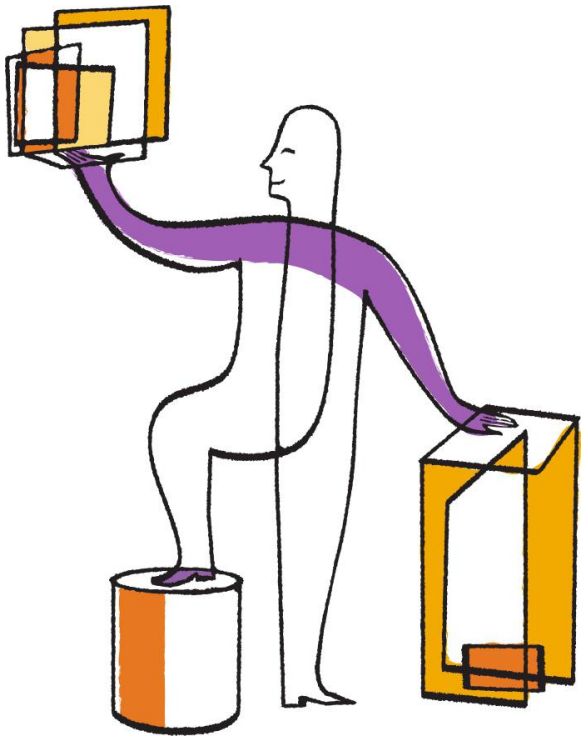
NetApp® SANtricity™ Web Service for E-Series Proxy 1.0

Installation Guide



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Overview of NetApp SANtricity Web Services Proxy

The NetApp SANtricity Web Services Proxy provides access through standard HTTPS mechanisms to configuring management services for E-Series storage arrays. You can install Web Services Proxy on either a Linux machine or a Windows machine. As Web Services Proxy satisfies the client request by collecting data or executing configuration change requests to a target storage array, the Web Services Proxy module issues SYMbol requests to the target storage arrays.

Web Services Proxy provides a Representative State Transfer (REST)-style API for managing E-Series controllers. The API enables you to integrate storage array management into other applications or ecosystems.

Web Services Proxy Interfaces

Web Services Proxy provides a REST-style interface for accessing common configuration operations and for retrieving basic configuration data, status, and statistics.

For more information about the interfaces, go to the Web Services Proxy Developer Guide at `https://nnn.nnn.nnn.nnn:8443/docs`, where *nnn.nnn.nnn.nnn* represents the host server. The Web Services Proxy Developer Guide contains links to the following documents:

- REST API specification
- SYMbol API specification

Web Services Proxy APIs

Web Services Proxy executes the command on the target controller. The REST-style API enables you to manage the following network components:

- Disk drives
- Disk statistics
- Hardware inventory
- Host groups
- Host types
- Hosts
- MEL events
- Snapshot groups
- Snapshot images
- Snapshot volumes
- Storage arrays
- Storage pools
- Thin-provisioned volumes
- Volume copy jobs
- Volume I/O statistics
- Volume mappings
- Volumes

Symbol Web

Symbol Web is a URL in the REST API, but it gives access to almost all symbol calls. The symbol function is the part of the following URL:

`http://host:port/devmgr/storage-system/storage system ID/symbol/symbol function`

Symbol calls take 0 or 1 input objects and return 0 or 1 results, which facilitates the proxy process with HTTP and JSON. For a complete list of all endpoints, see the API documentation.

Terms Used in This Guide

The following table shows the terms, abbreviations, and acronyms used in this guide and their definitions.

Table 1 Terms and Definitions

Terms	Definitions
API	Application Programming Interface
CORS	Cross-Origin Resource Sharing
JSON	JavaScript Object Notation
REST	Representational State Transfer

Cross-Origin Resource Sharing

Cross-Origin Resource Sharing (CORS) is handled by a `cors.cfg` file in the `working` directory of the web server as specified in the `wsconfig.xml` file. The CORS configuration is open by default, so cross-origin access is not restricted.

NOTE If no configuration file is present, CORS is open.

For more information about CORS, go to Web Services Proxy Configuration Files on page 18.

System Requirements

Compatibility

Make sure that your system meets the following compatibility requirements before you install Web Services Proxy.

Compatible Operating Systems

Web Services Proxy is compatible with and supported on the following operating systems:

Table 2 Compatible Operating Systems

Operating System	Version	Architecture
Red Hat Enterprise Linux (RHEL)	6.x	64 bit
SUSE Linux Enterprise Server (SLES)	10.x, 11.x	64 bit
Oracle Enterprise Linux (OEL)	5.x, 6.x, 7x	64 bit
Windows Server	2008 R2, 2012, 2012 R2	64 bit

Compatible Storage Arrays and Controller Firmware

Web Services Proxy is compatible with the following NetApp storage arrays and controller firmware versions

Table 3 Compatible Storage Arrays and Controller Firmware

Storage Array	Host Interfaces	Controller Firmware Versions
NetApp E26xx	iSCSI FC SAS	7.84 7.86 8.10
NetApp E27xx	iSCSI FC SAS	7.84 7.86 8.10
NetApp E54xx	iSCSI FC SAS	7.84 7.86 8.10
NetApp E55xx	iSCSI FC	7.84 7.86 8.10
NetApp EF540	iSCSI FC SAS Infiniband	7.84 7.86 8.10
NetApp EF 550	iSCSI FC SAS Infiniband	7.84 7.86 8.10

IP Support

Web Services Proxy supports only the IPv4 protocol.

Web Browser Return Status Descriptions

Resources accessed through the REST interface are returned status through standard web browser status codes.

NOTE When some of these errors occur in the JSON-RPC interface, the error status is returned in the JSON-RPC response object.

Table 4 Web Browser Return Status Descriptions

Status	Description
200	OK
201	Created—Response to a successful POST to create a new resource
401	Unauthorized—Challenge for user credentials

Status	Description
404	Not Found—Specified resource not present on the managed system
422	Unprocessable Entity—Request is formed correctly, but resulting SYMbol operation to the storage array failed
500	Internal Server Error

Installing and Maintaining Web Services Proxy

Capacity Planning for Web Services Proxy

Web Services Proxy requires adequate space for logging. Ensure that your system has adequate available disk space for Web Services Proxy. You can use a disk-space monitoring tool to verify available disk drive space for persistent storage and logging.

- Required Installation Space—194 MB
- Minimum Logging Space—200 MB

Installing Multiple Instances of Web Services Proxy

You can install only one instance of Web Services Proxy on a server, but you can install multiple instances of Web Services Proxy on multiple servers within a network. Installing multiple instances of Web Services Proxy on multiple servers within a network provides several advantages.

- Configuring multiple instances of Web Services Proxy with the same set of storage arrays can achieve high-availability service for a common set of storage arrays.
- Creating multiple instances of Web Services Proxy allows you to independently manage separate storage management domains. Management domains can have different sets of user accounts.

Installation Modes,

You can install Web Services Proxy in the following operating systems and modes. Table 2 on page 2 identifies the compatible operating systems and versions.

- Windows
- Linux
    - Graphical mode
    - Console mode
    - Silent mode

Web Services Proxy License

Web Services Proxy is a standalone product, for which no license is required. However, applicable copyrights and terms of service apply. During the graphical mode installation and the console mode installation, you must accept the End User License Agreement (EULA).

- Linux Installation

  On a Linux operating system, the `eula.html` file is installed in the default `/opt/netapp/santricity_web_services_proxy` directory. To open the `eula.html` file, type the following file name and directory path in the address bar of a web browser:

  `file:///opt/netapp/santricity_web_services_proxy/eula.html`

- Windows Installation

  On a Windows operating system, the `eula.html` file is installed in the default `C:\Program Files\NetApp\SANtricity Web Services Proxy` directory. To open the `eula.html` file either type the following file name and directory path in the address bar of a web browser, or use a web browser to search for the file.

