NetScaler Management, Analytics, and Optimizations

CNS-319-1I
Lab Guide

Credits Page

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Contents

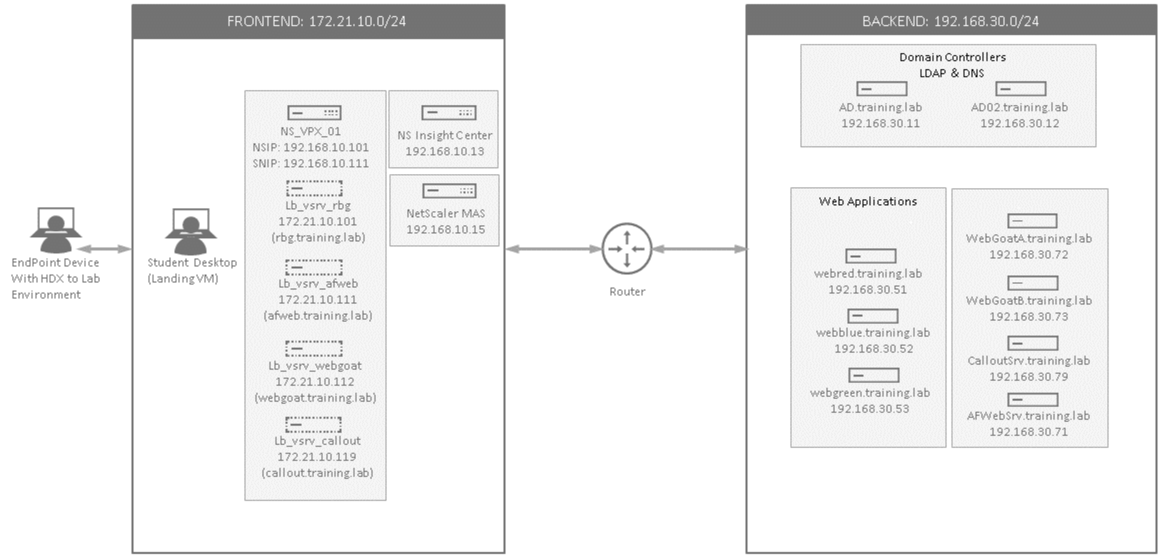
Lab Guide Overview

In this lab guide, you will get valuable hands-on experience with NetScaler management, monitoring and optimization settings. The exercises in this module cover NetScaler MAS, NSWL, Integrated Caching, FEO. It also includes additional tuning and optimization settings. This lab guide will enable you to work with product components and perform required steps for configuration of the NetScaler for web application security.

Lab Environment Overview

Lab Diagram

LAB DIAGRAM



SERVER LIST

Virtual Machine Name	Domain FQDN	IP Address	Description
AD.training.lab	ad.training.lab	192.168.30.11	Domain Controller (training.lab)
AD02.training.lab	ad02.training.lab	192.168.30.12	Domain Controller 2 (training.lab)
WebRed	webred.training.lab	192.168.30.51	Web Server
WebBlue	webblue.training.lab	192.168.30.52	Web Server
WebGreen	webgreen.training.lab	192.168.30.53	Web Server
AFWebSrv	afwebsrv.training.lab	192.168.30.71	Web Server - Application Firewall Test App
WebGoatA	webgoatA.training.lab	192.168.30.72	Web Server - Application Firewall Test App
WebGoatB	webgoatB.training.lab	192.168.30.73	Web Server - Application Firewall Test App
CalloutSrv	calloutsrv.training.lab	192.168.30.79	Web Server - Blacklist Server / HTTP Callout agent
Student Desktop	--	192.168.10.10	Student lab workstation; landing workstation. All labs performed from this system.

NetScaler List

Virtual Machine Name	NSIP Address	Subnet IP (SNIP) Address	Description
NS_VPX_01	192.168.10.101	SNIP1: 192.168.10.111 (traffic)	NS_VPX_01 is the only NetScaler in this environment. It is already configured with NSIP, SNIP, and initial load balancing virtual servers.
NS_InsightCenter	192.168.10.13		

CREDENTIALS LIST (1): Training Domain Users and Groups for NetScaler Administration

User Name	Groups	Password	Description
administrator	Domain Admins	Password1	Domain administrator account which can be used to access domain controllers via console or RDP. Otherwise, not needed in class.

