06

CNW - CLOUD NETWORKING

Network Load Balancing and IIS Configuration on Windows Server 2019

Building a two-node Multicast NLB cluster behind an Active Directory forest, validated through a shared cluster VIP

COURSE
CNW - Cloud Networking

DATE
19th June 2025

ENVIRONMENT
Windows Server 2019 (two VMs: cjrichard-M3server2019a and cjrichard-M3server2019b)

PAGES (REPORT)
35

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ORGANIZATION
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TECHNICAL BRIEF · EXECUTIVE SUMMARY

Network Load Balancing and IIS Configuration on Windows Server 2019

For this Milestone 3 lab I stood up a two-node Windows Server 2019 Network Load Balancing (NLB) cluster fronting IIS, running on QEMU/KVM virtual machines accessed through the Full Sail noVNC console (itlab.fsemergingtech.com). I renamed the hosts NLB-SERVER1 and NLB-SERVER2, gave each two NICs (a management interface and a dedicated NLB interface) with static addressing in the 192.168.50.0/24 subnet, then installed IIS and the NLB feature via PowerShell. I promoted NLB-SERVER1 to a domain controller, creating the FullSailNLB.Local forest, and joined NLB-SERVER2 to that domain. I then built a Multicast NLB cluster on the virtual IP 192.168.50.200 (full internet name www.nlbcluster.com), added both hosts, and deployed a distinct index.html on each node. Hitting the cluster VIP from a browser served the load-balanced web content, confirming the cluster and IIS were operational across both members.

▸ Objectives

- Deploy two Windows Server 2019 hosts and prepare them for clustering by renaming them NLB-SERVER1 and NLB-SERVER2
- Configure dual network adapters per server (a management NIC and a dedicated NLB NIC) with static IP addressing in the 192.168.50.0/24 subnet
- Install the IIS Web Server role and the Network Load Balancing feature on both nodes via PowerShell
- Establish an Active Directory environment by promoting NLB-SERVER1 to a domain controller (FullSailNLB.Local forest) and joining NLB-SERVER2
- Create and configure a Multicast NLB cluster on virtual IP 192.168.50.200 with both servers as hosts
- Validate the deployment by serving distinct IIS content from each node and reaching it through the shared cluster VIP

▸ Environment

```
Windows Server 2019 (two VMs: cjrichard-M3server2019a and cjrichard-M3server2019b)
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QEMU/KVM virtualization accessed via the noVNC web console at itlab.fsemergingtech.com (Proxmox-style KVM management)
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```
Private lab subnet 192.168.50.0/24 (mask 255.255.255.0, gateway 192.168.50.1)
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Active Directory forest FullSailNLB.Local (NetBIOS domain NLB)
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WALKTHROUGH & EVIDENCE

For Milestone 3 I stood up a two-node Windows Server 2019 Network Load Balancing cluster fronting IIS, running on QEMU/KVM virtual machines through Full Sail's noVNC console. Each host got dual NICs and static addressing in the 192.168.50.0/24 subnet, an Active Directory forest (FullSailNLB.Local) tying the nodes together, and a Multicast NLB cluster on virtual IP 192.168.50.200. The walkthrough below traces the build end to end: host prep, network and role configuration, domain join, cluster creation, and validation of load-balanced IIS content through the shared cluster VIP.

SETUP

Renaming the Cluster Hosts

Each Windows Server 2019 VM was renamed through sysdm.cpl to give the cluster predictable host identities before any networking or roles were applied.

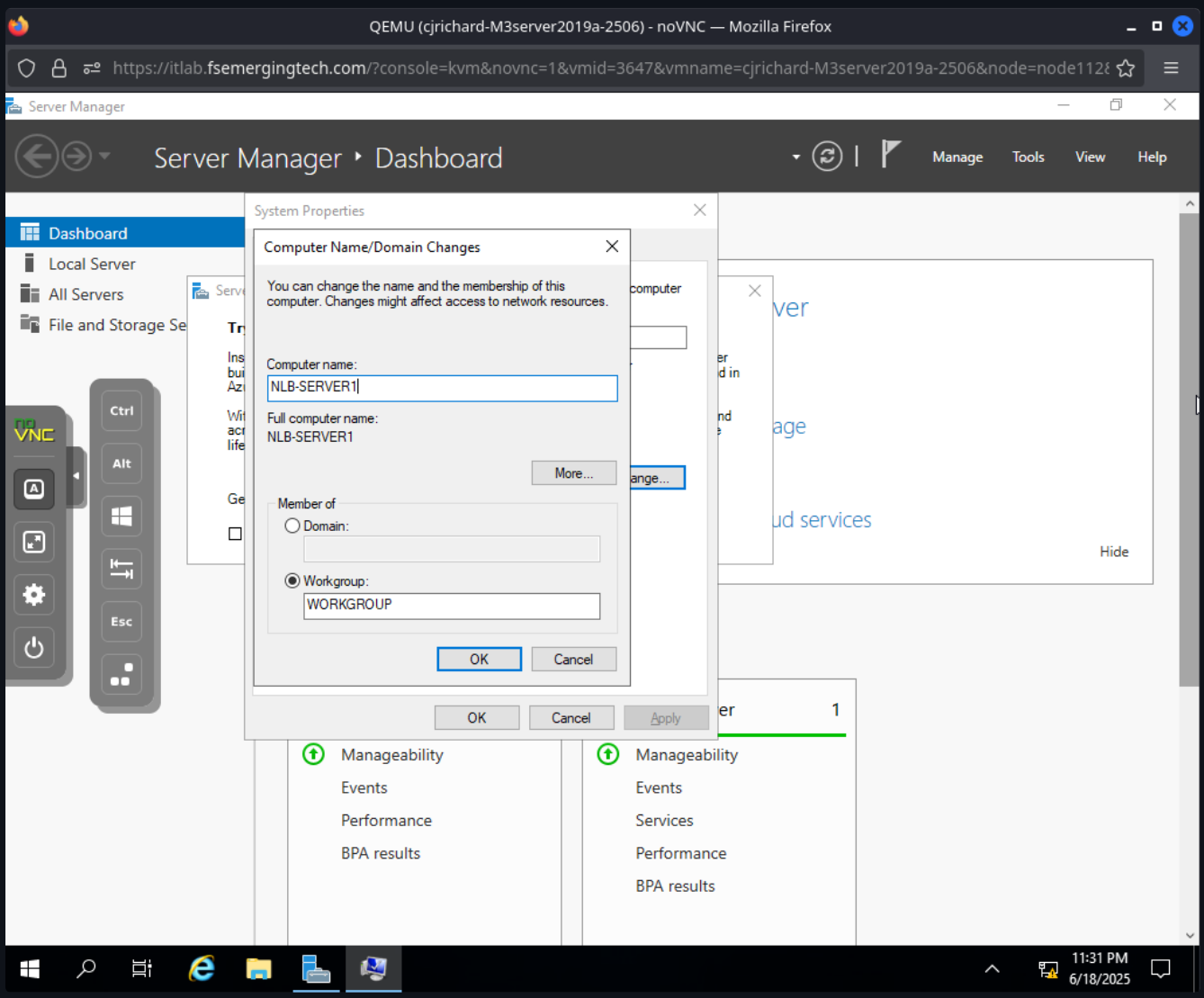

FIG 01 — System Properties on the first node, setting the computer name to NLB-SERVER1 while still in the WORKGROUP. Console runs in the Full Sail noVNC session (itlab.fsemergingtech.com) against VM cjrichard-M3server2019a.

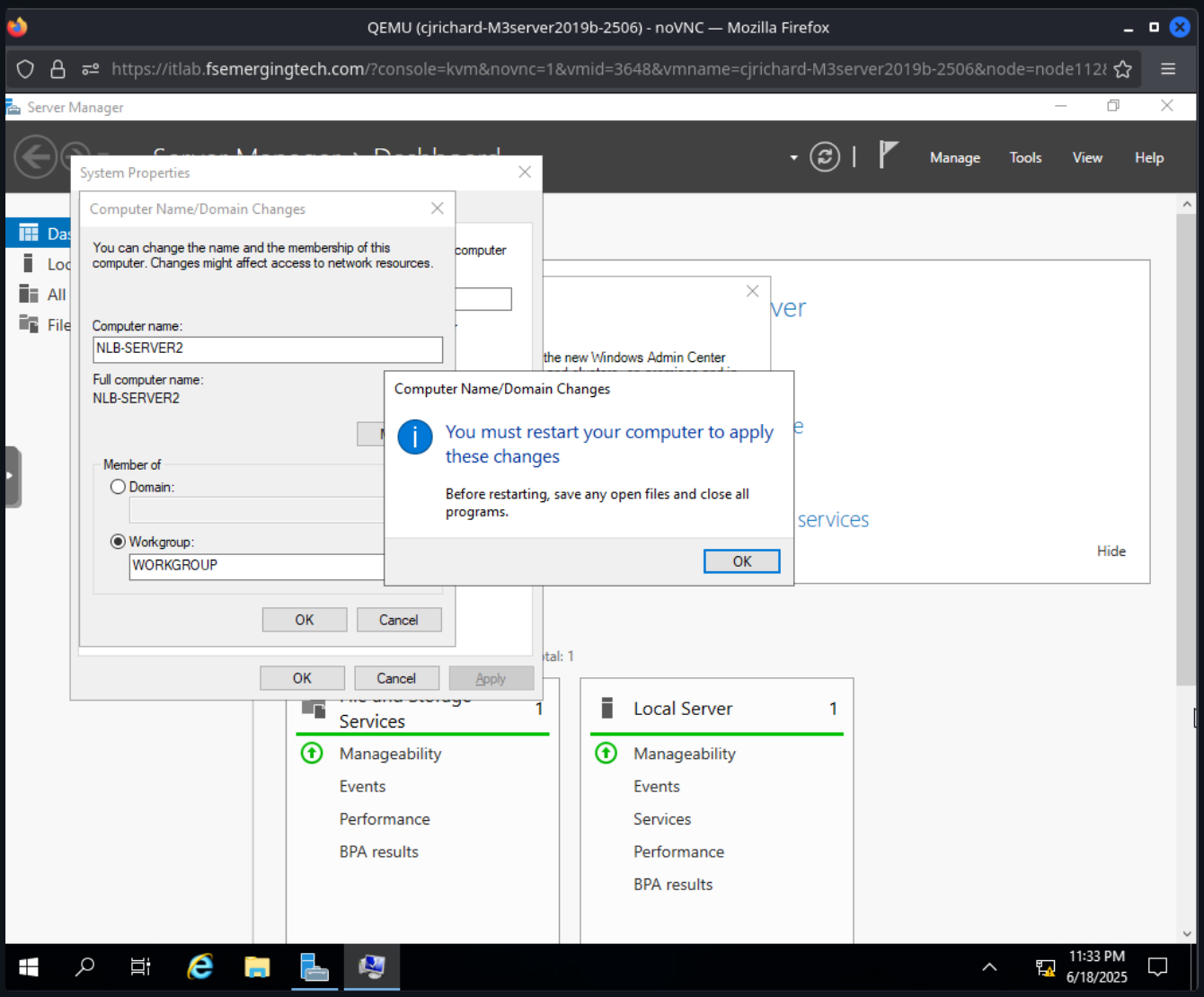

FIG 02 — The second node renamed to NLB-SERVER2, with Windows prompting for a restart to apply the change. VM cjrichard-M3server2019b, still in WORKGROUP at this stage.

NETWORKING

Server 1 - Dual NIC Layout and Management IP

NLB-SERVER1 was given two adapters - NIC1-Mgmt for management and NIC2-NLB dedicated to load balancing - with static IPv4 addressing in 192.168.50.0/24.

