nSSV Single Node Installation Guide

Single Node Deployment

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1 Overview

This tutorial describes how to install nSSV in single management node deployment.

2 Deployment Scenarios

nSSV provides three installation modes: management node mode, compute node mode, and expert mode.

The installation content, applicable scenarios, and installation steps vary for different installation modes.

Modes	Description	Applicable Scenarios
Management Node Mode	• Install the base system. • Install dependencies such as MariaDB and CloudBus message bus. • Automatically install and start nSSV.	Suitable for installing the management node.
Compute Node Mode	• Install the base system. • Install virtualization components such as libvirt and QEMU.	Suitable for compute nodes.
Expert Mode	Install the base system.	Suitable for installing other nodes in the virtualization platform excluding the management node, such as: • Compute nodes • Standalone image storage, distributed image storage nodes, distributed image storage monitoring nodes • Distributed storage nodes, distributed storage monitoring nodes

Table 1: Installation modes, description, and applicable scenarios

3 Single Management Node Deployment

3.1 Planning and Prerequisites

Hardware Requirements

The configuration of server CPU, memory, storage size, and NIC performance determines the business capacity of the nSSV.

Minimum Environment (All In One): Requires at least 4 CPU cores and at least 8 GB of memory. This is only suitable for basic demonstration environments and not recommended for production use.

Production Environment:

- **Management Node Configuration:** Determined by deployment scale and user environment, please consult official technical support for details. For small-scale scenarios, the recommended configuration for the management node is: 8 CPU cores, 16 GB of memory, and 240 GB of storage.
- **Compute Node Configuration:** Determined by business scale, please consult official technical support for details.

Recommended Configurations for Server Hardware Whether for minimum environment deployment or production environment deployment, it is recommended that hardware devices such as servers be configured according to the recommended configurations in the table below:

Device	Component	Configuration Requirements
Server	CPU	x86 Environment: 64-bit x86 architecture, supporting Intel VT or AMD-V hardware virtualization features (for example, Intel's VMX or AMD/Hygon's SVM). ARM Environment: 64-bit ARM architecture, supporting hardware virtualization features.
	Memory	No special requirements. Recommends DDR4 or higher performance memory.
	Motherboard	Standard dual-socket server motherboard.
	RAID Card	Supports SAS/SATA RAID 0/1/10 and supports passthrough mode.
	Hard Disk	No special requirements. You can choose between HDD or SSD based on storage planning.
	Network Port	• 1 Gigabit Ethernet port for management network, for example, Ethernet 1GbE, RJ45 • 1 10 Gigabit Ethernet port for business network, for example, Ethernet 10GbE, SFP+
Network Switch	–	• At least 1 Gigabit switch, 10 Gigabit switch recommended • Several Category 5 cables

Table 2: System Configuration Requirements

When preparing your server hardware, make sure to configure the following:

- Enable CPU virtualization support in the server BIOS.
- Complete your storage planning in advance:
  - If you use local storage, it is recommended to adopt a storage redundancy backup solution (for example, configure 4 hard disks in RAID 10) to improve the reliability of data storage and image storage. If your virtual machines require very high I/O read/write performance, consider using a RAID configuration with all SSDs. If the I/O access of your virtual machines leans more towards read performance, a mixed configuration of SSDs and HDDs can also work well.

  - If you use NFS or distributed storage, configure the corresponding storage or file system in advance. If your image storage uses a distributed image storage, ensure that your data storage also uses distributed storage.

- Plan your network in advance: It is recommended that you consistently name all physical host NICs and use NICs with the same name to carry the same type of communication traffic. For example, management traffic should all use the em1 NICs.
- Complete the necessary configurations on your network switch in advance:
  - If you need to use a VLAN network environment, configure the corresponding VLAN network communication on the switch in advance.
  - nSSV will actively allocate IP addresses to your virtual machines, so reserve a range of IP addresses that do not conflict with your system, and avoid conflicts with existing DHCP services in your network environment.

Prepare Installation Packages

nSSV ISO is built on Helix, a self-made virtualization kernel software that operates between the infrastructure layer and the upper-layer operating systems. It integrates essential components like hardware drivers, macro kernels, and virtual agents, shielding the differences among heterogeneous hardware. This releases operating systems from hardware driver dependencies, ensuring proper access to the heterogeneous hardware on the under layer. By doing so, Helix enhances hardware compatibility, high reliability, high availability, scalability, and performance of your virtual environment.

You can install nSSV without connecting to the public network or configuring a yum source, allowing for a completely offline installation.

To install nSSV, make sure to prepare the necessary ISO package in advance.

3.1.3.1 Burn ISO Image Using Rufus After you obtain the ISO package, you can use Rufus to burn the ISO image to a USB drive.

Procedure

1. **Select an ISO image.**
   a) Connect your USB drive and open Rufus.
   b) In the Boot Selection drop-down list, choose Disk or ISO image.
   c) Click SELECT to open the ISO image file that you obtained.

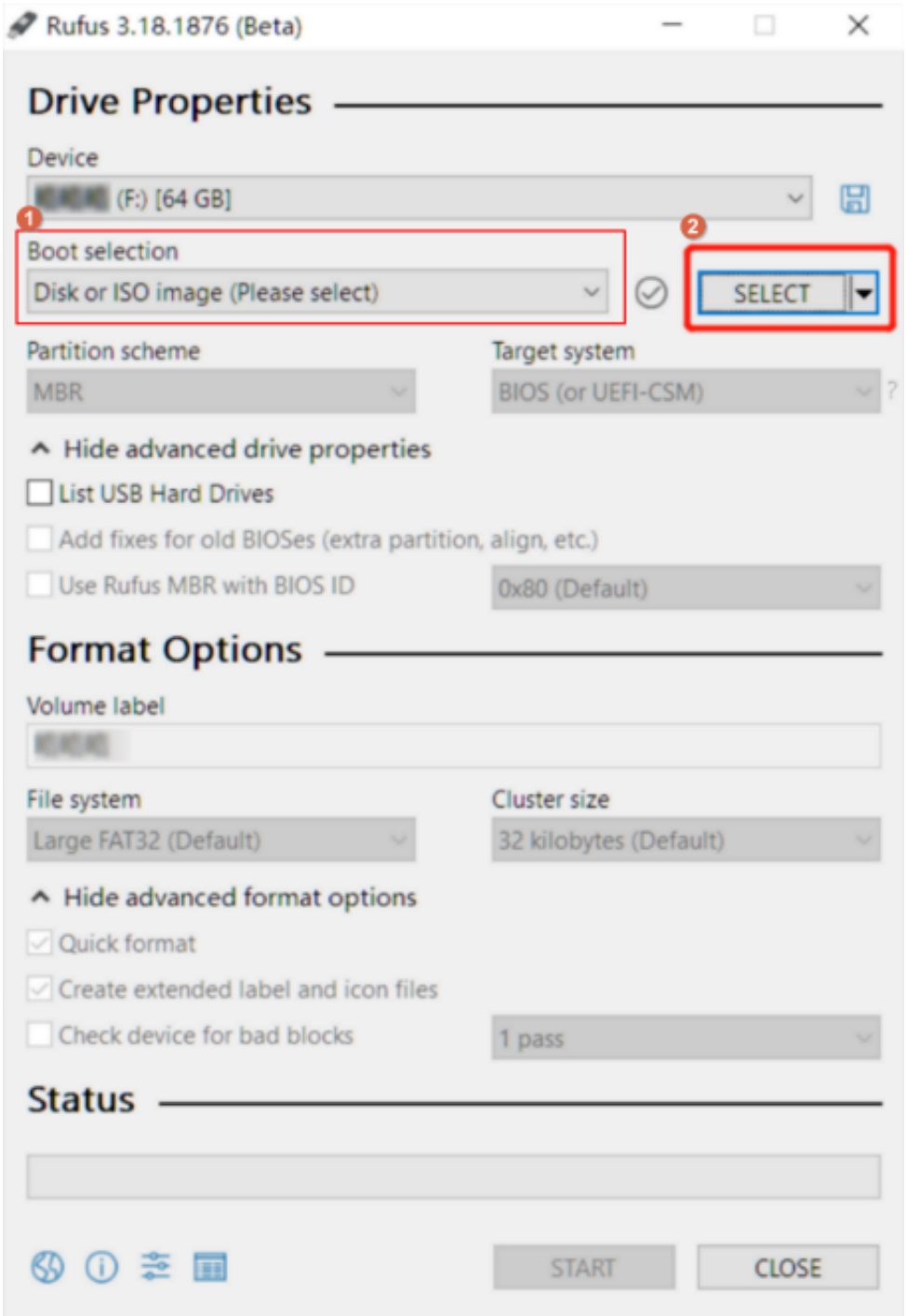

Figure 1: Select ISO Image

2. **Burn the image.**

   a) After selecting the ISO image, keep the other options at their default settings and click START.

   b) Confirm the warning message.