Virtual Servers, FQDNs, and VIPs - Days 1-3

Virtual Server Names	FQDN	VIPs	Course
lb_vsrv_rbg	rbg.training.lab	172.21.10.101	CNS318/CNS319
lb_vsrv_afweb	afweb.training.lab	172.21.10.111	CNS318/CNS319
lb_vsrv_webgoat	webgoat.training.lab	172.21.10.112	CNS318/CNS319
lb_vsrv_callout	callout.training.lab	172.21.10.119	CNS318/CNS319

Virtual Servers, FQDNs, and VIPs - Days 4-5

Virtual Server Names	FQDN	VIPs	Course
lb_vsrv_afweb_ssl	afweb.training.lab	172.21.10.111	CNS319
lb_vsrv_webgoat_ssl	webgoat.training.lab	172.21.10.112	CNS319

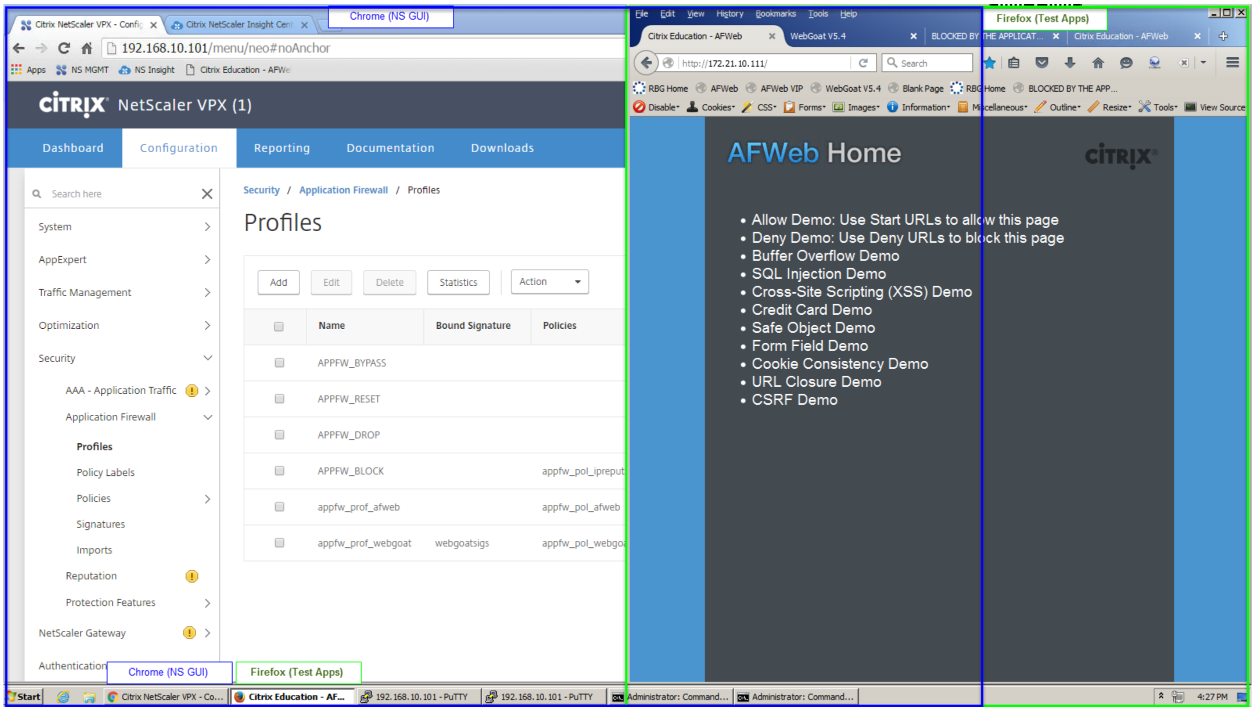
Working with the Labs

NetScaler Configuration and Application Testing

It is strong recommended, when running the exercises in this class, that you perform NetScaler configurations using Chrome web browser to access the NetScaler Configuration Management utility and test application attacks and protections in Firefox.

- This will allow you to switch back-and-forth from the configuration utility to the test application multiple times during each exercise.
- When certain labs require you to reset cookies or the browser's session state it will only affect Firefox and the test applications and not your connection to the management console in Chrome.
- Many of the troubleshooting and test utilities that will be required for the Application Firewall and other exercises are only installed for Firefox.

A suggested windows arrangement is pictured below:



Profiles

Name	Bound Signature	Policies
APPFW_BYPASS		
APPFW_RESET		
APPFW_DROP		
APPFW_BLOCK		appfw_pol_ipreput
appfw_prof_afweb		appfw_pol_afweb
appfw_prof_webgoat	webgoatsigs	appfw_pol_webgo

AFWeb Home

- Allow Demo: Use Start URLs to allow this page
- Deny Demo: Use Deny URLs to block this page
- Buffer Overflow Demo
- SQL Injection Demo
- Cross-Site Scripting (XSS) Demo
- Credit Card Demo
- Safe Object Demo
- Form Field Demo
- Cookie Consistency Demo
- URL Closure Demo
- CSRF Demo

During the Application Firewall exercises, the NetScaler Configuration Utility (GUI) will be run in the web browser to perform most of the configuration. You will also be asked to open two separate PuTTY sessions to make SSH connections to the NetScaler CLI.

