



NETLAB+®

Installation Guide

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This guide documents features available in **NETLAB+ version 22.5.0** and later.



Current NETLAB+ users of version 21.X.X and earlier: Please see the [NETLAB+ Data Transfer Utility Guide](#) for details on the required procedure to upgrade your NETLAB+ system to version 22.X.X.

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Introduction

This is the *NETLAB+ Installation Guide*, for the virtual edition of NETLAB+.

NETLAB+ is a remote access solution that allows academic institutions to deliver a hands-on IT training experience with a wide variety of curriculum content options. The training environment that NETLAB+ provides enables learners to schedule and complete lab exercises for information technology courses. NETLAB+ is a versatile solution for facilitating IT training in a variety of disciplines, including networking, virtualization, storage, and cybersecurity.

The material in this guide includes instructions on installing a NETLAB+ system.

1 Delivery and Licensing Options

See the subsections below for information on purchase and licensing options available for new and existing NETLAB+ Customers.

1.1 Delivery Options

Delivery options for NETLAB+:

- **Software Only:** Appropriate for those who already have an ESXi management server. NETLAB+ will be downloaded as an OVA.
- **Software and Hardware:** A management server may be purchased along with the software. This option is appropriate for customers who do not have a management server or those who currently have a management server but would like a secondary one.



We do not recommend, nor support, running the NETLAB+ appliance on an ESXi server that also hosts pod VMs.

2 Prerequisites

In preparation for the installation of your NETLAB+ system, please review the following list of prerequisites. Attending to these items will be helpful in expediting the installation process.

- Review the [NETLAB+ VE Designated Operating Environment Guide](#); the guide includes important information on the hardware and software needed to set up the virtual infrastructure required to install NETLAB+.
- You will be required to accept the [NETLAB+ VE Software License Agreement](#).
- NETLAB+ is distributed as an OVA file; purchase may be required. Please visit www.netdevgroup.com for details.

3 Obtain the OVA File



You will need the customer information email sent to your organization from the Network Development Group (NDG), in order to complete the steps in this section.

The email from Network Develop Group (NDG) includes the following items:

- **Link:** A link to the download page, where you will obtain the OVA (good for 30 days only)
- **Password:** Required to gain access to download the OVA
- **System Serial Number:** The serial number of your NETLAB+ system (see the *Manage License* section)
- **License Key:** The license key for your NETLAB+ system (see the *Manage License* section)
- **Active Pod Limit:** The number of pods that may be in use simultaneously, supported by your license

To obtain the OVA file:

1. Click the link in the email from NDG to view the download page.



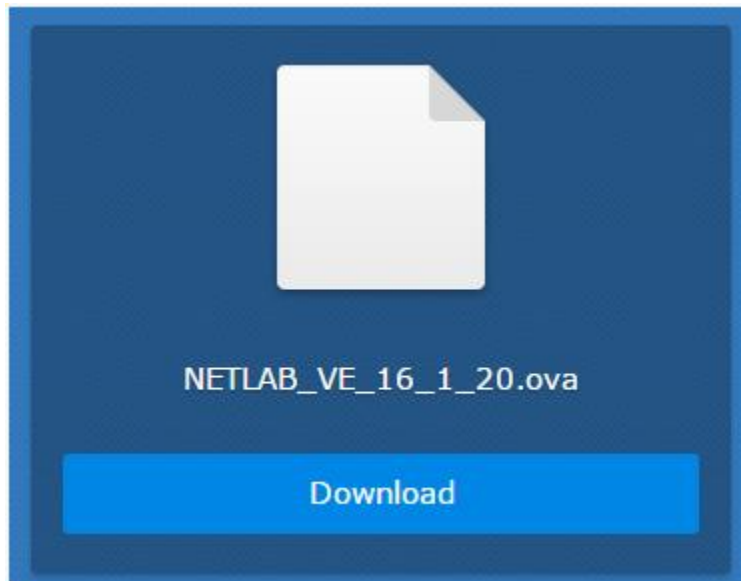
The download link will be functional for **30 days only** from time of receipt.

2. On the download page, enter the password provided by NDG.



The image shows a blue-themed login screen titled "Protected Access". Below the title, it says "Enter the password to gain access". There is a password input field with a lock icon on the left and a series of dots representing the password. Below the input field is a blue button labeled "Enter".

3. Click the **Download** button to download the OVA file.



If you have any issues submitting your information on the download page, please [contact NDG Support](#).

4 Deploy to the VMware ESXi Management Server

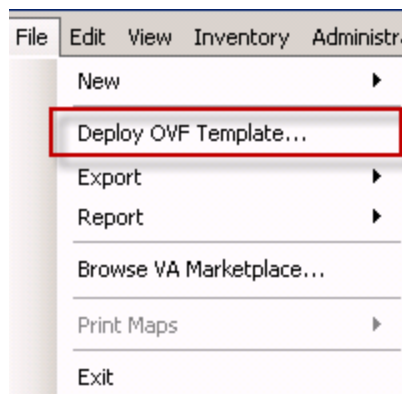


Please refer to the installation and configuration instructions provided in [Remote PC Guide Series - Volume 2, Installation](#) for details on installing the ESXi management server.



Do NOT install VMware Tools on the management server. NETLAB+ includes a modified version of VMware Tools pre-installed.

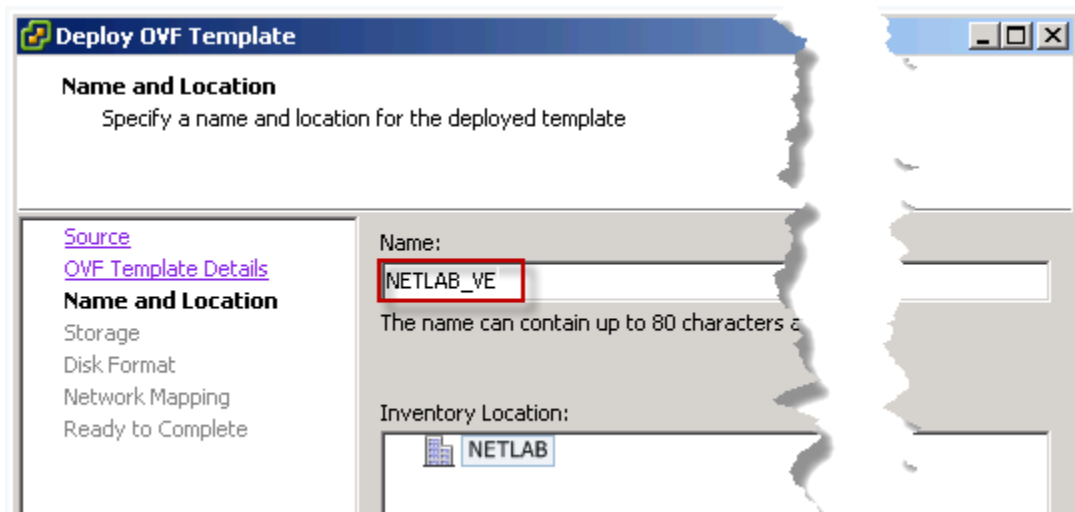
1. Using the vSphere client, navigate to **File > Deploy OVF Template**.



2. Click **Browse** and point to the OVA you downloaded. Click **Next**, review OVA details, and click **Next** again.
3. Enter **NETLAB_VE** as the virtual machine name, then click **Next**.



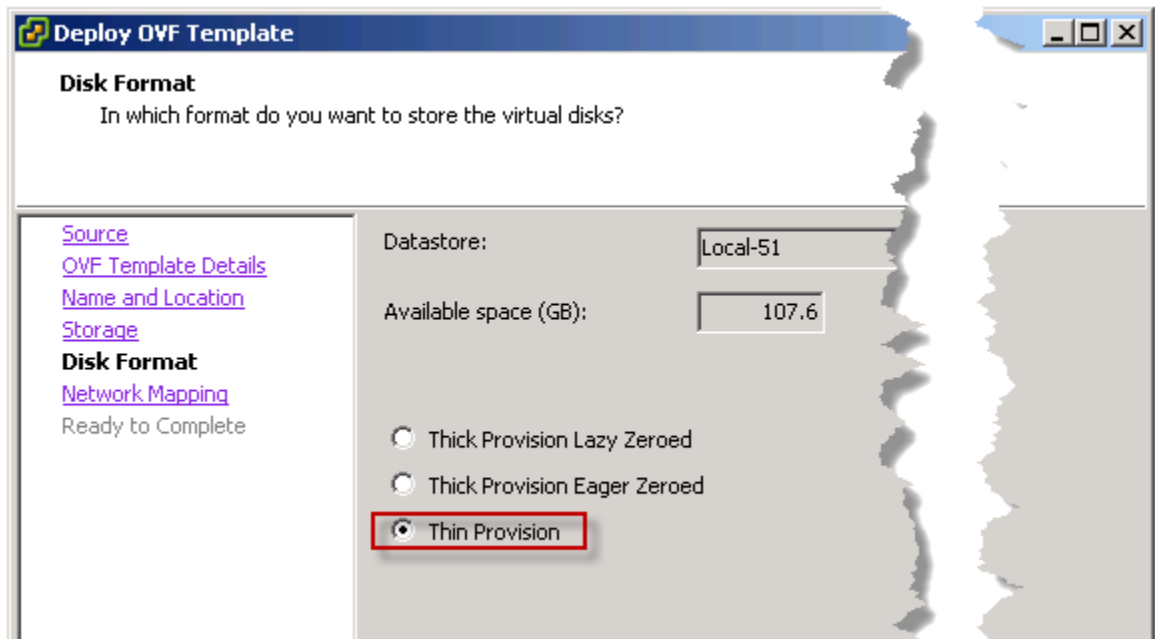
If your system setup has multiple NETLAB+ platforms, use the naming convention NETLAB_VE_1, NETLAB_VE_2, etc...



4. Select your destination storage for this virtual machine and click **Next**.
5. Select **Thin Provision** and click **Next**.



NDG strongly recommends you select **Thin Provision** for deployment. The advantages of expansive storage and performance have greatly increased in recent versions of VMware ESXi.



Deploy OVF Template

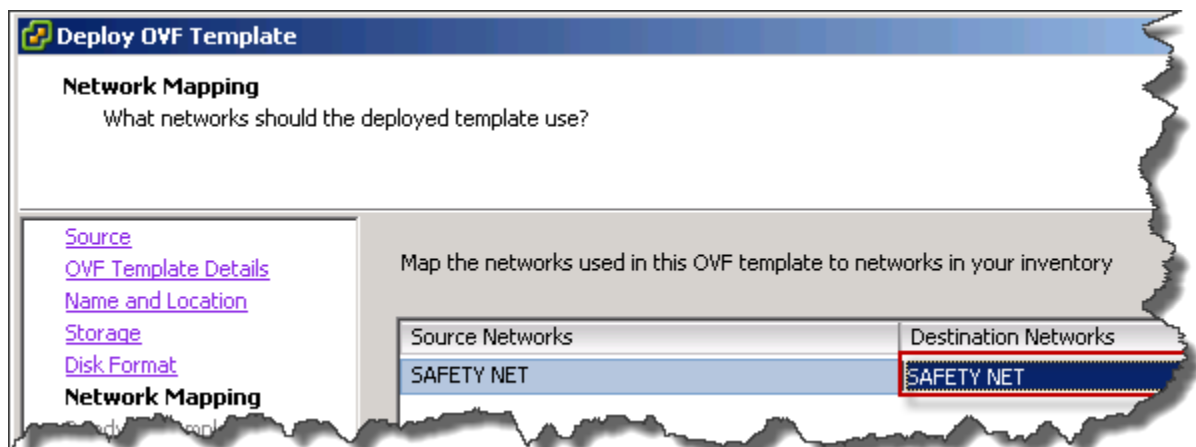
Disk Format
In which format do you want to store the virtual disks?

Source
[OVF Template Details](#)
[Name and Location](#)
[Storage](#)
Disk Format
[Network Mapping](#)
 Ready to Complete

Datastore: Local-51
 Available space (GB): 107.6

Thick Provision Lazy Zeroed
 Thick Provision Eager Zeroed
 Thin Provision

6. Make sure all sources networks are mapped to **SAFETY_NET** and click **Next**.



Deploy OVF Template

Network Mapping
What networks should the deployed template use?