Note

Burning the image will format the data on the USB drive. If you have important data on your USB drive, make sure to back it up before formatting.

c) Click OK, and Rufus will burn the ISO image to the USB drive.

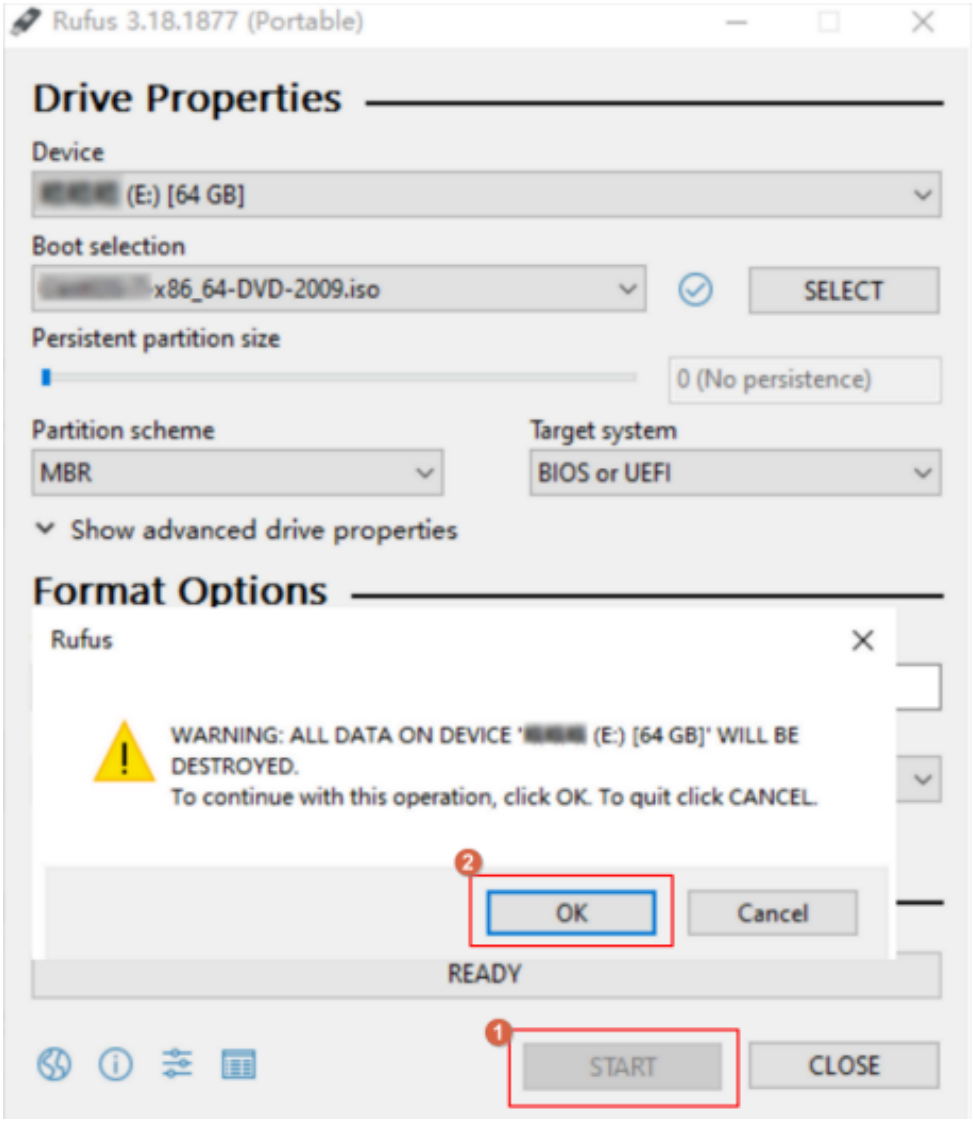

Figure 2: Burn the Image

What's next

After the burning process completes, you can use the USB drive as a boot disk. nSSV supports booting in Legacy mode or UEFI mode.

3.1.3.2 Burn ISO Image Using Fedora Media Writer After you obtain the ISO package, if you are using the Kylin operating system, we recommend using Fedora Media Writer to burn the ISO image.

Procedure

1. **Select an ISO image.**

a) Connect your USB drive and open Fedora Media Writer.

b) Click Custom Image to open the ISO image file that you obtained.

2. **Burn the image.**

   a) After selecting the ISO image, keep the other options at their default settings and click Write Disk.

What's next
After the burning process completes, you can use the USB drive as a boot disk. nSSV supports booting in Legacy mode or UEFI mode.

3.2 Install nSSV

Procedure

1. **Configure the server.**

   - Make sure to back up any data on the server's hard disk, as the installation process will overwrite it.
   - Enter the BIOS and enable the CPU VT and Hyper-Threading (HT) options.
   - Configure the appropriate RAID level in the RAID controller to provide data redundancy.
   - Set the USB drive as the first boot device.

2. **Select the boot option.**
   Enter the ISO boot interface and choose the default option to start the operating system installation. You can select based on your actual situation, but we recommend using the graphical user interface (GUI) for installation. If the server does not have a VGA port and only supports serial connections, you can use either VNC or text mode installation methods.

   - GUI method
   - VNC method
   - Text mode method

3. **Review the installation configuration summary.**
   This page displays the system installation configuration. You can modify the configuration as needed.

4. **Select the installation mode.**

   a) On the **INSTALLATION SUMMARY** page, click **Software Selection**.

   b) On the **SOFTWARE SELECTION** page, choose the installation mode. Below you will find a description of the available installation modes. For the purpose of this guide, please make sure to select **Management Mode**, as it will be the reference mode for all subsequent steps.

      - **nSSV Management Node:** This mode is for nSSV management node. We recommend selecting this mode for the first installation. If you choose this mode, the system will automatically begin installing the corresponding virtualization platform after the installation is complete.

- **nSSV Compute Node:** This mode is for nSSV compute node. If you select this mode, the system will automatically begin installing the corresponding virtualization platform after the installation is complete.
- **nSSV Expert Mode:** This mode allows for a custom installation. If you select this mode, the system will boot into a terminal interface after installation, allowing you to customize the installation.

c) After selecting the installation mode, click **Done**.

5. **Configure the disk partitions.**

a) On the **INSTALLATION SUMMARY** page, click **Installation Destination** to enter the **INSTALLATION DESTINATION** page.

b) For **Device Selection**, we recommend that you only configure the system disk. After the system is installed, you can configure other disks.

c) For **Storage Configuration**, we recommend selecting **Automatic** to automatically configure the disk partitions.

If you need to manually configure disk partitions, refer to the following guidelines based on the BIOS boot mode:

UEFI Mode:

- `/boot`: 1GB
- `/boot/efi`: 500MB
- `swap`: 32GB
- `/`: remaining space

Legacy Mode:

- `/boot`: 1GB
- `swap`: 32GB
- `/`: remaining space

Note

The NICs on servers connected to the data network do not need to have specified IP addresses, but the NIC names for each server connected to the data network must be the same (for example, all should be `eth0`).

Note

- The above values represent the recommended partition sizes for nSSV (total disk capacity should be greater than 300GB).
- In Legacy mode, if the system disk capacity exceeds 2TB, you need to configure a BIOS boot partition to support GPT partitioning. UEFI mode does not have this limitation and supports GPT partitioning.

d) Review the configuration and click **Done**.