- **Putty (1)** will be used to view the Syslog output as it is generated, using the following commands:

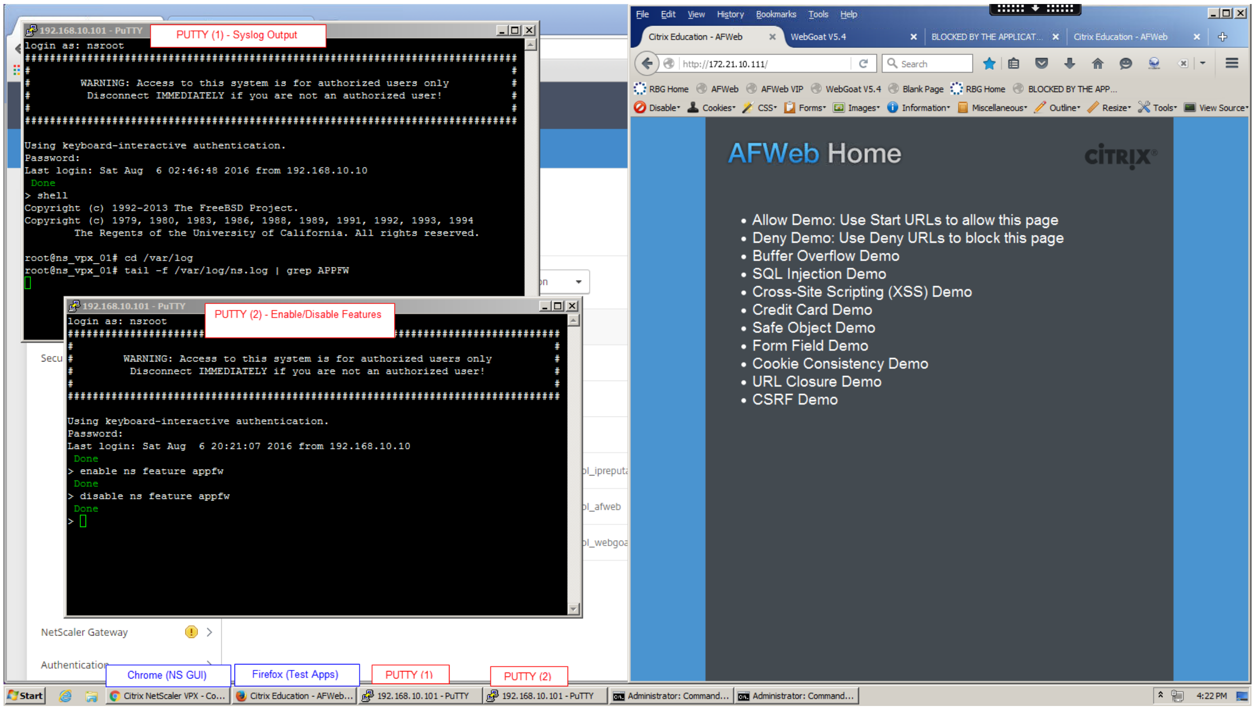
```
shell
cd /var/log/
tail -f /var/log/ns.log | grep APPFW
```

- **Putty (2)** will be used to toggle the Application Firewall feature on or off as required:

```
enable ns feature appfw
disable ns feature appfw
```

These SSH sessions will be used to make it easy to view Application Firewall violations as they occur or to switch the feature on and off frequently during exercises. The lab will instruct you when to create the sessions and when to use them.

It is recommended that students keep the two session running during the Application Firewall labs and switch between the Putty sessions as needed. A suggested arrangement for the windows is displayed below.



PUTTY (1) - Syslog Output

```
login as: nsroot
################################################################################
#                                                                              #
#        WARNING: Access to this system is for authorized users only          #
#         Disconnect IMMEDIATELY if you are not an authorized user!           #
#                                                                              #
################################################################################

Using keyboard-interactive authentication.
Password:
Last login: Sat Aug  6 02:46:48 2016 from 192.168.10.10
 Done
> shell
Copyright (c) 1992-2013 The FreeBSD Project.
Copyright (c) 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994
        The Regents of the University of California. All rights reserved.

root@ns_vpx_01# cd /var/log
root@ns_vpx_01# tail -f /var/log/ns.log | grep APPFW
```

PUTTY (2) - Enable/Disable Features

```
login as: nsroot
################################################################################
#                                                                              #
#        WARNING: Access to this system is for authorized users only          #
#         Disconnect IMMEDIATELY if you are not an authorized user!           #
#                                                                              #
################################################################################

Using keyboard-interactive authentication.
Password:
Last login: Sat Aug  6 20:21:07 2016 from 192.168.10.10
 Done
> enable ns feature appfw
 Done
> disable ns feature appfw
 Done
>
```

AFWeb Home

- Allow Demo: Use Start URLs to allow this page
- Deny Demo: Use Deny URLs to block this page
- Buffer Overflow Demo
- SQL Injection Demo
- Cross-Site Scripting (XSS) Demo
- Credit Card Demo
- Safe Object Demo
- Form Field Demo
- Cookie Consistency Demo
- URL Closure Demo
- CSRF Demo

Chrome (NS GUI)

Firefox (Test Apps)

PUTTY (1)

PUTTY (2)

Citrix Hands-on Labs

What are Hands-on Labs?