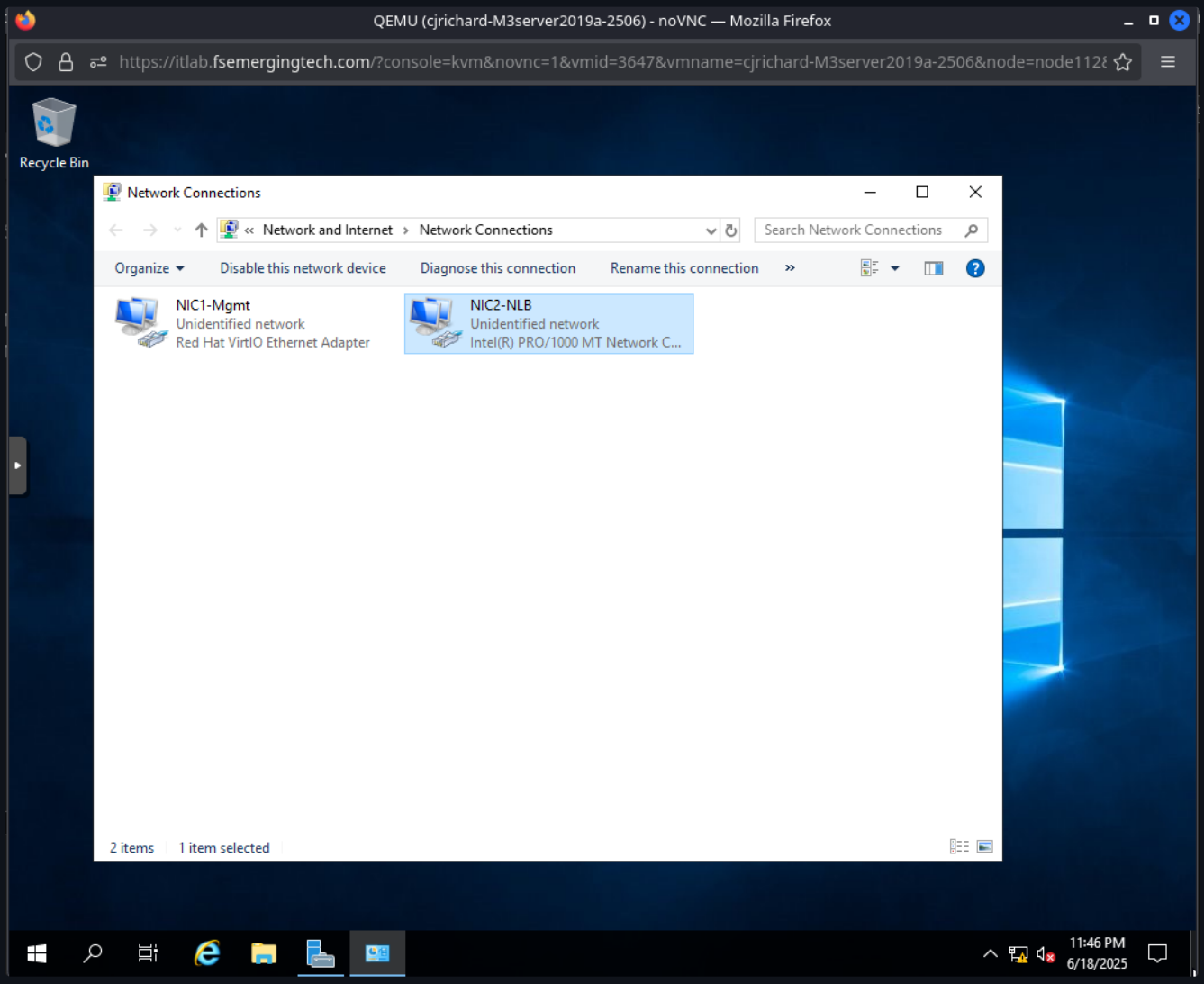

FIG 03 — Network Connections on NLB-SERVER1 showing the two renamed adapters: NIC1-Mgmt (Red Hat VirtIO Ethernet) and NIC2-NLB (Intel PRO/1000 MT).

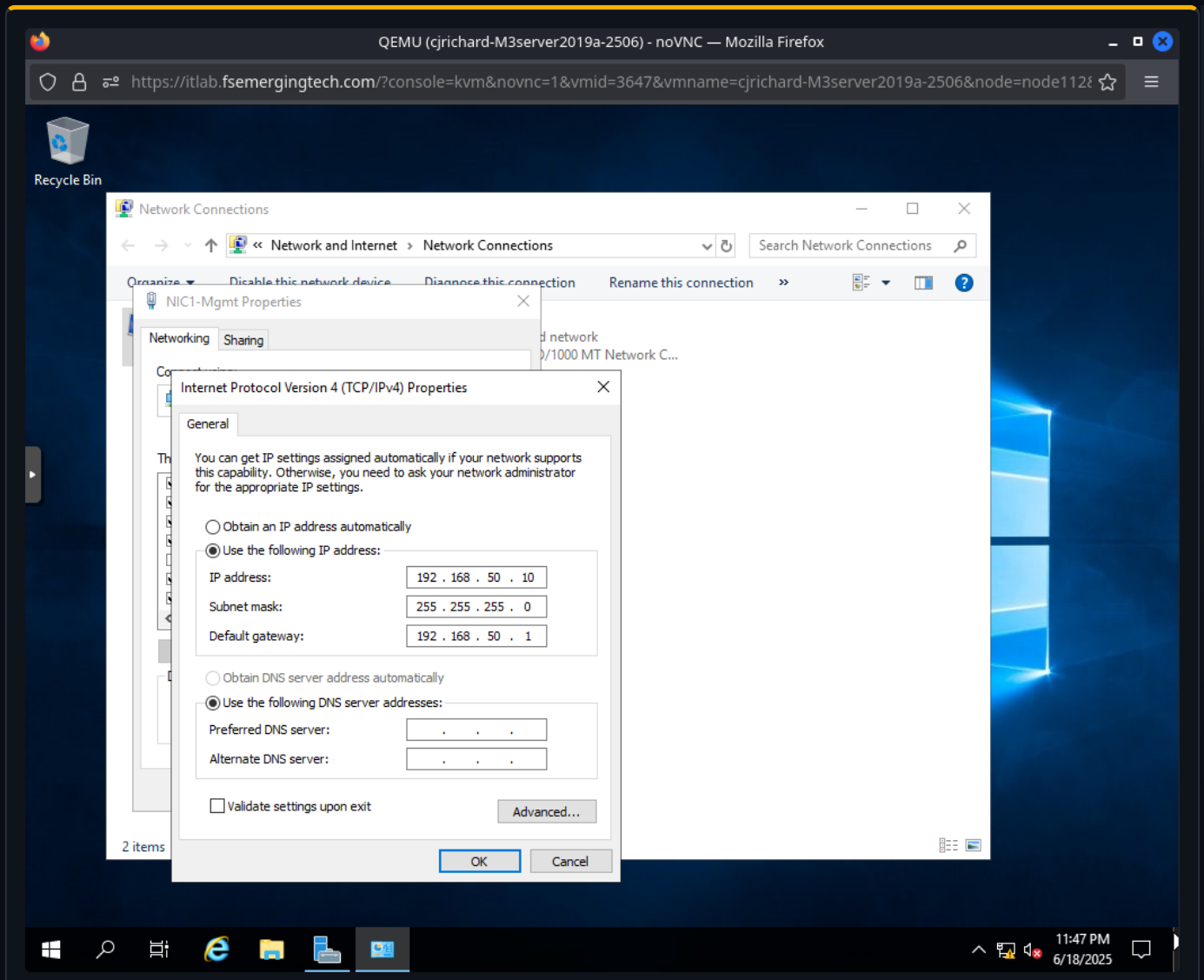

FIG 04 — NIC1-Mgmt configured with static IP 192.168.50.10, mask 255.255.255.0, gateway 192.168.50.1 - the management interface for Server 1.

NETWORKING

Server 1 - Dedicated NLB Interface

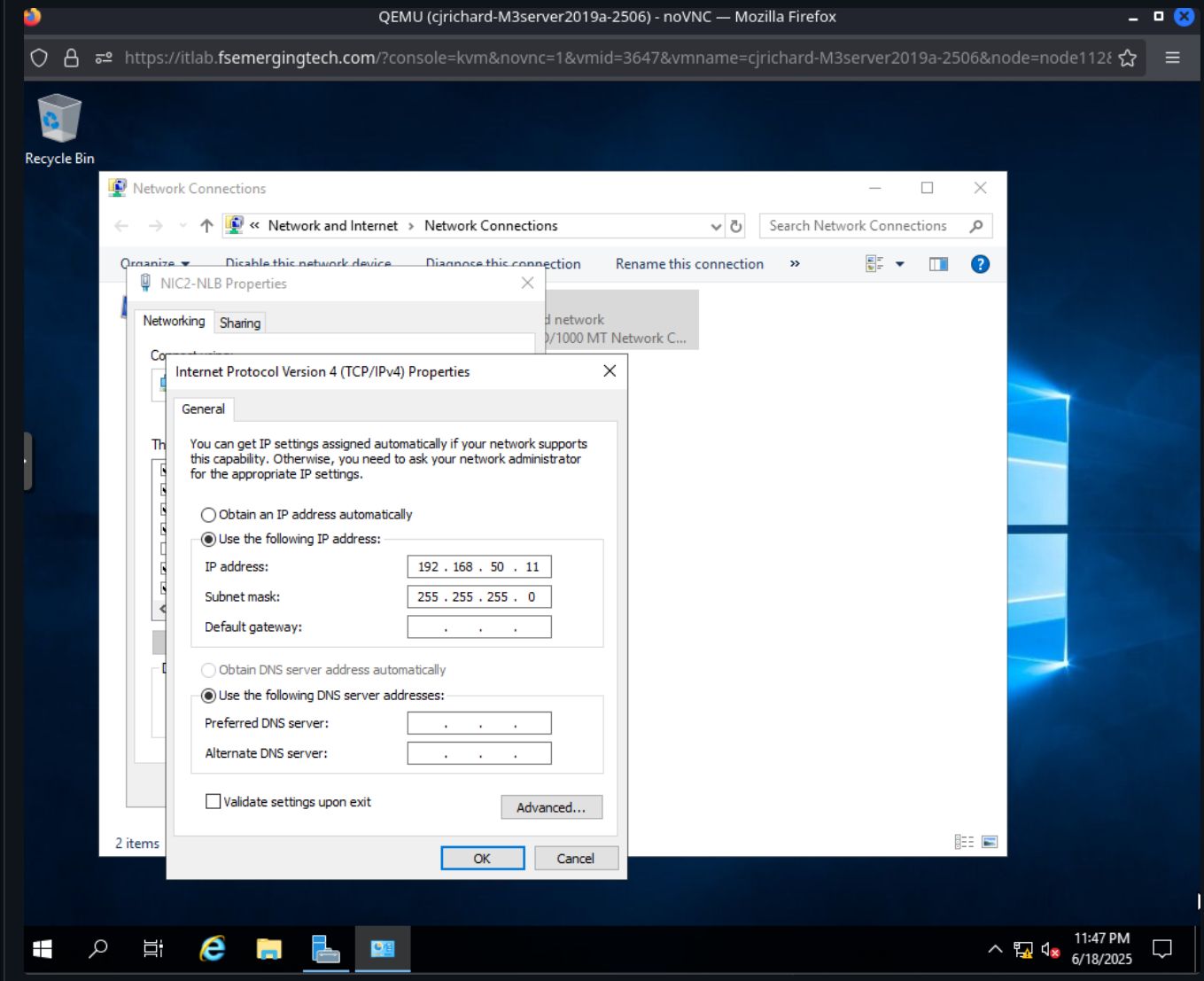

FIG 05 — NIC2-NLB on Server 1 set to 192.168.50.11 / 255.255.255.0 with the default gateway intentionally left blank, isolating the load-balancing interface from the management path.

NETWORKING

Server 2 - Dual NIC Layout and Management IP

The same dual-NIC scheme was mirrored on NLB-SERVER2, with addresses shifted to .12 and .13.