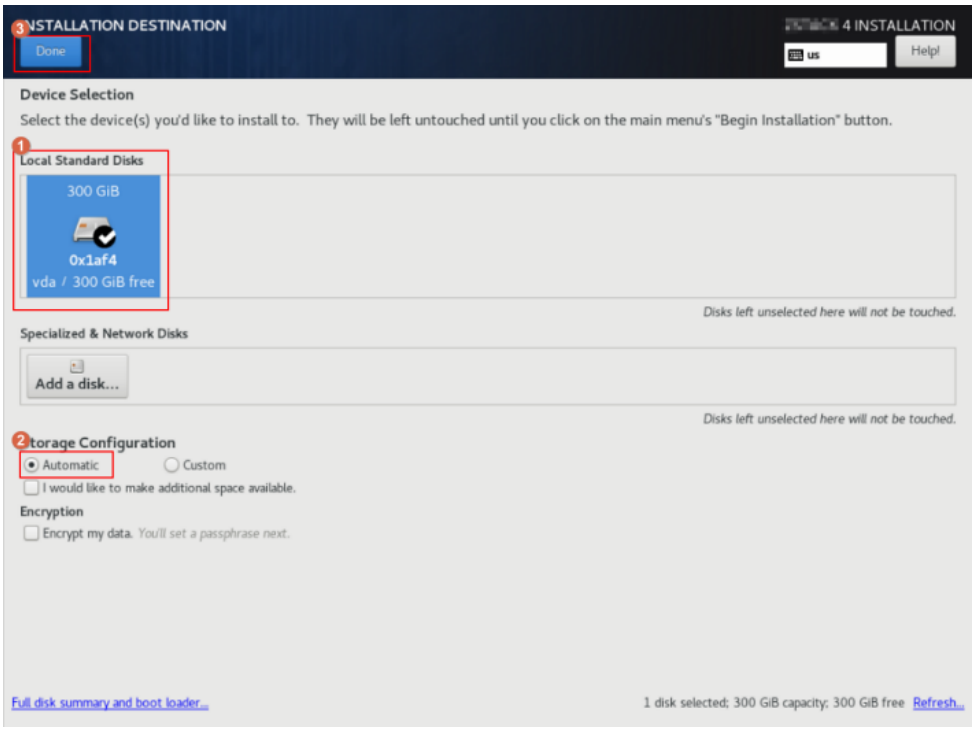

Figure 3: Configure Disk Partitions

6. **Add a bond device.**

   a) On the **INSTALLATION SUMMARY** page, click **Network & Host Name**.

   b) On the **NETWORK & HOST NAME** page, click the **+** button at the bottom left of the page. This will open the *Add device* dialog. From the drop-down list, choose **Bond**, then click **Add**.

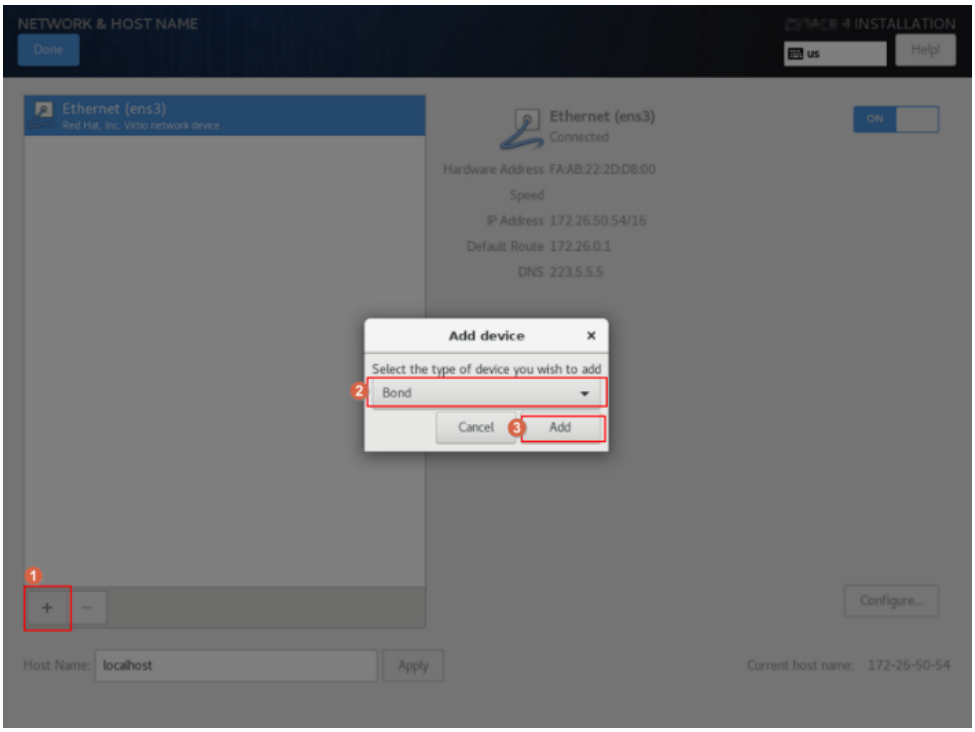

Figure 4: Add Bond Device

7. **Add a Bond Slave.**

   a) In the Bond configuration dialog, adjust the **Connection name** as needed.

> Note
>
> Connection name and interface name **must** match as showed in the screenshot below.

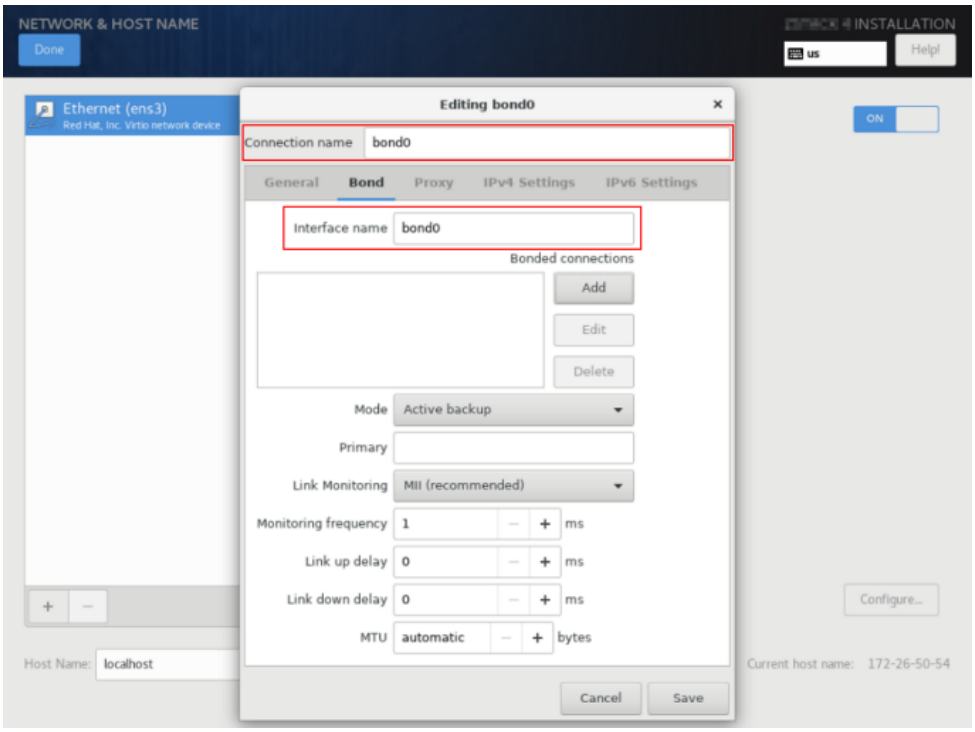

Figure 5: Adjust Connection Name

b) On the Bond configuration window, click **Add** to add a bond slave.