Source
[OVF Template Details](#)
[Name and Location](#)
[Storage](#)
[Disk Format](#)
Network Mapping

Map the networks used in this OVF template to networks in your inventory

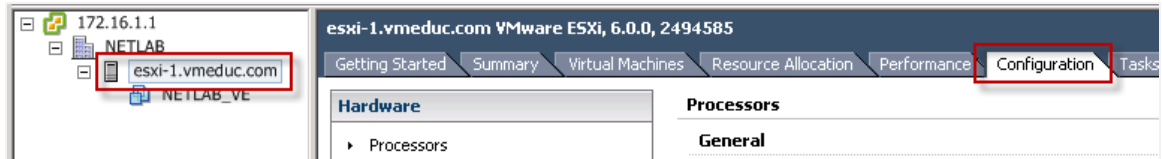
Source Networks	Destination Networks
SAFETY NET	SAFETY NET

7. Review the deployment settings and click **Finish** to deploy NETLAB+.

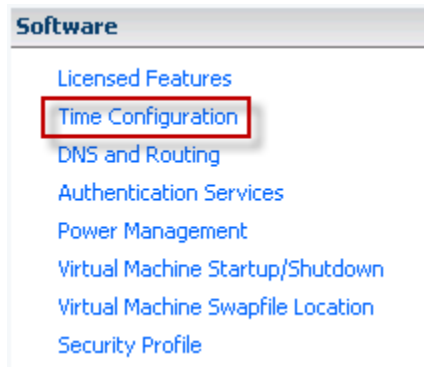
4.1 Verify Time Setting on Host

The NETLAB+ virtual machine currently uses VMware Tools to synchronize time with the host ESXi server. You will need to verify the host server is configured to synchronize with NTP (Network Time Protocol) so that the time is accurate.

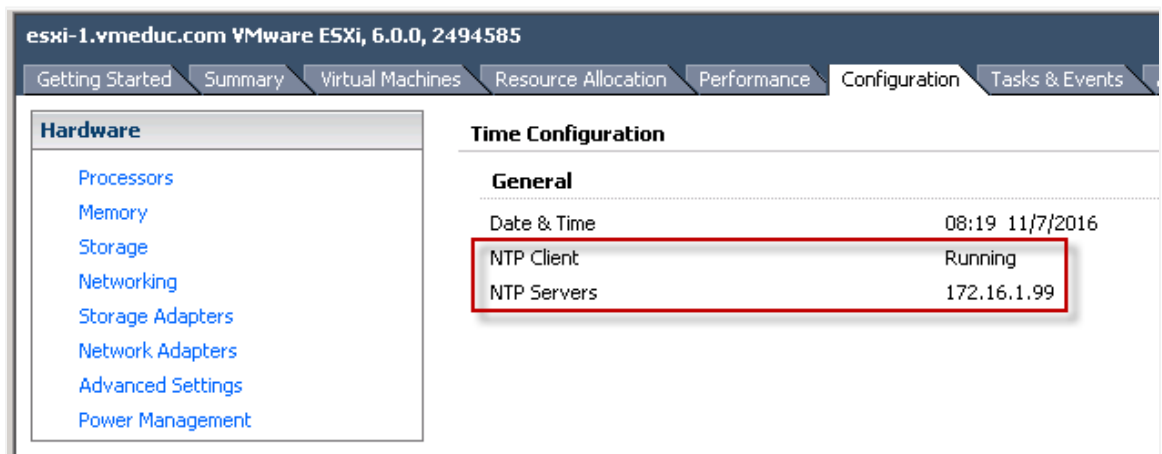
1. Select the ESXi host on the left and click the **Configuration** tab.



2. Select **Time Configuration** under the Software section on the left.



3. Verify that the **NTP Client** is running and the appropriate **NTP Servers** are set.



4.2 Edit VM Settings

Review and update the virtual machine properties. Adjust the settings for the hardware components as listed below.

1. Select the **NETLAB_VE** virtual machine on the left side.
2. Click on **Edit virtual machine settings**.
3. Verify Memory is set to **24GB**.
4. Verify CPUs is set to **4**.

Hardware	Summary
Memory	24576 MB
CPUs	4
Video card	Video card
VMCI device	Deprecated
SCSI controller 0	LSI Logic Parallel
CD/DVD drive 1	Client Device
Hard disk 1	Virtual Disk
Hard disk 2	Virtual Disk

5. Adjust the settings for network adapters, as shown in the table below.

Network Adapter	Name	Connect at power on - checkbox
Network Adapter 1	NETLAB_LAN_1	checked
Network Adapter 2	NETLAB_LAN_2	NOT checked
Network Adapter 3	SAFETY_NET	NOT checked
Network Adapter 4	SAFETY_NET	NOT checked



Network Adapter 1 is the primary network adapter, which connects to your campus LAN. The default name used by VMware for this adapter is **Management Network**, as shown in the *Verifying vSwitch0 Configuration* section of the [Remote PC Guide Series - Volume 2, Installation](#). We recommend renaming the adapter to **NETLAB_LAN_1**.



Network Adapter 2 is used in setups that include physical lab devices. Please refer to the [NETLAB+ VE Real Equipment Pod Installation Guide for Cisco Networking Academy](#).

6. Select **Options > VMware Tools**.



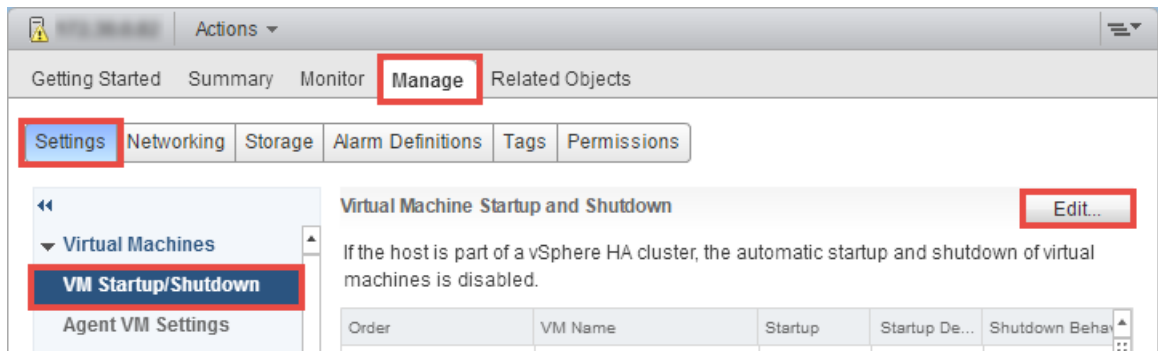
Do NOT install VMware Tools on the management server. NETLAB+ includes a modified version of VMware Tools pre-installed.

7. Verify that **Synchronize guest time with host** is checked.
8. Select **OK**.

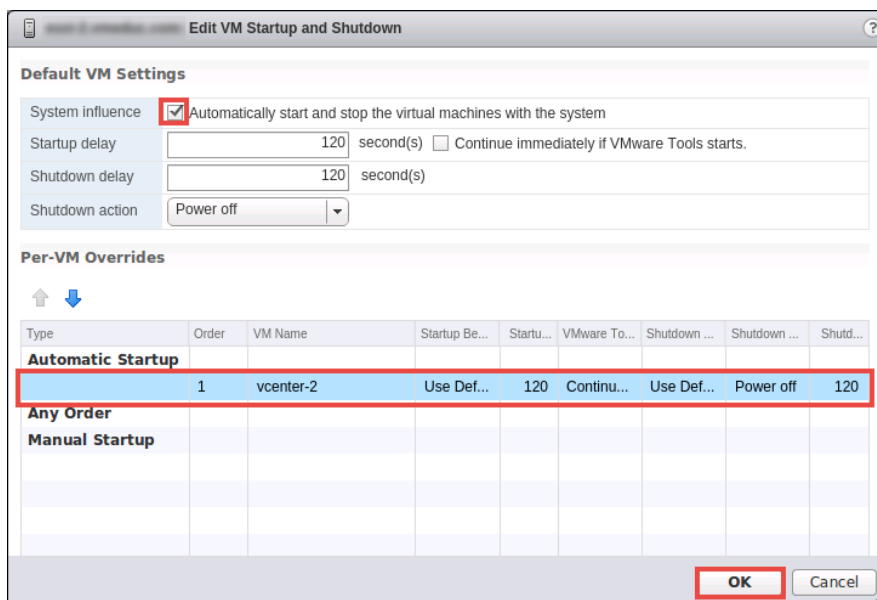
4.3 Configure Automatic Startup for NETLAB+ and vCenter

For this section, you will configure your NETLAB+ and vCenter to start with the ESXi Management Server automatically. This is important because if it is not set up and the ESXi Management Server powers off or is rebooted, the NETLAB+ and the vCenter Appliance will not start up, causing a NETLAB+ communication failure.

1. Using the *vSphere Web Client*, navigate to **Hosts and Clusters**.
2. Click on your ESXi host in the inventory pane where the NETLAB+ and vCSA reside.
3. With the host selected, select **Manage > Settings** from the top pane.
4. Under Virtual Machines, select **VM Startup/Shutdown** and click **Edit**.



5. On the *Edit VM Startup and Shutdown* window, click the checkbox to **Automatically start and stop the virtual machines with the system**.
6. Select your vCenter VM in the list and click the **Move Up** icon until it is directly under **Automatic Startup** (note that the picture below shows the vCenter VM only; you should also see your NETLAB+ listed in your setup).
7. Click **OK**.



8. Close **vSphere Web Client**.

4.4 Power On the Virtual machine

1. Within the vSphere client, click the green button to power on the **NETLAB_VE** virtual machine.

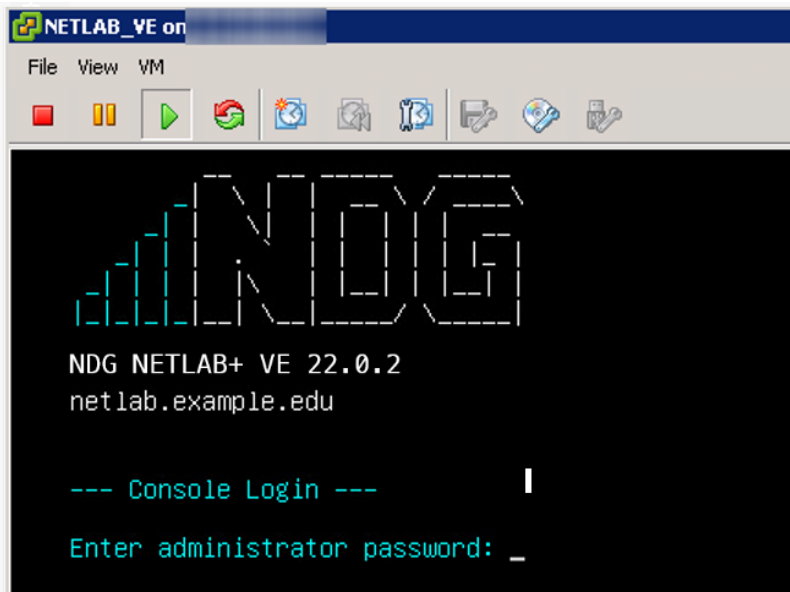


5 Configuring the NETLAB+ Console

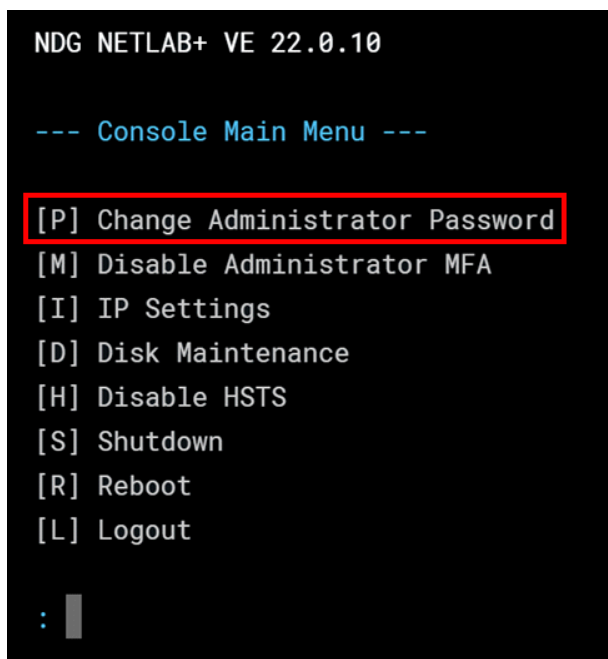
In order to enable web browser access and basic functionality, networking must be configured on the NETLAB+ virtual machine console using the VM vSphere client. Complete the steps in the subsections below.