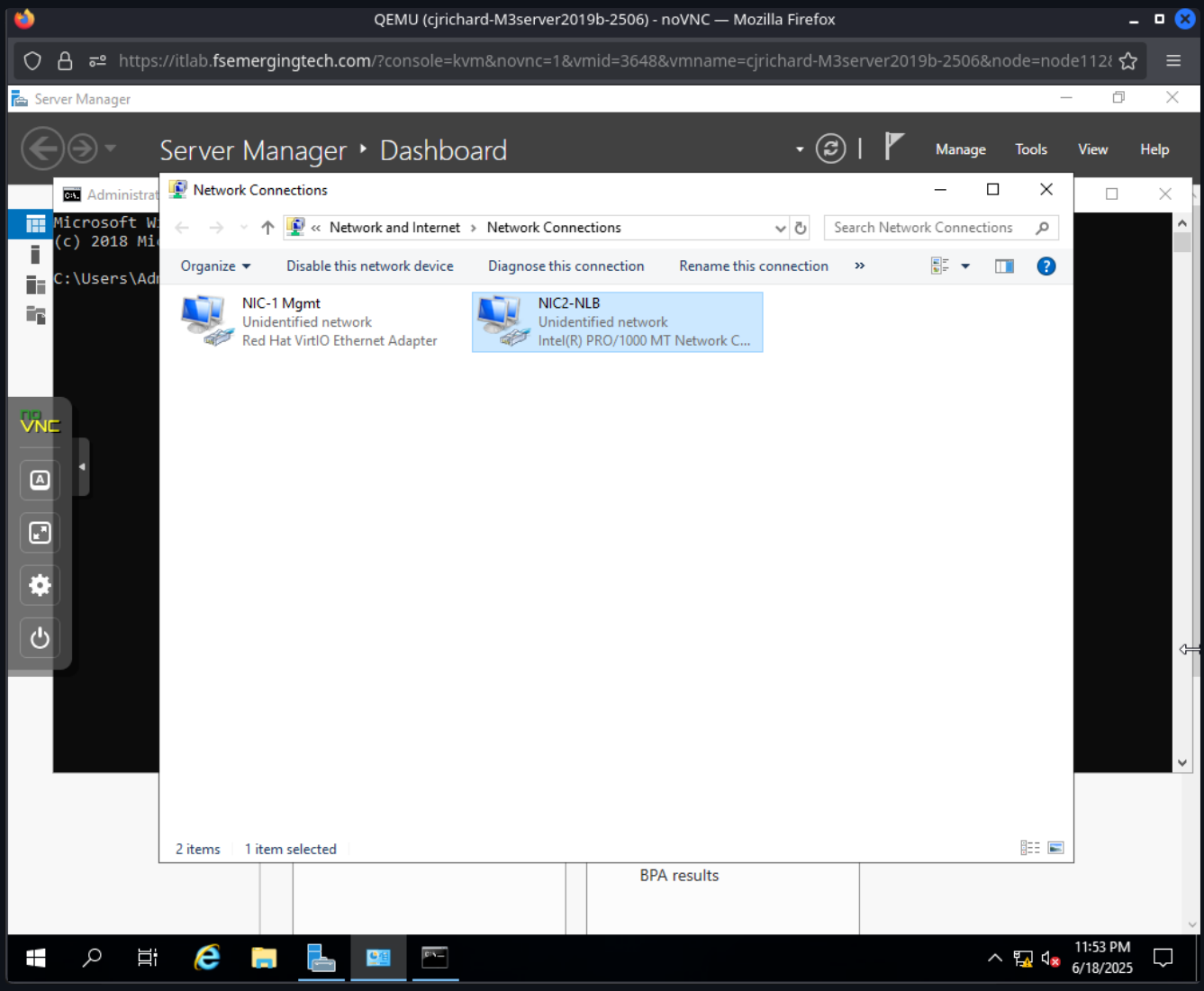

FIG 06 — Network Connections on NLB-SERVER2 with both adapters present: NIC-1 Mgmt (Red Hat VirtIO) and NIC2-NLB (Intel PRO/1000 MT).

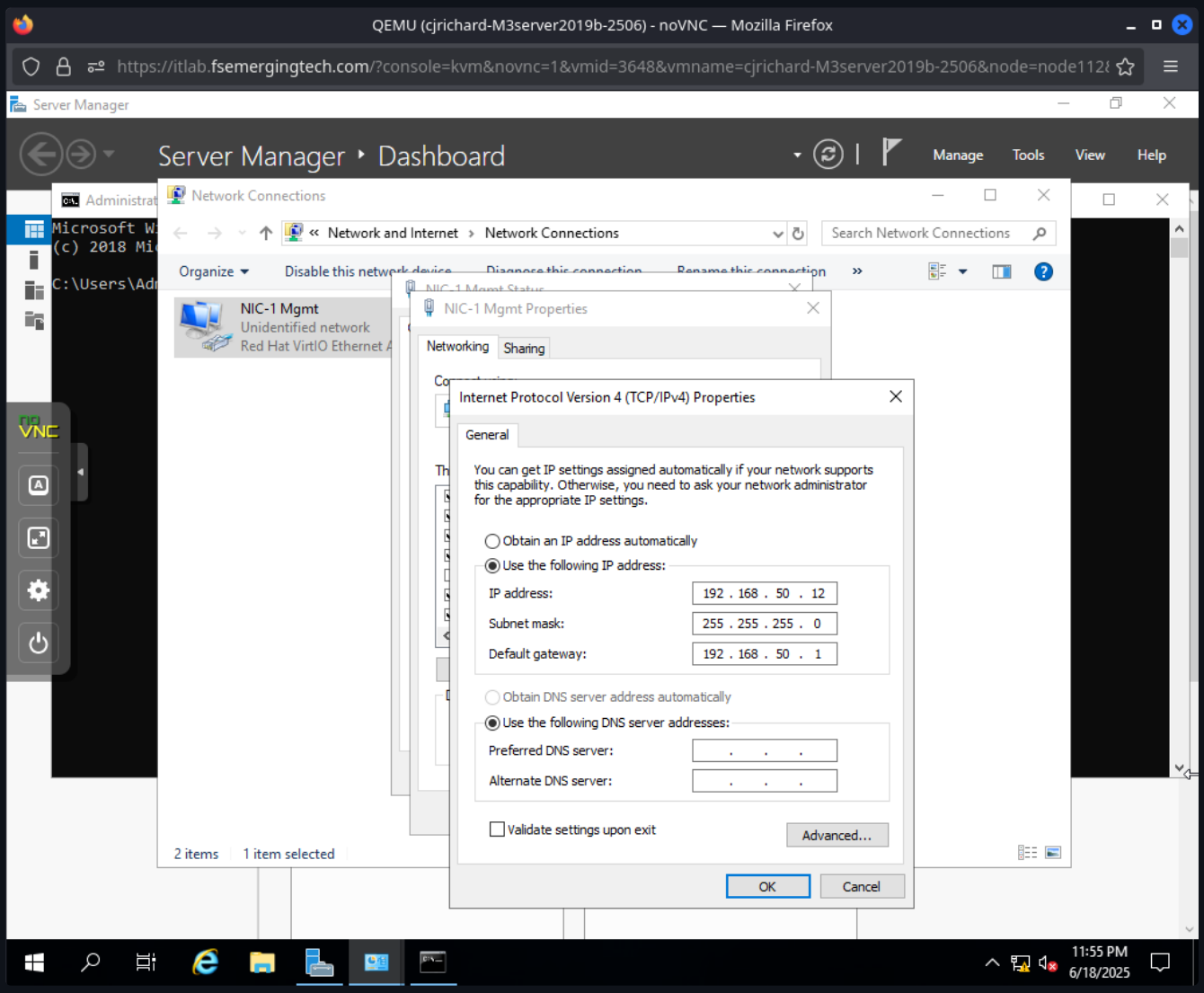

FIG 07 — NIC-1 Mgmt on Server 2 configured with static IP 192.168.50.12, mask 255.255.255.0, gateway 192.168.50.1.

NETWORKING

Server 2 - Dedicated NLB Interface

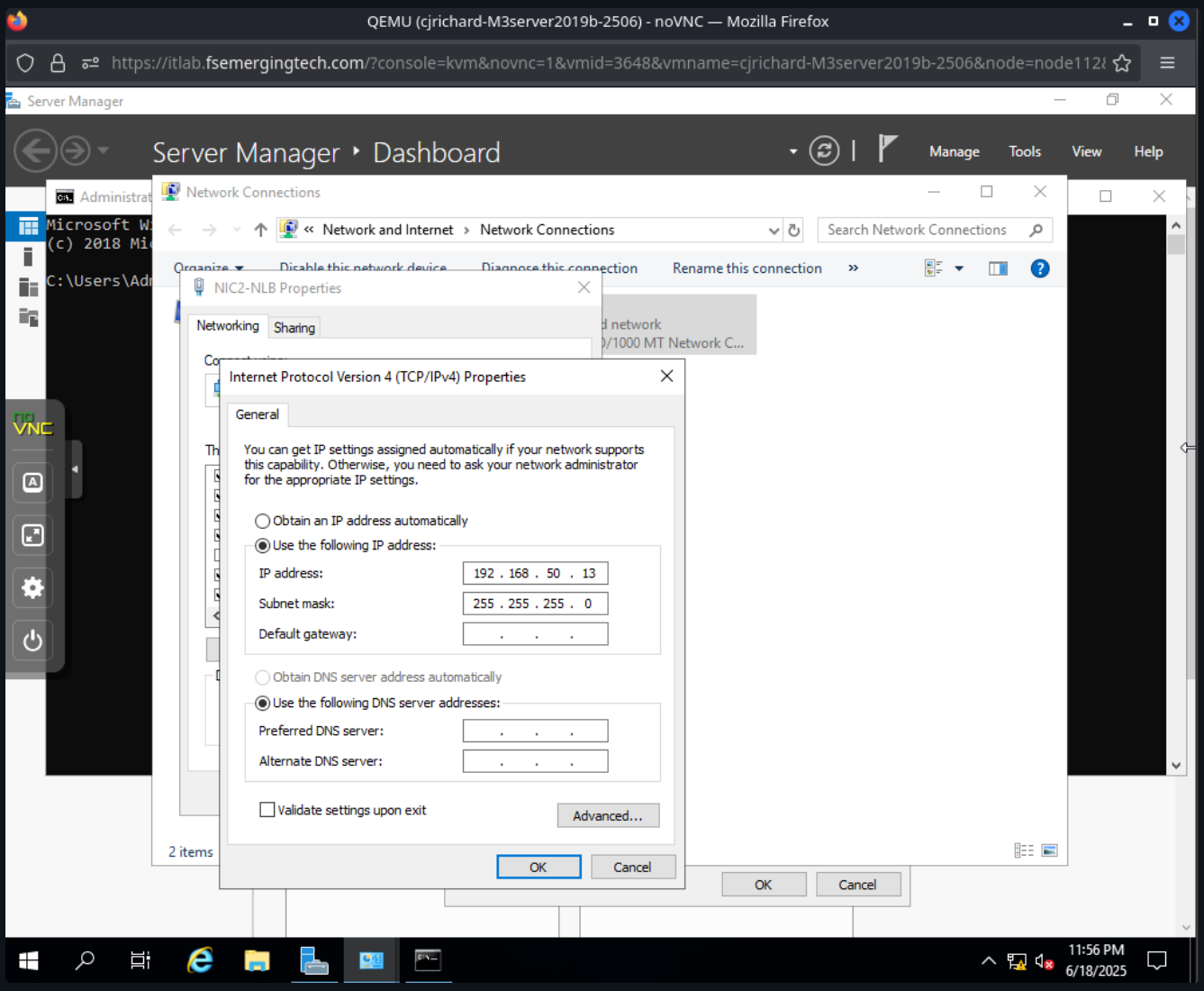

FIG 08 — NIC2-NLB on Server 2 set to 192.168.50.13 / 255.255.255.0 with no gateway, matching the gateway-blank pattern used on the Server 1 NLB interface.

ROLES

Server 1 - Installing IIS

With networking in place, the IIS Web Server role and the NLB feature were installed via PowerShell on both nodes.