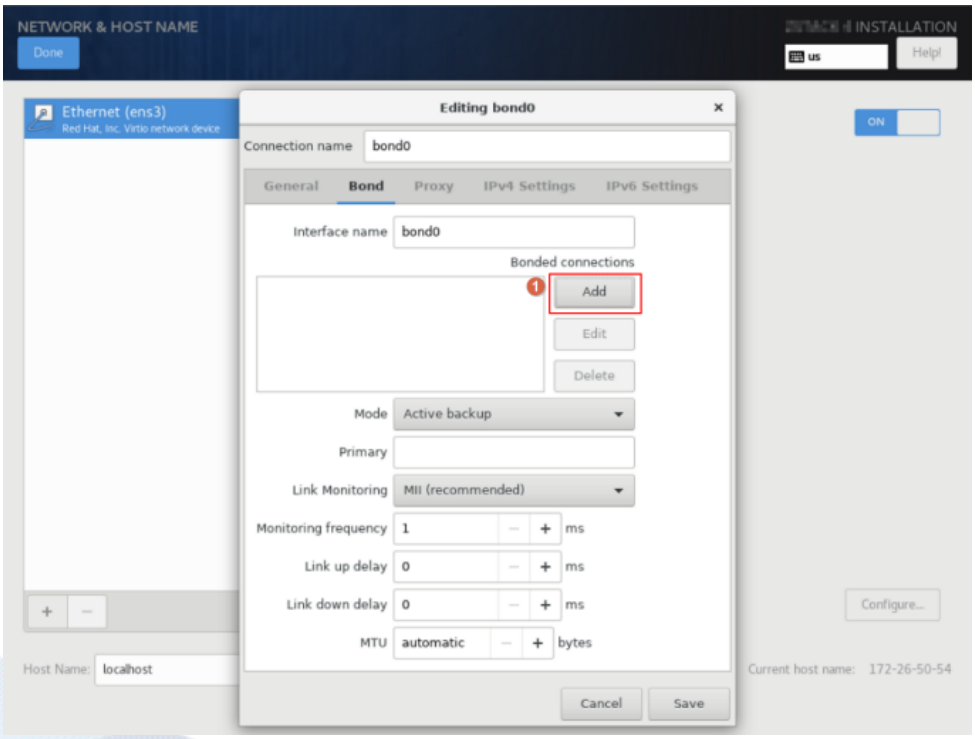

Figure 6: Add Bond Slave

c) In the *Choose a Connection Type* dialog, choose a connection type from the drop-down list, such as **Ethernet**, and then click **Create...**.

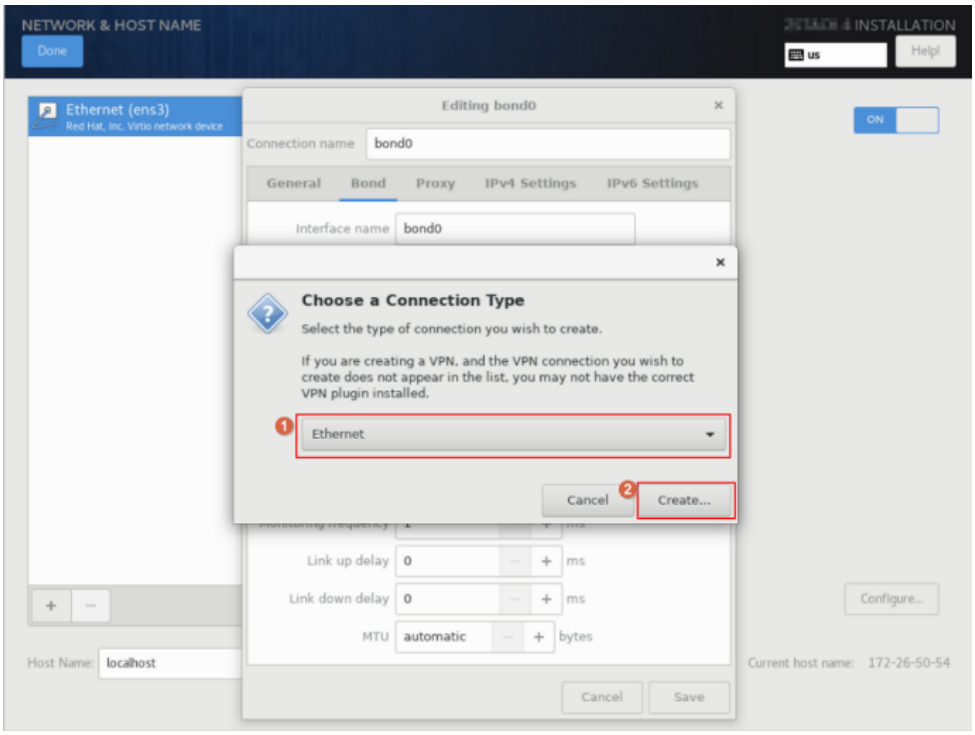

Figure 7: Select Bond Slave Connection Type

d) On the **Ethernet** tab of the *Editing bond0 slave1* dialog, click **Device** and select the Slave device you want to bind, such as **ens3** (corresponding MAC address). Keep the other options as default or customize them as needed, then click **Save**.

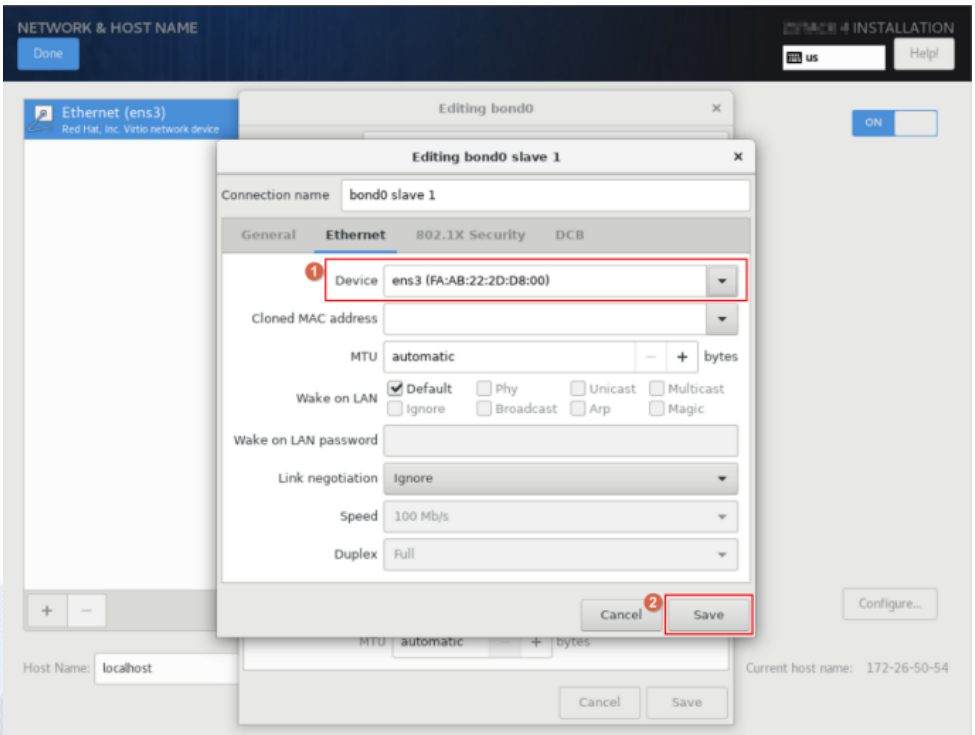

Figure 8: Select Bond Slave Device

8. **Select the Bond mode.**

In the Bond configuration dialog, choose the bond mode from the **Mode** drop-down list as needed, such as **Active backup**. Keep the other options as default or customize them as needed, then click **Save**.