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Certification exam preparation

Get ready for your Citrix certification exam by practicing test materials covered by lab exercises.

Module 1: NetScaler MAS: Introduction and Configuration

Overview:

The NetScaler Management and Analytics System (NetScaler MAS) is a virtual appliance that integrates the management, auditing, and configuration features of NetScaler Command Center using a new interface and management engine with the Analytics capabilities of NetScaler Insight Center. The new NetScaler MAS can be used to manage NetScaler MPX, VPX, and SDX deployments along with NetScaler SD-WAN products in one centralized utility. Modules 1-3 in this exercise workbook will cover various aspects of configuring and using NetScaler MAS to manage, configure, troubleshoot, and analyze NetScaler implementations.

NetScaler MAS lecture and exercises are divided into the following modules:

- Module 1: NetScaler MAS: Introduction and Configuration
- Module 2: NetScaler MAS: Managing and Monitoring NetScalers
- Module 3: NetScaler MAS: Managing NetScaler Configurations and Integrated Analytics

This module demonstrates the integration of NetScaler MAS with a NetScaler ADC system and additional NetScaler MAS configuration tasks.

After completing this lab module, you will be able to:

- Describe NetScaler MAS setup requirements (though the initial virtual appliance configuration has already been performed, these settings will be reviewed during the exercise.)
- Configure NetScaler MAS to manage one or more NetScaler systems and manage key settings of the initial MAS setup.
  - Configure NetScaler appliances for management by NetScaler MAS.
  - Perform additional NetScaler MAS setup tasks such as session timeouts, NTP synchronization, managed instance backup settings, and dashboard polling intervals.

This module contains the following exercises using the NetScaler Configuration Utility GUI:

- Exercise 1-1: Initial Configuration and Integration of MAS with NetScaler VPX 15 min

Before you begin:

Estimated time to complete this lab module: 15 mnutes

Exercise 1-1: Initial Configuration and Integration of MAS with NetScaler VPX

In this exercise, you will access the NetScaler MAS management console and integrate the NetScaler NS_VPX_01 for management and reporting with NetScaler MAS. The initial NetScaler MAS configuration settings will be reviewed and additional post-setup configuration changes will be applied.

This exercise introduces the initial NetScaler MAS setup and configuration.

Requirements for this scenario:

- Access the NetScaler MAS management console.
- Integrate a NetScaler for management by NetScaler MAS.
- Update NetScaler MAS settings with appropriate values for polling and backup retention suitable for use within the lab environment.

In this exercise, you will perform the following tasks:

- Connect to NetScaler MAS
- Configure Additional MAS Settings

Connect to NetScaler MAS

Step	Action
1.	Open Chrome and in **Tab (1)** connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
2.	In Chrome, open a new tab and in **Tab (2)** connect to NetScaler MAS management utility at http://mas.training.lab. Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
3.	Complete the NetScaler MAS setup tasks available in the Getting Started wizard: • Click **Get Started**. • Select **Single Server Deployment** under Select Deployment Type and Click **Next**. **Note**: The virtual appliance has been minimally configured for networking when the VM was imported. This lab will show management and configuration tasks available from the GUI and will not require access to XenCenter or the VM console.
4.	Continue to Add Instances to manage to NetScaler MAS: • Click **New** under Add New Instances. • Select **NetScaler** under Instance Type. Note: If the new instance button is greyed out, click Finish and then go the **infrastructure -> Instances -> NetScaler VPX** and select **Add**
5.	Create a new profile for NetScalers in the lab, before configuring other settings: • Click **+** (plus sign) next to Profile Name to create a new Profile. • Enter **netscaler_labstandard** in the Profile Name field. • Enter **nsroot** in the User Name field. • Enter **nsroot** in the Password field. • Enter **public** in the Community field. • Deselect (uncheck) **Use global settings for NetScaler communication**. • Select **http** under Protocol for NetScaler communication. Click **Create**. This will return you to the "Add Instance" dialog.