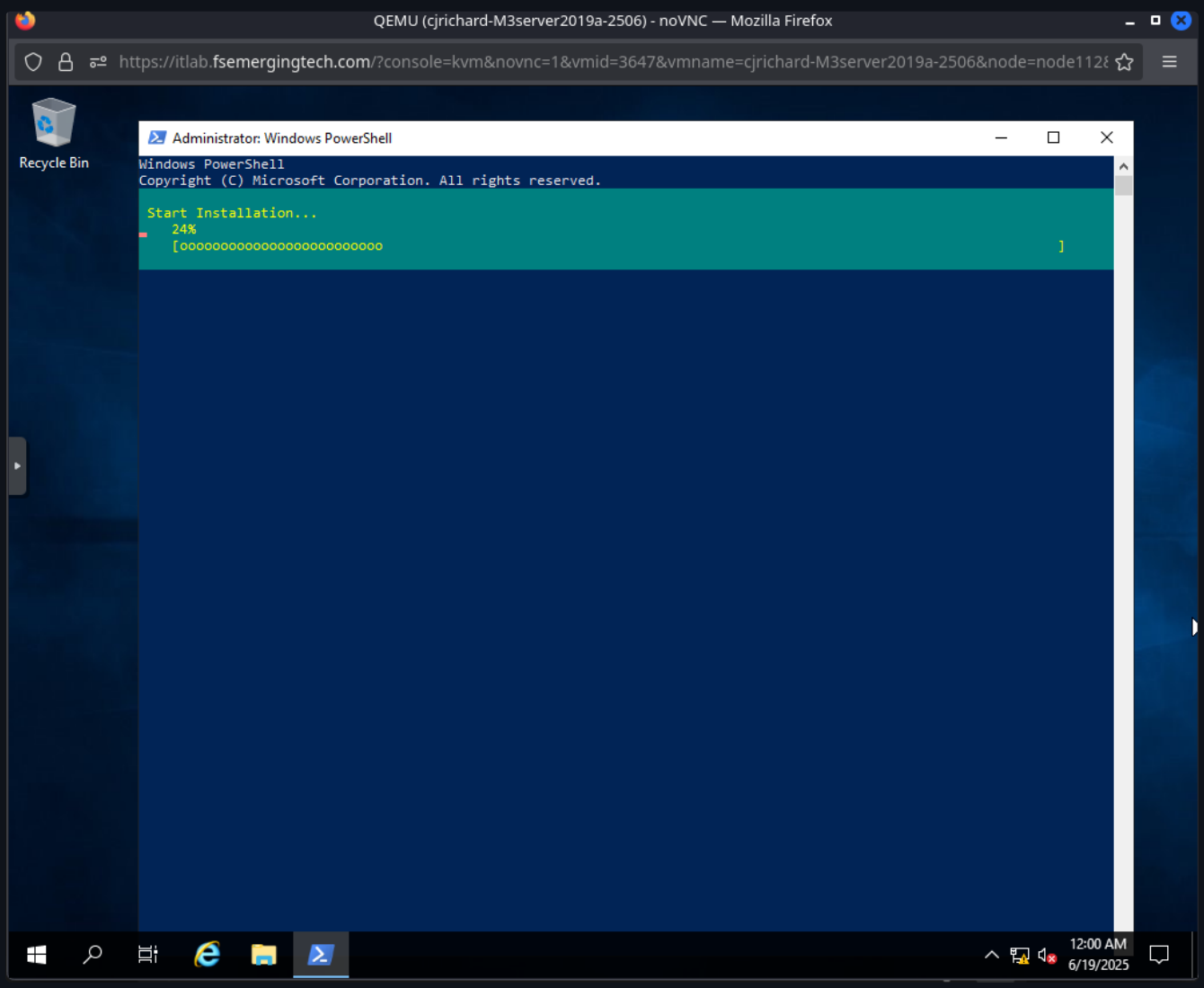

FIG 09 — Install-WindowsFeature Web-Server -IncludeManagementTools running on NLB-SERVER1, mid-install at 24%.

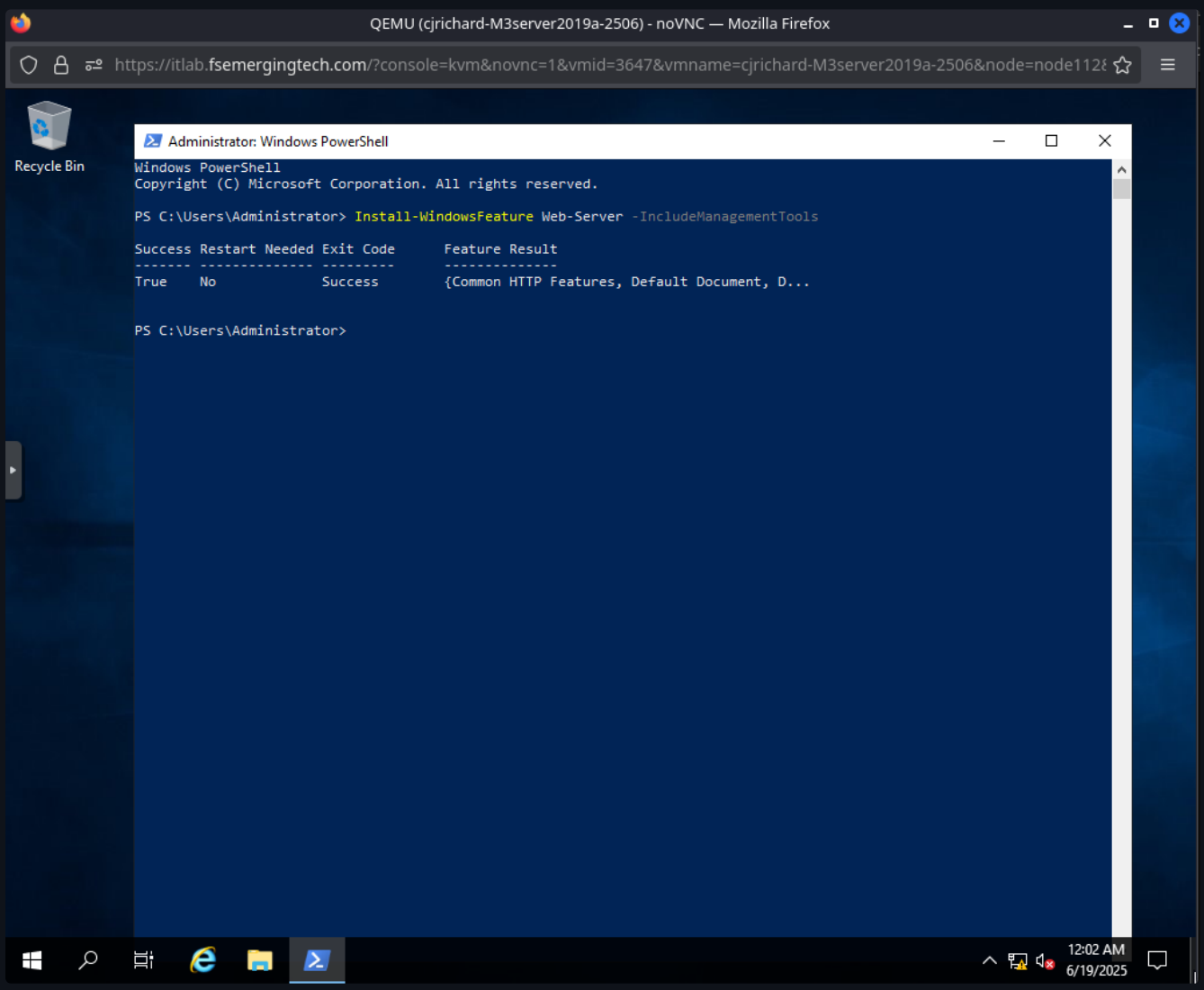

FIG 10 — IIS install completed on Server 1: Success / no restart needed, feature result lists Common HTTP Features and Default Document.

ROLES

Server 1 - Installing the NLB Feature

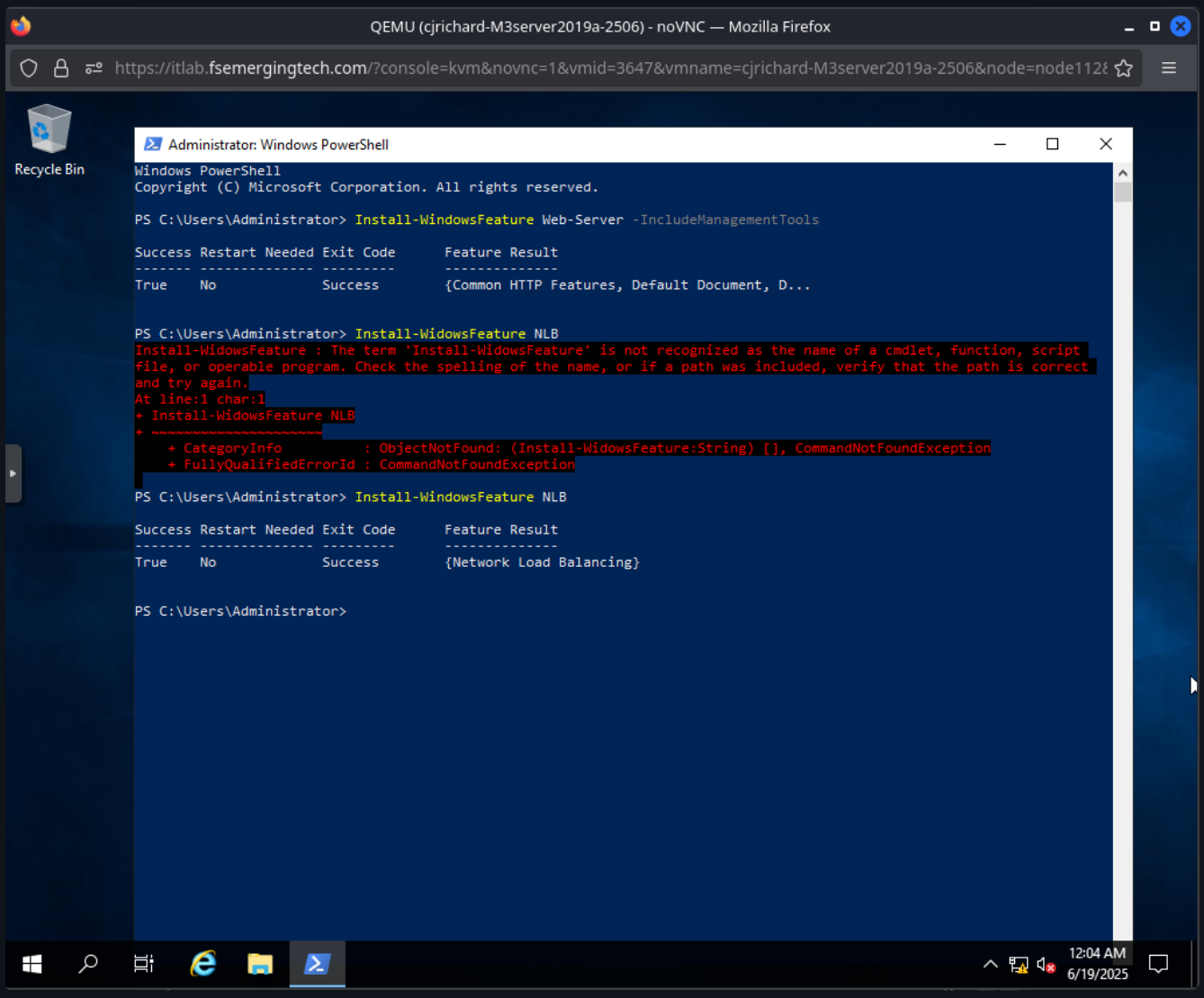

FIG 11 — Installing the NLB feature on Server 1. A typo (Install-WidowsFeature) throws a CommandNotFoundException; the corrected Install-WindowsFeature NLB then returns Success with feature result {Network Load Balancing}.

ROLES

Server 2 - IIS and NLB

The same two roles were provisioned on the second node.

