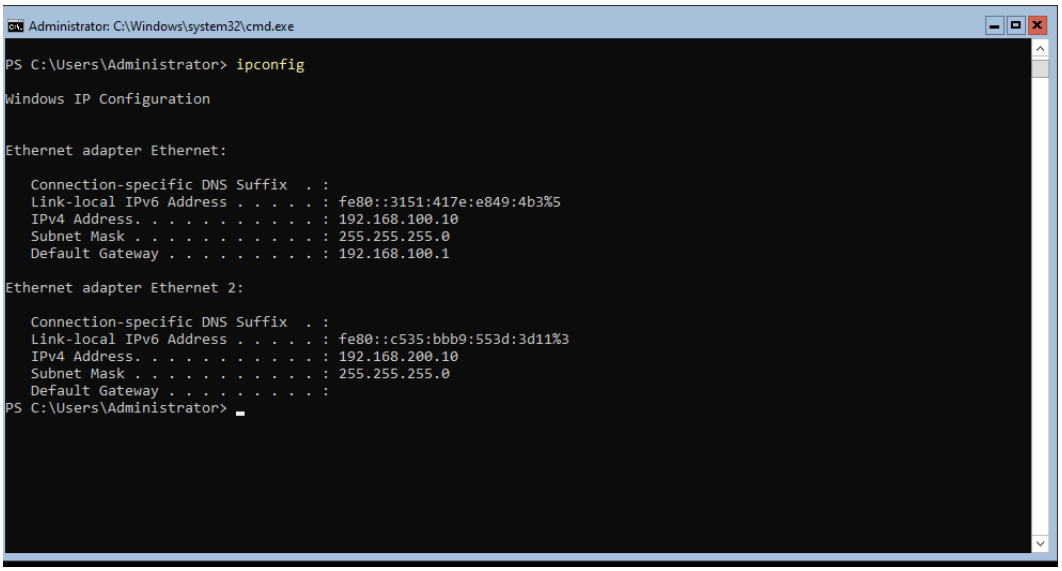
Each server and client was assigned appropriate RAM, hard disk, and system resources, and configured with static or dynamic IPs based on roles.

Configuration Steps Completed

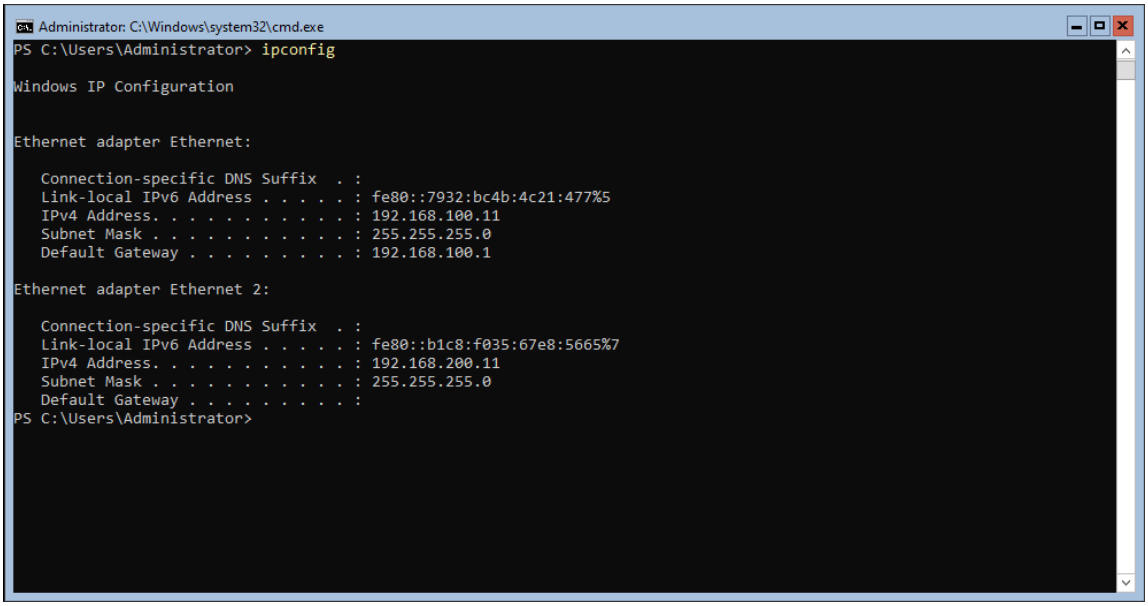
1. Network Connectivity

- Configured static IPs for DC01 and DC02.
- Enabled DHCP to dynamically assign IPs to client PCs.
- Verified successful pings using IP address and hostname resolution.

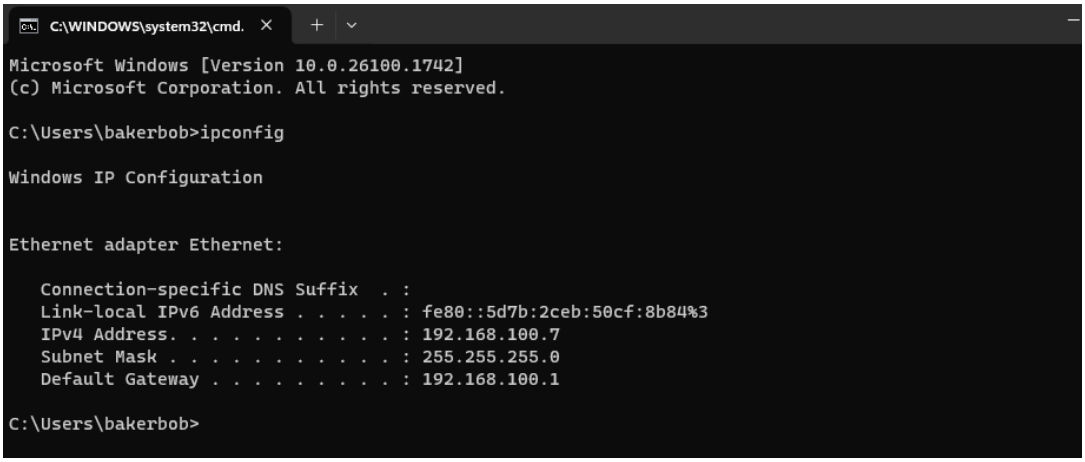
- Verified domain name resolution using nslookup.