6.	Add NetScaler instance to manage: • Enter **192.168.10.101** in the IP Address field. • Verify **netscaler_labstandard** is still selected under Profile Name. Click **OK**.
7.	Click **Finish** to complete instance integration. Verify the NetScaler MAS Dashboard is displayed on the Applications tab.
8.	Switch to **Tab (1)** for the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
9.	View MAS Integration Settings on NetScaler NS_VPX_01: • Navigate to **System > SNMP > Community**. o Verify the community string **public** is set to **ALL** permissions. • Navigate to **System > SNMP > Traps**. o Verify NetScaler MAS (192.168.10.15) is listed as the Generic and Specific trap destination. • Navigate to **System > AppFlow > Collectors**. o Confirm no entries for AppFlow collectors are configured yet. AppFlow integration has not been configured at this point.
10.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
11.	View MAS configuration details for NetScaler NS_VPX_01: • Click on the **Infrastructure** tab. • Navigate to **Instances > NetScaler VPX**. • Verify an entry for **192.168.10.101** is present.

Configure Additional MAS Settings

Step	Action
1.	In Chrome, open a new tab **Tab (2)** and connect to NetScaler MAS management utility at http://mas.training.lab. Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
2.	Use the NetScaler MAS Setup Wizard to review initial configuration settings: • Click on **System** tab. • Navigate to **System Administration** in the left pane. • Click **Setup Wizard Settings** under Set Up NetScaler MAS in the right pane.

3.	Run the NetScaler MAS Setup Wizard: • Click **NetScaler MAS Network**. • Verify the following information is entered: o NetScaler Management and Analytics System IP Address: 192.168.10.15 o Netmask: 255.255.255.0 o Gateway: 192.168.10.1 o DNS: 192.168.30.11 Click **Back**. **Note**: All of these settings can be configured during the initial appliance set up via the command line interactive setup menu. Once MAS is on the network, the settings can be changed using this menu in the GUI. Also note, the MAS admin account password for the nsroot user can be changed here. **DO NOT** change the password in the lab environment, but include this step during any production setup.
4.	Continue with the System Settings in the MAS Setup Wizard: • Click **System Settings**. • Verify Host Name is set to **mas.training.lab**. • Select **http** under Communication with instance(s). Click **Done** to close the System Settings wizard. Click **Done** again to close the MAS Setup Wizard.
5.	Update additional settings on MAS (not included in wizard): • Click **Change System Settings** under System Settings (right-pane). • Select (check) **Enable Session Timeout**. • Enter **120** under Session Timeout. • Keep default settings for other parameters to insure proper instance management. Click **OK**. **Note**: The timeout for NetScaler MAS management console is being increased to minimize logon requirements during lab exercises. A shorter timeout may be more appropriate for production deployments. A logout is required for the new timeout to take effect.
6.	Review SSL Settings for NetScaler MAS: • Click **Configure SSL Settings** under System Settings. • Click **Protocol Settings** under Edit Settings (on the right) to add category to configuration pane. • Verify SSLv3 is disabled by default. TLSv1, TLSv1.1, and TLSv1.2, and SSL Renegotiation are enabled by default. Click **Done** without making changes.
7.	Configure Instance Backups to Retain: • Click **Instances Backup Settings** under Policy Administration. • Enter **3** for Number of Backup Files to retain. Click **OK**.

8.	Configure Polling Interval for Managed Devices: • Click **Applications** tab. • Navigate to **Dashboard > Settings**. • Click **Configure Polling Interval for Entities**. • Enter **10** in the Poll Interval (minutes) field. (This is the minimum polling interval.) Click **OK**. **NOTE**: To ensure that we have reasonably frequent updates during lab, the smallest supported polling interval will be used. This may impact sizing and data growth in production deployments.
9.	Configure MAS with NTP Synchronization: • Click **System** tab. • Navigate to **NTP Servers** in the left pane. • Click **Add**. • Enter **192.168.30.11** in the Server Name / IP Address field. • Select (check) **Preferred**. • Click **Create** and click **Yes**. Enable NTP Synchronization: • Select (check) **192.168.30.11** in the NTP Server list. • Click **NTP Synchronization** button in the right pane. • Enable (check) **Enable NTP Synchronization**. • Click **OK** and click **Yes**. Wait for NetScaler MAS to restart (approximately 90 seconds).
10.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
11.	Verify session timeout: • Click on **System** tab to return to MAS System settings. • Navigate to **Sessions** (left pane). • Confirm your logged on session now has about 2 hours until expiration.

Takeaways:

- NetScaler MAS is meant to replace Citrix Command Center for NetScaler management, monitoring, and alerting tasks. NetScaler MAS combines Citrix Command Center and NetScaler Insight Center into one management system. NetScaler MAS also introduces additional new management features not present in the previous Citrix Command Center product.
- NetScaler MAS can be used to manage and monitor multiple NetScaler systems of any NetScaler appliance types, including NetScaler MPX, NetScaler VPX, NetScaler SDX and its instances.

Module 2: NetScaler MAS: Managing and Monitoring NetScalers

Overview:

In this module, you will use NetScaler MAS to view current real-time dashboard and statistics information for managed NetScaler appliances. The exercises in this module will demonstrate the different levels of information available from the NetScaler MAS, Instance Dashboard, Infrastructure Dashboard, and the Application Dashboard views. Additional monitoring capabilities using the events view and syslog will extend the NetScaler administrators view of real-time operation of the managed NetScaler appliances.