  `C:\Program Files\NetApp\SANtricity Web Services Proxy\eula.html`

Web Services Proxy Readme File

- Linux Installation—

  On a Linux operating system, the `readme.html` file is installed in the default `/opt/netapp/santricity_web_services_proxy` directory. To open the `readme.html` file, type the following file name and directory path in the address bar of a web browser.

  `file:///opt/netapp/santricity_web_services_proxy/readme.html`

- Windows Installation—

  On a Windows operating system, the `readme.html` file is installed in the default `C:\Program Files\NetApp\SANtricity Web Services Proxy` directory. To open the `readme.html` file, either type the following file name and directory path in the address bar of a web browser, or use a web browser to search for the file.

  `C:\Program Files\NetApp\SANtricity Web Services Proxy\readme.txt`

Installing Web Services Proxy on a Windows Operating System

The Web Services Proxy installation file for Windows is `webservice-01.`*`nn.nnnn.nnnn`*`.exe`, where *`nn.nnnn.nnnn`* is the version number of Web Services Proxy. The default destination path on a Windows operating system is `C:\Program Files\NetApp\SANtricity Web Services Proxy`.

NOTE You cannot change the destination path.

Installing Web Services Proxy

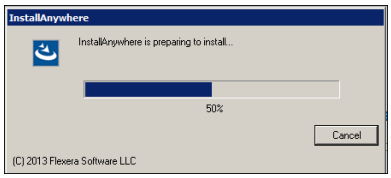
To install Web Services Proxy on a Windows operating system, perform the following actions:

1. Download the installation file to the location on your server from which to install Web Services Proxy.
2. Download the Web Services Proxy installation file to your local computer.
3. Go to the directory that contains the downloaded Web Services Proxy installation file.
4. Double-click the Web Services Proxy installation file.

- The InstallAnywhere message with the progress bar appears.

  NOTE If the User Account Control message appears before the InstallAnywhere message appears, click Yes.

Figure 1 InstallAnywhere Message and Progress Bar

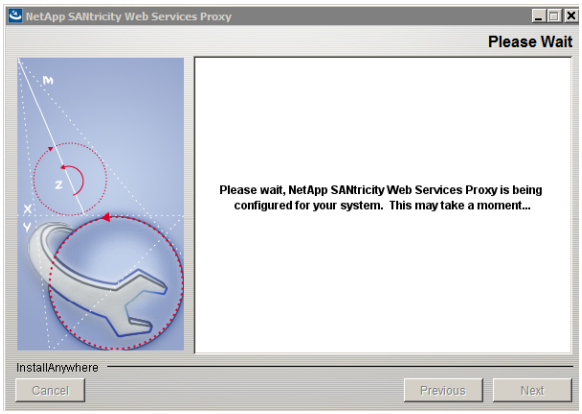


- The NetApp SANtricity Web Services Proxy splash screen appears.

Figure 2 SANtricity Web Services Proxy

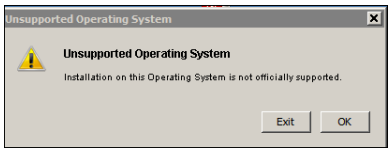
- The NetApp SANtricity Web Services Proxy splash screen disappears, and the Please Wait message appears.

Figure 3 Please Wait



NOTE If the operating system is not compatible with Web Services Proxy, the Unsupported Operating System message appears superimposed on the Please Wait dialog box.

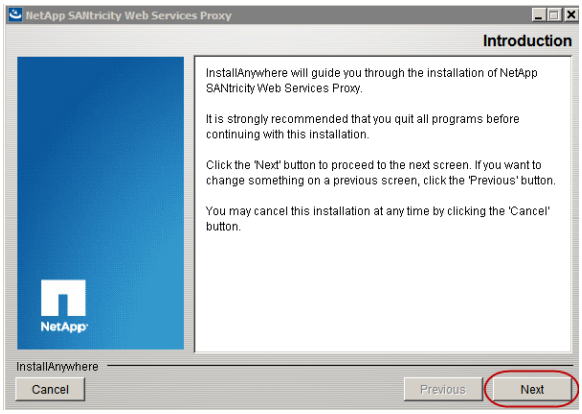
Figure 4 Unsupported Operating System



- To continue the installation process on an unsupported operating system, click OK.
- To exit the installation process, click Exit.

- The NetApp SANtricity Web Services Proxy Installer dialog box appears.

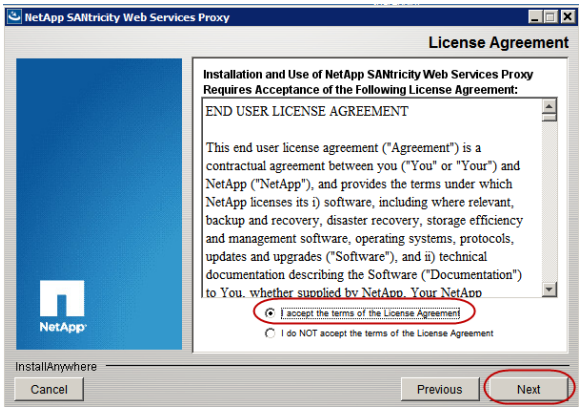
Figure 5 Introduction



5. Click Next.

   The License Agreement appears.

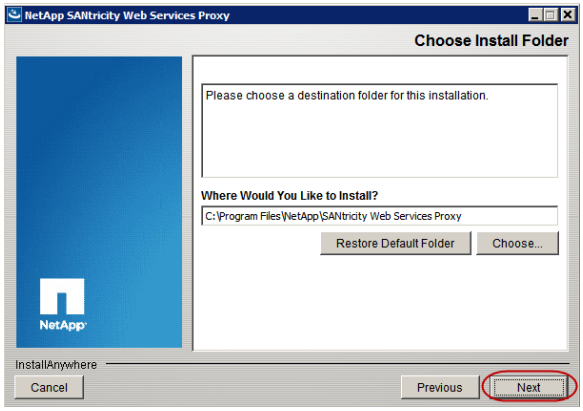
Figure 6 License Agreement



6. Select I accept the terms of the License Agreement, and then click Next.

   The Choose Install Folder dialog box appears.

Figure 7 Choose Install Folder

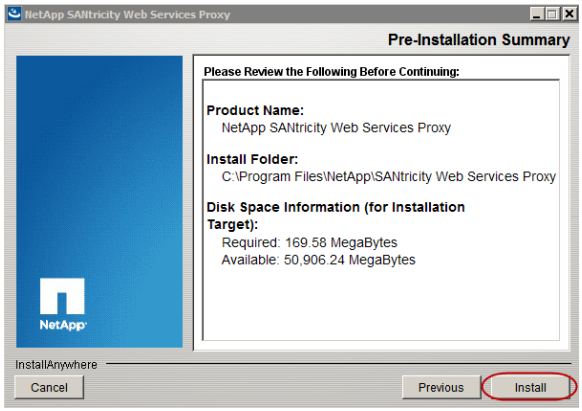


- To change the installation location, delete the path in the Where Would You Like to Install? text box, and then type the new path.
- To search for the installation folder, click Choose, and then select the folder in the Browse for Folder dialog box.

7. Click Next.

   The Pre-Installation Summary dialog box appears.

Figure 8 Pre-Installation Summary



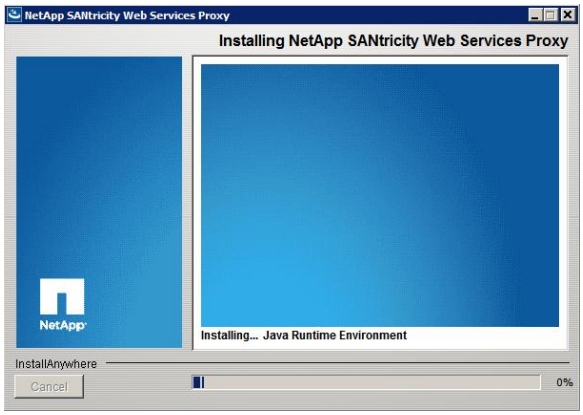
8. Review the information.