5.1 Change the Administrator Password

1. Open a console to the NETLAB+ virtual machine.
2. Enter the administrator password, **netlab** (factory default, all lowercase).



3. Press **[P]** to change the administrator password.



4. Enter a new administrator password.
5. Confirm the new password by entering it again.
6. Press any key to continue.



Please record your new password in a safe place. This password will also be used to log in to the administrator web interface.

Passwords must meet the following requirements:

The default requirements shown below can be revised by the NETLAB+ administrator by editing the Password Policy settings.

- Must contain 8 or more characters.
- Must not contain more than 64 characters.
- Must not contain any common, English, dictionary words that are more than 3 characters long.
- Must not contain the user ID for this account.
- Must not contain the email address for this account.
- Must not contain any names associated with this account.

```
NDG NETLAB+ VE 22.0.2
--- Change Administrator Password ---

The administrator password is used to log in to both
the administrator account from the web interface and
this console interface.

Enter new administrator password (blank to quit): *****
Confirm new password: *****
*** password changed
Press any key to continue...
```

5.2 Disable Administrator MFA

NETLAB+ supports multifactor authentication (MFA). MFA requirements are set through the NETLAB+ administrator interface for the administrator, instructors, and students, as described by the [NETLAB+ Administrator guide](#).



Disabling administrator MFA is particularly useful if you find it necessary to override previously set administrator MFA requirements to regain administrator access to your system.



Choosing this option will disable multi-factor authentication for the administrator account. Any existing factors associated with the administrator account will also be disabled. Multifactor authentication and any existing factors can be re-enabled in NETLAB+ administrator web interface.

1. Press **[M]** for Disable Administrator MFA from the Console Main Menu.

```
NDG NETLAB+ VE 22.0.10

--- Console Main Menu ---

[P] Change Administrator Password
[M] Disable Administrator MFA
[I] IP Settings
[D] Disk Maintenance
[H] Disable HSTS
[S] Shutdown
[R] Reboot
[L] Logout

: |
```

2. To confirm, press **[Y]** for Yes.

```
--- Disable Administrator MFA ---

This operation will disable multifactor authentication for the
administrator account. Any existing factors, associated with
the administrator account, will also be disabled. Multifactor
authentication and existing factors can be re-enabled in the
NETLAB+ VE administrator web interface.

Disable MFA? (Y)es/(N)o:
```


5.3 Configure Network Settings

1. Press **[I]** for IP Settings from the Console Main Menu.

```
NDG NETLAB+ VE 22.0.10

--- Console Main Menu ---

[P] Change Administrator Password
[M] Disable Administrator MFA
[I] IP Settings
[D] Disk Maintenance
[H] Disable HSTS
[S] Shutdown
[R] Reboot
[L] Logout

: █
```

2. Press **[I]** for IP Settings.

```
NDG NETLAB+ VE 22.0.6

--- Current IP Settings ---

Hostname       : netlab.example.edu
Web login URL  : https://netlab.example.edu
IP address     : 192.0.2.2
Subnet mask    : 255.255.255.0
Default gateway : 192.0.2.1
DNS servers    : 8.8.8.8
IPv6 Enabled   : No

--- IP Settings Menu ---

[H] Hostname
[I] IP Settings
[6] IPv6 Settings
[D] DNS Servers
[T] Test Network Settings (recommended)
[X] Exit

: _
```

3. Review the current settings, and press [Y] for Yes.

```
NDG NETLAB+ VE 22.0.6
--- Current IPv6 Settings ---
IP address       : 192.0.2.2
Subnet mask      : 255.255.255.0
Default gateway  : 192.0.2.1
Change IP settings (Y)es/(N)o:
```

4. Review the requirements and then press [Y] for Yes.

```
NDG NETLAB+ VE 22.0.6
--- Change IPv4 Settings ---
IMPORTANT: the following applies to systems behind a firewall...
(1) If using NAT, there must be a permanent static NAT entry where
one outside IP address is mapped to one inside address, and vice-versa.
(2) Port 443 (SSL) must be allowed in both directions through the
firewall. This port must be routed; proxies are not supported.
(3) Port 22 (SSH) should be allowed from outside to inside to
facilitate support by NDG. SSH connections to the system can be
limited to source addresses provided by NDG (and we do this in
the system's packet filter too)
Understood? (Y)es/(Q)uit:
```

5. Enter the new IP address.

```
NDG NETLAB+ VE 22.0.6
--- Current IP Settings ---
IP address       : 192.0.2.2
Subnet mask      : 255.255.255.0
Default gateway  : 192.0.2.1
--- Change IP Settings ---
Configuring new IP settings.
Enter 'Q' at any prompt to cancel.
IP address (or Q) [192.0.2.2]: 192.0.2.2
```

6. Enter the **Subnet mask**.

```
NDG NETLAB+ VE 22.0.6

--- Current IP Settings ---

IP address      : 192.0.2.2
Subnet mask     : 255.255.255.0
Default gateway : 192.0.2.1

--- Change IP Settings ---

Configuring new IP settings.
Enter 'Q' at any prompt to cancel.

IP address (or Q) [192.0.2.2]: 192.0.2.2
Subnet mask (or Q) [255.255.255.0]: 255.255.255.0
```

7. Enter the **Default gateway**.

```
NDG NETLAB+ VE 22.0.6

--- Current IP Settings ---

IP address      : 192.0.2.2
Subnet mask     : 255.255.255.0
Default gateway : 192.0.2.1

--- Change IP Settings ---

Configuring new IP settings.
Enter 'Q' at any prompt to cancel.

IP address (or Q) [192.0.2.2]: 192.0.2.2
Subnet mask (or Q) [255.255.255.0]: 255.255.255.0
Default gateway (or Q) [192.0.2.1]: 192.0.2.1
```

8. Press [Y] to apply the settings.

```
NDG NETLAB+ VE 22.0.6

--- Current IP Settings ---

IP address      : 192.0.2.2
Subnet mask     : 255.255.255.0
Default gateway : 192.0.2.1

--- Change IP Settings ---

Configuring new IP settings.
Enter 'Q' at any prompt to cancel.

IP address (or Q) [192.0.2.2]: 
Subnet mask (or Q) [255.255.255.0]: 
Default gateway (or Q) [192.0.2.1]: 

OK, ready to apply new interface settings...

IP address      : 
Subnet mask     : 
Default gateway : 

Apply these settings? (Y)es/(N)o:
```

9. From the IP Settings Menu, enter [D] for DNS servers.

```
--- IP Settings Menu ---

[H] Hostname
[I] IP Settings
[6] IPv6 Settings
[D] DNS Servers
[T] Test Network Settings (recommended)
[X] Exit

: _
```

10. Select **[L]** or **[G]**, depending on if you are using local or Google (default is **[G]**).

```
NDG NETLAB+ VE 22.0.6
--- Current DNS Settings ---
DNS servers      : 8.8.8.8
--- DNS Configuration Options ---
[L] Use Local DNS Servers
[G] Use Google DNS Servers (8.8.8.8, 8.8.4.4)
[X] Exit
:
```

11. Enter the **First DNS server IP address**.

```
NDG NETLAB+ VE 22.0.6
--- Current DNS Settings ---
DNS servers      : 8.8.8.8
--- DNS Configuration Options ---
[L] Use Local DNS Servers
[G] Use Google DNS Servers (8.8.8.8, 8.8.4.4)
[X] Exit
: L

Please enter the IP addresses of local DNS servers in the order they
should be tried.  The first DNS server will normally be used for all
DNS lookups.  The second DNS server (optional) will only be tried if
the first DNS server request fails.

First DNS server IP address (Q to quit):
```

12. Enter the **Second DNS server IP address**.

```

NDG NETLAB+ VE 22.0.6

--- Current DNS Settings ---

DNS servers      : 8.8.8.8

--- DNS Configuration Options ---

[L] Use Local DNS Servers
[G] Use Google DNS Servers (8.8.8.8, 8.8.4.4)
[X] Exit

: L

Please enter the IP addresses of local DNS servers in the order they
should be tried. The first DNS server will normally be used for all
DNS lookups. The second DNS server (optional) will only be tried if
the first DNS server request fails.

First DNS server IP address (Q to quit): 192.168.1.1
*** second DNS server is optional, enter blank for none
Second DNS server IP address (blank for none, Q to quit):

```

13. Verify that all DNS lookups pass, and then press any key to continue.



UDP port 53 must be open outbound.

```

NDG NETLAB+ VE 22.0.6

--- Current DNS Settings ---

DNS servers      : 8.8.8.8

--- DNS Configuration Options ---

[L] Use Local DNS Servers
[G] Use Google DNS Servers (8.8.8.8, 8.8.4.4)
[X] Exit

: L

Please enter the IP addresses of local DNS servers in the order they
should be tried. The first DNS server will normally be used for all
DNS lookups. The second DNS server (optional) will only be tried if
the first DNS server request fails.

First DNS server IP address (Q to quit): 192.168.1.1
*** second DNS server is optional, enter blank for none
Second DNS server IP address (blank for none, Q to quit):
*** second DNS not specified, only first will be used
*** setting DNS server(s) to 192.168.1.1
*** pinging DNS server
*** testing DNS lookup to
*** testing DNS lookup to www.netdevgroup.com... OK
*** testing DNS lookup to www.google.com... OK
*** testing DNS lookup to www.letsencrypt.org... OK
Press any key to continue...

```

14. From the IP Settings Menu, press **[H]** for Hostname.

```
--- IP Settings Menu ---
[H] Hostname
[I] IP Settings
[6] IPv6 Settings
[D] DNS Servers
[T] Test Network Settings (recommended)
[X] Exit

: _
```

15. Review the requirements and then press **[Y]** for Yes.

```
NDG NETLAB+ VE 22.0.6

--- Set Hostname ---

IMPORTANT: the following requirements must be met for
SSL and NETLAB+ HTML5 viewers to function properly..

(1) A hostname-to-IP mapping for this hostname must be
configured in your local DNS servers.

(2) The hostname entered here must match the hostname
specified in the SSL certificate you configure on this
system. If the certificate is a domain certificate,
then only the domain portion of the hostname must match.

(3) Users must access the system using the hostname, not
the IP address. Example:

    Valid URL: https://netlab.example.edu
    Invalid URL: https://192.0.2.2

Understood? (Y)es/(Q)uit: _
```

16. Enter the fully qualified domain name of your system.

```
NDG NETLAB+ VE 22.0.6

--- Set Hostname ---

Enter the fully qualified domain name of this system,
or leave blank to quit. Example:

    netlab.example.edu

Enter hostname (or leave blank to quit): netlab.somedomain.edu_
```

17. From the IP Settings Menu, press [T] to test the network settings.

```
--- IP Settings Menu ---

[H] Hostname
[I] IP Settings
[6] IPv6 Settings
[D] DNS Servers
[T] Test Network Settings (recommended)
[X] Exit

: _
```

18. Review the requirements and then press [Y] for Yes.

```
NDG NETLAB+ VE 22.0.6

--- Network Test ---

This utility checks both inbound and outbound network connectivity.
Requirements to pass all tests:

- IP address, subnet mask, and default gateway set correctly.
- DNS setting configured for local DNS servers, or Google servers.
- Hostname set correctly.
- Hostname is mapped to IP address in local DNS.
- Users outside the firewall can resolve hostname to IP address.
- One-to-one static mapping in firewall (if system is behind one).
- TCP port 80 and 443 allowed through firewall to this host.
- System can contact NDG servers.
- NDG servers can contact this system.

Ready to test? (Y)es/(Q)uit: _
```


19. Verify that the settings are correct and then respond with [Y] to proceed with the test.

```

NDG NETLAB+ VE 22.0.6

--- Network Test ---

These are the current settings that will be tested:

Hostname       : netlab.example.edu
Web login URL  : https://netlab.example.edu
IP address     : 
Subnet mask    : 
Default gateway : 
DNS servers    : 
IPv6 Enabled   : No

Are these correct? (Y)es/(Q)uit: _

```

20. Review the test results shown and then press any key to continue.

```

NDG NETLAB+ VE 22.0.6

--- Network Test ---

These are the current settings that will be tested:

Hostname       : netlab.example.edu
Web login URL  : https://netlab.example.edu
IP address     : 
Subnet mask    : 
Default gateway : 
DNS servers    : 
IPv6 Enabled   : No

Are these correct? (Y)es/(Q)uit: y
*** pinging DNS server (icmp)... OK
*** testing DNS lookup to nss.netdevgroup.com... OK
*** testing DNS lookup to www.netdevgroup.com... OK
*** testing DNS lookup to www.google.com... OK
*** testing DNS lookup to www.letsencrypt.org... OK
*** contacting NDG servers using HTTPS... OK
*** resolving to IP address... OK
*** maps to 
*** outbound traffic appears on the Internet from 
*** outbound and inbound address are the same... OK
*** open on TCP port 443... OK
*** open on TCP port 80... OK
*** is a NETLAB+ system... OK
*** is this system... OK
*** 12 of 12 tests have passed
*** looks good!
Press any key to continue...