Finally, SSL Certificate expiration and monitoring will be used to identify expiring certificates within the environment. NetScaler MAS will then be used to update and replace the certificates with replacement files.

After completing this lab module, you will be able to:

- Use NetScaler MAS to monitor real-time events and statistics on the managed NetScaler appliances.
- Use NetScaler MAS to identify hotspots and trouble areas with specific NetScalers, entities, or applications to facilitiate a quicker time to resolution.
- Use NetScaler MAS to monitor and manage event and syslog reporting.
- Use NetScaler MAS to identify certificates in use, certificate expiration alerts, and to manage certificate replacement tasks.

This module contains the following exercises using the NetScaler Configuration Utility GUI:

• Exercise 2-1: Using MAS for NetScaler Instance Management	25 min
• Exercise 2-2: Viewing Events and Syslog	5 min
• Exercise 2-3: Managing SSL Certificates	5 min

Before you begin:

Estimated time to complete this lab module: 35 minutes

Exercise 2-1: Using MAS for NetScaler Instance Management

In this exercise, you will use the NetScaler MAS dashboard functions to identify appliance, entity, and application summary data using the dashboard functions. These dashboards provide graphical summaries of key statistics, top-n style metrics for alerts and entities in use, alerts, and other key metrics. The dashboards provide monitoring and alerting capabilities that can be used to view items across multiple NetScaler instances, multiple traffic management entities, and/or applications. The dashboards also allow administrators to view the available metrics from a number of different perspectives and use the summary metrics to drill-down to specific entities.

NetScaler MAS provide different dashboard views depending on how the statistics should be viewed. This exercise demonstrates where to access these views and key information relevant to each. These views include the instance dashboard, infrastructure dashboard, and application dashboard.

These dashboards can be used for monitoring status and for drilling down into entities for quick management tasks like enabling and disabling affected resources.

Requirements for this scenario:

- View statistics and operational tasks available from the Instance dashboard.
- Manage instance backups and backup restorations.
- Generate a traffic load event and identify how this statistics affect the dashboard views.
- Define and manage virtual servers as applications in NetScaler MAS.

In this exercise, you will perform the following tasks:

- NetScaler MAS: Instance Dashboard and Infrastructure Dashboard
- NetScaler MAS: Applications Dashboard

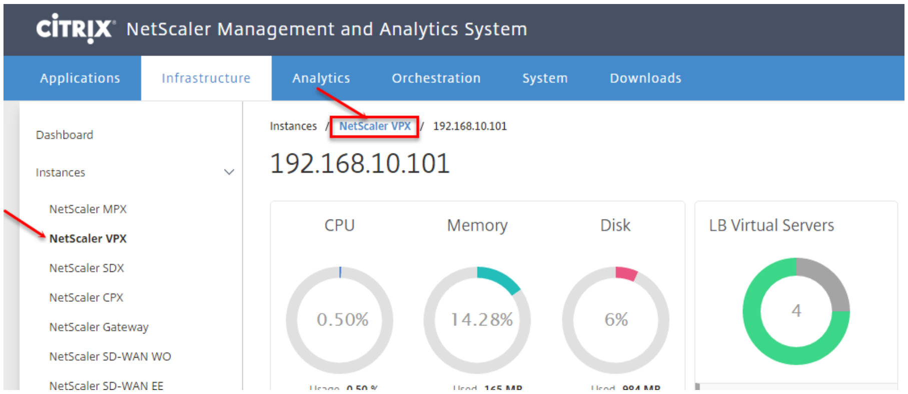
NetScaler MAS: Instance Dashboard and Infrastructure Dashboard

Step	Action
1.	Continue to keep the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
3.	View NetScaler Instances managed by NetScaler MAS: • Click on the **Infrastructure** tab. • Navigate to **Instances > NetScaler VPX**. • Select (check) **192.168.10.101** in the NetScaler VPX list and click **Dashboard** button (in right pane). **NOTE**: This instance-level dashboard view is different than the Infrastructure Dashboard (left pane navigational node) that summarizes all instances.