   NOTE If you do not accept the summary information, click Previous to return to the Choose Install Folder dialog box.

9. Click Install to accept the summary information.

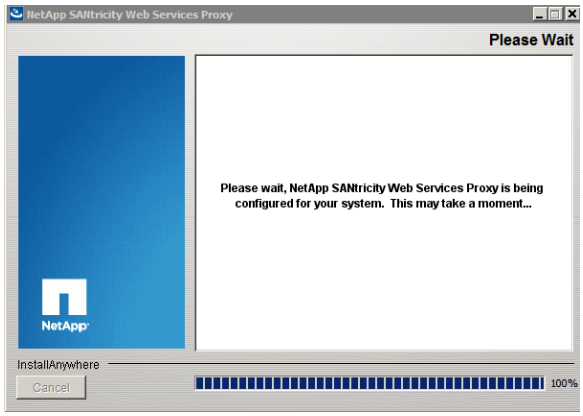
   - The Installing NetApp SANtricity Web Services Proxy message appears and shows the installation progress bar.

Figure 9 Installing NetApp SANtricity Web Services Proxy



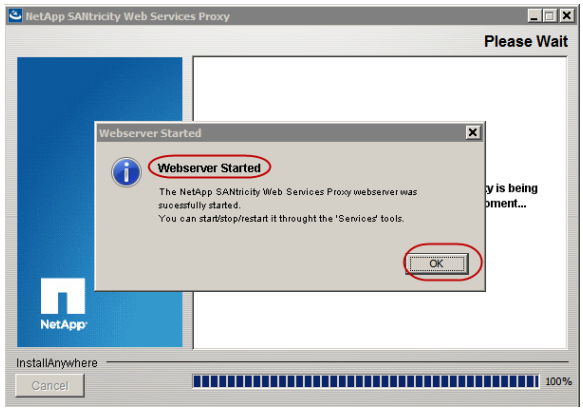
- The Installing NetApp SANtricity Web Services Proxy message disappears, and the Please Wait dialog box appears.

Figure 10 Please Wait



- When the NetApp SANtricity Web Services Proxy configuration is complete, the Webserver Started message appears superimposed on the Please Wait message.

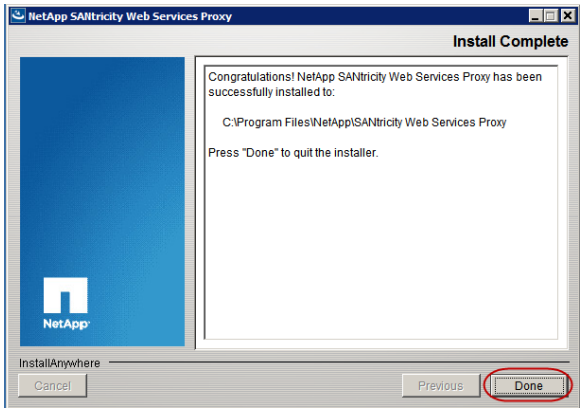
Figure 11 Please Wait – Webserver Started



10. On the Webserver Started message, click OK to complete the installation.

    When the installation is complete, the Install Complete dialog box appears.

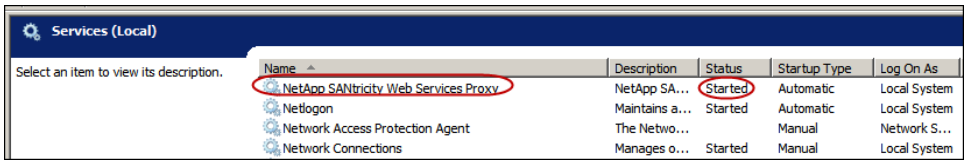
Figure 12 Install Complete



11. Click Done.

    The NetApp SANtricity Web Services Proxy is installed in the Services (Local) window and automatically starts.

Figure 13 Services (Local) – NetApp SANtricity Web Services Proxy

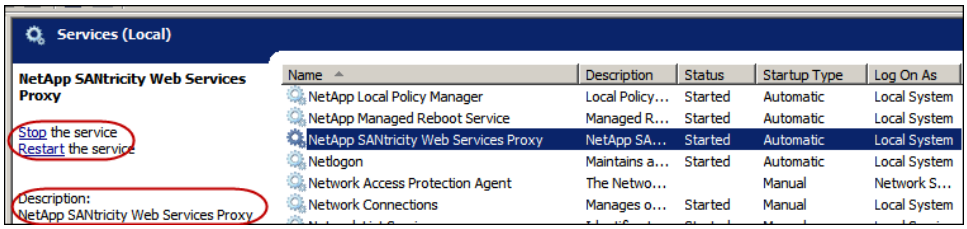


Stopping and Restarting the NetApp SANtricity Web Services Proxy Application Server

To stop the Web Application Server, perform these actions:

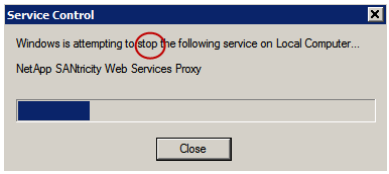
1. In the start menu, select Administrative Tools > Services.

Figure 14 – NetApp SANtricity Web Services Proxy – Stop the Service



2. Select Stop the Service/

Figure 15 Service Control



3. To restart the NetApp SANtricity Web Services Proxy, select Restart the Service.

Installing Web Services Proxy on a Linux Operating System

You can install Web Services Proxy on a Linux operating system in the following three ways:

- Graphical
- Console
- Silent

Web Services Proxy installation file for Linux is `webservice-01.nn.nnnn.nnnn.bin`, where *`nn.nnnn.nnnnn`* is the version number of the Web Services Proxy. The default destination path on a Linux operating system is `/opt/netapp/santricity_web_service_proxy`.

To install Web Services Proxy, perform the following actions:

1. Download the installation file to the location on your server from which to install Web Services Proxy.
2. Download the Web Services Proxy installation file to your local computer.
3. Open a terminal window, and log in.
4. Go to the directory that contains the Web Services Proxy installation file.
5. Refer to the appropriate instructions for installing Web Services Proxy.

    - Installing Web Services Proxy in the Graphical Mode
    - Installing Web Services Proxy in the Console Mode
    - Installing Web Services Proxy in the Silent Mode

Installing Web Services Proxy in the Graphical Mode

The graphical mode is the default installation mode. The default location for the graphical installation is `/opt/netapp/santricity_web_services_proxy`.

1. Run the following command, where *`nn.nnnn.nnnn`* is the version number of the application:

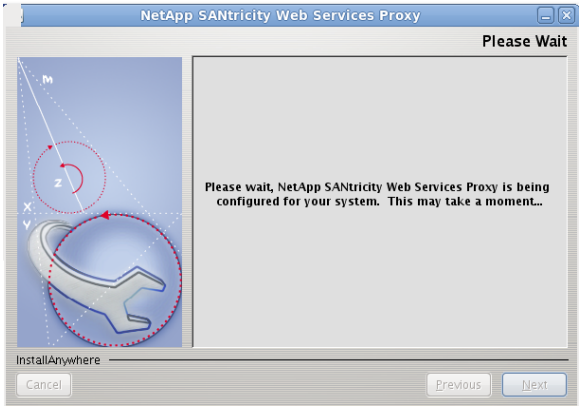
    `./webservice-01.nn.nnnn.nnnn.bin`

    - The installation process starts.
    - The NetApp SANtricity Web Services Proxy splash screen appears.