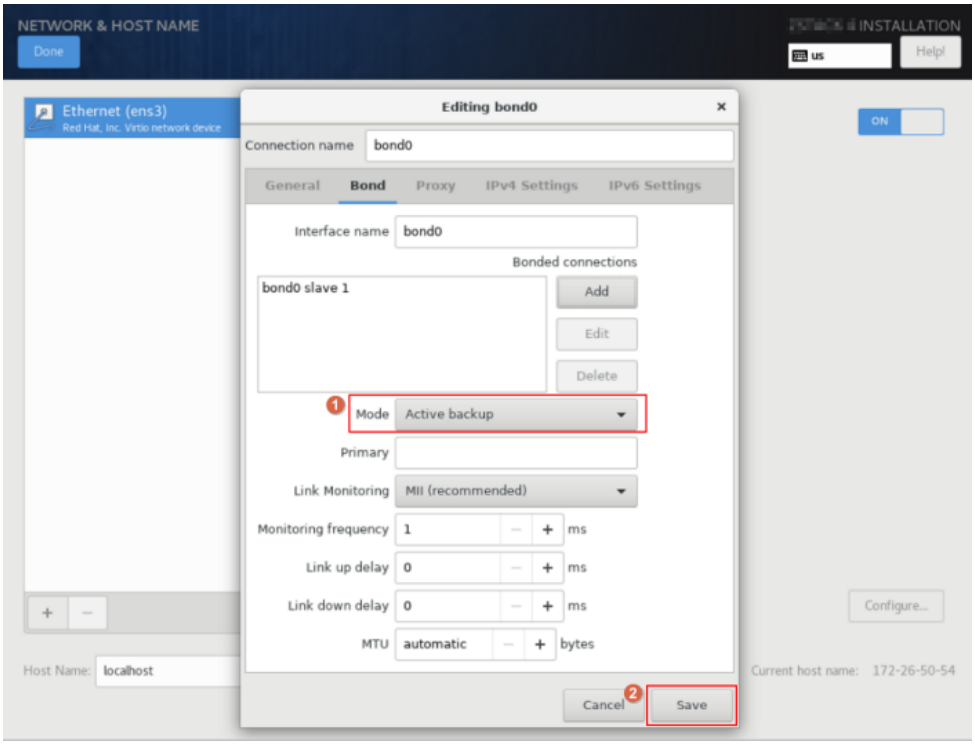

Figure 9: Select Bond Mode

9. **Disable IPv4 on the original NIC.**

   a) Select the original NIC, such as **Ethernet (ens3)**, and click **Configure**.

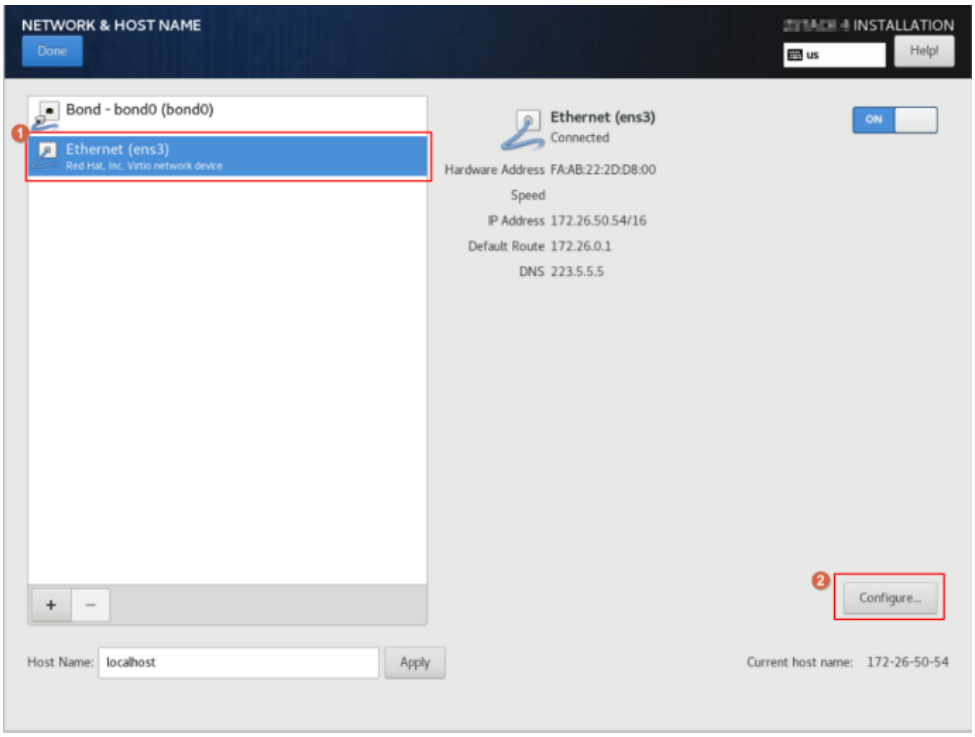

Figure 10: Configure Original NIC

b) The *Editing ens3* dialog pops up. Click **IPv4 Settings** to access the IPv4 Settings tab. Change the **Method** parameter value to **Disabled**, then click **Save**.

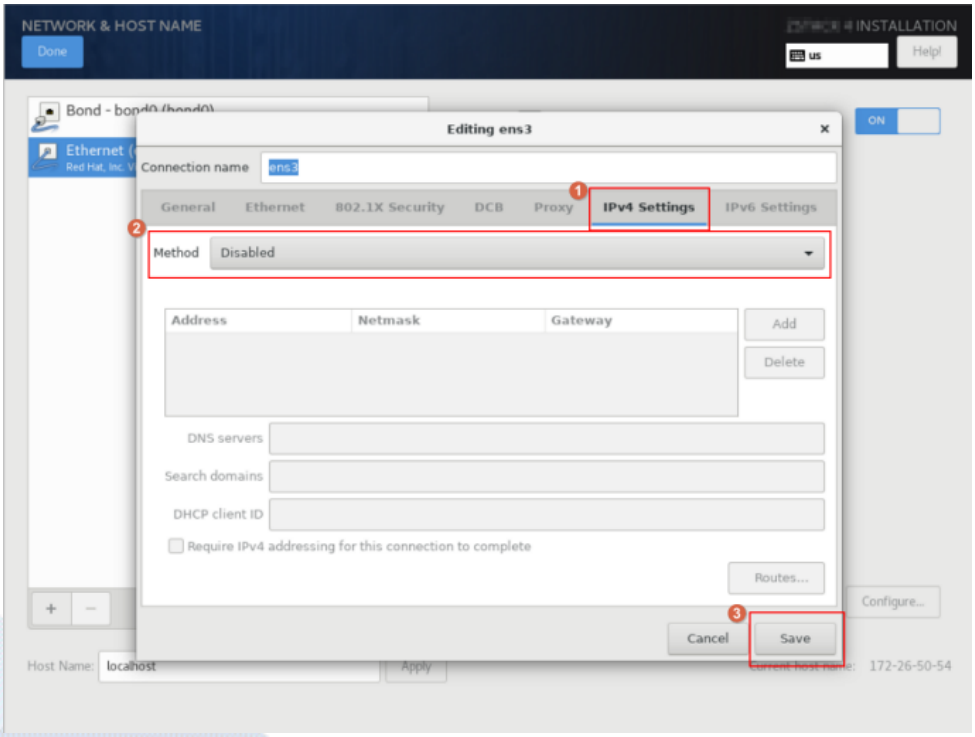

Figure 11: Disable IPv4

10. **Configure a static IP address for Bond.**

a) On the **NETWORK & HOST NAME** page, choose the bond device, such as **Bond (bond0)**, and then click **Configure**.

b) The *Editing bond0* dialog pops up. Click **IPv4 Settings** to access the IPv4 Settings tab. Change the **Method** parameter value to **Manual** to switch the IP address acquisition method to manual.

c) Click **Add** to add an IP address entry. Configure the IP address, netmask, and gateway as needed, then click **Save** to save the configuration.

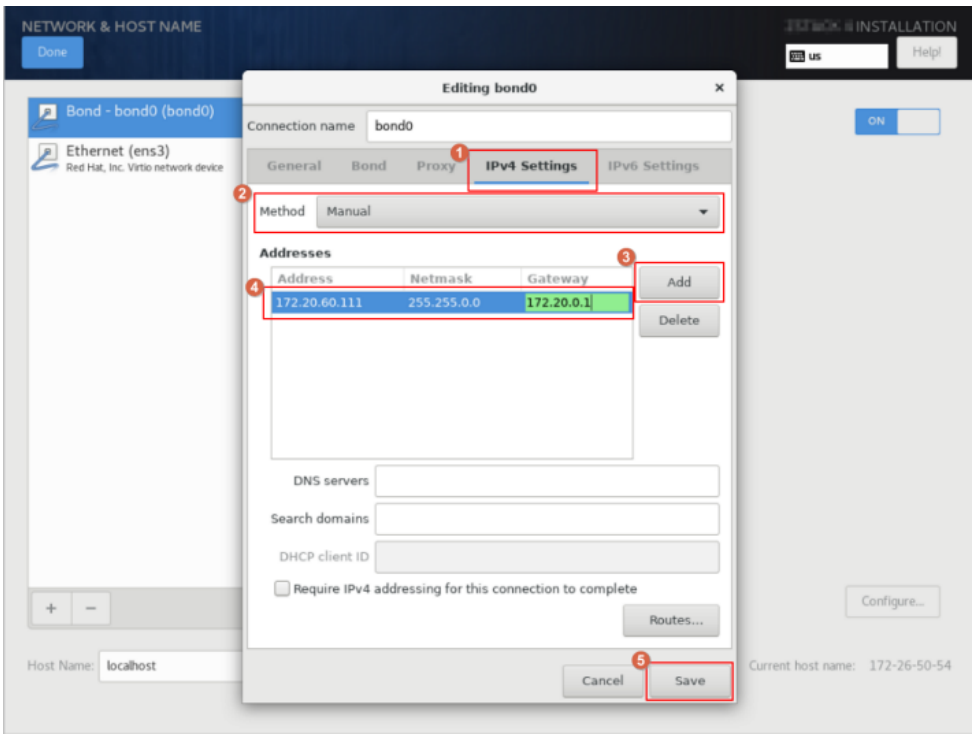

Figure 12: Configure Bond Static IP Address

11. **Configure the NIC to activate automatically.**
In the *Editing bond0* dialog, click **General** to access the General tab. Select the **Connect automatically with priority** checkbox to set the NIC to activate automatically, then click **Save**.