```



Notice the Web login URL displayed, this is the URL used to access NETLAB+.

21. Enter [X] to exit the IP settings.

```
--- IP Settings Menu ---  
  
[H] Hostname  
[I] IP Settings  
[6] IPv6 Settings  
[D] DNS Servers  
[T] Test Network Settings (recommended)  
[X] Exit  
  
: _
```

22. Press [L] to Logout.

```
NDG NETLAB+ VE 22.0.10  
  
--- Console Main Menu ---  
  
[P] Change Administrator Password  
[M] Disable Administrator MFA  
[I] IP Settings  
[D] Disk Maintenance  
[H] Disable HSTS  
[S] Shutdown  
[R] Reboot  
[L] Logout  
  
: █
```

5.4 Reset SSL Certificate to Default

NETLAB+ includes a console option to reset the SSL certificate to default should an error condition with the certificate prevent access to the web interface.



Resetting the SSL certificate to default will allow the administrator to regain administrator access to the web interface. This default self-signed certificate is included for configuration purposes. HTML5 viewers will not work with this certificate. It must be replaced with a certificate signed by a trusted certificate authority. Please refer to the [Configuring Your Network Settings](#) section.

1. Press **[I]** for IP Settings from the Console Main Menu.

```
NDG NETLAB+ VE 22.5.0
--- Console Main Menu ---
[P] Change Administrator Password
[M] Disable Administrator MFA
[I] IP Settings
[D] Disk Maintenance
[H] Disable HSTS
[S] Shutdown
[R] Reboot
[L] Logout
: _
```

2. From the IP Settings Menu, press **[S]** for Reset SSL Certificate to Default.

```
--- IP Settings Menu ---
[H] Hostname
[I] IP Settings
[6] IPv6 Settings
[D] DNS Servers
[S] Reset SSL Certificate to Default
[T] Test Network Settings (recommended)
[X] Exit
```

3. Review the information shown and then press [Y] for Yes.

```
--- Reset Active SSL Certificate to Default ---  
  
This options resets the active SSL certificate to the factory default  
and then restarts the web server. The default certificate is  
self-signed and therefore must be replaced with a valid certificate  
using the admin web interface.  
  
Understood? (Y)es/(Q)uit: _
```

4. Press any key to continue.

```
*** restarting web services  
*** nginx restarted ok  
*** apache2 server restarted  
*** SSL certificate reset to default  
*** You must replace the certificate with a valid one.  
Press any key to continue... _
```






6 Connect to the Administrator Interface

The web-based interface allows the administrator to monitor and maintain the NETLAB+ system and devices. This interface is accessible to the administrator.

1. To access the login page, direct a web browser to the address of the NETLAB+ system. Using the most recent available version of the browser you select is recommended. Supported browsers are listed in the table below.



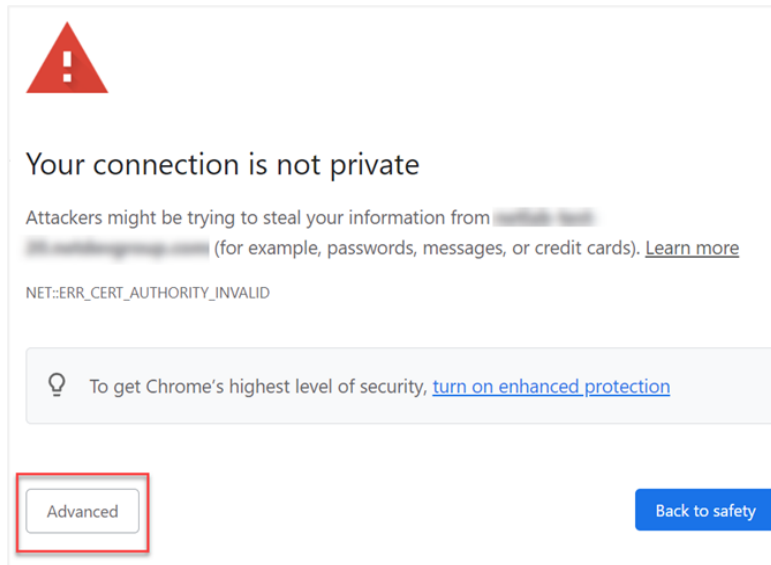
Cookies and JavaScript must be enabled in your browser. The latest information on supported web browsers is available from **Help > Supported Web Browsers** when signed in to a NETLAB+ account.

	Browser	Minimum Version	Support/Experience
	Google Chrome	98	* * * * *
	Mozilla Firefox	97	* * * *
	Apple Safari (MAC only)	15	* * * *
	Microsoft Edge	98	* * * *
	Microsoft Internet Explorer		No longer supported

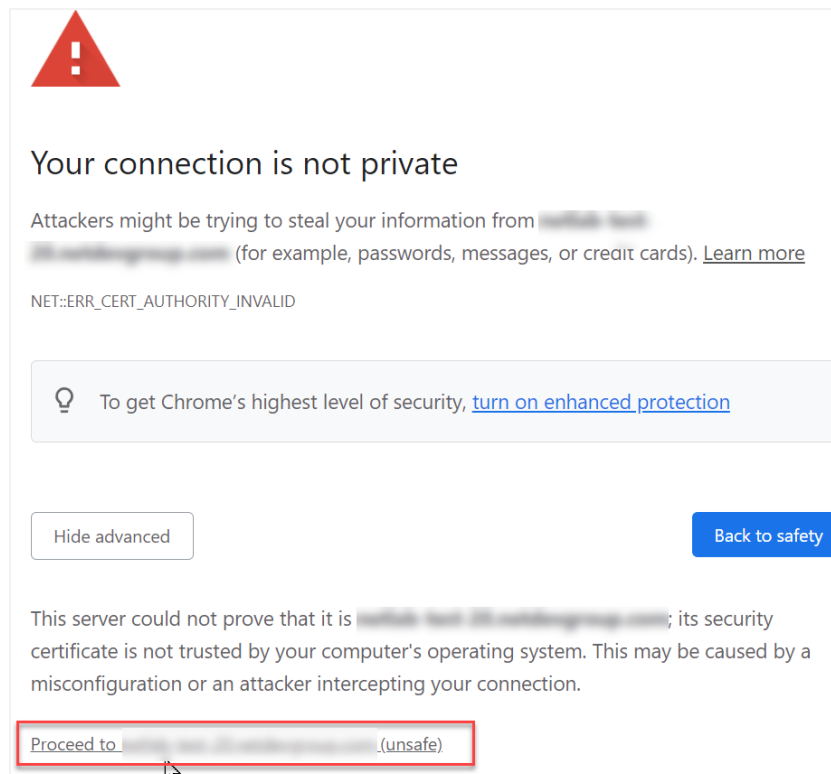
2. Because SSL is not yet configured, you will receive a warning that your connection is not private. Your options to continue will vary, depending on your browser selection. Chrome users should select **Advanced**, as shown below.





The *SSL Configuration - Manage Certificates* section provides instructions on replacing the self-signed certificate included for configuration purposes. HTML5 viewers will not work with this certificate. It must be replaced with a certificate signed by a trusted certificate authority.



3. Select the option to **Proceed** to the page (the options displayed vary, depending on your browser selection).

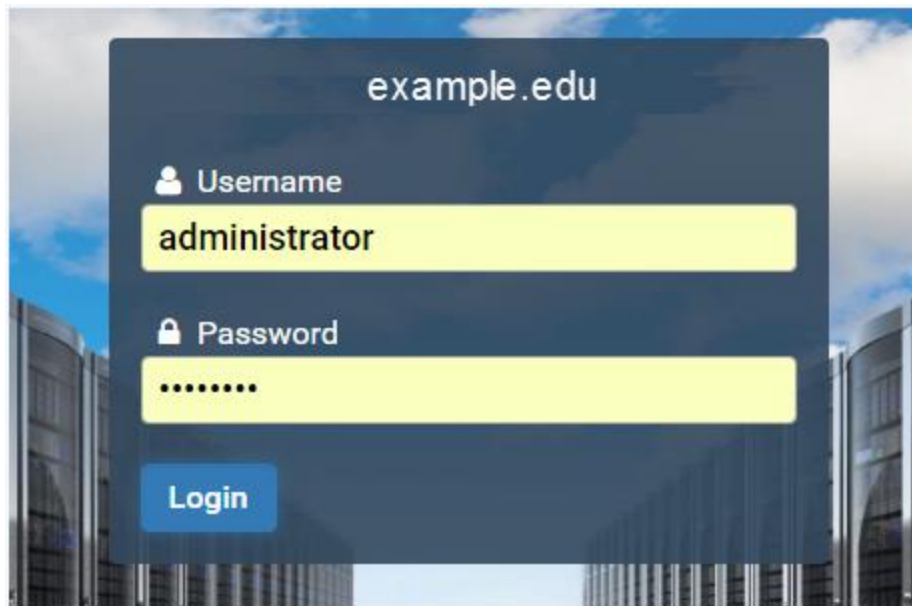


4. Enter the Username  and password , as noted in the table below. Click the **Login** button. The graphics on the page may be different from the example shown below.

Username	Password
administrator	<p>If you changed the password as directed while configuring the NETLAB+ console (see Section 5.1), use your new password.</p> <p>If you have not yet changed the administrator password, enter the factory default, netlab (lowercase).</p>



If you changed the factory default password while completing NETLAB+ console configuration (see Section 5.1), use your new password.



6.1 Change the Administrator Password



If you have already changed the factory default password, skip to the next section.

If you did not yet change the factory default password, the Change Password screen will be displayed during the initial login into the administrator account, requiring you to change the password. NETLAB+ enforces strong passwords.



Please record your new password in a safe place.

Passwords must meet the following requirements:

The default requirements shown below can be revised by the NETLAB+ administrator by editing the Password Policy settings.

- Must contain 8 or more characters.
- Must not contain more than 64 characters.
- Must not contain any common, English, dictionary words that are more than 3 characters long.
- Must not contain the user ID for this account.
- Must not contain the email address for this account.
- Must not contain any names associated with this account.



Changing the administrator account password also changes the the system console password. The same password is used for both functions.

Change Password

New Password

Retype New Password



Notice the **Help** button. You can click the **Help** button on this and other NETLAB+ pages to display information to assist you in entering information and making selections. To hide the help information, click the button again.

Change Password

New Password
Enter your new password here.

Retype New Password
Enter your new password again for confirmation.

- Enter your selection into the **New Password** field.
- Enter the password once again in the **Retype New Password** field and then click **Submit**.



An error message will be displayed if the password entered does not meet the requirements. The message will indicate why the password was unacceptable.

Examples of typical password errors:

- The error message shown below indicates that the new password entered is a simple word found in the common dictionary and, therefore, not eligible to be a password on the system.

New Password

Password cannot be a common dictionary word.

- If the values in the two password fields do not match, an error message will be displayed, similar to the one shown below.

Retype New Password

**The provided passwords do not match.
Please try again.**



If you receive an error, correct the information in the fields as needed and click **Submit** again.




















Make note of your new password, you will need it each time you log into the NETLAB+ system.

6.2 Administrator Home Page

After a successful login, the administrator Home page will be displayed. The administrative functions in the main panel include displaying various system logs and alerts, user management, pods and infrastructure, and content management. Select any function by clicking on the icon or the function name. On the right, system information is displayed.