Figure 16 NetApp SANtricity Web Services Proxy

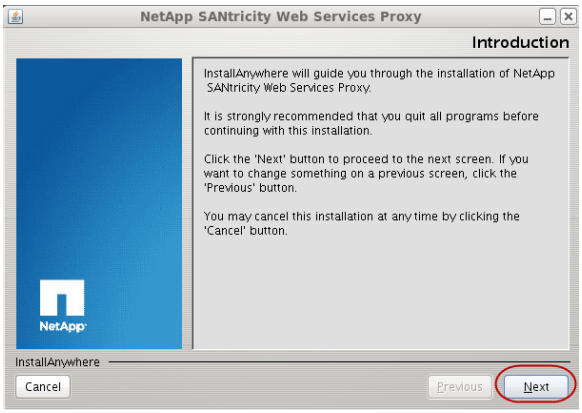
    - The NetApp SANtricity Web Services Proxy splash screen disappears, and the Please Wait message appears and then disappears.

Figure 17 Please Wait



- The Please Wait message disappears, and the Introduction dialog box appears.

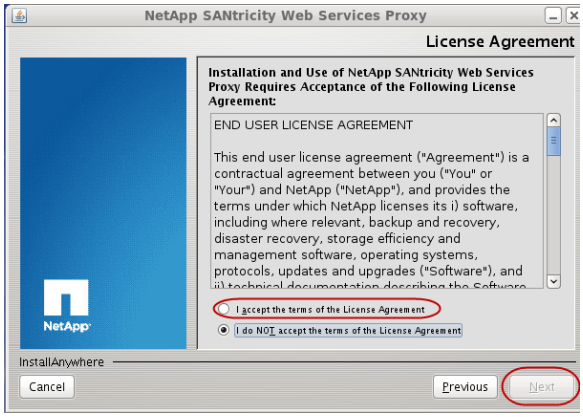
Figure 18 Introduction



2. Click Next.

   The License Agreement appears.

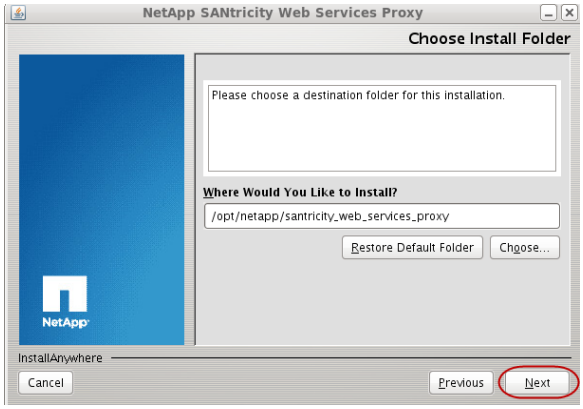
Figure 19 License Agreement



3. Select I accept the terms of the License Agreement, and click Next.

   The Choose Install Folder dialog box appears.

Figure 20 Choose Install Folder

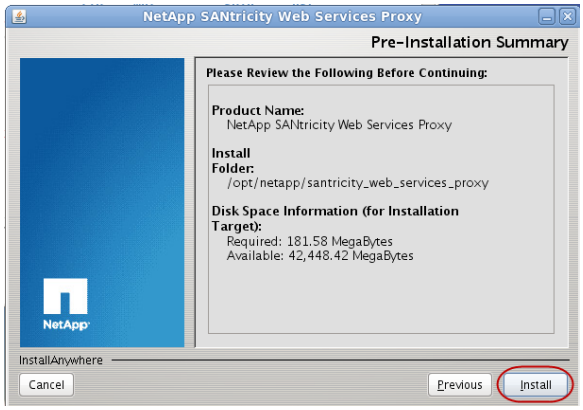


- To change the installation location, delete the path in the Where Would You Like to Install? text box, and then type the new path.
- To search for the installation folder, click Choose, and then select the folder in the Browse for Folder dialog box.

4. Click Next

   The Pre-Installation Summary dialog box appears.

Figure 21 Pre-Installation Summary



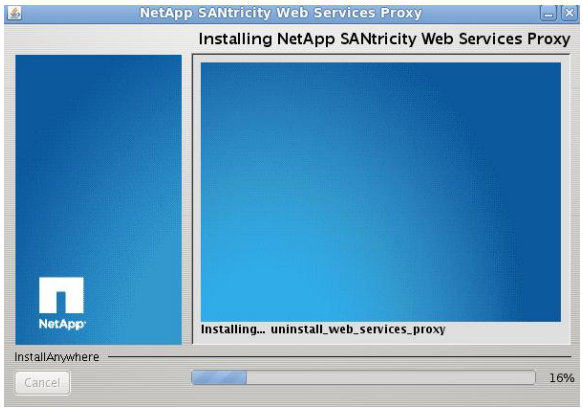
5. Review the Information.

   NOTE If you do not accept the summary information, click Previous to return to the Choose Install Folder dialog box.

6. Click Install.

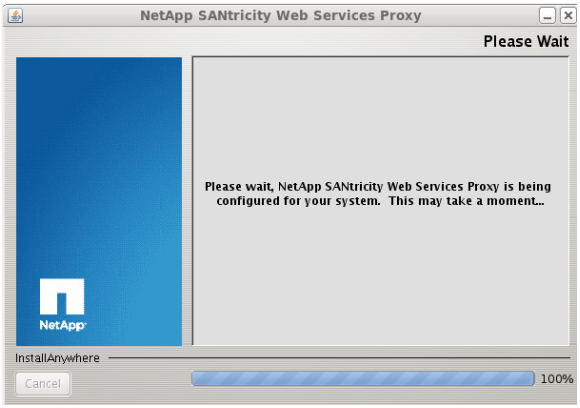
   - The Installing NetApp SANtricity Web Services Proxy message appears and shows the installation progress bar.

Figure 22 Installing NetApp SANtricity Web Services Proxy



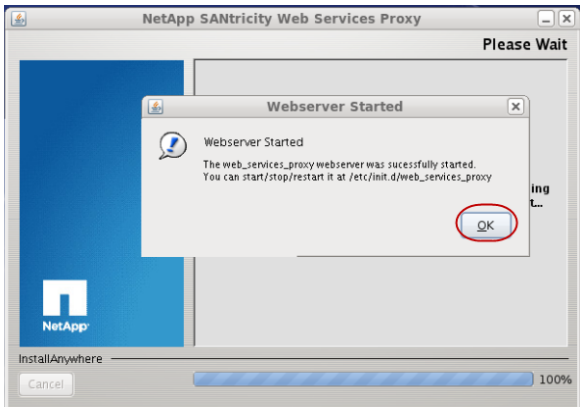
- The Installing NetApp SANtricity Web Services Proxy message disappears, and the Please Wait message appears.

Figure 23 Please Wait



- When the NetApp SANtricity Web Services Proxy configuration is complete, the Webserver Started message appears superimposed on the Please Wait message.
- For more information about the web_services_proxy webserver, go to Stopping and Restarting the Web Services Proxy webserver on page 18.

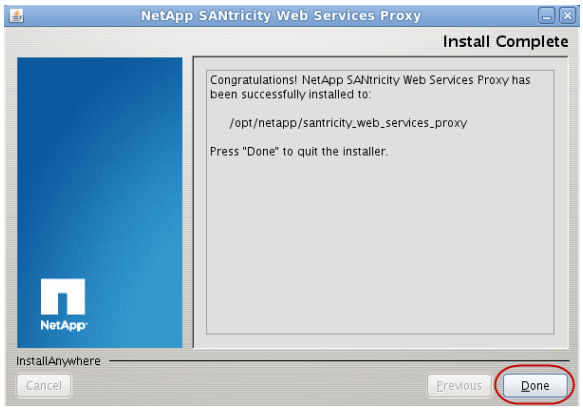
Figure 24 Please Wait – Webserver Started



7. On the Webserver Started message, click OK to complete the installation.

   When the installation is complete, the Install Complete message appears.