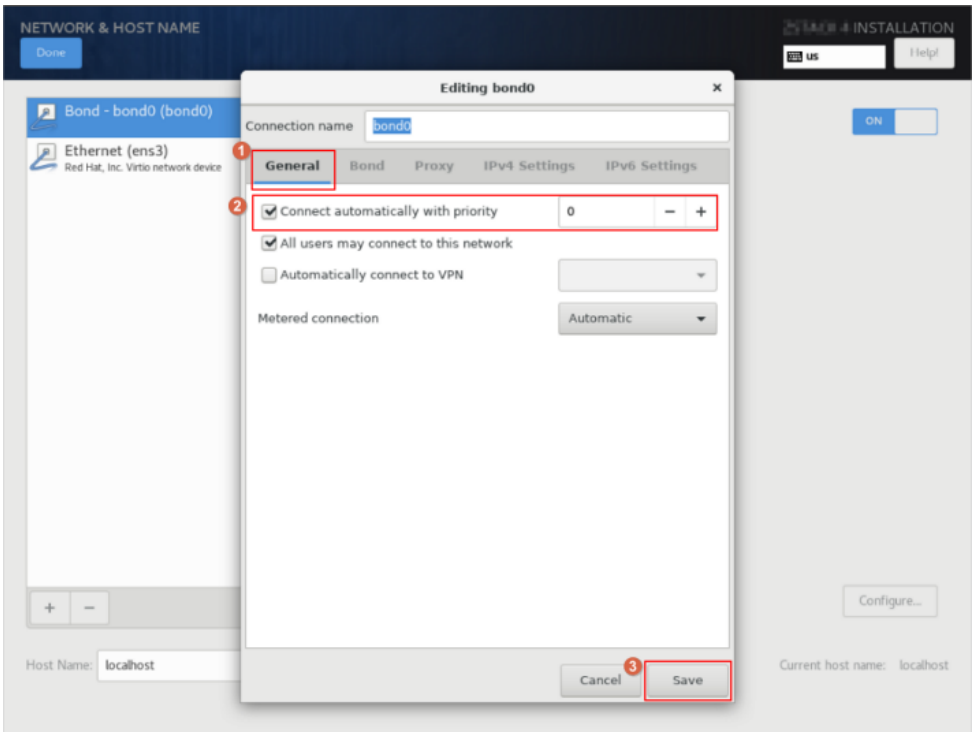

Figure 13: Configure NIC to Activate Automatically

12. **Complete the Bond configuration.**

    a) Check the Bond configuration settings. Ensure that **On** is enabled and that you have configured the IP address. Also, make sure the Bond Slave (such as **ens3**) is set to **On**. Otherwise, nSSV will not be installed properly.

    b) Review the configuration and click **Done** to return to the **INSTALLATION SUMMARY** page.

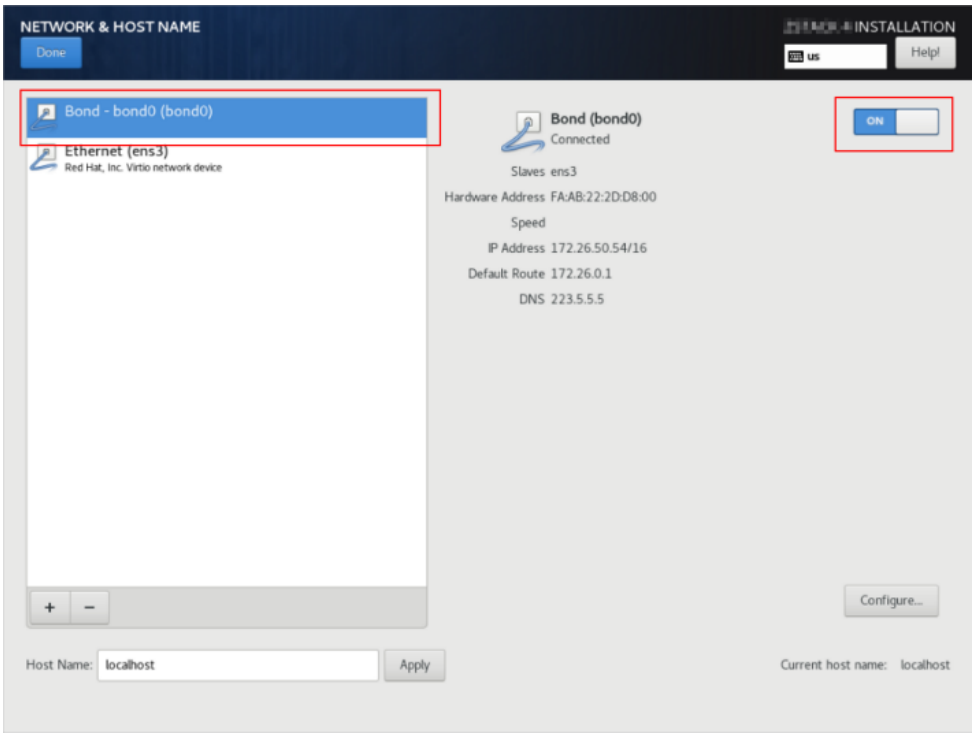

Figure 14: Check Bond Configuration

13. On the **INSTALLATION SUMMARY** page, click **Root Password** to set the root password for the operating system.
14. On the **INSTALLATION SUMMARY** page, click **Begin Installation** to begin installing the operating system.

3.2.2 Single NIC Deployment

The process for installing the operating system is the same for both x86 and ARM servers. The following sections will detail the installation steps using the x86 server as an example.

Procedure

1. **Configure the server.**
    - Make sure to back up any data on the server's hard disk, as the installation process will overwrite it.
    - Enter the BIOS and enable the CPU VT and Hyper-Threading (HT) options.
    - Configure the appropriate RAID level in the RAID controller to provide data redundancy.
    - Set the USB drive as the first boot device.
2. **Select the boot option.**
   Enter the ISO boot interface and choose the default option to start the operating system installation. You can select based on your actual situation, but we recommend using the graphical user interface (GUI) for installation. If the server does not have a VGA port and only supports serial connections, you can use either VNC or text mode installation methods.
    - GUI method

- VNC method
- Text mode method

3. **Review the installation configuration summary.**
   This page displays the system installation configuration. You can modify the configuration as needed. By default, nSSV is configured with the following settings:
   - Keyboard: English (US)
   - Language Support: English (United States)
   - Time & Date: Asia/Shanghai (UTC+8). We recommend that you check the host's time in advance and configure it to the current time and time zone.
4. **Select the installation mode.**
   a) On the **INSTALLATION SUMMARY** page, click **Software Selection**.
   b) On the **SOFTWARE SELECTION** page, choose the installation mode.
      - **nSSV Management Node**
      - **nSSV Compute Node**
      - **nSSV Expert Mode**
   c) After selecting the installation mode, click **Done**.
5. **Configure the disk partitions.**
   a) On the **INSTALLATION SUMMARY** page, click **Installation Destination** to enter the **INSTALLATION DESTINATION** page.
   b) For **Device Selection**, we recommend that you only configure the system disk. After the system is installed, you can configure other disks.
   c) For **Storage Configuration**, we recommend selecting **Automatic** to automatically configure the disk partitions.