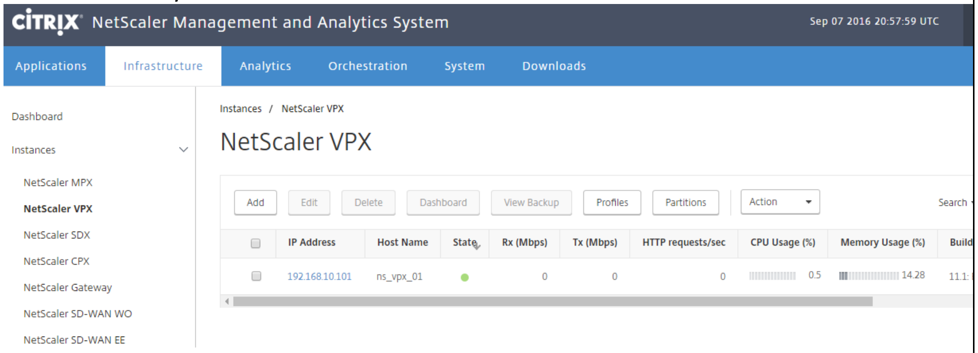
4.	Review the summary information in the Instance Dashboard view: • Current NetScaler instance CPU, Memory, Disk utilization. • Status of Virtual Servers above 75% health. This is clickable and will take you to a pre-configured search filter of the affected virtual servers at the status level selected. • Summary of Events. • Certificate expiration summary. This is also clickable and will take you to a list of certificates in the affected categories. Notice that at least one certificate has expired; this will be addressed later. • Network Interface Summary. Scroll down to the Information section and view NetScaler instance details: • View NetScaler system details such as: NSIP, uptime, build version, hardware version and system model ID details. • Note that the running vs. saved configuration comparison can be made on the instance dashboard. • Licensed Features shows which features are licensed (not which features are enabled). • Modes displays summary of enabled/disabled modes. **Note**: • The Instance Dashboard is accessed by selecting the instance on the Infrastructure page and clicking the Dashboard button in the right-pane. • This is different than the Dashboard for all instances at the top of the navigation pane under the Infrastructure tab. (Which will be viewed in a later step.) • This is also separate from the Dashboard view present under the Applications tab.

5. Return to instance details for NS_VPX_01 (192.168.10.101):

- Click on **Infrastructure** tab.
- Navigate to **Instances > NetScaler VPX**.
- If still in the Instance Dashboard view, use the navigation bread crumbs to backup one level and return to the **NetScaler VPX** list.



This will return you to the list view:



□	IP Address	Host Name	State	Rx (Mbps)	Tx (Mbps)	HTTP requests/sec	CPU Usage (%)	Memory Usage (%)	Build
□	192.168.10.101	ns_vpx_01	●	0	0	0	0.5	14.28	11.1:

6. Make a backup of a managed instance:

- Select (check) **192.168.10.101** and click **View Backup**.
- Click **Back Up** to create a backup of this NetScaler.
- Enter **Password1** in the Password and Confirm Password fields.

Click **Continue**.

Verify a green confirmation message is displayed as a banner in the page. Click in the in-page refresh icon to refresh this view and verify the backup file is displayed.

7. View the Infrastructure Dashboard:

- Remain on the Infrastructure tab.
- Navigate to **Dashboard** in the left pane.

Note: The display can be toggled from displaying all managed instances to viewing instances by Datacenter (Datacenter groupings have not been defined.)

8.	Scroll down the Infrastructure Dashboard view the following: • The top dashboard summary identifies total entities being across all managed devices. • Events by Severity (for all instances) • Health, Up Time, Models, and Versions for all instances. • NetScaler Certificates, Config Save Status, and NetScaler config drift across all instances.
9.	Generate an event on the managed NetScaler: • Switch to **Tab (1)** and access the NetScaler Configuration Utility for http://192.168.10.101. Log on as **nsroot / nsroot** if required. • Save the NetScaler configuration. • Navigate to the **System** node in the left pane and click **Reboot** in the right-pane. (Ensure Save configuration is enabled before proceeding, in case you missed the previous step.) Wait for the NetScaler to reboot and reconnect to http://192.168.10.101 in Tab (1) before continuing.
10.	Verify the load balancing virtual servers are in an UP state following reboot. • Navigate to **Traffic Management > Load Balancing > Virtual Servers**. • Verify the virtual servers are in an UP state (except for lb_vsrv_callout). • If the virtual servers are DOWN, wait 30 seconds - 1 minute for all services to finish initializing following the reboot. • Use the in-page refresh to refresh the view. Verify virtual servers are UP before continuing.

11. Generate an event on the managed NetScaler:

Use the hulk.py scripts to generate a brief load event. Prep the CMD Prompt (2) with the taskkill command before actually generating load. Commands are located in C:\resources\hulk_commands.txt for easy reference.

Open CMD Prompt (1) to run the load script:

- Open an elevated CMD prompt on the Student Desktop: use the CMD prompt pinned to the Student Desktop.
- When prompted select Notepad to open
- In CMD Prompt (1) run the following command:

```
c:\hulk.py http://rbg.training.lab/home.php
```

- Stop the script after the first 3-4 outputs are generated.