Please refer to the [NETLAB+ VE Administrator Guide](#) for details on the features and functions of NETLAB+ that are accessed through the Administrator interface.

<div data-bbox="250 720 358 758">System</div> <div data-bbox="315 789 407 890">  Settings </div> <div data-bbox="548 785 618 890">  Logs </div> <div data-bbox="768 785 844 890">  Alerts </div> <div data-bbox="980 789 1070 890">  Usage </div> <div data-bbox="250 947 336 982">Users</div> <div data-bbox="285 1012 436 1115">  Communities </div> <div data-bbox="529 1012 638 1115">  Accounts </div> <div data-bbox="761 1012 850 1115">  Classes </div> <div data-bbox="992 1012 1065 1152">  User Logins </div> <div data-bbox="250 1207 557 1243">Pods & Infrastructure</div> <div data-bbox="310 1272 404 1375">  Pods </div> <div data-bbox="505 1272 662 1444">  Virtual Machine Infrastructure </div> <div data-bbox="761 1272 850 1413">  Control Devices </div> <div data-bbox="980 1272 1070 1444">  Lab Device Images </div> <div data-bbox="250 1503 368 1537">Content</div> <div data-bbox="310 1572 412 1709">  Course Manager </div> <div data-bbox="529 1572 638 1709">  Pod Designer </div> <div data-bbox="761 1572 850 1709">  Lab Designer </div> <div data-bbox="980 1572 1070 1709">  File Manager </div>	<div data-bbox="1151 684 1419 747"> Hostname hostname.example.edu </div> <div data-bbox="1151 774 1266 840"> IP Address 192.0.2.14 </div> <div data-bbox="1151 865 1427 928"> SSL Certificate Expiration  2022-06-28 (274 days) </div> <div data-bbox="1151 957 1386 989"> Network Settings </div> <div data-bbox="1151 1024 1310 1083"> Software Version 21.2.0 </div> <div data-bbox="1151 1104 1343 1163"> Maintenance Expires 2022-06-28 </div> <div data-bbox="1151 1188 1369 1218"> Software Updates </div> <div data-bbox="1151 1251 1273 1312"> User Logins Enabled </div> <div data-bbox="1151 1335 1315 1402"> Logged In Users 25 </div> <div data-bbox="1151 1417 1273 1482"> Pods in Use 15 </div> <div data-bbox="1151 1507 1395 1575"> Active Lab Reservations 20 </div> <div data-bbox="1151 1589 1395 1656"> Future Lab Reservations 42 </div> <div data-bbox="1151 1682 1482 1713"> Manage Lab Reservations </div> <div data-bbox="1151 1759 1347 1822"> System Uptime 1 hour, 9 minutes </div> <div data-bbox="1151 1852 1398 1883"> Shutdown/Reboot </div>
--	--

7 Configuring Your Network Settings



SSL must be configured on your NETLAB+ system in order for it to be fully functional (see subsection below).

Hostname
hostname.example.edu

IP Address
192.0.2.14

SSL Certificate Expiration
2017-06-28

 [Network Settings](#)

The first section of the panel on the right side of the administrator home page provides convenient viewing of the Hostname, IP Address, and SSL Certificate Expiration date of your NETLAB+ system.

Further details are available by selecting **Network Settings**. You may also access the settings by selecting the Settings icon on the administrator Home page and then selecting **Network Settings**.



Manage License

Activate and manage system license key.



Network Settings

Manage network settings and SSL certificates.



Network interface settings are modified from the system console. The web interface allows you to view, but not modify these settings. Use caution when changing network configuration settings. Under some circumstances, if you enter an incorrect value, the erroneous setting may result in your system no longer being accessible using the configuration utility. It would then be necessary to make corrections through the virtual machine console (see previous section).

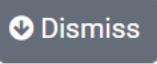
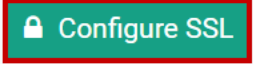
To see an example of the Network Settings page, continue to the subsection below.

7.1 SSL Configuration - Manage Certificates

You must configure connectivity for your NETLAB+ system through SSL. On the Network Settings page, select **Configure SSL**.

Network Settings

Hostname	hostname.example.edu
IPv4 Address	172.16.17.1
IPv4 Subnet Mask	255.255.255.0
IPv4 Default Gateway	172.16.17.1
IPv4 DNS Servers	8.8.8.8, 8.8.4.4
IPv6 Enabled	No




You will notice (see the picture in the section below) that a self-signed SSL certificate is displayed in the list of certificates.



This self-signed certificate is included for configuration purposes. HTML5 viewers will not work with this certificate. It must be replaced with a certificate signed by a trusted certificate authority. The subsections below provide details on your options for replacing the certificate.

7.1.1 View Certificate Information


First, we will take a look at the unsigned certificate as an example of how to view certificate information on the system.

Manage SSL Certificates				
Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	 2026-05-27 (1575 days)	 Active, Self-Signed	

To view more information about the self-signed certificate, click the certificate name.

Active SSL Certificate


Name default

Status  Active, Self-Signed

Host(s) www.example.org

Issuer None (certificate is self-signed)

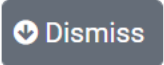

Valid From 2016-05-29 19:25

Expiration  2026-05-27 (1575 days)

Signature Algorithm sha256WithRSAEncryption

Private Key Type RSA

Private Key Length 2048


Select the **Details** button to view additional information.



Click **Dismiss** to return to the previous page.

7.1.2 Adding New Certificates

To add a signed certificate to your NETLAB+ system, proceed with one of the following methods, depending on if you need to obtain a certificate or already have a certificate.



How would you like to add the certificate?

Generate a certificate signing request, temporary certificate, and new private key.

I have an existing certificate and private key.

Get a certificate from Let's Encrypt™.


- **Generate a certificate signing request:** You will generate a certificate request, temporary certificate, and new private key through NETLAB+. You will send the request to the Certificate Authority (CA) of your choice. Once you receive a signed version from the CA, you will update the certificate in NETLAB+. See [7.1.2.1](#) for details.
- **If you already have a signed certificate and private key for your organization:** (This can be a domain-level certificate). You will proceed by adding the certificate and private key to your NETLAB+ system, as described in [7.1.2.2](#).



- **Get a certificate from Let's Encrypt™:** Initiate an automated process where your NETLAB+ system will request and obtain a signed certificate from Let's Encrypt, a free certificate authority. See [7.1.2.3](#).

7.1.2.1 Generate a Certificate Request and Replace an Unsigned Certificate with a Signed Certificate

First, you will generate a certificate request and submit it to the CA of your choice.


1. Navigate to **Network Settings > Configure SSL**. If this is your first time adding a certificate, you will see that the self-signed certificate that is included with NETLAB+ is initially the active certificate.

 **Manage SSL Certificates**

Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	 2026-05-27 (1575 days)	 Active, Self-Signed	▼

⏮ Dismiss
➕ Add Certificate

2. Click **Add Certificate**.
3. Select the option to generate a certificate signing request, temporary certificate, and new private key, and press **Next**.

 **How would you like to add the certificate?**

Generate a certificate signing request, temporary certificate, and new private key.

I have an existing certificate and private key.

Get a certificate from Let's Encrypt™.

✔ Next
✕ Cancel

4. Fill in the fields on the form with the information appropriate for your site. For guidance on completing the form, see the field descriptions below or select **Help**.
5. Click **Submit**.

Generate New SSL Certificate and Signing Request

Entry Name	<input type="text" value="example.edu"/>
Server Name	<input type="text" value="netlab.example.edu"/>
Organization	<input type="text" value="Example University"/>
Organizational Unit	<input type="text" value="IT Department"/>
City	<input type="text" value="Anytown"/>
State/Region	<input type="text" value="NC"/>
Country	<input type="text" value="United States"/>
Email Address	<input type="text" value="testadmin@example.edu"/>
Private Key Length (bits)	<input type="text" value="2048"/>
Signature Algorithm	<input type="text" value="SHA-256"/>


Field Descriptions - Generate New SSL Certificate

- **Entry Name:** The name used to manage this certificate. The hostname is recommended. Letters must be lowercase. No spaces are permitted.
Example: netlab.myschool.edu
- **Server Name:** The fully qualified domain name (FQDN) of your server. This name must exactly match what you type in your web browser, or you will receive a name mismatch error. Wildcard certificates cannot be generated by NETLAB+.
Example: netlab.example.edu
- **Organization:** The legal name of your organization. This should not be abbreviated and should include suffixes such as Inc, Corp, or LLC.
Example: Digitech College of Southern California


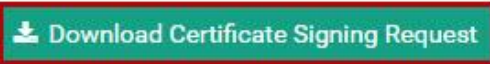
- **Organizational Unit:** The division of your organization handling the certificate. Example: Computer Science Department
- **City:** The city where your organization is located. Example: Los Angeles
- **State/Region:** The state or region where your organization is located. This should not be abbreviated. Example: California
- **Country:** The country where your organization is located. Example: United States
- **Email Address:** An email address used to contact your organization. Example: support@example.edu
- **Private Key Length (bits):** The length of the private key to generate in bits. 2048 is recommended and now required by most certificate authorities. 4096-bit certificates are currently not supported for performance reasons.
- **Signature Algorithm:** The algorithm used to sign the request. SHA-256 is now used by most certificate authorities. SHA-1 is an older algorithm and is no longer recommended.

NETLAB+ has generated a new private key, certificate signing request, and self-signed certificate.

6. Select the button to **Download Certificate Signing Request**.

**Certificate generated.**




- NETLAB+ has generated a new private key, certificate signing request, and self-signed certificate.
- To make this the active certificate, active it from the certificate management page.
- Usage of self-signed certificates is limited to administrative maintenance only. To use this certificate in production, download the certificate signing request, have it signed by trusted certificate authority (CA), and replace the self-signed certificate with the certificate provided by the CA.

7. The certificate signing request (a file of encrypted text named *Entry Name.csr*) will be downloaded to your local machine. Submit this file to the Certificate Authority (CA) of your choice. Typically, a small annual fee is charged by the CA for this service.

After you receive a signed version of your certificate from the CA, you will use it to replace the unsigned version.

1. Navigate to **Network Settings > Configure SSL**.
2. You will be replacing the self-signed certificate that you created. Notice that the *default* certificate is indicated to be the active certificate; this is necessary since you cannot replace an active certificate. (If the default is not currently the active certificate, select it and the option to activate it on the Action dropdown).
3. Select the self-signed certificate you created.

Manage Certificates				
Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	 2022-05-03 (89 days)	 Active, Self-Signed	<input type="button" value="▼"/>
example.edu	netlab.example.edu	 2026-05-27 (1574 days)	Self-Signed	<input type="button" value="▼"/>

4. Click the **Replace** button to replace the certificate.

View Certificate

Name example.edu

Status Self-Signed

Host(s) netlab.example.edu

Issuer None (certificate is self-signed)

Valid From 2018-12-04 4:42 PM

Expiration 2023-12-04 4:42 PM

Private Key Length 2048 bit

Signature Algorithm SHA-256

5. Paste the signed certificate you received from the CA into the **New Certificate** text box, including the header and footer lines, and select **Submit**.
 - a. Paste the contents of the new certificate file (.crt or .pem) above.
 - b. The certificate must be in PEM format. The PEM certificate format uses the following header and footer lines, which should be included:


```
-----BEGIN CERTIFICATE-----
-----END CERTIFICATE-----
```



When using a chain of certificates, just append the certificates together, one after the other; the server certificate needs to go first, otherwise you will get a mismatch between private and public keys.



If the new certificate is valid, it will overwrite the old certificate - the old certificate is not retrievable.

Replace Certificate - example.edu

Name example.edu

New Certificate

```
-----BEGIN CERTIFICATE REQUEST-----
```

6. Return to the certificate page.
7. Verify that your certificate now indicates it is signed (as shown below).




If the status of the certificate does not indicate signed, it may be necessary to log off the system and close your browser window. The status will be updated when you enter the system again.