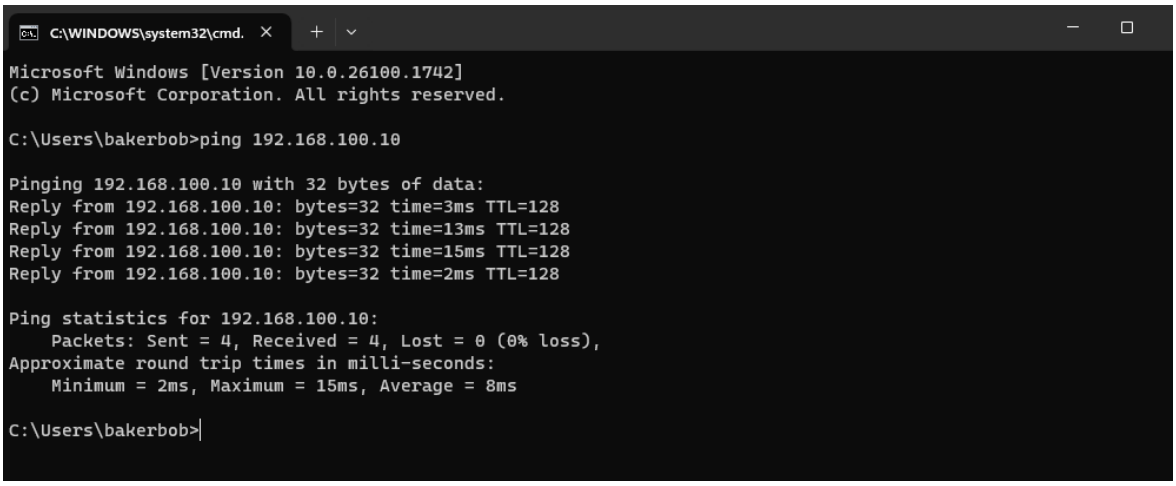
Static IP Configuration on DC01



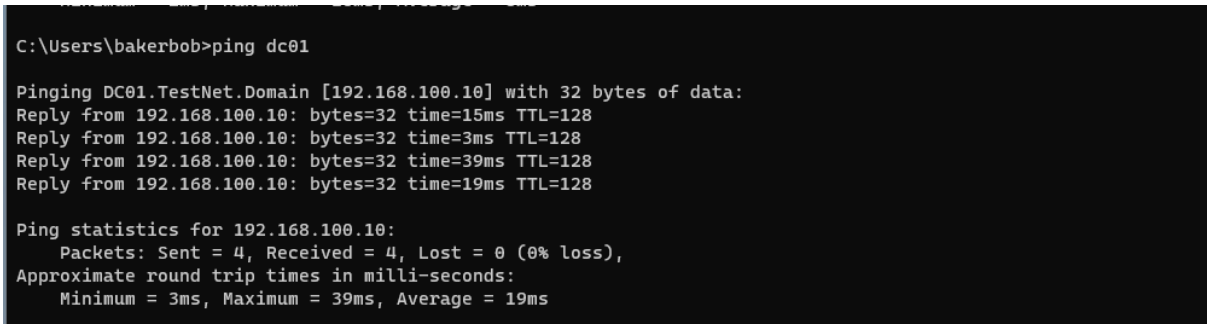
Static IP Configuration on DC02



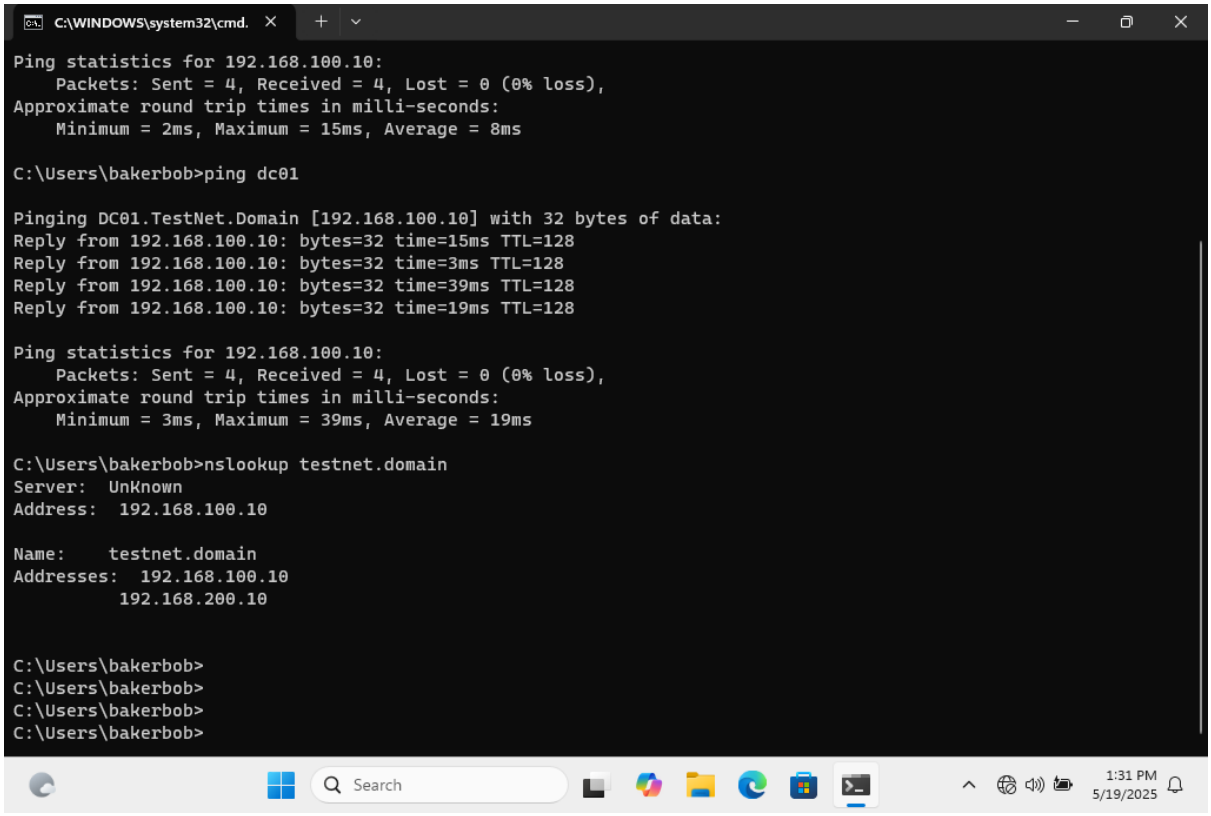
DHCP IP Assignment on ClientPC01 - Confirms client received IP in the DHCP range (e.g., 192.168.100.50–100)



Successful Ping from ClientPC01 to DC01 by IP - Tests direct IP connectivity between client and server.



Successful Ping from ClientPC01 to DC01 by Hostname - Tests NetBIOS/hostname resolution. Ensures DNS is resolving names correctly.



Domain Name Resolution Using nslookup - Validates DNS forward lookup from the client to the domain name.