   If you need to manually configure disk partitions, refer to the following guidelines based on the BIOS boot mode:

   UEFI Mode:
   - `/boot`: 1GB
   - `/boot/efi`: 500MB
   - `swap`: 32GB
   - `/`: remaining space

   Legacy Mode:
   - `/boot`: 1GB
   - `swap`: 32GB
   - `/`: remaining space

Note:

- The above values represent the recommended partition sizes for nSSV (total disk capacity should be greater than 300GB).
- In Legacy mode, if the system disk capacity exceeds 2TB, you need to configure a BIOS boot partition to support GPT partitioning. UEFI mode does not have this limitation and supports GPT partitioning.

d) Review the configuration and click **Done**.

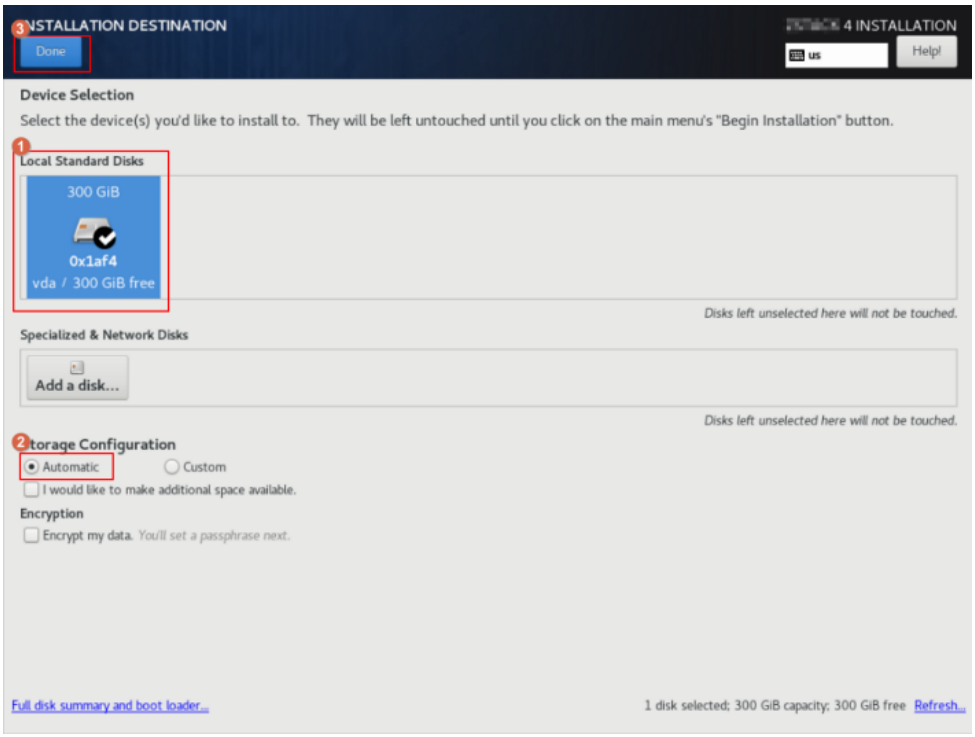

Figure 15: Configure Disk Partitions

6. **Start configuring the NIC.**

   a) On the **INSTALLATION SUMMARY** page, click **Network & Host Name** to access the **NETWORK & HOST NAME** page.

   b) Select a NIC from the list on the left, such as **Ethernet (ens3)**.

   c) Click **Configure**.

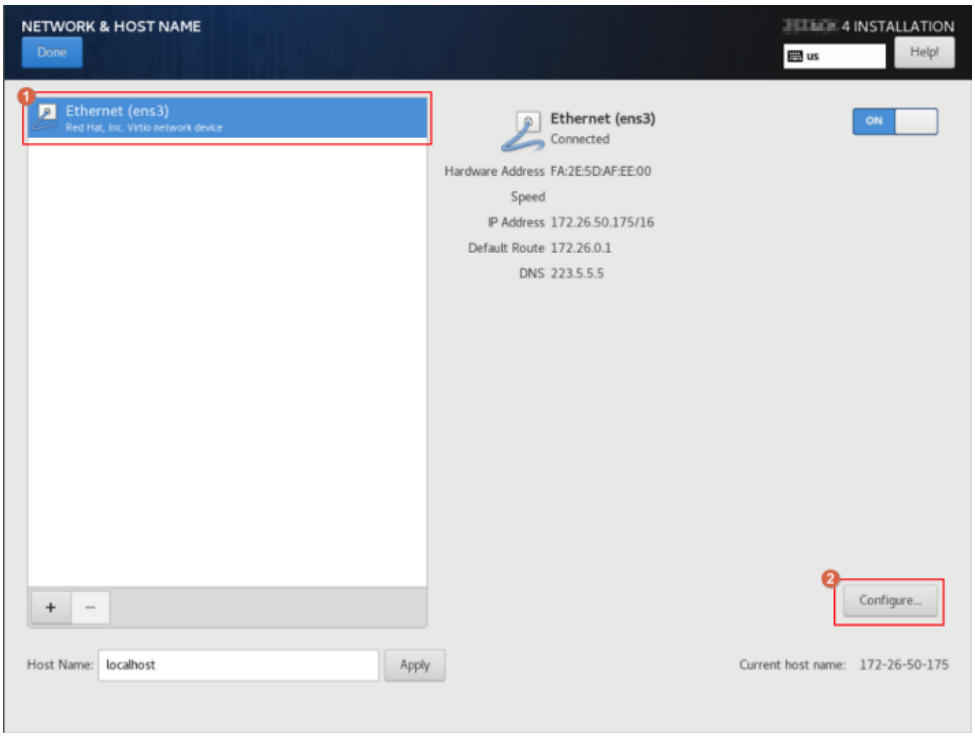

Figure 16: Configure NIC

7. **Configure a static IP address for the NIC.**

   a) In the *Editing ens3* dialog, click **IPv4 Settings**.

   b) For **Method**, choose the IP address acquisition method as needed. For example, select **Manual** to specify the IP address manually.

   c) Click **Add** to add an IP address entry, and configure the IP address, netmask, and gateway as needed.

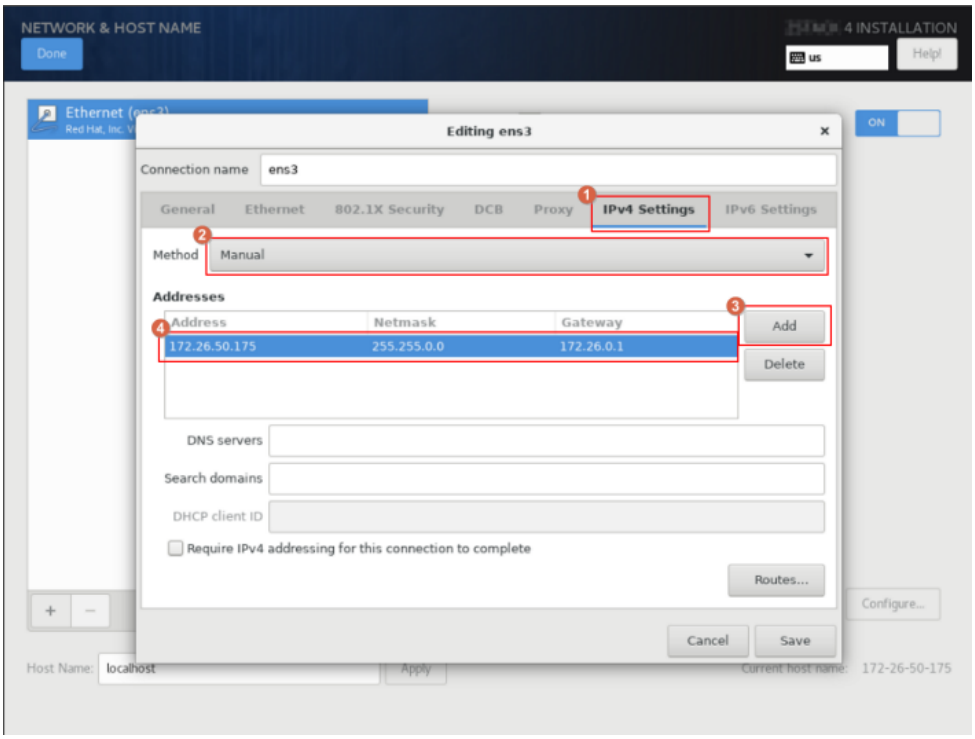

Figure 17: Configure Static IP Address

8. **Configure the NIC to activate automatically.**

   a) In the *Editing ens3* dialog, click **General**, then select the **Connect automatically with priority** checkbox to set the NIC for automatic activation.

   b) Review the configuration and click **Save**.