8. Click **Activate**.

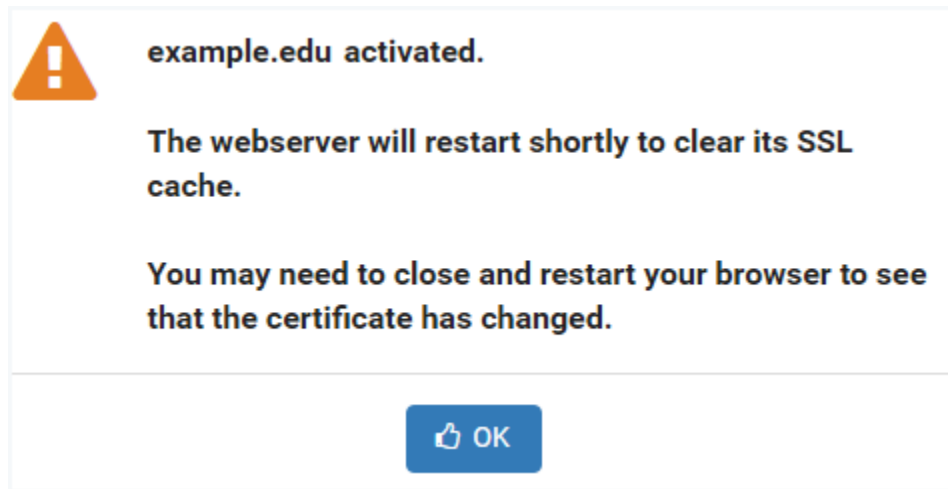
SSL Certificate

Name	example.edu
Status	Signed
Host(s)	netlab.example.edu
Issuer	
Valid From	2017-04-13 3:41 PM
Expiration	2020-06-28 11:44 AM
Private Key Length	2048 bit
Signature Algorithm	SHA-256

9. You will be prompted to confirm that you want to activate the certificate. Select **Proceed**.

 Do you want to activate certificate 'example.edu'?

10. A message will indicate that the certificate has been activated and that the webserver will restart shortly to clear its SSL cache. Click **OK**.



11. Verify that the signed certificate is now active (see the Status in the picture below). If the signed certificate is not active, it may be necessary to log off the system, close your browser window, and then re-enter the system.




🔒 Manage Certificates				
Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	📅 2022-05-03 (89 days)	Self-Signed	⌵
example.edu	netlab.example.edu	📅 2026-05-27 (1574 days)	🟢 Active, Signed	⌵

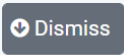

12. Verify that your browser address now indicates HTTPS. It may be necessary to log off the system, close your browser window, and then re-enter the system.




7.1.2.2 Add a Certificate and Private Key to NETLAB+

1. Navigate to **Network Settings > Configure SSL**. If this is your first time adding a certificate, you will see that the self-signed certificate that is included with NETLAB+ is initially the active certificate.

Manage SSL Certificates				
Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	 2026-05-27 (1575 days)	 Active, Self-Signed	



2. Click **Add Certificate**.
3. If you have a signed certificate and private key for your organization (it may be a domain-level certificate), you will add the certificate and private key to your NETLAB+ system. Select the choice, **I have an existing certificate and private key**.

 **How would you like to add the certificate?**

Generate a certificate signing request, temporary certificate, and new private key.

I have an existing certificate and private key.

Get a certificate from Let's Encrypt™.

4. Click **Next**. The Add Certificate page will be displayed (see picture on next page).
5. For the **Entry Name**, using the hostname (which is populated in this field as the default value) is recommended.
6. Paste your certificate, including the header and footer lines, into the **Certificate** textbox.
 - a. Paste the contents of the certificate file (.crt or .pem) above.
 - b. The certificate must be in PEM format. The PEM certificate format uses the following header and footer lines, which should be included:


```
-----BEGIN CERTIFICATE-----
-----END CERTIFICATE-----
```



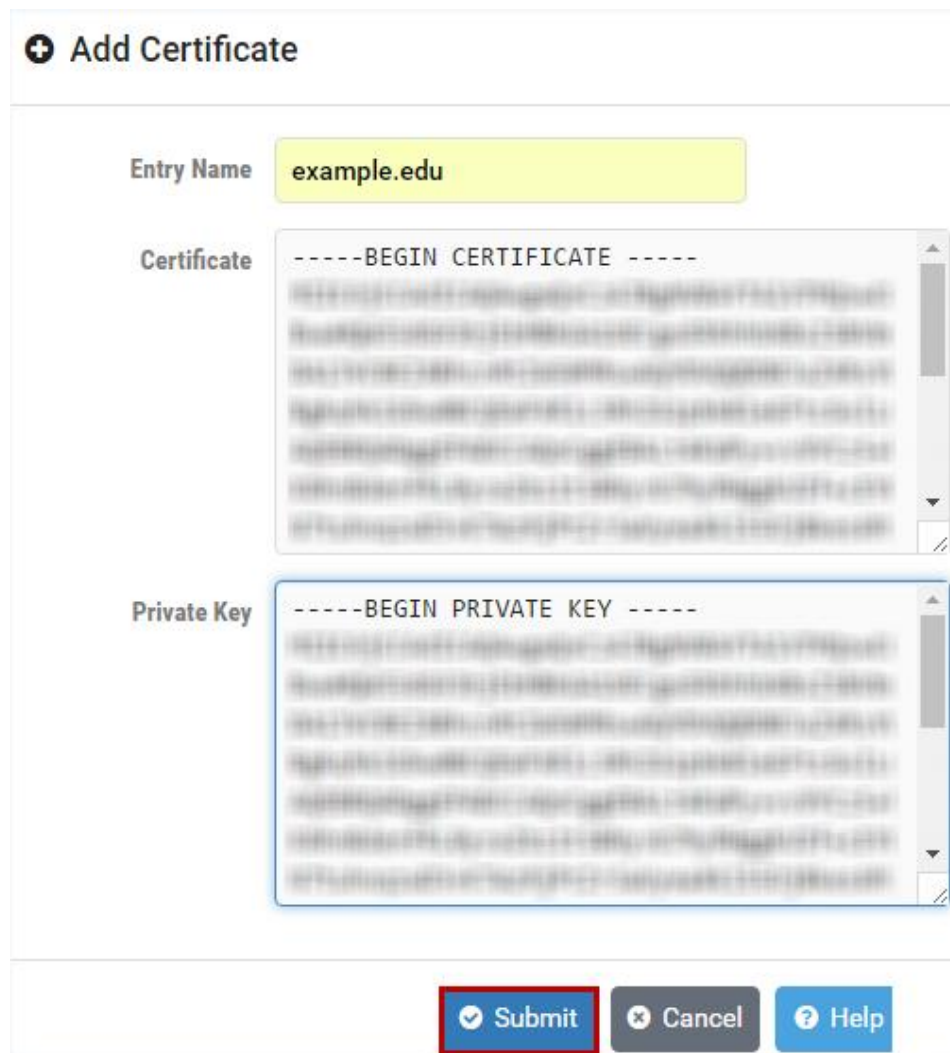
When using a chain of certificates, just append the certificates together, one after the other; the server certificate needs to go first, otherwise you will get a mismatch between private and public keys.

7. Paste your private key, including the header and footer lines, into the **Private Key** textbox.
 - a. Paste the contents of the new certificate file (.crt or .pem) above.
 - b. The private key must be in PEM format. The PEM certificate format uses the following header and footer lines, which should be included:
-----BEGIN PRIVATE KEY-----
-----END PRIVATE KEY-----



To protect the private key, there is no user interface to view or download it later. Therefore, you should keep a copy of the private key in a safe place.

8. Press **Submit**.



The screenshot shows a web form titled "Add Certificate". It has three main input fields: "Entry Name" with the value "example.edu", "Certificate" containing PEM-formatted certificate data, and "Private Key" containing PEM-formatted private key data. At the bottom, there are three buttons: "Submit" (highlighted with a red box), "Cancel", and "Help".

9. Return to the certificate page.
10. Verify that your certificate now indicates it is signed (as shown below).




If the status of the certificate does not indicate signed, it may be necessary to log off the system and close your browser window. The status will be updated when you enter the system again.

11. Click **Activate**.

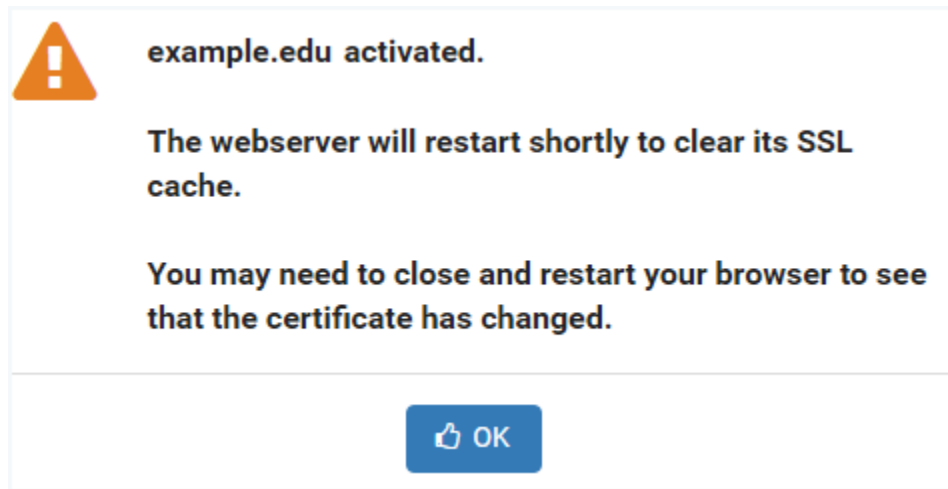
🔒 SSL Certificate

Name	example.edu
Status	Signed
Host(s)	netlab.example.edu
Issuer	██
Valid From	2017-04-13 3:41 PM
Expiration	2020-06-28 11:44 AM
Private Key Length	2048 bit
Signature Algorithm	SHA-256

12. You will be prompted to confirm that you want to activate the certificate. Select **Proceed**.

 **Do you want to activate certificate 'example.edu'?**

13. A message will indicate that the certificate has been activated and that the webserver will restart shortly to clear its SSL cache. Click **OK**.



14. Verify that the signed certificate is now active (see the Status in the picture below). If the signed certificate is not active, it may be necessary to log off the system, close your browser window, and then re-enter the system.

Manage Certificates				
Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	2022-05-03 (89 days)	Self-Signed	
example.edu	netlab.example.edu	2026-05-27 (1574 days)	Active, Signed	

15. Verify that your browser address now indicates HTTPS. It may be necessary to log off the system, close your browser window, and then re-enter the system.



7.1.2.3 Get a Certificate from Let's Encrypt

Initiate an automated process where your NETLAB+ system will request and obtain a signed certificate from *Let's Encrypt™*, a free certificate authority. Your NETLAB+ system will interact with Let's Encrypt to request the signed certificate and respond to a challenge issued by Let's Encrypt to verify control of the domain.


Requirements to use Let's Encrypt with NETLAB+:




- **Your system must have an Internet-accessible public DNS entry.**
- **Ports 80 and 443 must be accessible and open through the firewall.**

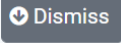



In this automated process, NETLAB+ will respond to a challenge to perform cryptographic math and provide signed, calculated results to prove control of the domain. For more details, see [Let's Encrypt, How It Works](#).


1. Navigate to **Network Settings > Configure SSL**. If this is your first time adding a certificate, you will see that the self-signed certificate that is included with NETLAB+ is initially the active certificate.

 Manage SSL Certificates


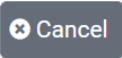
Name	Host/Domain	Expiration	Status	Actions
default	www.example.org	 2026-05-27 (1575 days)	 Active, Self-Signed	

2. Click **Add Certificate**.
3. Select the choice, **Get a certificate from Let's Encrypt™**. Click **Next**.

 **How would you like to add the certificate?**

Generate a certificate signing request, temporary certificate, and new private key.
 I have an existing certificate and private key.
 Get a certificate from Let's Encrypt™.

4. The **Get a Certificate from Let's Encrypt** page is displayed. Enter the appropriate information into the fields (see field descriptions below) and then click **Submit**.

Get a Certificate from Let's Encrypt

Domain Name

Contact Email

Field Descriptions - Get a Certificate from Let's Encrypt

- **Domain Name:** The fully qualified domain name (FQDN) of your server. This name must match exactly what you type in your web browser, or you will receive a name mismatch error. Wildcard certificates cannot be issued by Let's Encrypt.
- **Contact Email:** Let's Encrypt will send email to this address to warn of expiring certificates and to notify about changes to their privacy policy.

Be sure to enter the address of an email account that is checked on a regular basis to ensure that your organization is kept aware of any issues with the certificate.