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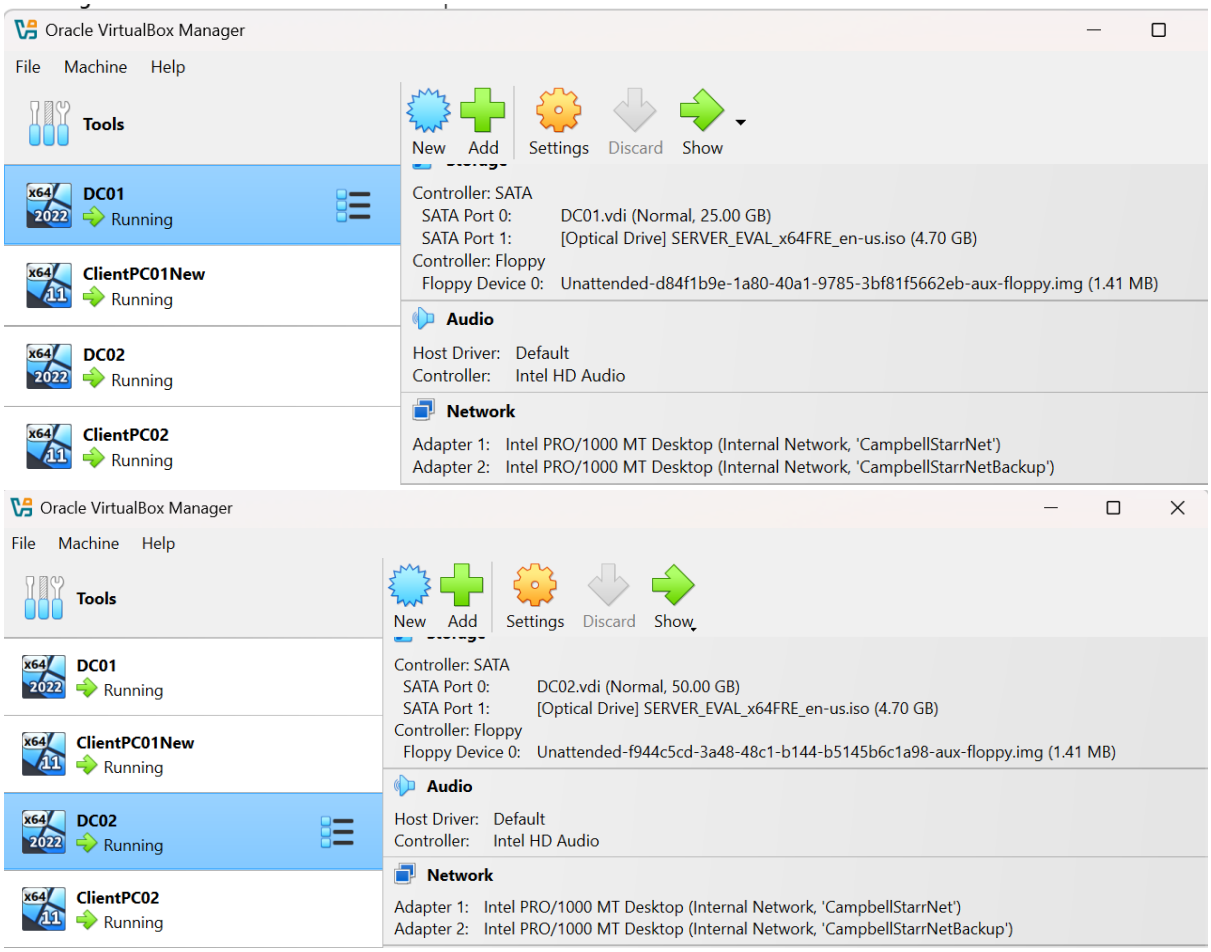
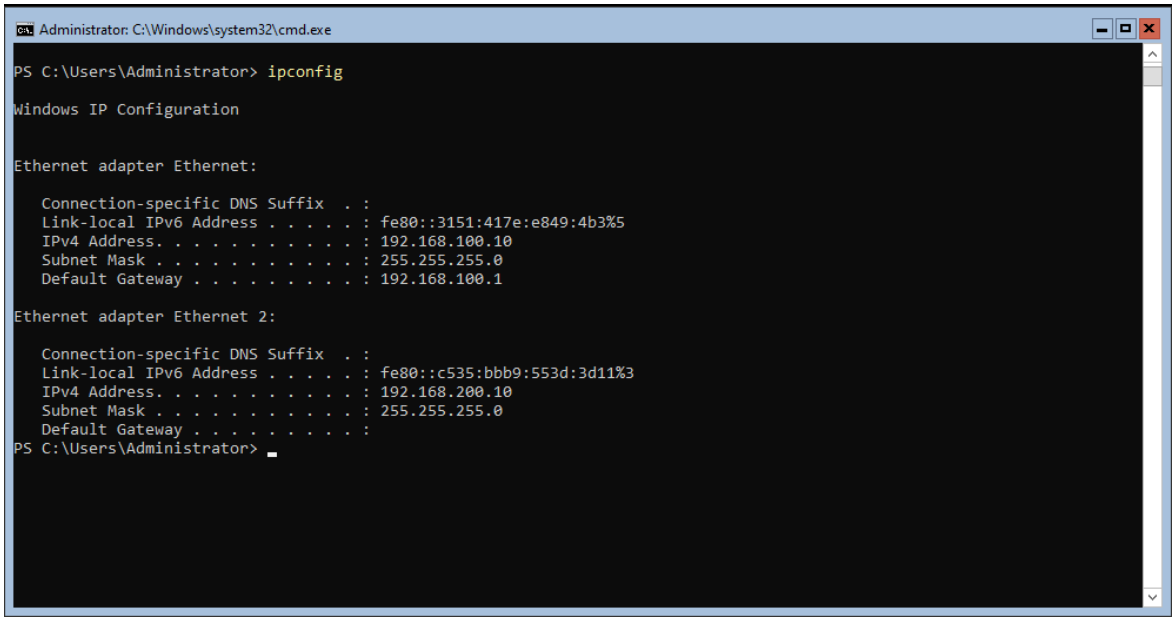
2. Redundancy Setup

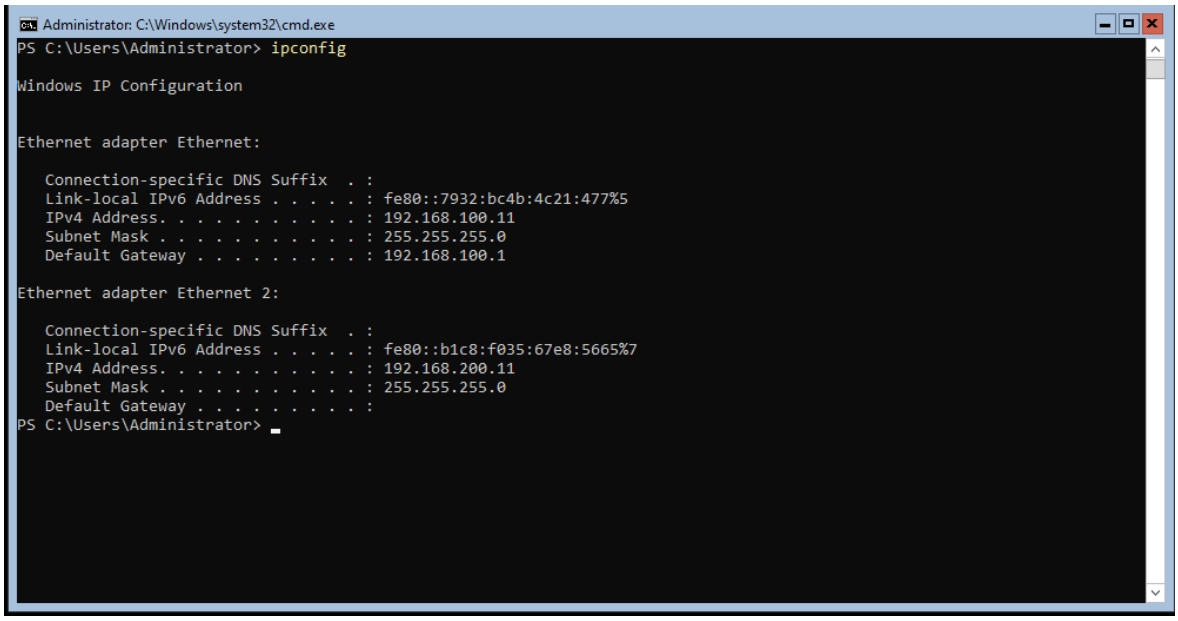
- Added a second network adapter to both domain controllers.
- Assigned IPs on the backup network (192.168.200.0/24).
- Ensured failover ping works if one adapter/network is down.
- Validated DNS and replication continued through backup network.



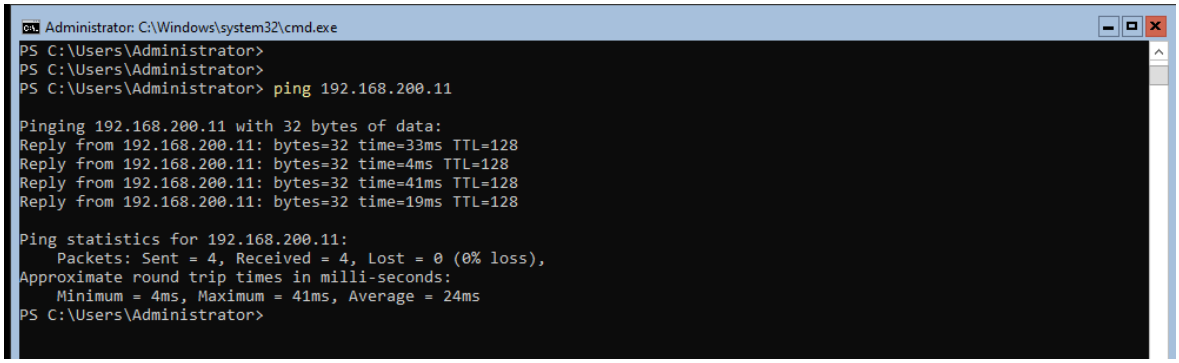
Confirms redundancy using dual NICs across separate internal networks.