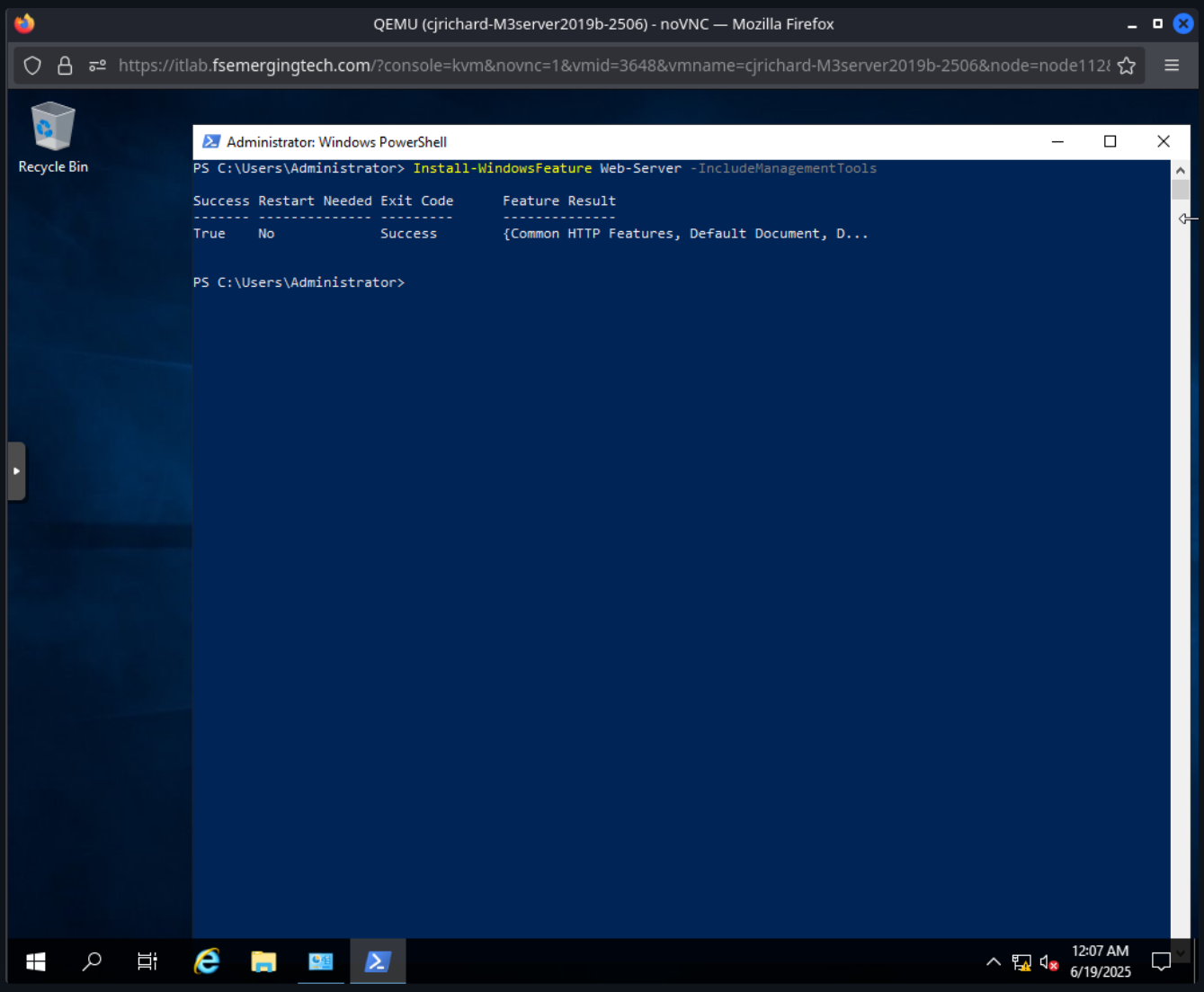

FIG 12 — Install-WindowsFeature Web-Server -IncludeManagementTools on NLB-SERVER2 returning Success with Common HTTP Features and Default Document.

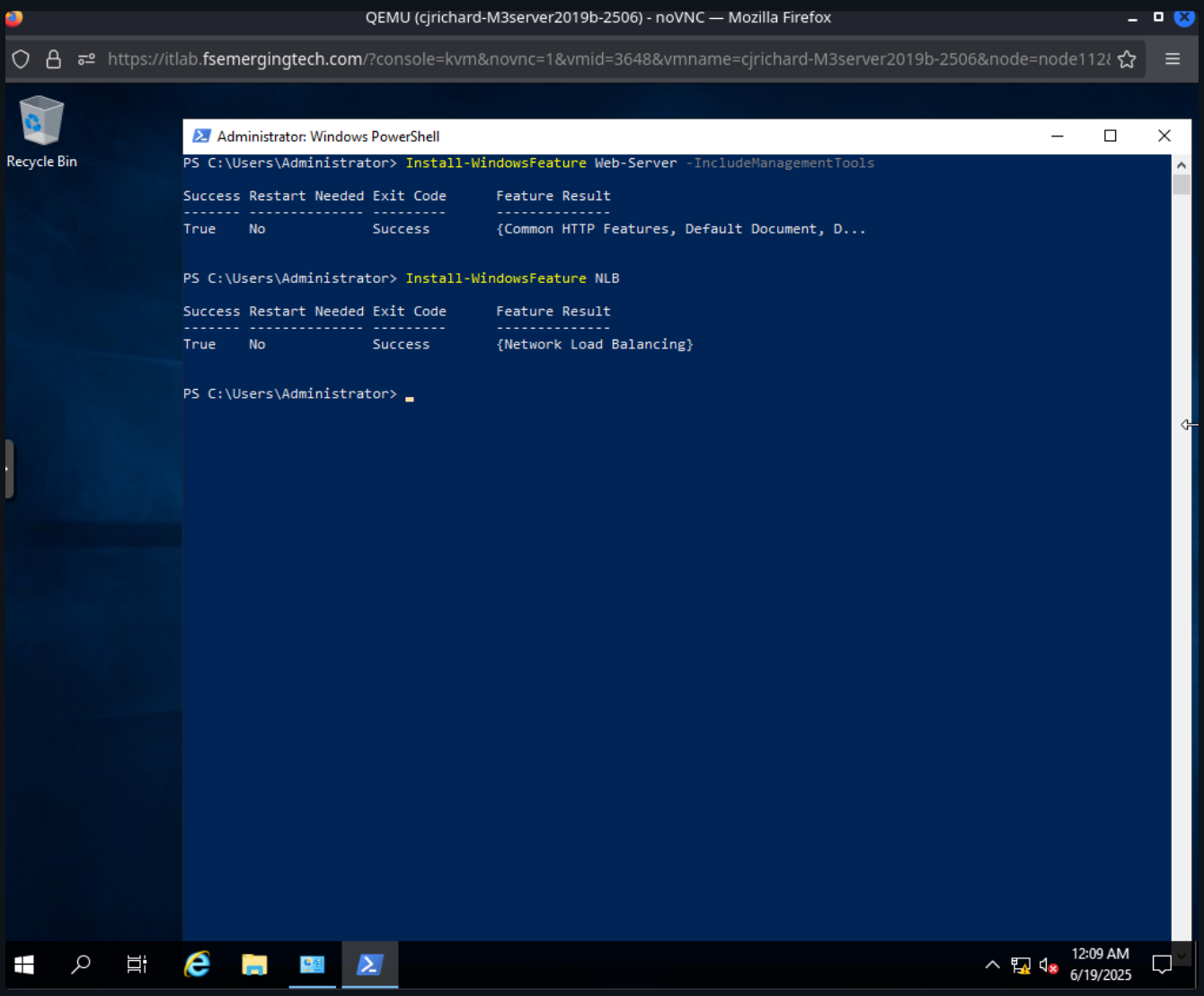

FIG 13 — Both roles confirmed on Server 2: Web-Server and NLB each report Success, with NLB's feature result {Network Load Balancing}.

DIRECTORY

Promoting Server 1 to Domain Controller

NLB-SERVER1 was promoted to a domain controller, creating the FullSailNLB.Local forest with the NetBIOS name NLB.

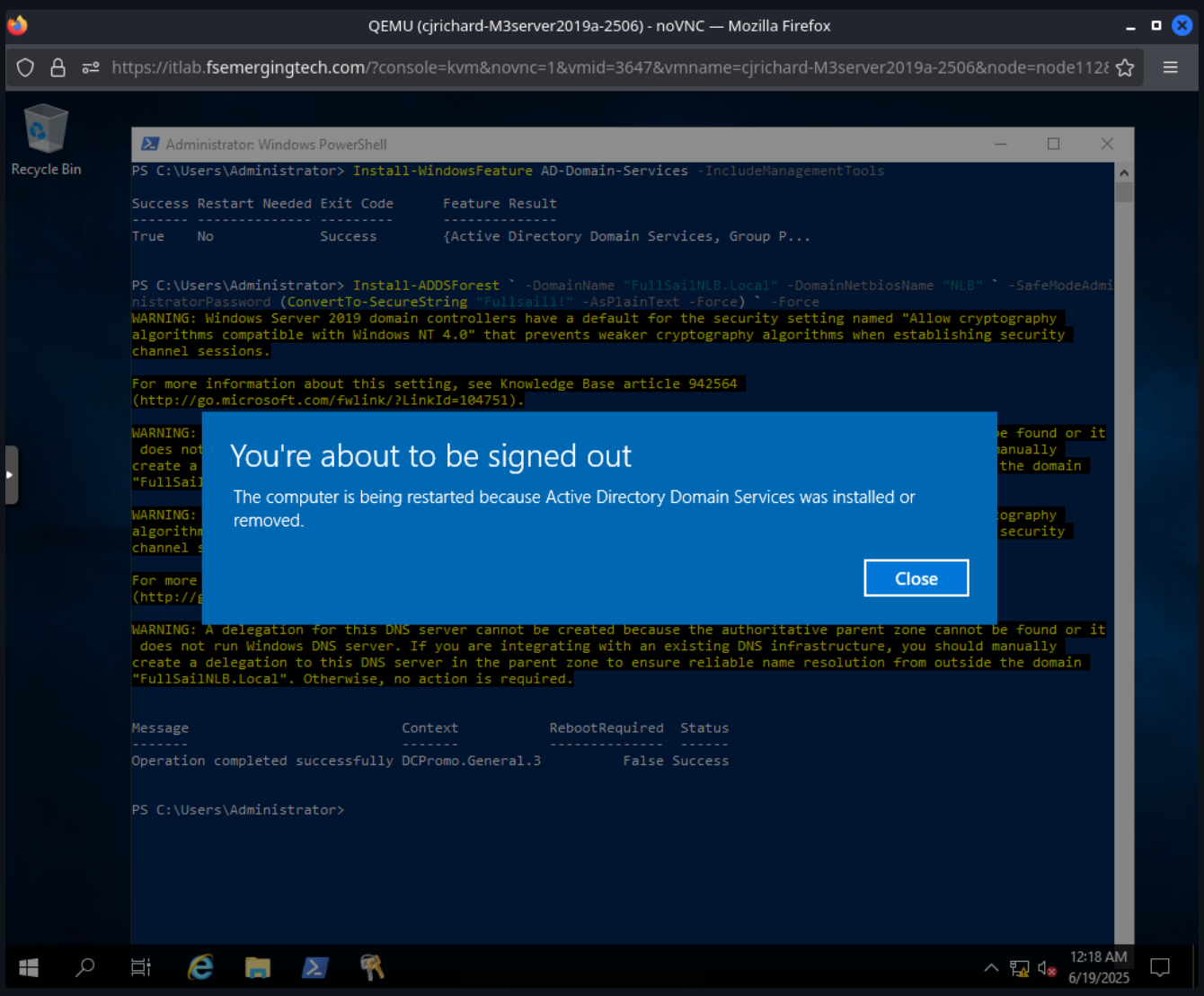

FIG 14 — Install-WindowsFeature AD-Domain-Services succeeds, then Install-ADDSForest builds the FullSailNLB.Local forest (NetBIOS NLB). DCPromo reports 'Operation completed successfully' and the server is signed out for the AD DS reboot.