- As the configuration proceeds, you will see a log showing the progress of each step. As shown below, you may click any line to view expanded details. Click **Next** to proceed.

🔒 Configuring Let's Encrypt

Progress - COMPLETE
⚠️ Errors - 0
🚫 Warnings - 0
Showing - 30/30

```

🔒 lets encrypt -> Connecting to https://acme-v02.api.letsencrypt.org/acme/authz-v3/71868660550
🔒 lets encrypt -> Received challenges for netlab-test-20.netdevgroup.com.
🔒 lets encrypt -> Requested challenges for 1 domain(s).
    hdr_group: SKG-7785
    hdr_id: "61FB1884-REGX4-82H2"
    hdr_time: "2022-02-02 23:49:24.964"
    module: "task_system_lets_encrypt_enable"
    msg: "lets encrypt -> Requested challenges for 1 domain(s)."
    msg_src: "HDR"
    severity: 7
    severity_t: "DEBUG"
    task_id: RNHW-RPMY-YIVG
    time: "2022-02-02 23:49:24"
    ts: 1643845764.964
🔒 lets encrypt -> Domain netlab-test-20.netdevgroup.com has been already validated, skipping.
🔒 lets encrypt -> Issuer's certificate has been already received.
✅ lets encrypt -> certificate request succeeded, enjoy your certificate

```

Next



If an error occurs indicating too many certificate requests, be aware that [Let's Encrypt enforces rate limits](#). This should not present a problem for typical use. If you have made an excessive amount of certificate renewal requests (perhaps due to testing or development

- When prompted to activate the Let's Encrypt certificate, click **Proceed**.


?

Do you want to activate the Lets Encrypt certificate?

- Your firewall must continue to allow http on port 80 inbound for Let's Encrypt verification to succeed.
- The certificate will renew every 60 days.


Proceed
Cancel

- The **letsencrypt** certificate is activated. As noted, you may need to restart your browser to see that the certificate has changed. Click **OK**.





Certificate 'letsencrypt' was activated.



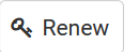
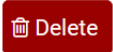
- The web server will restart shortly to clear its SSL cache.
- You may need to close and restart your browser to see that the certificate has changed.



- The Active SSL Certificate window will be displayed. Notice the expiration date. The certificate will expire in **89 days**. Click **Dismiss**.

Active SSL Certificate

Name	letsencrypt
Status	 Active, Signed
Host(s)	netlab.example.edu
Contact Email	admin@example.edu
Issuer	R3
Valid From	2022-02-02 22:49
Expiration	 2022-05-03 (89 days)
Signature Algorithm	sha256WithRSAEncryption
Private Key Type	ECC
Private Key Length	384
Private Key NIST Curve	P-384
Private Key ASN1 OID	secp384r1






NETLAB+ will automatically request a renewal of the certificate from Let's Encrypt every **60 days**. This provides a 30-day window for the automated renewal to successfully take place (allowing for any connectivity issues, power outages, etc. at your site). The renewal will be attempted twice a day until it succeeds.



No intervention will be required, except for situations where system outages for an extensive period prevent the renewal from executing in a timely manner. **See the highlighted box at the end of this section for discussion on initiating a renewal.**

- Verify that the letsencrypt certificate is now active (see the status in the picture below). If the letsencrypt certificate is not active, it may be necessary to log off the system, close your browser window, and then re-enter the system. Click **Dismiss**.

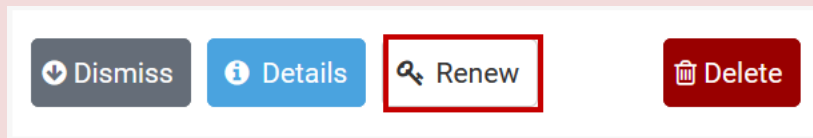
Name	Host/Domain	Expiration	Status	Actions
letsencrypt	netlab-test-20.netdevgroup.com	 2022-05-03 (89 days)	 Active, Signed	<input type="button" value="v"/>
default	www.example.org	 2026-05-27 (1574 days)	Self-Signed	<input type="button" value="v"/>

- Verify that your browser address now indicates HTTPS. It may be necessary to log off the system, close your browser window, and then re-enter the system.

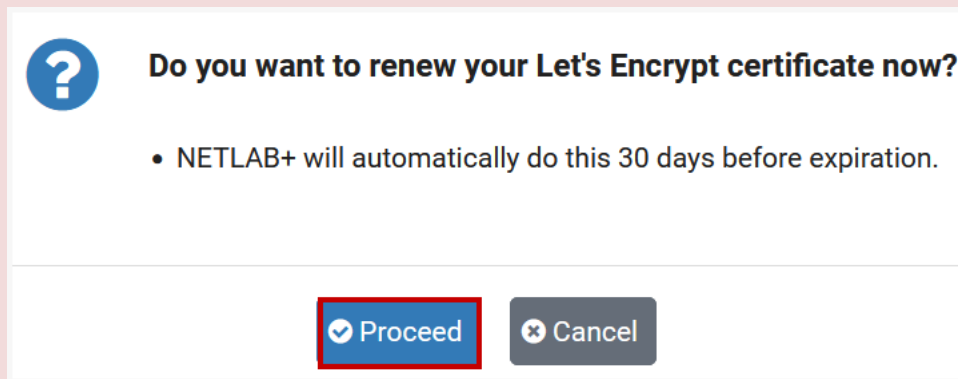


Under normal operating conditions, no administrator action is required to renew the certificate. If system outages for an extensive period have prevented the automatic renewal from executing, the certificate will expire at the end of the 90-day period.

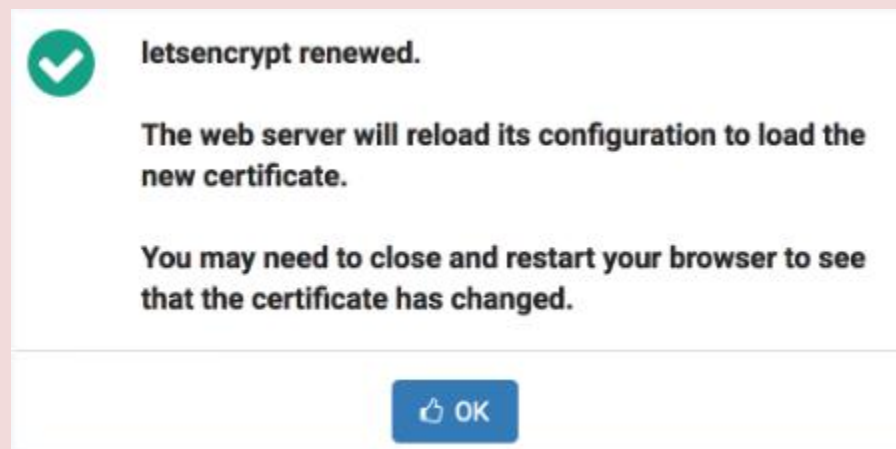
The administrator may initiate a request to renew the certificate by clicking the **Renew** button on the View Certificate page. However, before proceeding, we recommend [contacting our support team](#) for assistance in troubleshooting/resolving any problems with the automated process.



As noted, click **Proceed** if you have been instructed to perform this step by our support team.

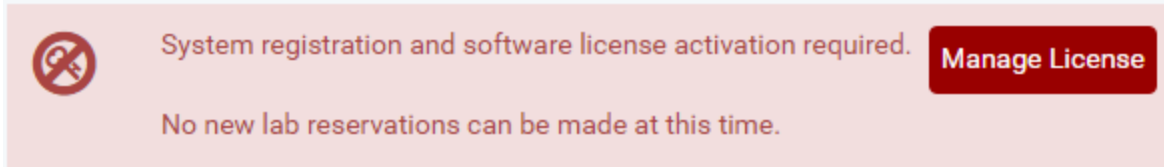


A message will confirm the certificate is renewed. Click **OK**. You may need to close and restart your browser to see the updates to the certificate.



8 Manage License

Notice the message at the top of the administrator Home page, indicating that system registration and software license activation is required.



System registration and software license activation required. [Manage License](#)

No new lab reservations can be made at this time.



You will need the customer information email sent to your organization from the Network Development Group (NDG), in order to complete the steps in this section.

The email from Network Develop Group (NDG) includes the following items needed to activate the license:

- **System Serial Number:** The serial number of your NETLAB+ system.
- **License Key:** The license key for your NETLAB+ system (good for 5 activations).

The System Serial Number and License Key must be entered into your NETLAB+ system in order to enable activation of its full functionality, including the scheduling of lab reservations. See the *Activate License* subsection below.



Please keep your license information in a secure place. You will need to enter it periodically, when major events/changes have taken place on your NETLAB+ system. See the *Reactivate License* subsection below.

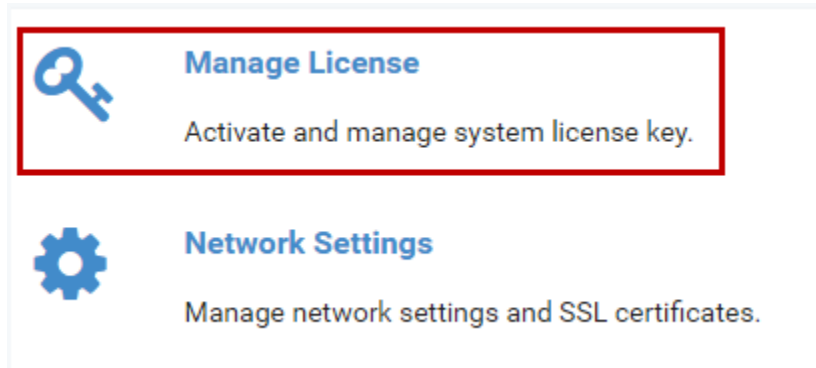
8.1 Activate License (Initial Activation)

Complete the following steps to activate your system license key. You will need the System Serial Number, and License Key provided to you from NDG.



The NETLAB+ virtual machine must have network connectivity for license activation. Please make sure network setup is completed before activating the license, refer to the *Network Settings* section for guidance.

1. Select Settings from the administrator Home page and then select **Manage License** (or select **Manage License** on the alert message at the top of the page; see the previous section).



2. The Activate License page will be displayed. Enter the **System Serial Number** and the **License Key** provided by NDG. Select **Activate**.

Your easiest option for entering the System Serial Number and License Key is to simply copy and paste from the customer information letter.

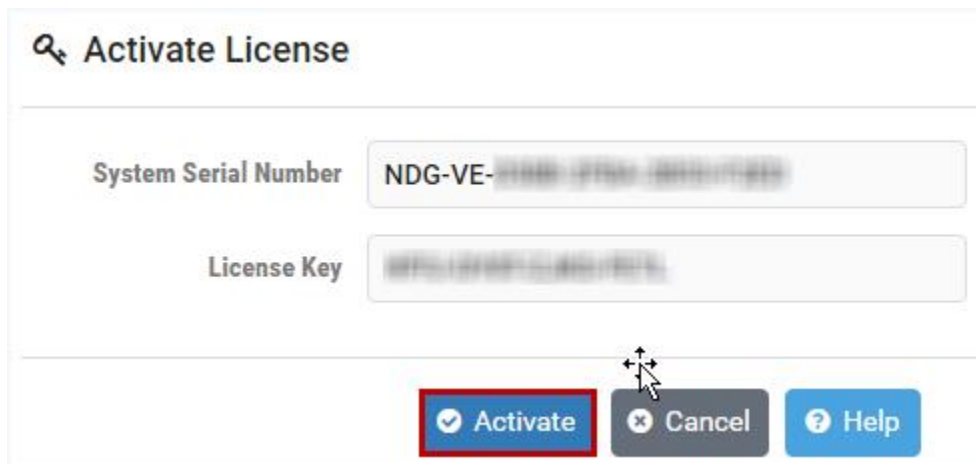
If you enter the information into these fields, keep in mind the following:

System Serial Number:

- Can be lowercase/uppercase
- Must include dashes

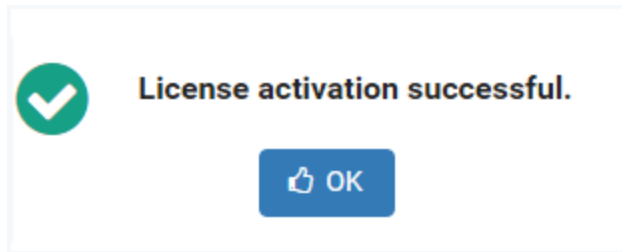
License Key:

- Must be uppercase
- Must include dashes

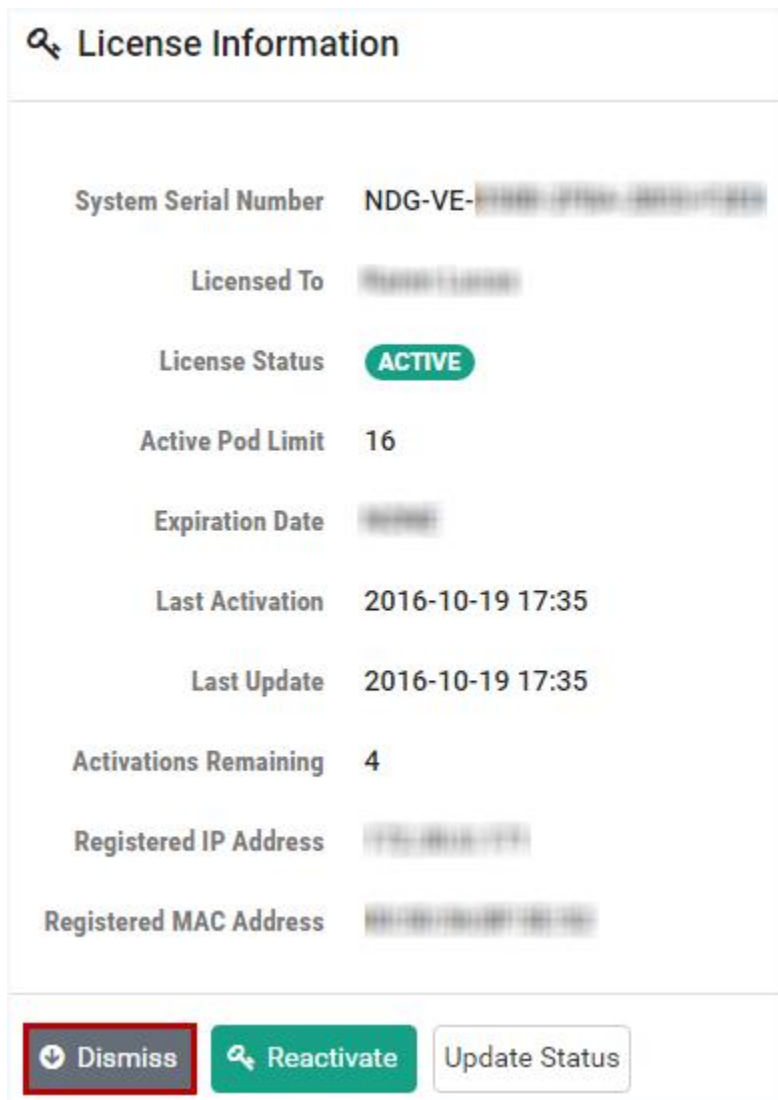


The screenshot shows the 'Activate License' page. It has a search icon and the title 'Activate License'. Below the title are two input fields: 'System Serial Number' containing 'NDG-VE-1234-5678-9012-3456' and 'License Key' containing 'NDG12345678901234567890'. At the bottom, there are three buttons: 'Activate' (highlighted with a red border), 'Cancel', and 'Help'. A mouse cursor is pointing at the 'Activate' button.

3. A message will display, indicating the license activation was successful. Select **OK**.



4. The License Information page will be displayed. Notice that the license status has been changed to Active. Your system is now fully functional.
5. To ensure the information is updated, click **Update Status**.
6. Click **Dismiss**.

A screenshot of the "License Information" page. The title "License Information" is at the top left with a magnifying glass icon. Below the title is a list of license details:

System Serial Number	NDG-VE- XXXXXXXXXXXXXXXXXXXX
Licensed To	XXXXXXXXXXXXXXXXXXXX
License Status	ACTIVE
Active Pod Limit	16
Expiration Date	XXXXXXXXXXXX
Last Activation	2016-10-19 17:35
Last Update	2016-10-19 17:35
Activations Remaining	4
Registered IP Address	XXXXXXXXXXXX
Registered MAC Address	XXXXXXXXXXXX

At the bottom of the page are three buttons: "Dismiss" (with a red border), "Reactivate" (with a magnifying glass icon), and "Update Status".

9 Backup Your NETLAB+ Virtual Appliance

It is imperative that you establish a plan for making backups of your NETLAB+ virtual appliance on a regular basis to protect against data loss and disaster recovery preparedness. You are also strongly advised to perform a backup before any software update and prior to adding additional content to your NETLAB+ system.



It is the responsibility of the customer to maintain backups of their NETLAB+ system.

Consider the advantages of setting up an automated backup process; see further discussion in the subsection below. Manual backups using tools available within the *vSphere Web Client* are another option, also described below.



Perform backups on a regular basis, at least once per week or more (depending on the size/volume of use of your system), in addition to backing up before a software or content update.

9.1 Automated Backups

To ensure that backups are performed regularly, consider implementing an automated method of creating backups. Taking the time to set up a robust, automated backup process helps protect the investment your organization has made in your NETLAB+ system.



Please refer to the [NETLAB+ VE Automated Backups Guide](#) for details on performing automated backups using VMware vSphere Data Protection (VDP).

9.2 Manual Backups

You may make a backup of your NETLAB+ virtual appliance by creating snapshots and clones of your virtual machine.



VMware Infrastructure: The *VMware* infrastructure needs to be fully configured, which includes the setup of the *ESXi* hosts, *vCenter*, networking and storage.

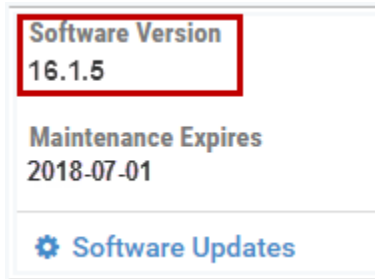
- **Snapshot:** A snapshot preserves the state and data of a virtual machine, including virtual machine settings, power state, and disk state. The Snapshot Manager in the *vSphere Web Client* provides several operations for creating and managing virtual machine snapshots. Refer to VMware documentation for details: <https://www.vmware.com/support/pubs/>



Do not rely on snapshots alone as your backup strategy; you should also create a clone periodically. Consider, for example, creating a daily snapshot and a weekly clone.

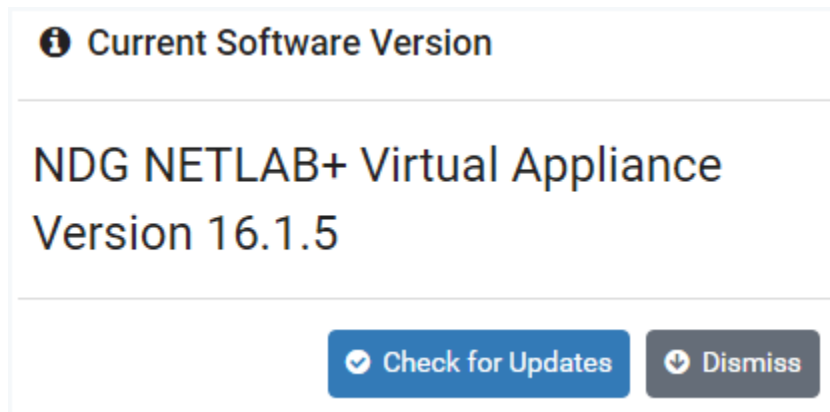
- **Clones:** A clone is a virtual machine that is a copy of the original. The new virtual machine is configured with the same virtual hardware, installed software, and other properties that were configured for the original virtual machine. The cloning task may be performed from the *vSphere Web Client*; refer to VMware documentation for details: <https://www.vmware.com/support/pubs/>

10 Check for Software Updates

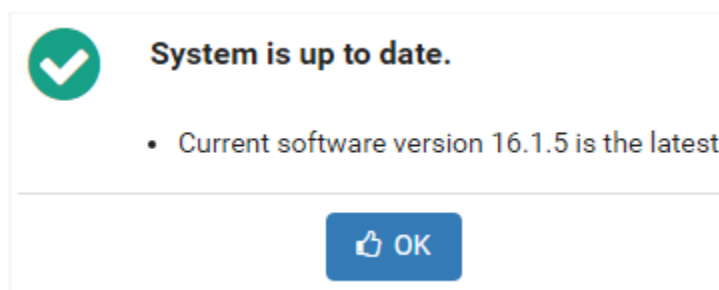


The Software Version of your NETLAB+ system, along with the date that maintenance expires, is displayed in the last panel.

1. Select the **Software Updates** option to check for available software updates.
2. The software version currently running on your NETLAB+ system is displayed. Click Dismiss to return to the Home page, or select the option to **Check for Updates**.



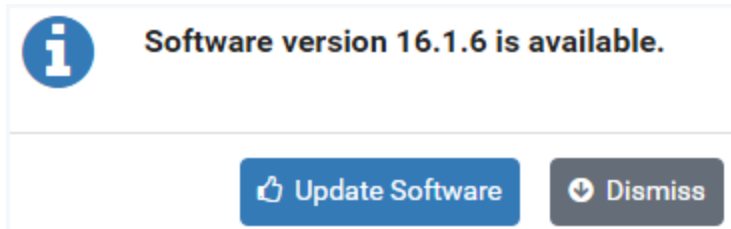
3. If your system has the latest available software, a message will indicate that the **System is Up to Date**. Select **OK**.



Otherwise, a message will indicate a later software version is available. Proceed to the next section for instructions on updating your NETLAB+ software.

10.1 Update NETLAB+ Software

If your NETLAB+ system does not have the latest available software (see the previous section), checking for software updates will result in a message alerting you that a new version is available.



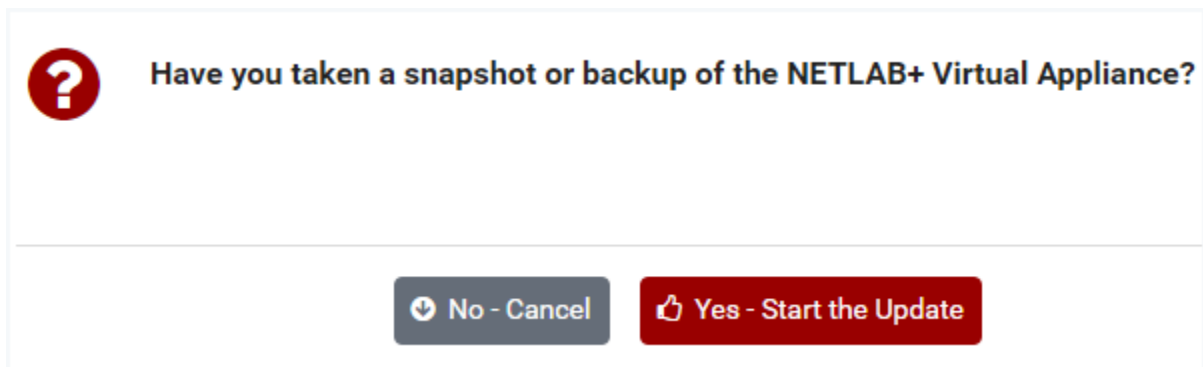
Before updating the software of your NETLAB+ system, it is strongly recommended that you take a snapshot or backup the NETLAB+ virtual appliance. Please see the *Backup the NETLAB+ Virtual Appliance* section.

- Keep in mind that there is no built-in software downgrade or data restore function. A snapshot or backup of the virtual appliance will be required to recover from a failed software update, or if you decide to roll back to a previous software version.
- NDG does not backup software or data in the virtual version of the NETLAB+ product.




To avoid disruption to users, update the system software at a time when there are no active lab reservations.

1. Take a snapshot or backup the NETLAB+ virtual appliance (see the *Backup the NETLAB+ Virtual Appliance* section for instructions).
2. Select **Update Software**
3. You will be prompted to verify that you have taken a snapshot or backup. If you have, select **Yes - Start the Update**.




You may see messages indicating that a Reboot is in progress.

 **Reboot in Progress**

Current Version 16.1.5

Target Version 16.1.6

Progress 

Status Rebooting - Please Wait

11 Documentation Resources



Please refer our website for additional documentation specific to NETLAB+:
<https://www.netdevgroup.com/support/documentation/netlabve>