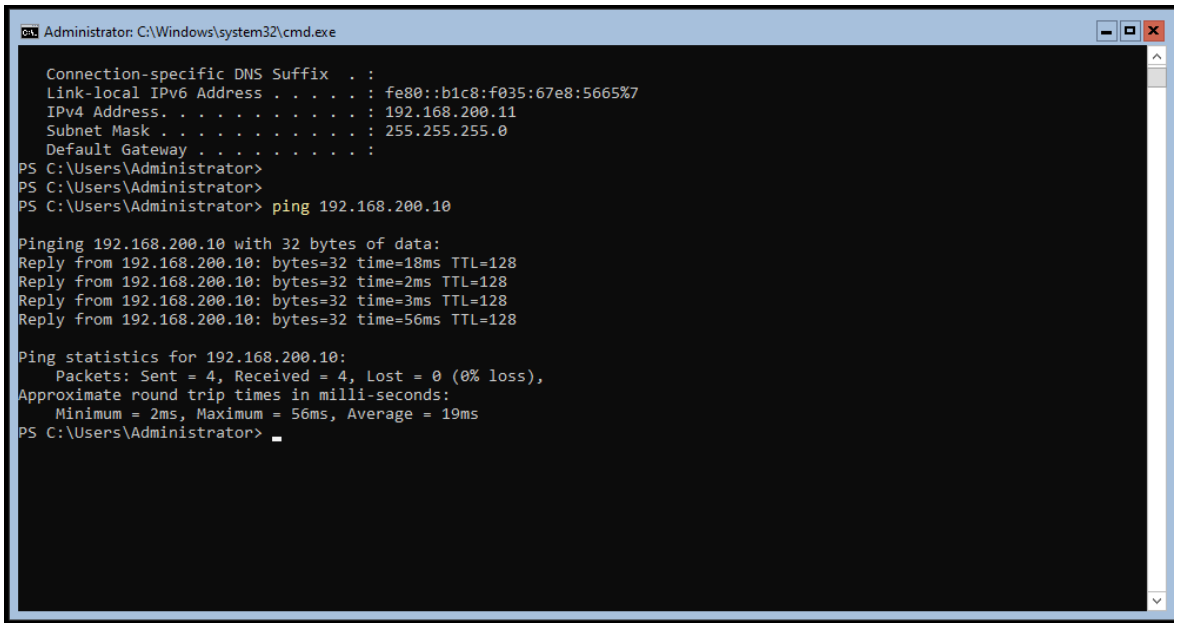
Static IP Configuration on Backup Network for DC01



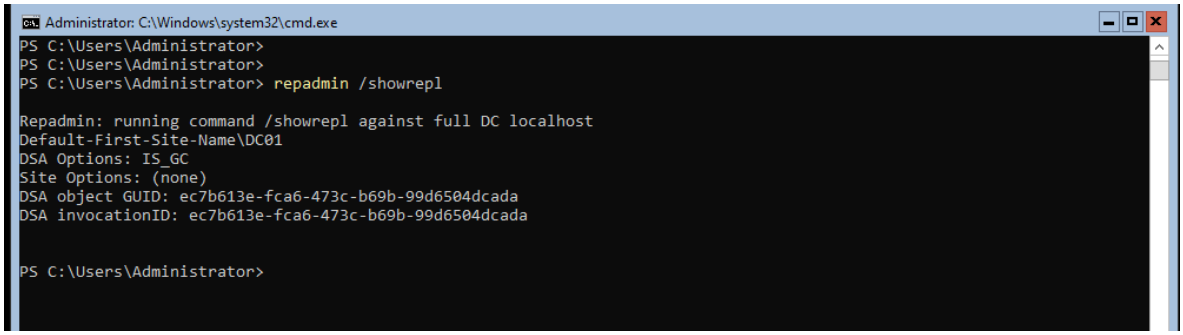
Static IP Configuration on Backup Network for DC02



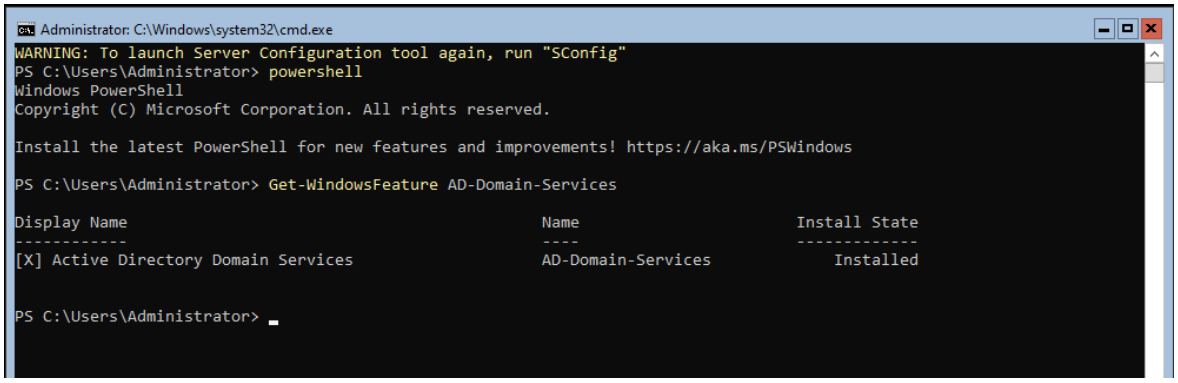
Ping from DC01 to DC02 via Backup IP - Confirms network failover link works between DCs via backup adapter.



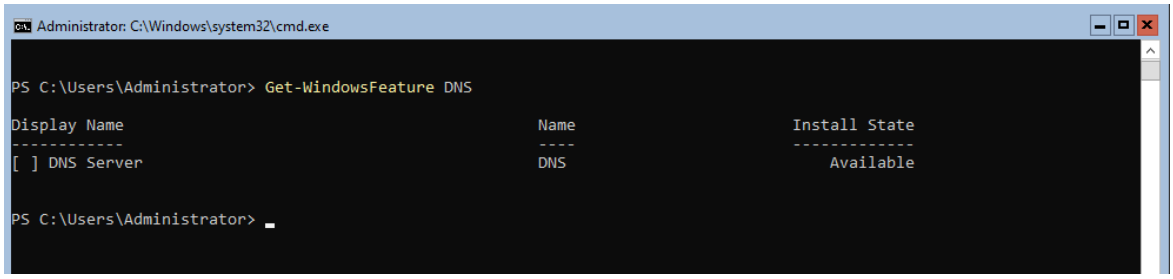
Ping from DC02 to DC01 via Backup IP - Validates return connectivity on redundant path.



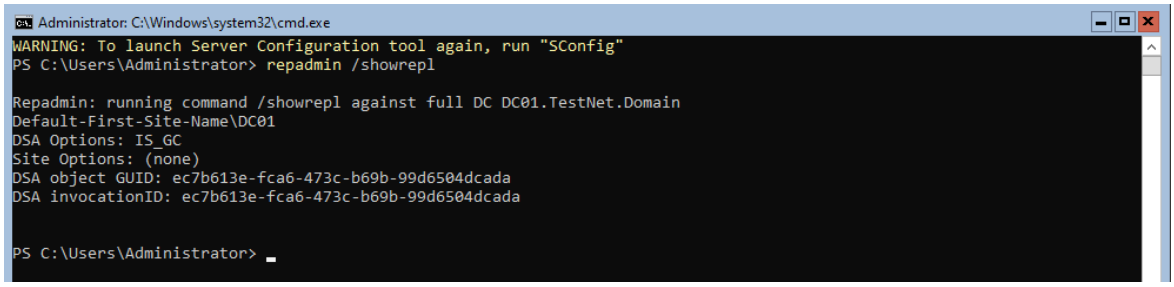
Replication Still Functional - Ensures AD replication is still occurring through any network available.



Active Directory Domain Services role installed on DC02.



DNS role installed on DC02 for redundancy.