Figure 25 Install Complete



8. Click Done.

   - The NetApp SANtricity Web Services Proxy was successfully installed.
   - The Install closes.

Installing Web Services Proxy in the Console Mode

The default location for the console installation is `/opt/netapp/santricity_web_services_proxy`.

1. Run the following command, where *nn.nnnn.nnnn* is the version number of the application:

   `./webservice-01.nn.nnnn.nnnn.bin -i console`

   The installation process starts.

   NOTE To cancel the installation at any time during the installation process, type Quit at the command prompt.

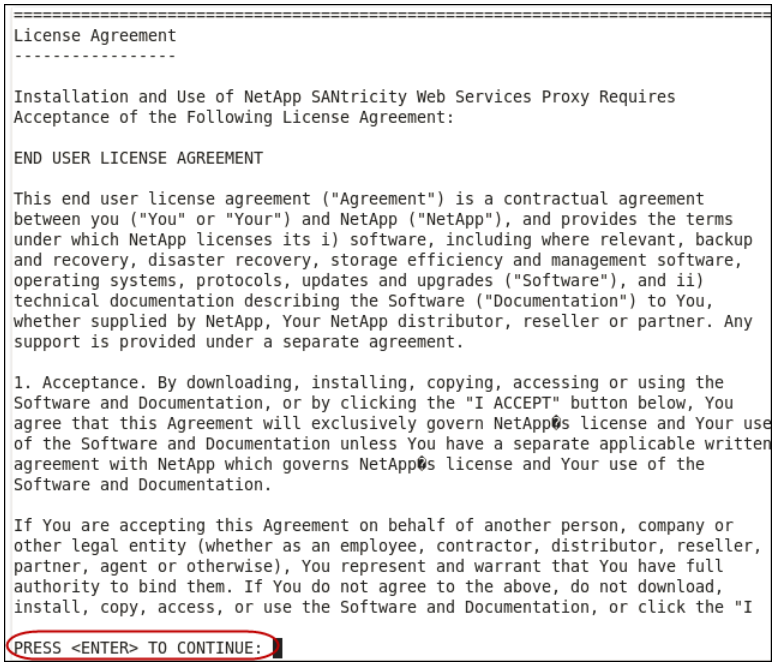
Figure 26 Launching Installer – Introduction

```
[root@localhost Downloads]# ./webservice-01.00.7020.0011.bin -i console
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...

Launching installer...

===============================================================================
NetApp SANtricity Web Services Proxy             (created with InstallAnywhere)
-------------------------------------------------------------------------------

Preparing CONSOLE Mode Installation...




===============================================================================
Introduction
------------

InstallAnywhere will guide you through the installation of NetApp SANtricity
Web Services Proxy.

It is strongly recommended that you quit all programs before continuing with
this installation.

Respond to each prompt to proceed to the next step in the installation.  If you
want to change something on a previous step, type 'back'.

You may cancel this installation at any time by typing 'quit'.

PRESS <ENTER> TO CONTINUE:
```

2. Press Enter.

   The License Agreement appears.

Figure 27 License Agreement



NOTE The License Agreement is on multiple pages.

3. After each page, press Enter to go to the next page.

   The last page contains the License Agreement acceptance statement:

Figure 28 DO YOU ACCEPT THETERMS OF THIS LICENSE AGREEMENT (Y/N)

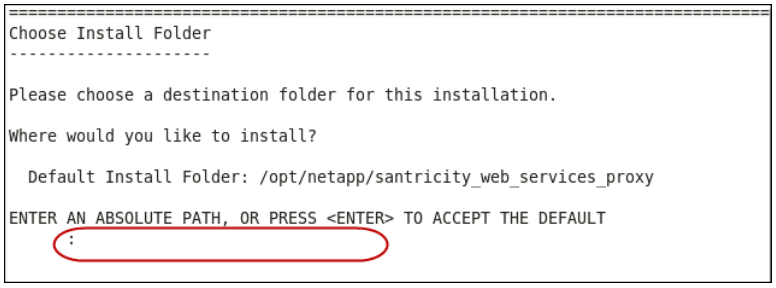
4. Type Y to accept the License Agreement.

   If you do not accept the License Agreement, a warning message appears. If you again do not accept the License Agreement, the installation process terminates and returns you to the installation location..

5. Press Enter

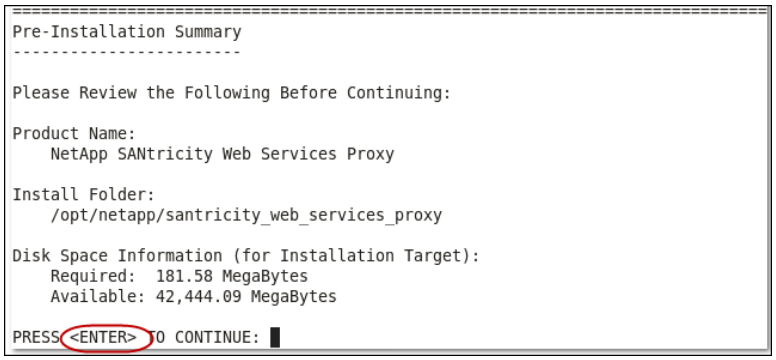
   - The Choose Install Folder option appears.

Figure 29 Choose Install Folder



   - To change the installation location, type the absolute path to the new location after the colon.
   - The Pre-Installation Summary appears.

Figure 30 Pre-Installation Summary

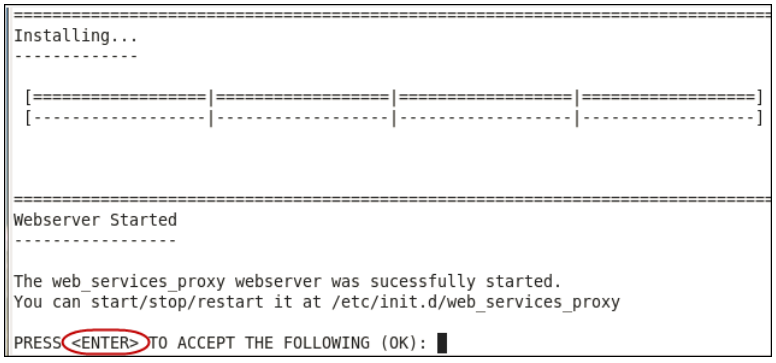


6. Review the Pre-Installation Summary.
7. Press Enter to accept the Install folder.

   NOTE You cannot change the installation location. To install Web Services Proxy in a different location, you must quit the installation process and start the installation again.

   The Installing and Webserver Started messages appear. For more information about the web_services_proxy webserver, go to Stopping and Restarting the Web Services Proxy webserver on page 18.

Figure 31 Installing – Webserver Started



8. Press Enter to complete the installation.

   The Installation Complete message appears.

Figure 32 Installation Complete

9. Press Enter to exit the installation and return to the installation directory.

Installing Web Services Proxy in the Silent Mode

The default location for the silent location is `/opt/netapp/santricity_web_services_proxy`.

1. Run the following command, where *nn.nnnn.nnnn* is the version number of the application:

   `./webservice-01.<nn.nnnn.nnnn>.bin -i silent`

2. Press Enter.

   - The installation process can take several minutes to complete.
   - The installation process runs, but no return messages or script appear in the terminal window.
   - After Web Services Proxy is successfully installed, a command prompt appears in the terminal window.

Figure 33 Silent Installation Mode

Stopping and Restarting the Web Services Proxy webserver

1. Change to the `root` directory.
2. At the command prompt, type the appropriate command.

   - To stop the Web Services Proxy webserver type `/etc/init.d/web_services_proxy stop` at the command prompt.
   - To start the Web Services Proxy webserver, type `/etc/init.d/ web_services_proxy start` at the command prompt.
   - To restart the Web Services Proxy webserver, type `/etc/init.d/ web_services_proxy restart` at the command prompt.