DIRECTORY

Pointing Server 2 DNS at the Domain Controller

To join the domain, Server 2 had its DNS pointed at the new DC before the join.

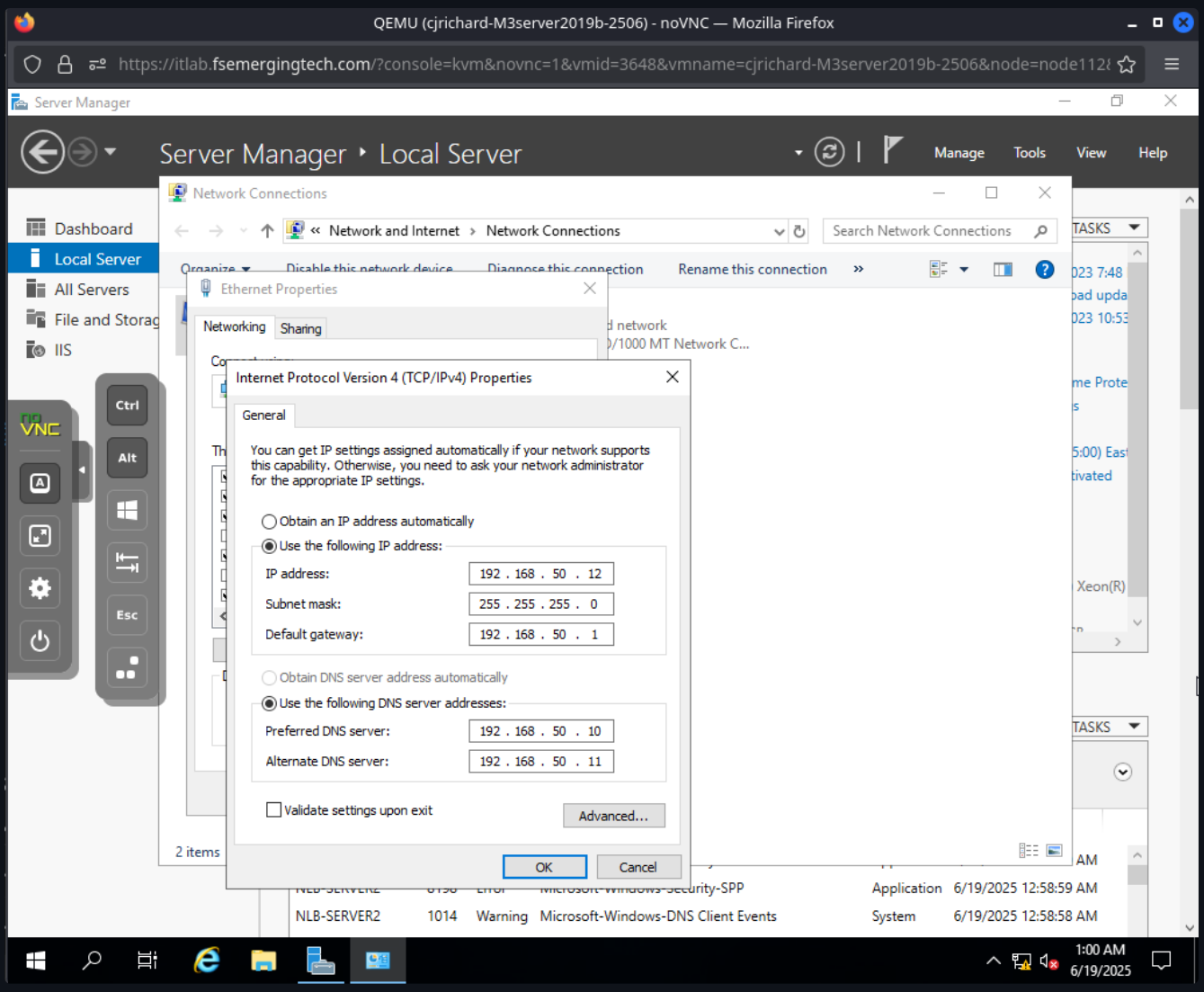

FIG 15 — Server 2's adapter set to 192.168.50.12 with preferred DNS 192.168.50.10 and alternate 192.168.50.11 - directing name resolution to Server 1 ahead of ipconfig /flushdns and an nslookup FullSailNLB.Local check.

DIRECTORY

Joining Server 2 to the Domain

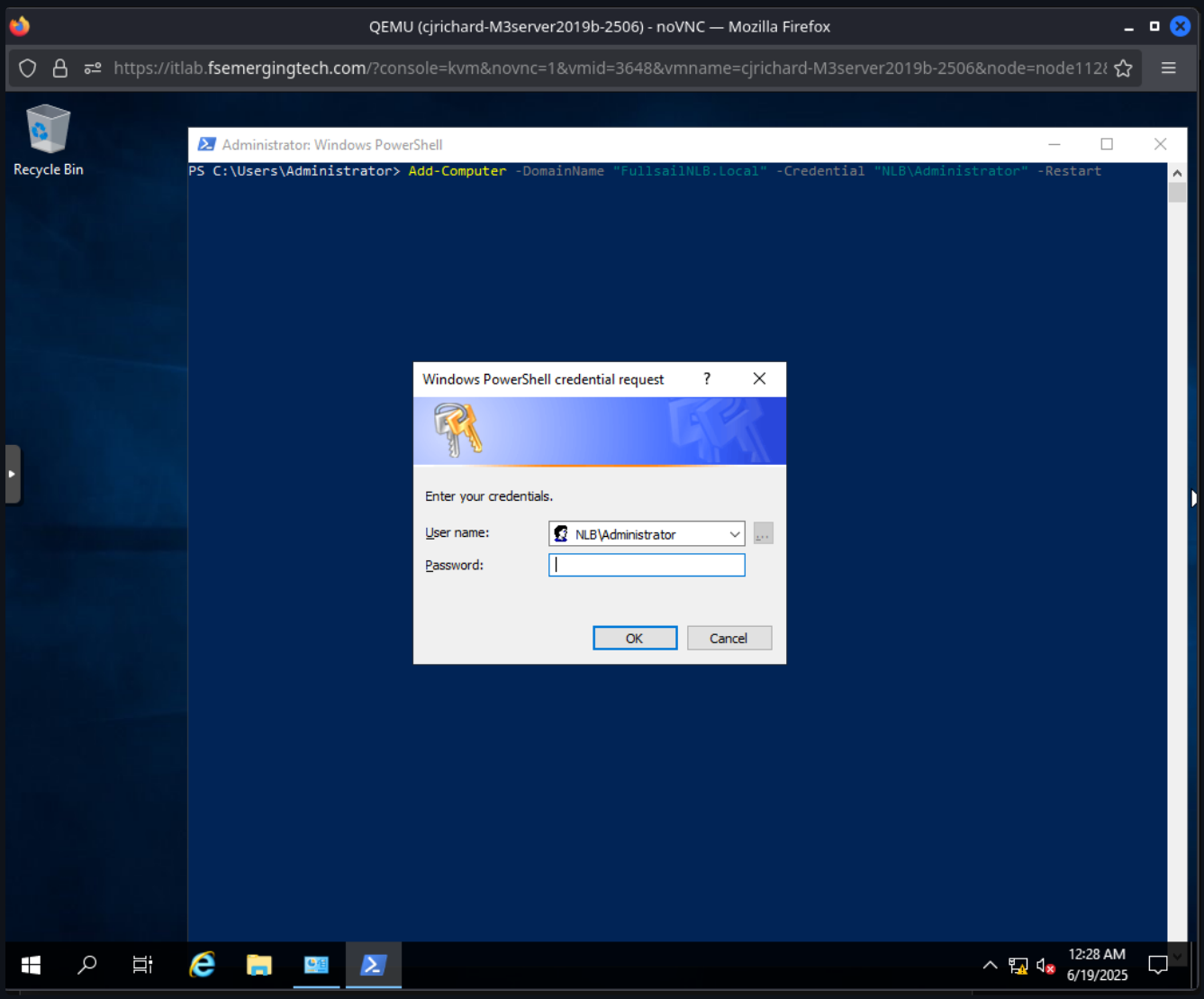

FIG 16 — Add-Computer -DomainName FullSailNLB.Local -Credential NLB\Administrator -Restart, with the PowerShell credential prompt requesting the NLB\Administrator password.

DIRECTORY

Domain Membership Verified

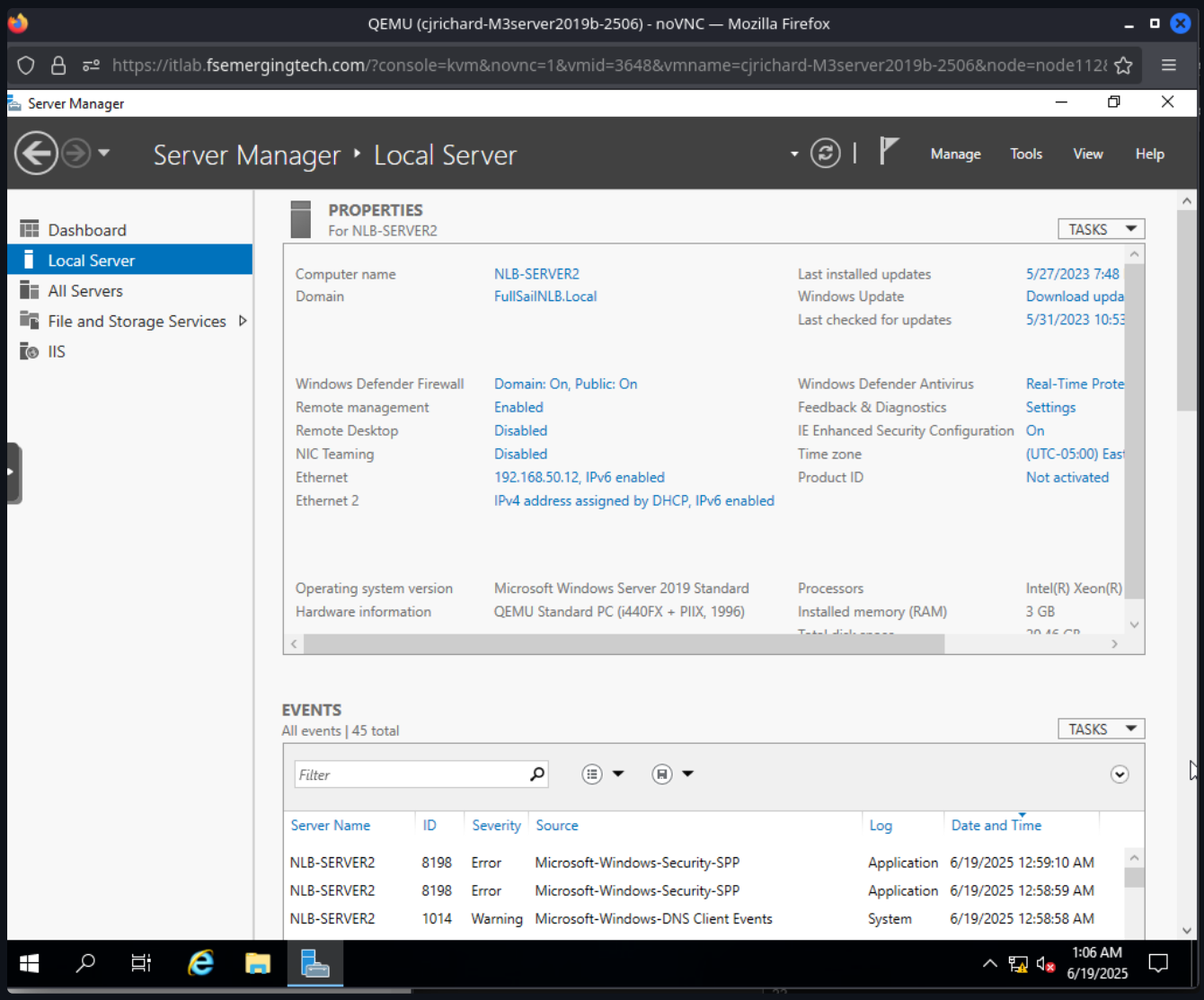

FIG 17 — Server Manager on NLB-SERVER2 confirming Domain: FullSailNLB.Local, Ethernet at 192.168.50.12, on Windows Server 2019 Standard (Intel Xeon, 3 GB RAM) - Server 2 is now a domain member.