Validated DNS and replication continued through backup network

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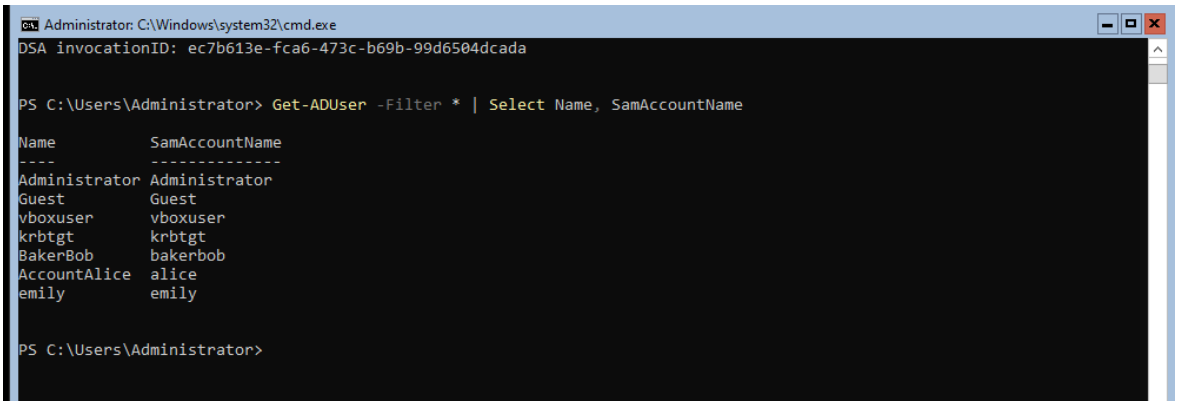
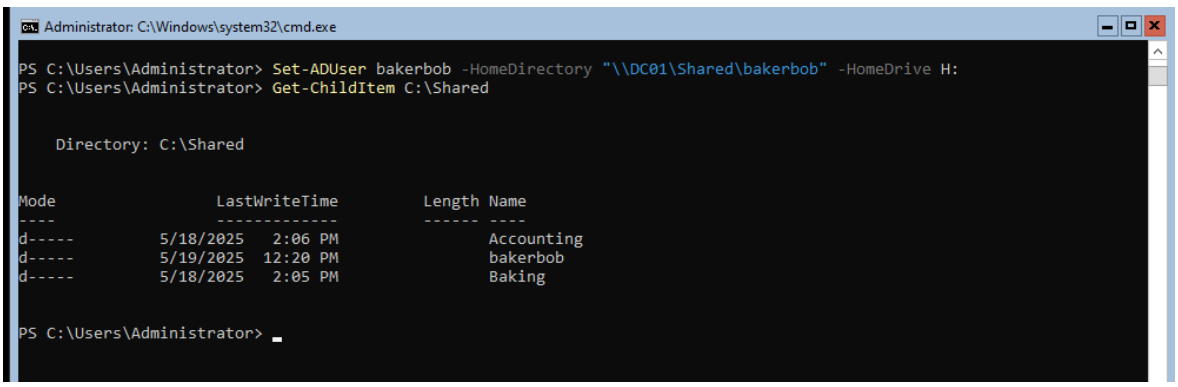
3. User Creation & Automation

- Created users using PowerShell (bakerbob, emily).
- Used Set-ADUser to assign home directories.
- Simulated user-based access and login.
- Group Policy automation was planned but not implemented due to time.

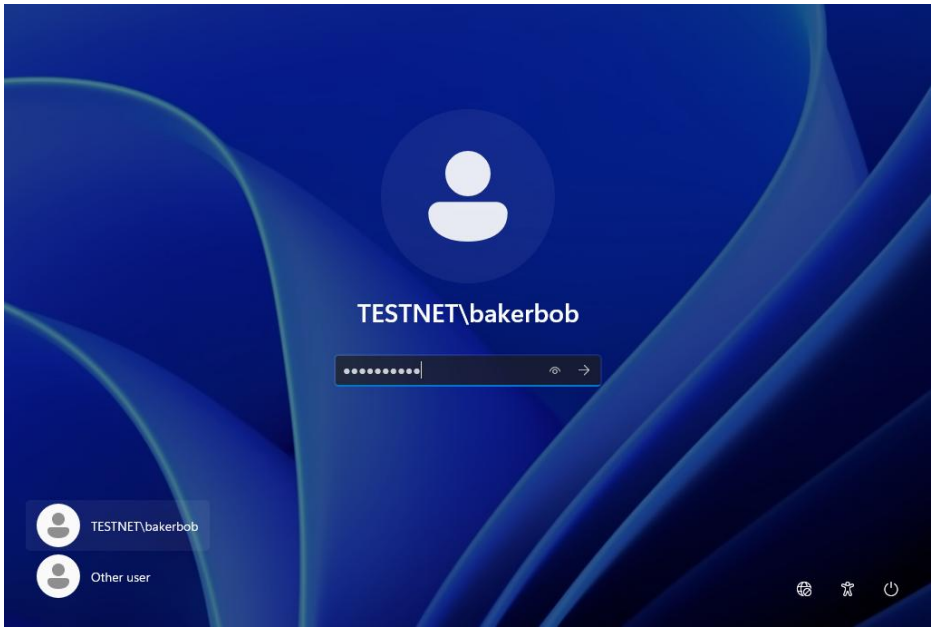


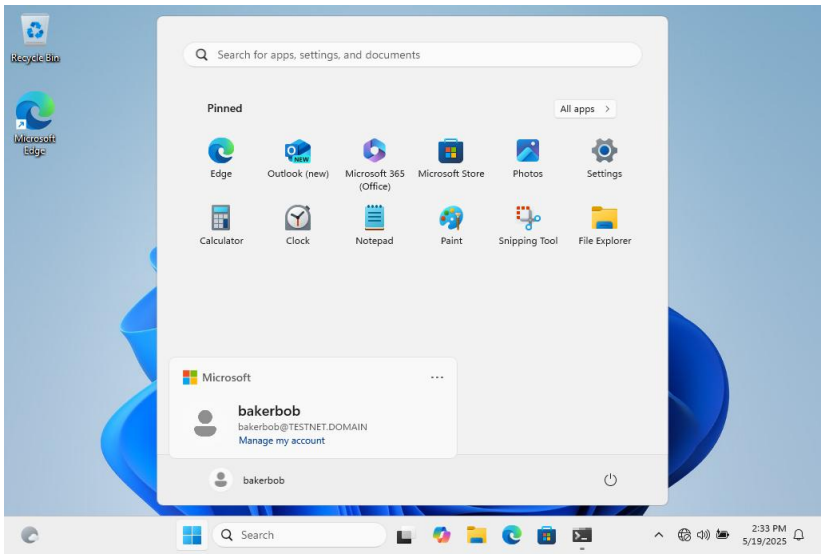
PowerShell Output: Users Created (bakerbob, emily) - Shows bakerbob and emily were created in Active Directory.

Assign Home Directory using Set-ADUser - Demonstrates understanding of user home directory mapping (even though the folder isn't auto-created).