3. After Web Services Proxy has restarted, start a Web Services Proxy web session and verify that the changes have taken effect.

Web Services Proxy Configuration Files

After you have installed Web Services Proxy, you can either accept the default Web Services Proxy settings or modify them to meet the unique operating and performance requirements for your environment.

Default Configuration Files for a Linux Operating System

On a Linux operating system, Web Services Proxy installs the two default configuration files in the following locations:

- `wsconfig.xml`
- `users.properties`

Table 5 Linux Default Locations and Configuration Files

Default Directory Locations	Description
`/opt/netapp/santricity_web_services_proxy/wsconfig.xml` `<sslport clientauth="request">8443</sslport>`	• Web Services Proxy webserver port • The default is port 8443
`/opt/netapp/santricity_web_services_proxy/working/users.properties`	Web Services Proxy password files. For more information, go to Configuring the users.properties File.
`/opt/netapp/santricity_web_services_proxy/working`	Web Services Proxy working directory
`/opt/netapp/santricity_web_services_proxy/working/logs`	Web Services Proxy log files

You can install the optional Cross-Origin Resource Sharing (CORS) configuration file to restrict CORs access. To configure the `cors.cfg` file, go to Configuring the cors.cfg File on page 21.

Default Configuration Files for a Windows Operating System

On a Windows operating system, Web Services Proxy installs the two default configuration files in the following locations.

- `wsconfig.xml`
- `users.properties`

Table 6 Windows Default Locations and Configuration Files

Default Directory Locations	Description
`C:/Program Files/NetApp SANtricity Web Services Proxy/wsconfig.xml <sslport clientauth="request">8443</sslport>`	• Web Services Proxy webserver port • The default is port 8443
`C:/Program Files/NetApp SANtricity Web Services Proxy /working/users.properties`	Web Services Proxy password files. For more information, go to Configuring the users.properties File.
`C:/Program Files/NetApp SANtricity Web Services Proxy/working`	Web Services Proxy working directory
`C:/Program Files/NetApp SANtricity Web Services Proxy/working/logs`	Web Services Proxy log files

Configuring the wsconfig.xml File

Table 7 shows the attributes of the NetApp Web Server configuration file. Table 7 below shows an example of the screen output.

Table 7 Attributes of the wsconfig.xml File

Name	Description	Parent Node	Attributes	Required
`config`	The root node for the config	Null	• Version • The version of the config schema is currently 1.0.	Yes
`sslport`	The TCP port to listen for SSL requests. Defaults to 8443	config	Clientauth	No
`keystore`	Keystore for SSL connections. Defaults to a keystore in the working directory.	config	• Password • Password can be plain text or obfuscated using Jetty's Password utilities.	No
`truststore`	Truststore for the SSL server. Defaults to a truststore in the working directory.	config	• Password • Password can be plain text or obfuscated using Jetty's Password utilities.	No
`workingdir`	Working directory is the directory that the server looks for all its subdirectories and configuration files.	config		Yes

To configure the `wsconfig.xml` file, perform these actions:

1. Open a terminal window, and log in as `root`.
2. Navigate to the `/opt/netapp/santricity_web_service_proxy` directory.
3. With a text editor, open the `wsconfig.xml` file.
4. Make the necessary changes.
5. Save the file.
6. Close the file.

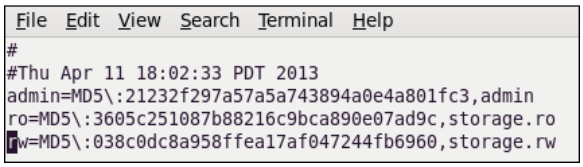
Figure 34 Sample Screen Output of the wsconfig.xml File

```
File  Edit  View  Search  Terminal  Help
<?xml version="1.0" encoding="UTF-8"?>
<config version="1">

    <!-- non-ssl port if not specified, no listener is made-->
    <sslport clientauth="request">8443</sslport>
    <workingdir>working</workingdir>
    <adminuser password="password">admin</adminuser>
</config>
```

Configuring the users.properties File

The `users.properties` file contains user authentication information, including user names, passwords, and roles. The file is in the `/opt/netapp/santricity_web_service_proxy/working` directory. For detailed information about user names, passwords, and roles, go to User Roles and Access on page 28.

Figure 35 Default users.properties File



Configuring the cors.cfg File

Cross-Origin Resource Sharing is handled by the `cors.cfg` file in the working directory in Web Services Proxy, as specified by the `wsconfig.xml` file. The CORS configuration is open by default, so cross-origin access is not restricted. If no configuration file is present, CORS is open. If the `cors.cfg` file is present, it is used. If the `cors.cfg` file is empty, you cannot make a CORS request.

To configure CORS settings, add lines to the `cors.cfg` file. Each line in the CORS configuration file is a regular expression pattern to match. The origin header must match a line in the `cors.cfg` file. If any line pattern matches the origin header, the request is allowed. The complete origin is compared, not just the host element. This comparison allows requests to be matched not only on the host, but also according to protocol, such as the following:

- Match localhost with any protocol—*localhost*
- Match localhost for HTTP only—https://localhost*

Logging in to the API

Web Services Proxy has two default user logins and permission levels:

- Read-write access –
  - User ID is :rw (colon rw)
  - Password is rw
- Read-only access –
  - User id is :ro (colon ro)
  - Password is ro

To log in, type the following URL in a web browser:

`http://<host:port>/utils/login`

Uninstalling Web Services Proxy

Uninstalling Web Services Proxy from a Windows Operating System

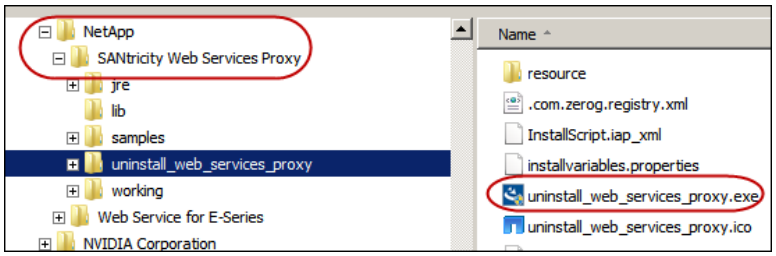
To uninstall Web Services Proxy from a Windows operating system, perform the following actions:

1. Go to the directory that contains the Web Services Proxy uninstall file.

   The default location is `C:/Program Files/NetApp/SANtricity Web Services Proxy/uninstall_web_services_proxy`.

2. In the `uninstall_web_services_proxy` folder, double click `uninstall_web_services_proxy.exe`.

Figure 36 Program Files>>NetApp>>SANtricity Web Services Proxy>> uninstall_web_services_proxy>>uninstall_web_services_proxy.exe



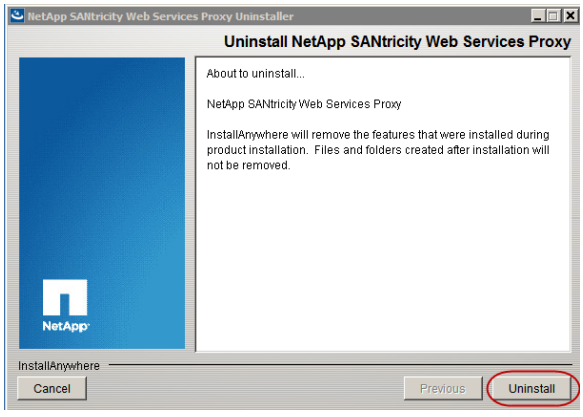
- The SANtricity Web Services Proxy splash screen appears.

Figure 37 NetApp SANtricity Web Services Proxy

NOTE If the User Account Control message appears before the SANtricity Web Services Proxy splash screen appears, click Yes.