CLUSTER

Cluster Created on Server 1

A new Multicast NLB cluster was created in Network Load Balancing Manager on NLB-SERVER1, bound to the dedicated NIC2-NLB interface and the cluster VIP.

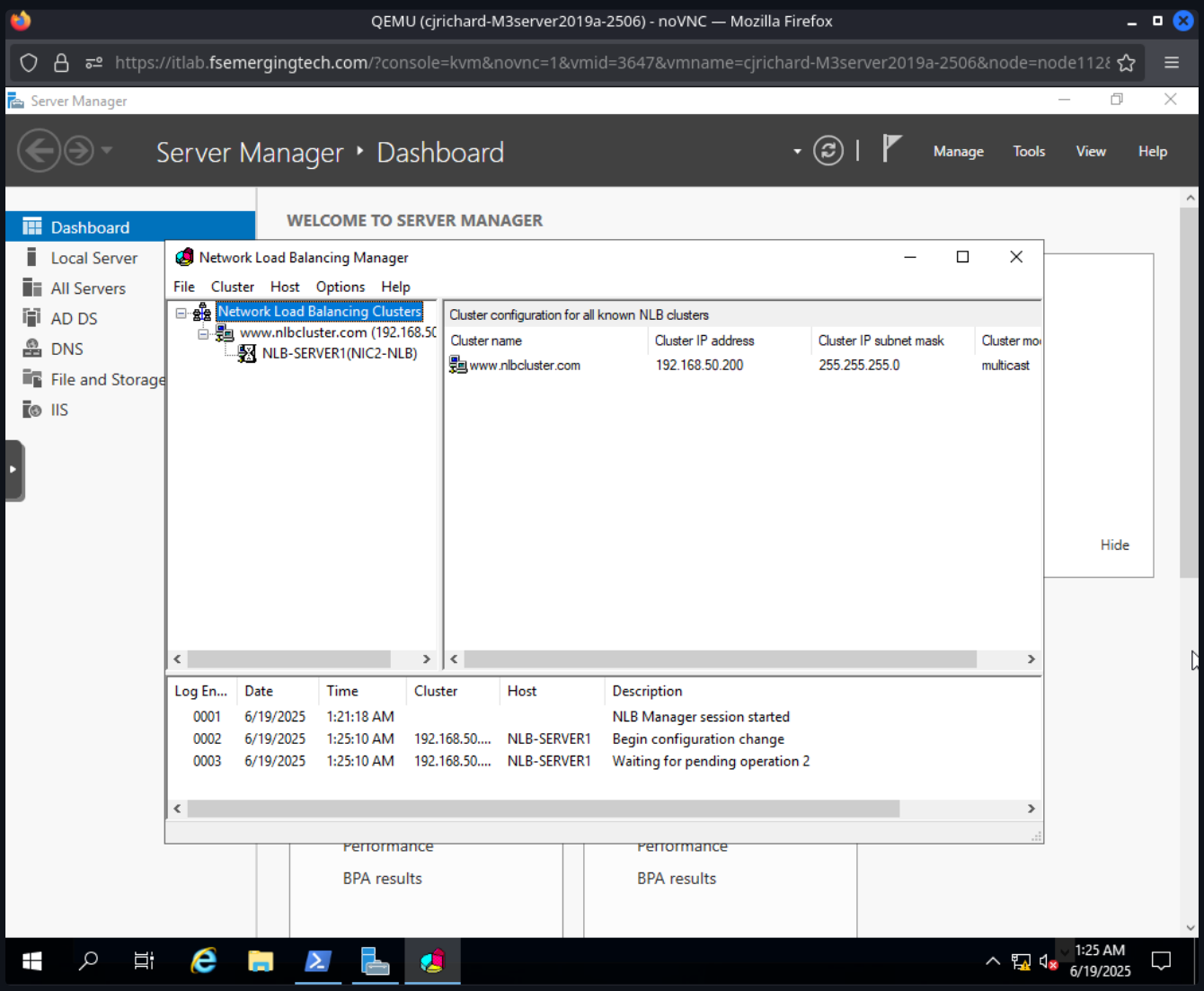

FIG 18 — NLB Manager showing the new cluster www.nlbcluster.com with NLB-SERVER1(NIC2-NLB) as the first host - cluster IP 192.168.50.200, subnet 255.255.255.0, operation mode multicast.

CLUSTER

Adding Server 2 to the Cluster

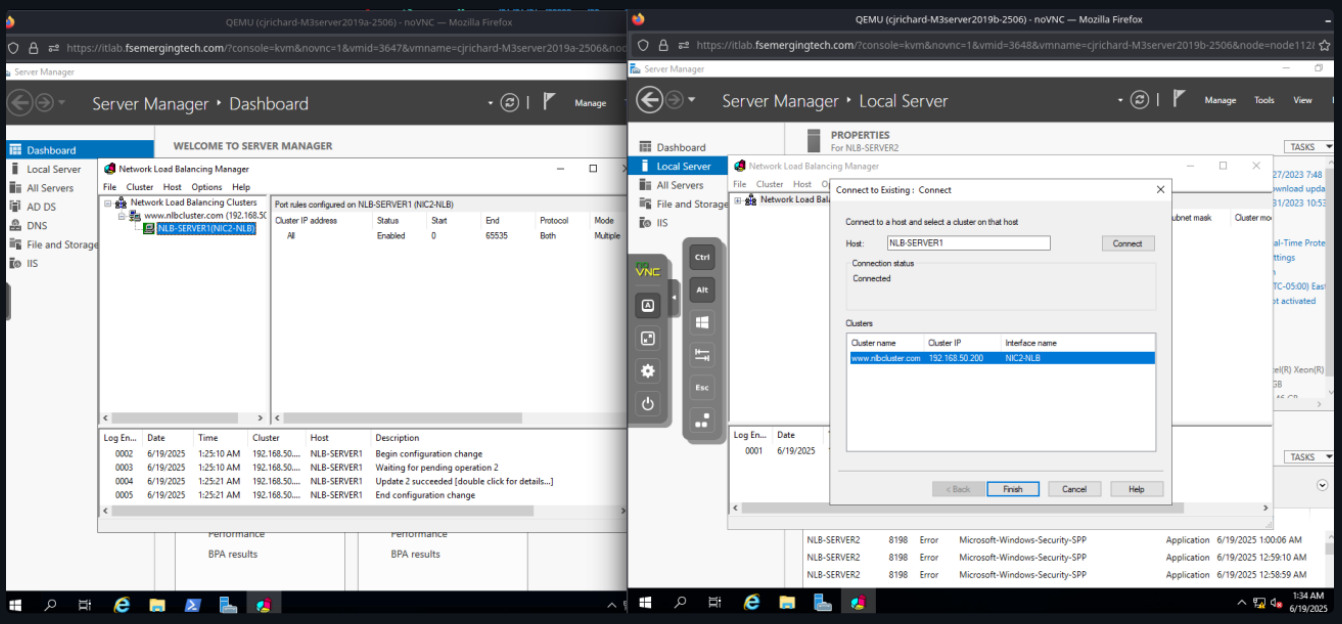

FIG 19 — Side-by-side consoles for the Add Host workflow: the Connect dialog targets host NLB-SERVER1 and resolves the existing cluster www.nlbcluster.com (192.168.50.200, NIC2-NLB) so the second node can join it.

VALIDATION

Distinct IIS Content per Node

Each node got a unique index page in C:\inetpub\wwwroot so the responding host could be identified through the shared VIP.

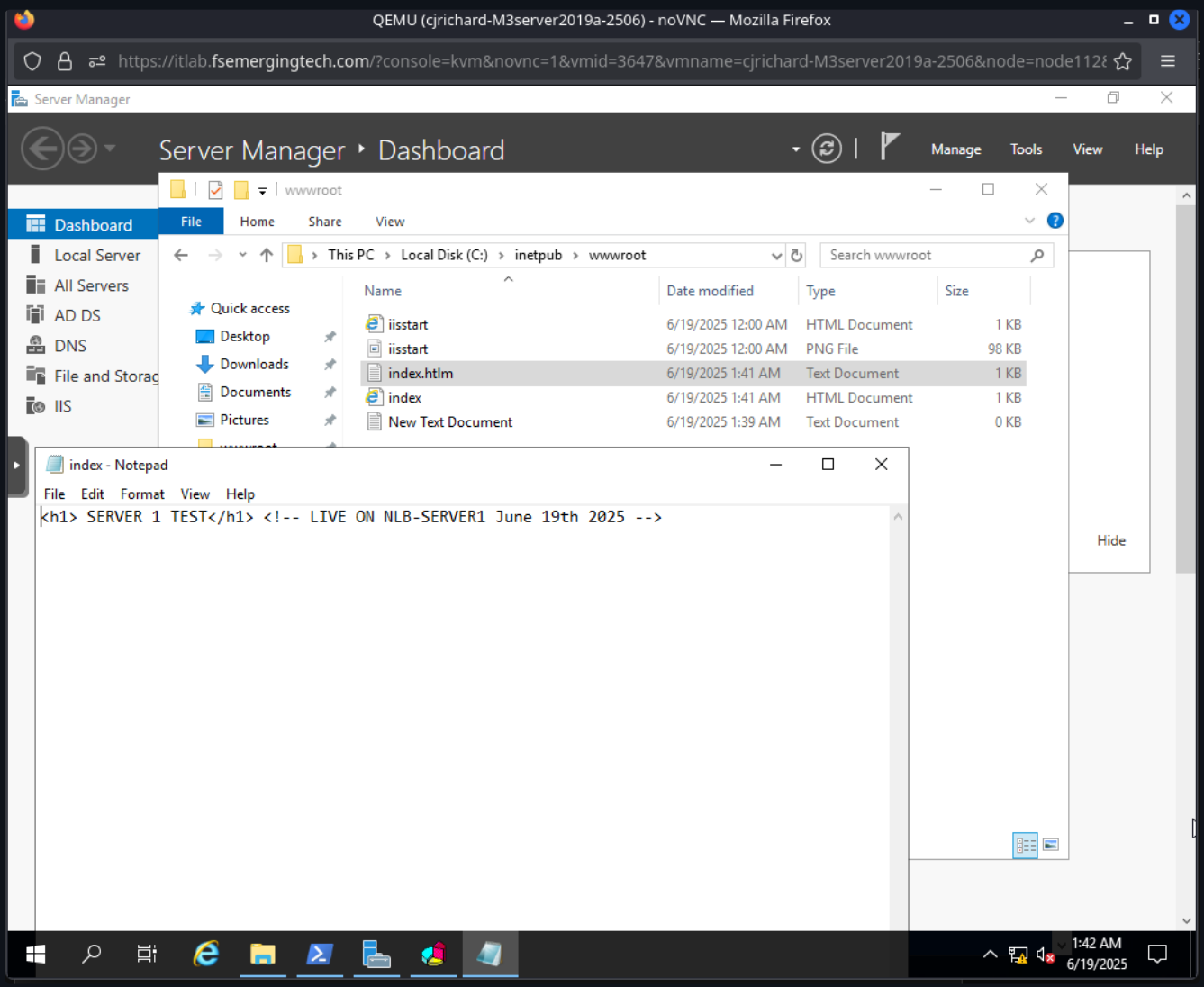

FIG 20 — Server 1's index page authored in Notepad - <h1>SERVER 1 TEST</h1> with comment 'LIVE ON NLB-SERVER1 June 19th 2025' - saved in C:\inetpub\wwwroot.