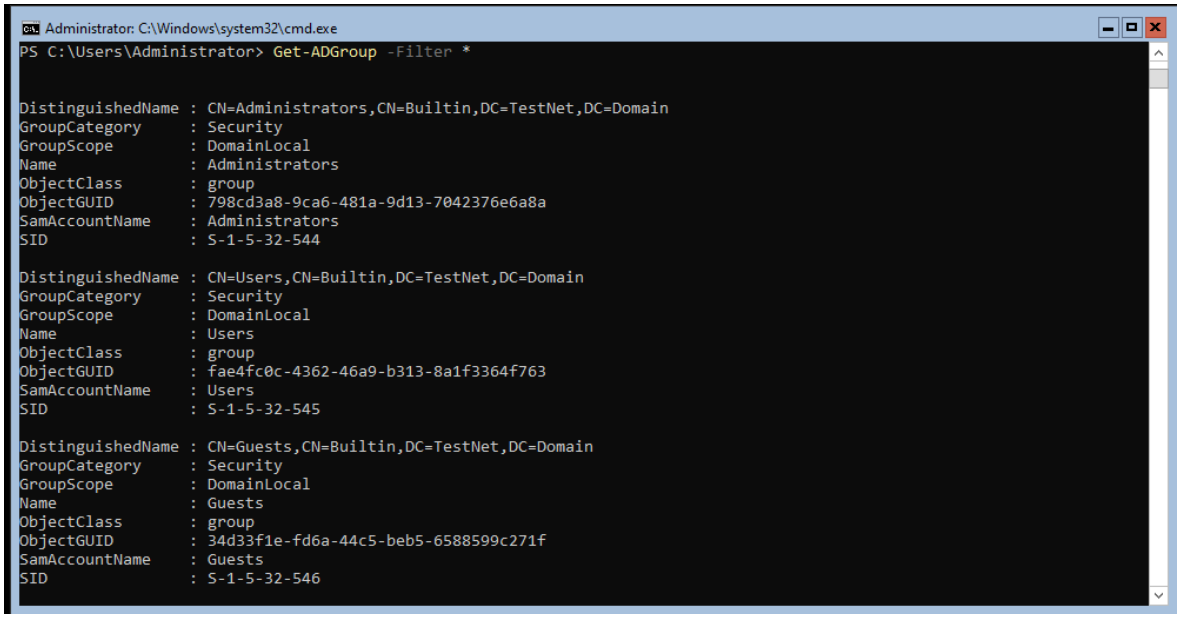


Verify Folder Path Exists - Confirm that the home directory path like C:\Shared\bakerbob exists for the user.





Domain Login as User - Desktop after login or the login screen showing domain user. Confirms successful domain user login simulation.



Group Creation - Shows user groups if you added ones like Accounting, Baking, etc.

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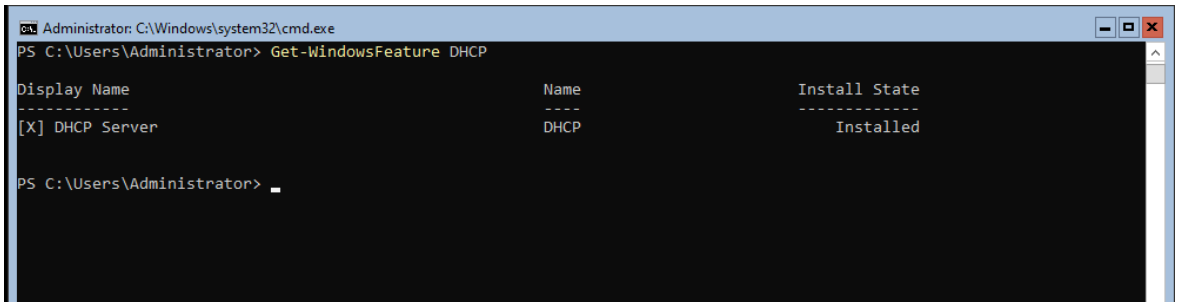
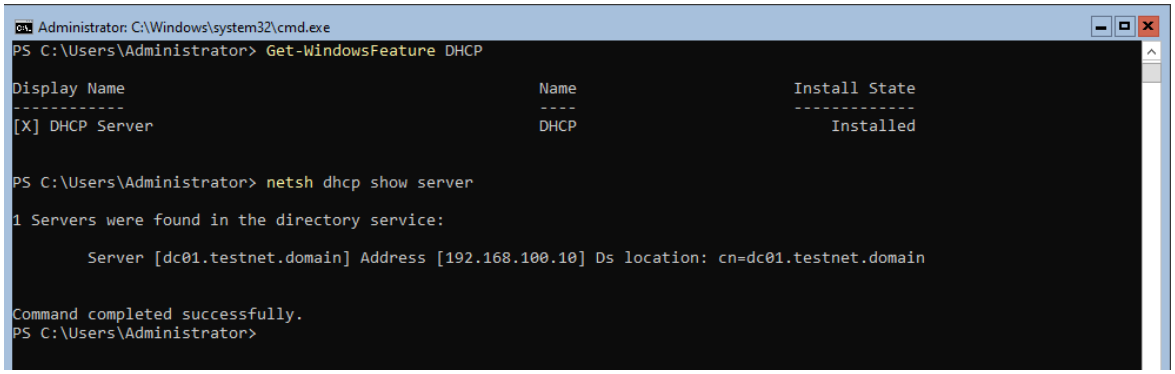
4. DHCP Configuration

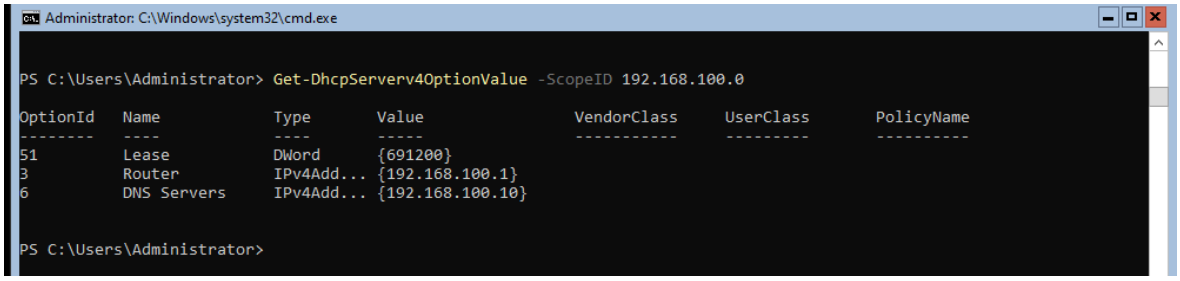
- Installed DHCP role on DC01.
- Configured scope: 192.168.100.50 – 192.168.100.100.
- Defined exclusions and set DNS/Gateway options.
- Clients confirmed to receive correct IP addresses from DHCP.



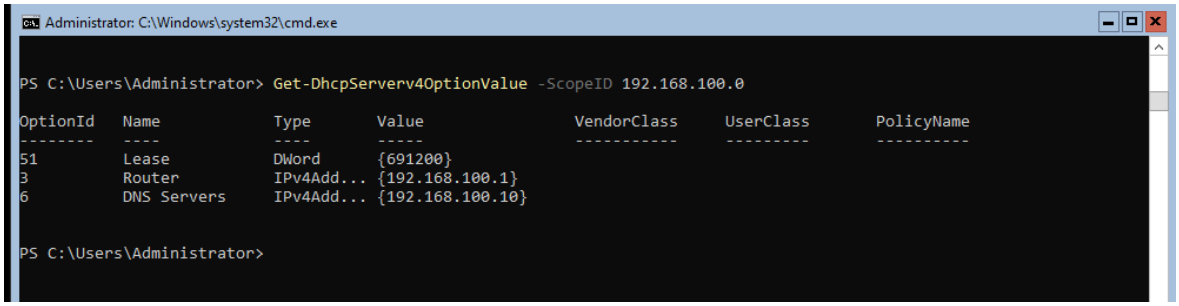
DHCP Role Installed on DC01 - Shows [X] DHCP is installed and active on DC01.



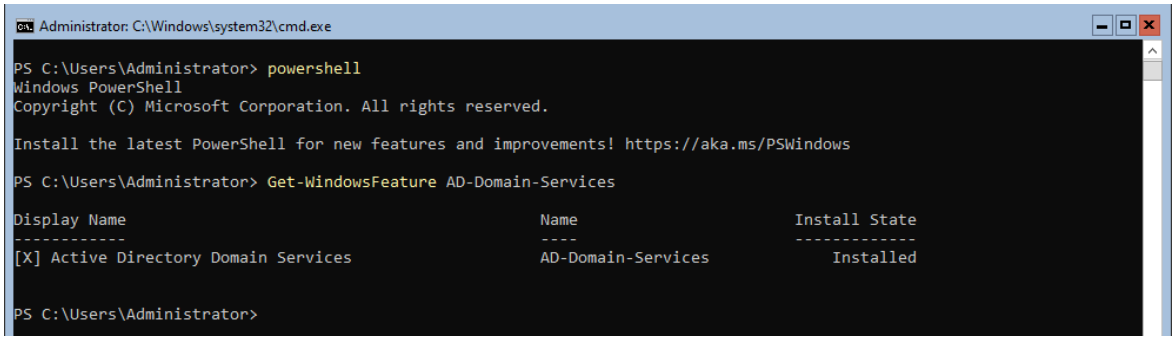
Authorized DHCP Server - Confirms DC01 is authorized to issue DHCP leases within the domain.