- The Uninstall NetApp SANtricity Web Services Proxy dialog box appears.

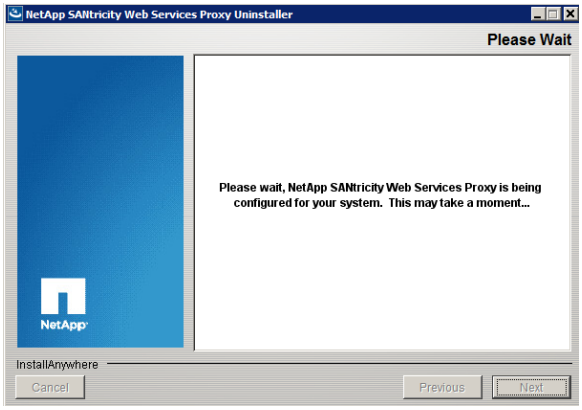
Figure 38 Uninstall NetApp SANtricity Web Services Proxy



3. Click Uninstall.

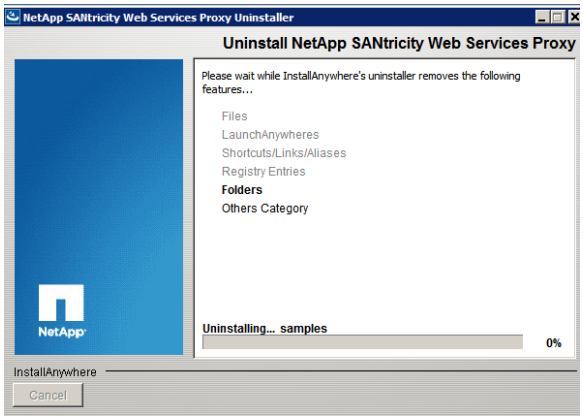
- The Uninstall NetApp SANtricity Web Services Proxy message disappears, and the Please Wait message box appears.

Figure 39 Please Wait



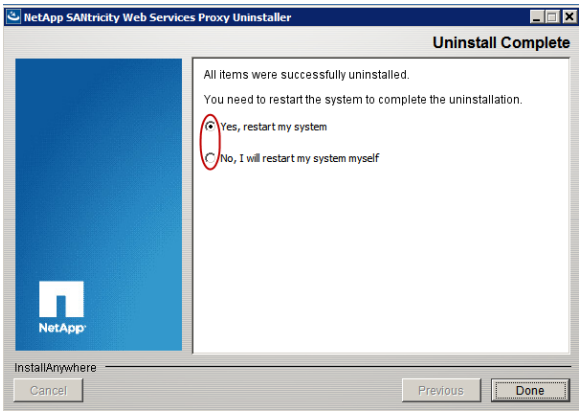
- The Please Wait message disappears, and the Uninstall NetApp SANtricity Web Services Proxy message appears.

Figure 40



- The Uninstall NetApp SANtricity Web Services Proxy message disappears, and the Uninstall Complete dialog box appears.

Figure 41 Uninstall Complete



4. Select either Yes, restart my system or No, I will restart the system myself, and then click Done.

Uninstalling Web Services Proxy from a Linux Operating System

The default uninstall mode is the same as the installation mode. However, you can specify any of the following modes to use for uninstalling Web Services Proxy.

- Graphical mode
- Console mode
- Silent mode

To uninstall Web Services Proxy, perform the following actions:

1. Open a terminal window, and log in.
2. Go to the directory that contains the Web Services Proxy uninstall file.

   The default directory is `/opt/netapp/santricity_web_services_proxy/uninstall_web_services_proxy`.

3. Refer to the appropriate instructions for uninstalling Web Services Proxy.

   - Using the Graphical Mode to Uninstall Web Services Proxy
   - Using the Console Mode to Uninstall Web Services Proxy
   - Using the Silent Mode to Uninstall Web Services Proxy

Using the Graphical Mode to Uninstall Web Services Proxy

Regardless of the installation mode, you can use the graphical mode to uninstall Web Services Proxy. To uninstall Web Services Proxy, perform these actions:

1. Run the following command:

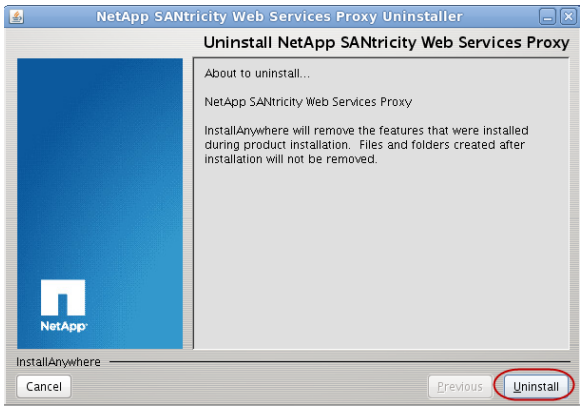
   ```
   uninstall_web_services_proxy -i gui
   ```

   - The SANtricity Web Services Proxy splash screen appears.

Figure 42 NetApp SANtricity Web Services Proxy

   - The SANtricity Web Services Proxy splash screen closes.
   - The Uninstall NetApp SANtricity Web Services Proxy dialog box appears.

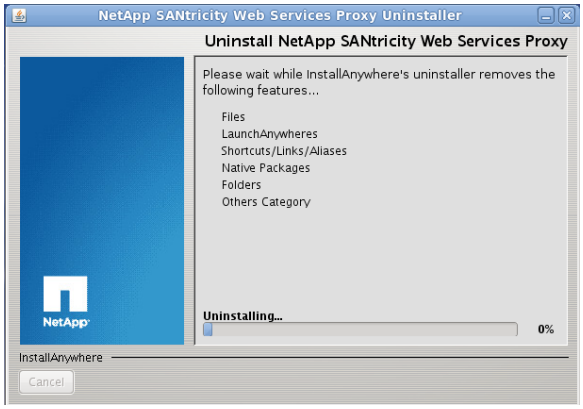
Figure 43 Uninstall NetApp SANtricity Web Services Proxy



2. Click Uninstall.

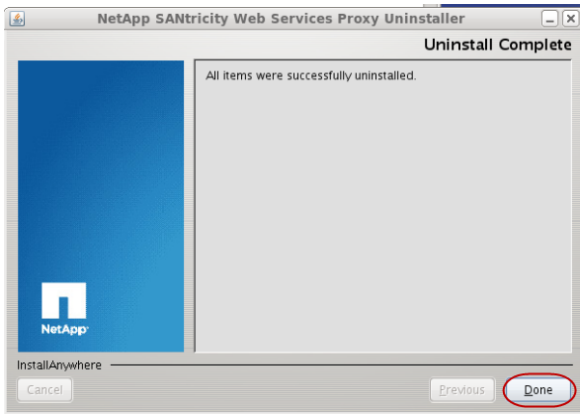
- The Please Wait message appears and closes.
- The Uninstaller progress bar appears and shows the uninstall progress.

Figure 44 Uninstalling NetApp SANtricity Web Services Proxy



- The Uninstall Complete—all items were successfully uninstalled message appears.

Figure 45 Uninstall Complete



3. Click Done.

- Web Services Proxy is removed from the server.
- The Uninstall Complete dialog box closes.