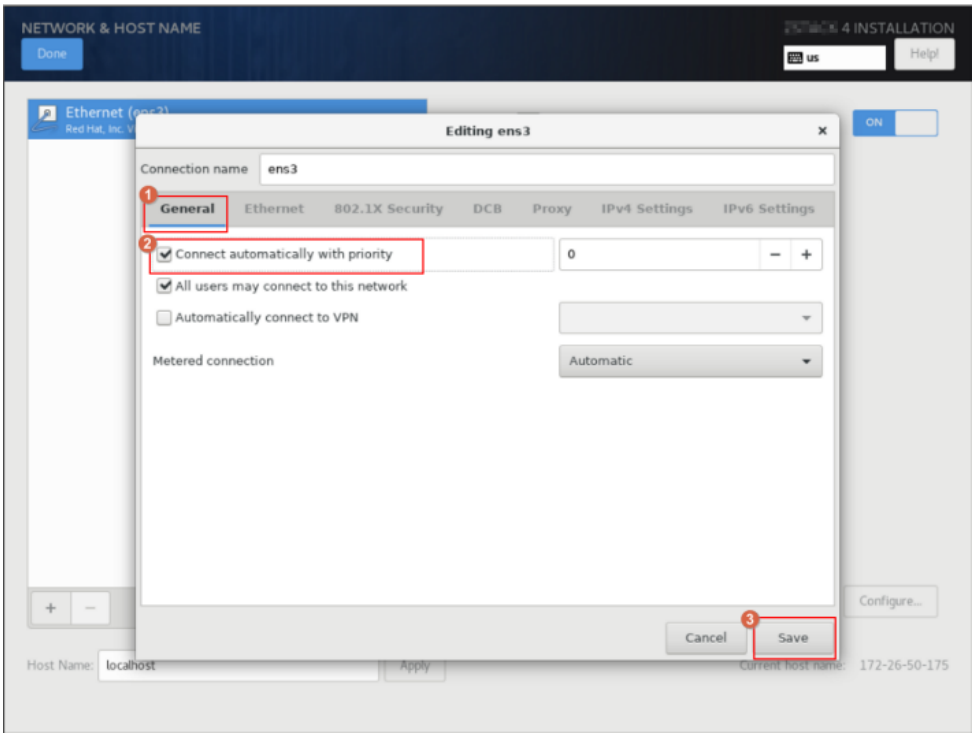

Figure 18: Configure NIC to Activate Automatically

9. **Complete the NIC configuration.**

   a) Return to the **NETWORK & HOST NAME** page, and confirm that you have selected the correct NIC and that the NIC status is **ON**.

   b) Click **Done** to return the **INSTALLATION SUMMARY** page.

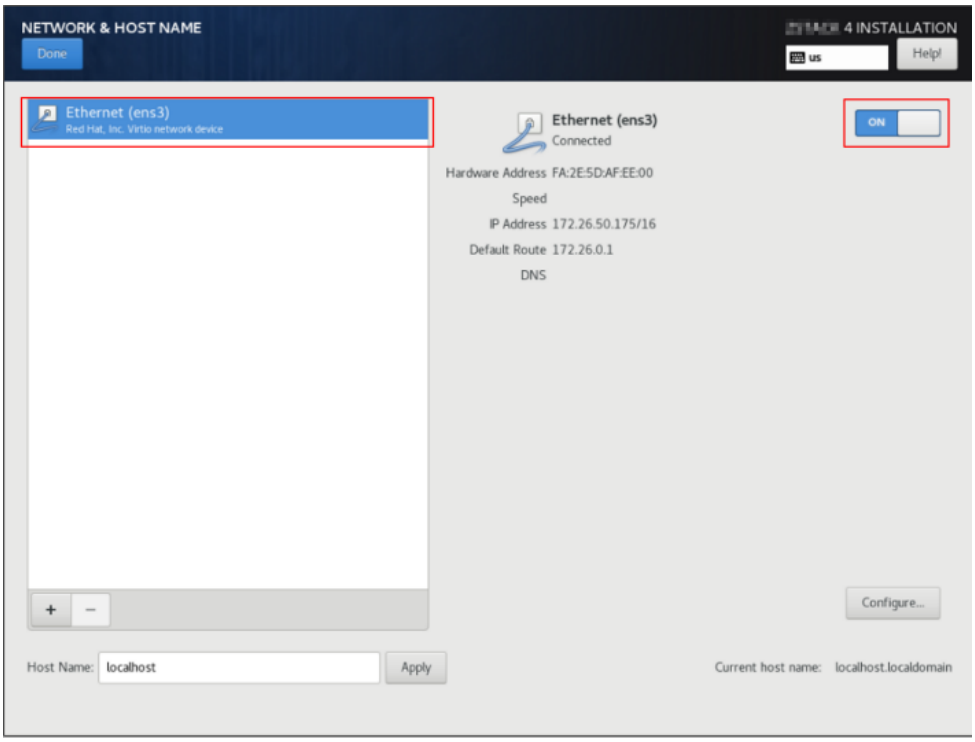

Figure 19: Check NIC Configuration

10. On the **INSTALLATION SUMMARY** page, click **Root Password** to set the root password for the operating system.
11. On the **INSTALLATION SUMMARY** page, click **Begin Installation** to begin installing the operating system.

3.3 Manage nSSV Service

Check Service Status You can use the `cloud-ctl status` command to check the running status of the services related to the nSSV management node.

You can also use the `cloud-ctl ui_status` command to check the status of the Web UI separately.

```
[root@localhost ~]# cloud-ctl ui_status
```

```
UI status: Running [PID:8459] https://10.0.0.254:443
```

Change Service Status If you need to restart the management node service without restarting the Web UI service during use, run the following command:

```
cloud-ctl restart_node
```

It is not recommended to stop and restart all services at once during use. If you must restart all services, you can run the following command:

```
cloud-ctl stop && cloud-ctl start
```

If the management node stops services due to maintenance or other issues, you need to start the services manually. To start the nSSV service, run the following command:

 # This command will start both the management node and Web UI services

```
[root@localhost ~]# cloud-ctl start
```

4 Access nSSV Web Interface

Once the services related to nSSV have started successfully, you can access nSSV using your browser:

Default Credentials: `admin` / `password`.

4.1 Platform Login

HTTPS Protocol: The virtualization platform defaults to redirecting to the HTTPS address on port 443. Simply enter the management node IP address in your browser to access the UI management interface, for example:

```
    https://management_node_ip
```

nSSV supports the following login methods:

- **Account Login**: You need to enter your username and password.
- **Single Sign-On Login**: You need to enter your login attribute name and password.

5 Initial nSSV Configuration via Web Interface

5.1 First Login Setup

After successfully logging into the nSSV web interface, the **initial setup wizard** will automatically start. Follow the wizard steps to complete the basic configuration of the platform:

1. **Create Data Center**: Define the logical container for your resources.
2. **Create Cluster**: Organize one or more hosts within the data center.
3. **Add Host**: Register the physical node that will provide compute resources.
4. **Configure Data Storage**: Add and configure storage resources for VM data.
5. **Configure Image Storage**: Add storage for operating system images and templates.
6. **Configure Networking**: Define network resources and distributed switches.

Once the wizard is completed successfully, your environment is ready for creating and managing virtual machines.

6 Creating Virtual Machines

With the infrastructure configured, you can now create virtual machines directly from the web interface by selecting:

- The target host or cluster
- Basic VM settings (name, OS type, CPU, memory)
- Storage and networking parameters
- Installation media from the configured image storage

7 Conclusion

The nSSV installation and initial configuration are now complete. The platform is ready for virtual machine deployment and management.