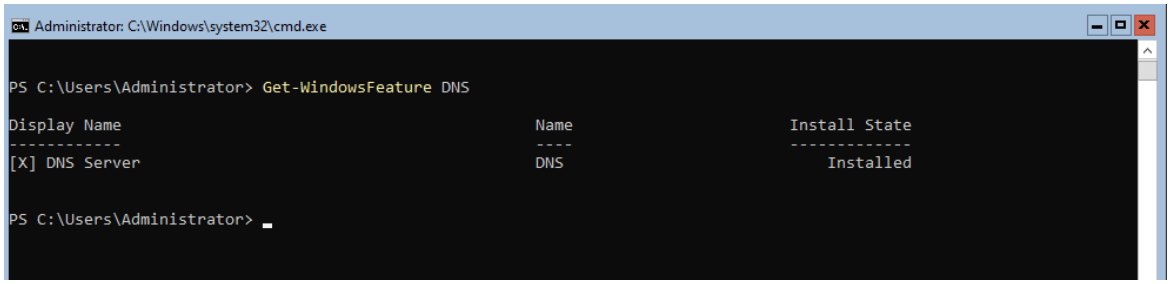
DHCP Scope Configured - Shows scope with range 192.168.100.50 – 192.168.100.100.



DHCP Options Set (DNS, Gateway) - Verifies DNS server (192.168.100.10) and router (192.168.100.1) were configured correctly.



Active Directory Domain Services role successfully installed on DC01.



DNS Server role installed and working on DC01.

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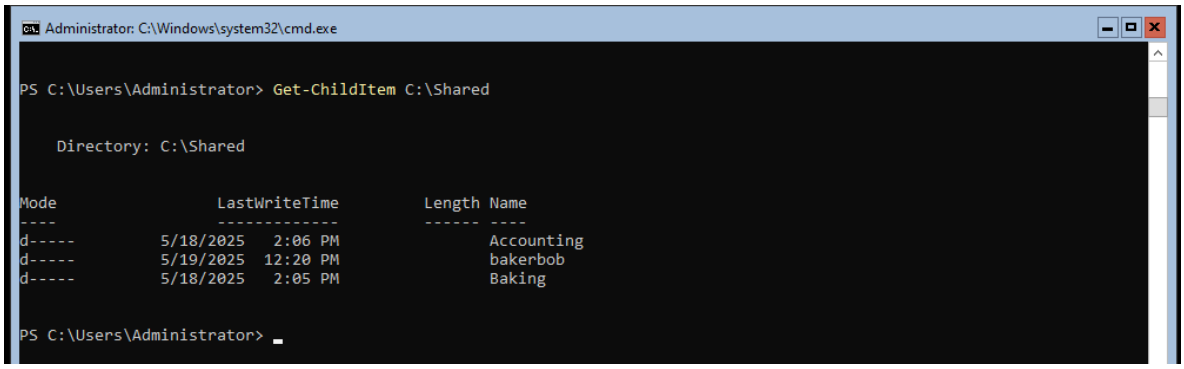
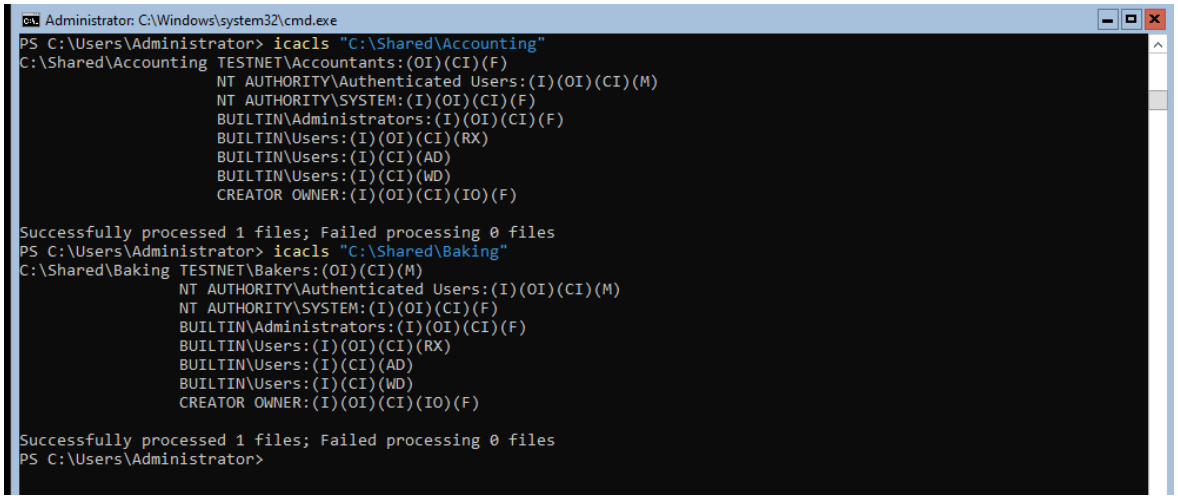
5. NTFS Security

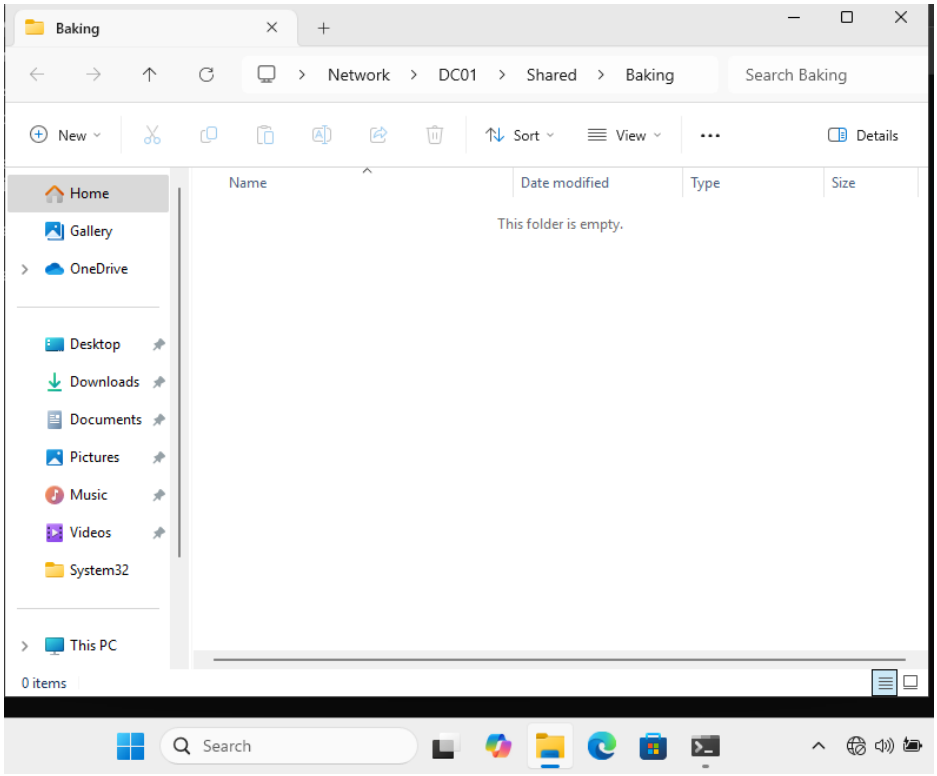
- Created a shared folder structure at C:\Shared.
- Subfolders: \Accounting, \Baking created for different departments.
- NTFS permissions applied using icacls, allowing restricted access to groups.
- Shared folder access tested from clients.