Using the Console Mode to Uninstall Web Services Proxy

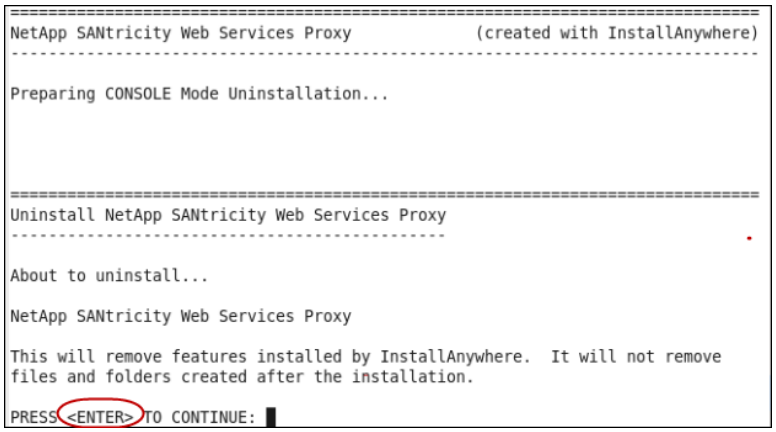
Regardless of the installation mode, you can use the console mode to uninstall Web Services Proxy. To uninstall Web Services Proxy, perform these actions:

1. Run the following command:

   ```
   uninstall_web_services_proxy -i console
   ```

   The uninstall process starts.

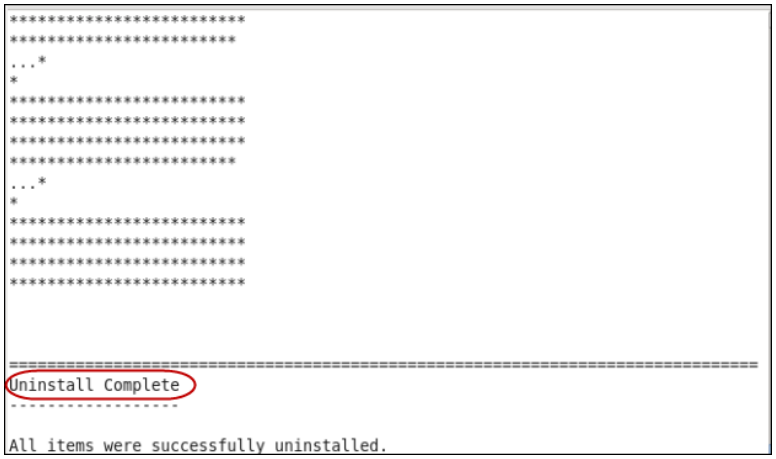
Figure 46 Preparing CONSOLE Mode Uninstallation



2. Press Enter.

   Web Services Proxy is uninstalled.

Figure 47 Uninstall Complete



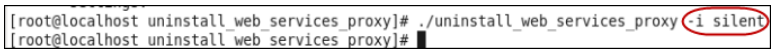
Using the Silent Mode to Uninstall Web Services Proxy

Regardless of the installation mode, you can use the silent mode to uninstall Web Services Proxy. To uninstall Web Services Proxy, run the following command:

```
uninstall_web_services_proxy -i silent
```

- The uninstall process runs, but no return messages or script appear in the terminal window.
- After Web Services Proxy is successfully uninstalled, a command prompt appears in the terminal window.

Figure 48 Silent Uninstall Mode



Web Services Proxy Security

Web Services Proxy uses the Secure Sockets Layer (SSL) for security.

Generating a Self-Signed Certificate

To enable SSL, add an SSL port designation to the `wsconfig.xml` configuration file. When the server is started with SSL configured, the server looks for the keystore and truststore files.

- If the server does not find a keystore, the server uses the IP address of the first non-loop back IPv4 address it finds to generate a keystore and add a self-signed certificate to the keystore.
- If the server does not find a truststore, or the truststore is not specified, the server uses the keystore as the truststore.

Generating an SSL Certificate

Web Services Proxy provides a Java keytool with which to generate an SSL certificate. To generate a certificate you must have a common name for the server, such as the DNS name or the IP address. You can also use a subject alternate name (SAN) for the server. For example, when the IP address is the common name, you can use the IP address as the SAN.

NOTE Do not reverse these; if the server has a DNS name, use it for the common name and use the IP address for the SAN.

Use the keytool installed with Web Services Proxy:

installdir`/jre/bin/keytool`

To generate a signed SSL certificate and export and store it on each client, perform these actions.

Application Server

1. Remove any auto-generated keystores in the working directory.
2. Stop the server.
3. Run the following command to generate the certificate:

   ```
   keytool -genkeypair -keyalg RSA -keysize 2048 -alias jetty -dname CN=<THE SERVER DNS NAME> -keypass changeit -storepass changeit -keystore keystore -ext san=ip:<THEIR IP ADDRESS> <or> keytool -genkeypair -keyalg RSA -keysize 2048 -alias jetty -dname CN=servername -keypass changeit -storepass changeit -keystore keystore -ext san=ip:192.168.1.1
   ```

   The following message appears in the terminal window:

   ```
   When prompted for a password, use "changeit", unless you specify a specific one in the wsconfig.xml file
   When prompted for your first and last name, use the IP address or DNS name of the host, whichever one you plan on using in URLs
   ```

4. Follow the instructions in the terminal window.
5. Run the following command to export the certificate for signing:

   ```
   keytool -certreq -alias jetty -file mycertreq.cet -keystore keystore
   ```

6. Send the certificate request to a certifying authority to be signed.
7. Run the following commands to import the CA certificate and the signed certificate back into your keystore.

   ```
   keytool -importcert -file ca.crt -keystore keystore
   ```

8. Run the following command to save the certificate in your keystore.

   ```
   keytool -importcert -alias jetty -file signedFileFromCA.crt -keystore keystore
   ```

9. Restart the server.

   NOTE You can reuse the certificate on the same server.

Application Client

If you do not already have the certificate, import it from the certifying authority.

NOTE The import process varies according to your operating system and web browser.

User Roles and Access

User access to Web Services Proxy is based on user roles and their corresponding levels. The following file contains the user IDs, user roles, and passwords:

```
/opt/netapp/santricity_web_service_proxy/working/ users.properties
```

- The initial user role is `rw`.
- The password is `rw`.

User names, passwords, and roles are in the following sequence:

```
user=encryptedpassword,storage.role
```

Appendix A Statistics Enhancements to the REST API

Overview

The REST service provides the ability to set up an auto poll of volume and disk statistics. The polling is enabled by modifying the `wsconfig.xml` file that is typically located in the `webserver` directory. The new service will poll for all disk and volume statistics on the storage system registered with the service.

This feature does not change the behavior of the URLs for current disk and volume statistics. These URLs continue to retrieve the statistics when they are called. However, the user has the option to add the `usecache=true` query string to the end of the URL to retrieve cached statistics from the last poll. Using cached results greatly increases the performance of statistics retrieval. However, multiple calls at a rate equal to or less than the configured polling interval cache will retrieve the same data.

Two new URLs have been added to a storage system:

- `analysed-drive-statistics/{optional list of disk ids}`
- `analysed-volume-statistics/{optional list of volume ids}`

These URLs retrieve analyzed statistics from the last poll and are only available when polling is enabled. These URLs provide the following input-output data:

- Operations per second
- Throughput in megabytes per second
- Response times in milliseconds

These calculations are based on the differences between statistical polling iterations, which are the most common measures of storage performance. These statistics are preferable to unanalyzed statistics.

NOTE When the system starts, there is no previous poll to use to calculate the data, so it is based off cumulative data. In addition, if the cumulative counters are reset, the next polling cycle will have unpredictable numbers for the data.

Configuration

To enable polling and the analyzed URLs, add the following lines to the `wsconfig.xml` file, where *nn* is the number of seconds for the interval between polling requests:

```
<env-entries>

   <env key="stats.poll.interval">nn</env>

</env-entries>
```

In this example, polling starts at 60-second intervals; that is, the system requests that polling starts 60 seconds after the prior polling period was completed, regardless of the duration of the prior polling period. It does not mean that polling starts every 60 seconds. All the statistics are time-stamped with the exact time they were retrieved. The system uses the time stamp or time difference on which to base the 60-second calculation.

NOTE The statistics are cached in memory, so you might see an increase of about 1.5 megabytes of memory-use for each array.

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