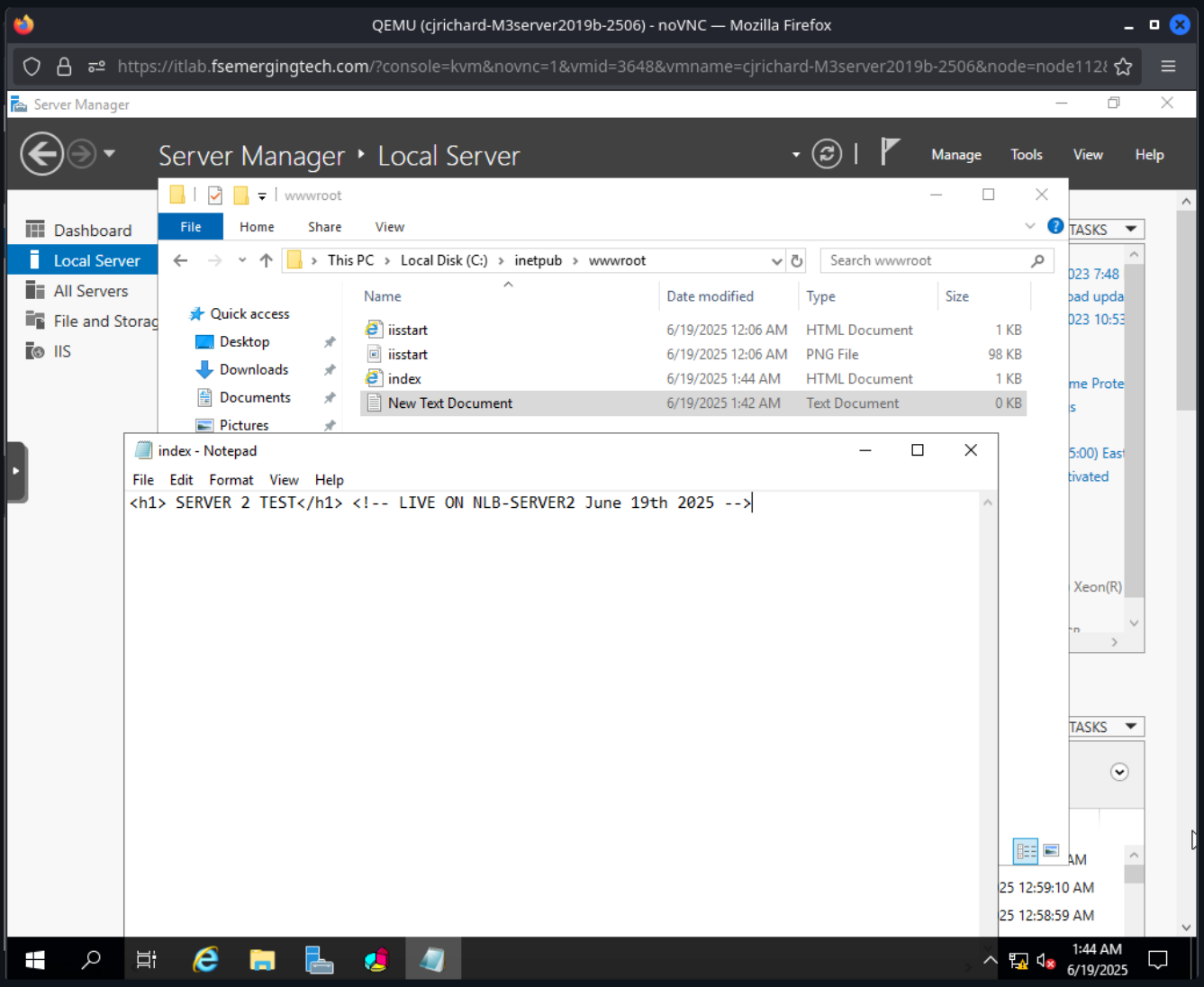

FIG 21 — Server 2's index page - <h1>SERVER 2 TEST</h1> with comment 'LIVE ON NLB-SERVER2 June 19th 2025' - placed in C:\inetpub\wwwroot on the second node.

VALIDATION

Serving Through the Cluster VIP

Browsing the cluster virtual IP confirmed IIS was serving load-balanced content from both members.

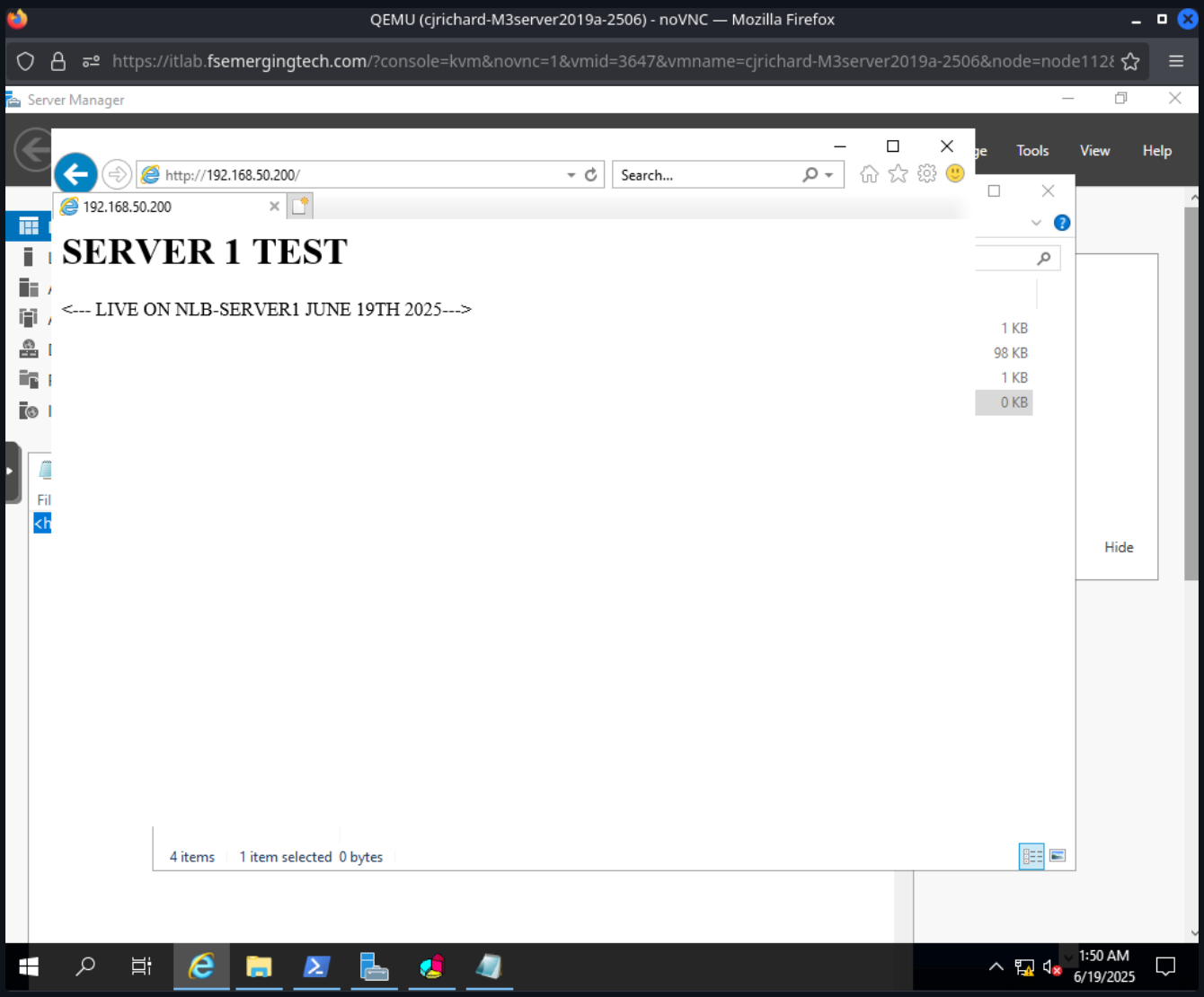

FIG 22 — Internet Explorer at http://192.168.50.200/ rendering 'SERVER 1 TEST' - the cluster VIP serving Server 1's IIS page.

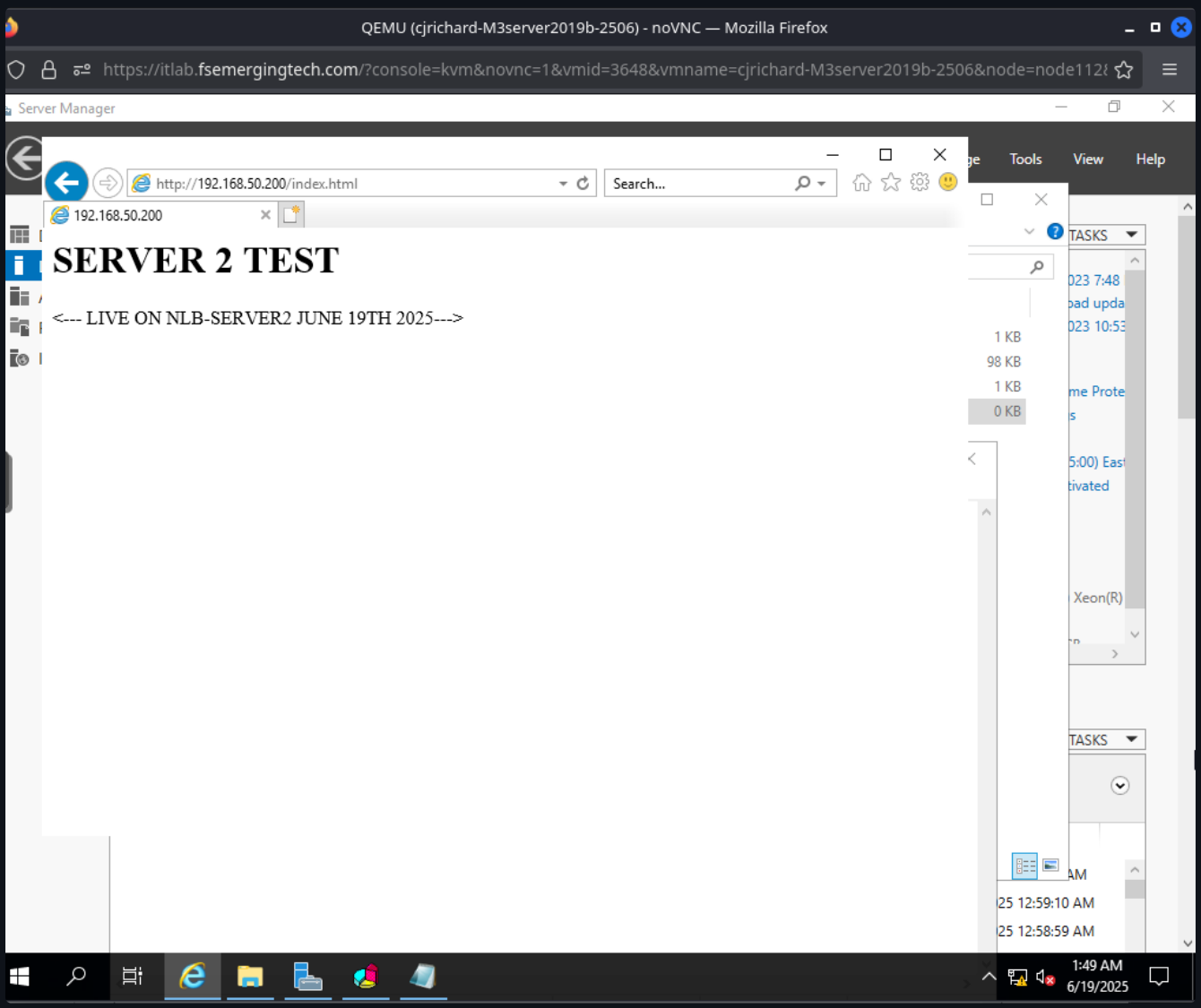

FIG 23 — The same cluster VIP at http://192.168.50.200/index.html rendering 'SERVER 2 TEST', confirming both nodes respond behind the shared address.