Shared Folder Structure Created - Confirms that department folders were created successfully.



NTFS Permissions Using icacls - Shows access control list applied to folders, e.g., TestNet\Accounting has Modify rights.



ClientPC Access Test - ClientPC01 successfully accessed the domain-shared folder \\DC01\Shared\Baking, verifying both network sharing and NTFS permission setup.

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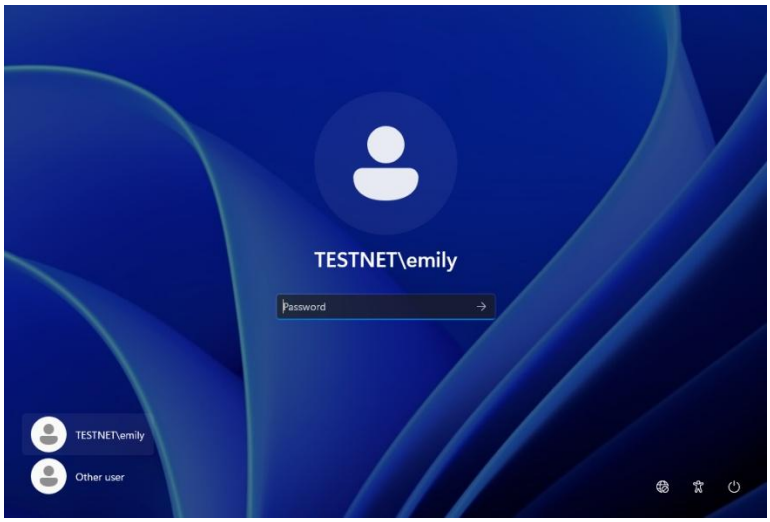
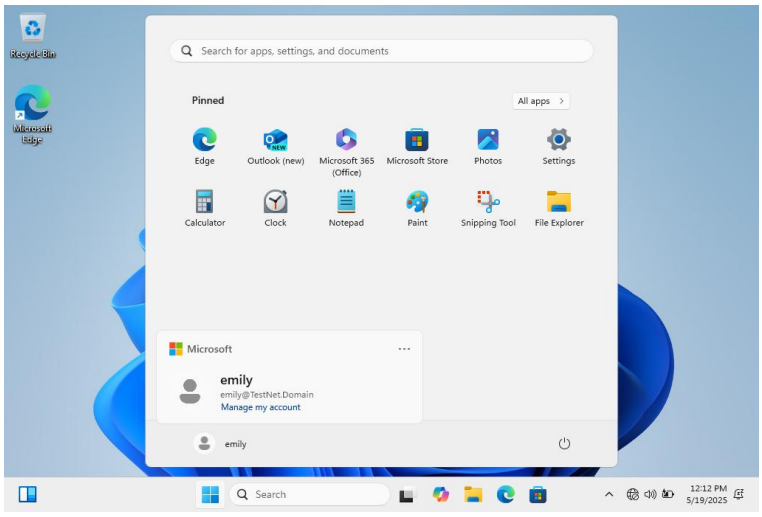
6. Credential Usage

- Avoided using default Administrator account.
- Domain logins were performed using created users like emily.
- Login verification confirmed user profile creation and access to shares.

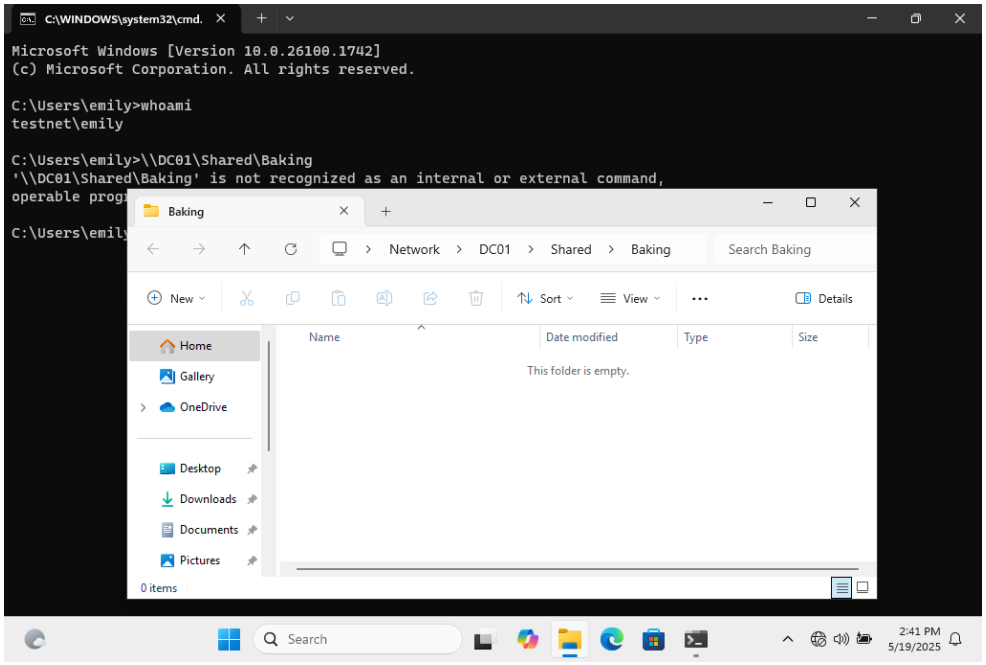




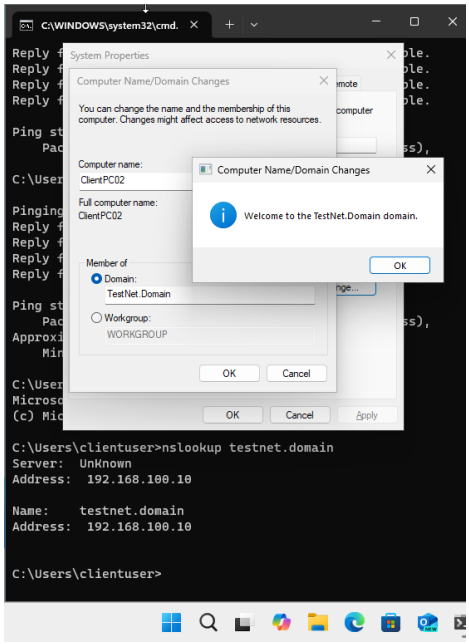
Domain Login as Emily on ClientPC01 - User emily successfully logged into ClientPC01 as a domain user, confirming credential use without the default administrator.

Command Prompt Showing User Context - Displays that the logged-in domain user is

testnet\emily, verifying proper credential usage without relying on built-in admin accounts.



Accessing Shared Folder as Emily - Domain user emily accessed shared folder \\DC01\Shared\Baking, confirming user-specific permissions and role-based access.



ClientPC successfully joined to TestNet.Domain. This is a critical screenshot showing the domain join confirmation.

Problems Faced and Resolutions

- **DNS Unreachable from Clients:** Clients initially failed to join the domain. Fixed by manually setting DNS to DC01's IP using PowerShell.
- **AD Web Services Errors:** Encountered issues retrieving user lists; solved by restarting services and creating users with fallback commands.
- **Network Adapter Conflicts:** Certain pings failed when multiple adapters were misconfigured. Fixed by verifying MAC address uniqueness and adapter order.
- **Folder Access Errors:** NTFS permissions were too restrictive at first; resolved with icacls adjustments to allow specific group access.

Conclusion

The network infrastructure successfully replicates a real-world enterprise environment. It supports centralized administration, DHCP IP allocation, user authentication, and controlled file access. By configuring redundancy and verifying client-server communications, this project ensures high availability and reliability for business operations.