Open CMD Prompt (2) to run the stop command:

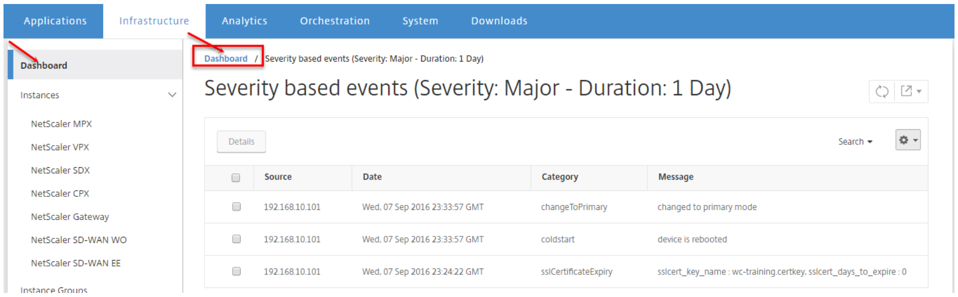
- Right-click the CMD prompt (elevated) pinned to the taskbar and click **Command Prompt** to open a second window.
- When prompted select Notepad to open
- In CMD Prompt (2) run the following command:

```
taskkill /im Python.exe /F
```

During the test, keep both CMD prompts running with access to the commands during the next several steps and you can start/restart the Python script and terminate the process as needed. When the test is done, remember the following:

- If you have issues terminating the script, use task manager to terminate any running python process.
- Be sure the hulk.py process is stopped before continuing after the test.

NOTE: A text file containing both commands is located on the Student Desktop at C:\resources\hulk_commands.txt. Use this to copy and paste commands to the CMD prompts, if needed.

12.	Return to MAS in Tab (2). Remain on the Infrastructure tab > Dashboard view. View Events by Severity: - Change time period from 1 Day to **5 minutes**. - Click on **Major** in the Events by Severity graph to display a list of major events across all managed devices. - Depending on time frames, this should include events related to the NetScaler reboot and the rate limit being reached (based on the bandwidth limit in the license). Return to the Dashboard view: - Use the navigation breadcrumbs to return to Dashboard:  Applications Infrastructure Analytics Orchestration System Downloads Dashboard Instances NetScaler MPX NetScaler VPX NetScaler SDX NetScaler CPX NetScaler Gateway NetScaler SD-WAN WO NetScaler SD-WAN EE Instance Groups Dashboard / Severity based events (Severity: Major - Duration: 1 Day) Details Search Severity based events (Severity: Major - Duration: 1 Day) Source | Date | Category | Message 192.168.10.101 | Wed, 07 Sep 2016 23:33:57 GMT | changeToPrimary | changed to primary mode 192.168.10.101 | Wed, 07 Sep 2016 23:33:57 GMT | coldstart | device is rebooted 192.168.10.101 | Wed, 07 Sep 2016 23:24:22 GMT | sslCertificateExpiry | sslcert_key_name : wc-training.certkey, sslcert_days_to_expire : 0

NetScaler MAS: Applications Dashboard

Step	Action
1.	Continue to keep the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
3.	View the Applications Dashboard in NetScaler MAS: - Click on the **Applications** tab. - Navigate to **Dashboard** in the left-pane. - Verify Virtual Servers view is selected in the right-pane. **NOTE**: The Dashboard on the Applications tab is different than the Infrastructure Dashboard and Instance Dashboards viewed previously. This Dashboard can be toggled between virtual servers views and applications views.

4.	Review the information on the Applications Dashboard for Virtual Servers. Verify the information displayed for the following areas: • Top 5 Virtual Servers with Highest Client Connections should display spikes in activity for lb_vsrv_rbg and little to no activity for other virtual servers. (It may take a few minutes after stopping the hulk.py script before data is displayed.) • Top 5 Virtual Servers with Highest Server Connections. • Virtual Servers summarized by State: Up, Down, Out of Service. • Managed NetScaler instances providing virtual servers. • Summary views for Virtual Servers by health, protocols, load balancing methods, and persistence type. **NOTE**: The virtual servers below each graph are clickable and you can customize the graph to show all, some, or specific virtual server data.
5.	View Dashboard by Applications • Click **Applications** in the right-pane of the Dashboard node to switch from Virtual Servers to Applications view. Create an Application for RBG Content: • Click **New Application**. • Enter **RBG App** in the Name field. • Click **Add Virtual Servers > LB Virtual Servers**. • Select (check) **lb_vsrv_rbg** and click **Select**. • Click **OK**. Create an Application for WebGoat Content that includes the WebGoat and Callout virtual servers: • Click **New Application**. • Enter **WebGoat App** in the Name field. • Click **Add Virtual Servers > LB Virtual Servers**. • Select (check) **lb_vsrv_callout, lb_vsrv_webgoat,** and **lb_vsrv_webgoat_ssl**. • Click **Select**. • Click **OK**. **Note**: An application in NetScaler MAS is a way to group multiple virtual servers together so that they can be managed and viewed as a single entity. This can be used to group virtual severs and dependencies together, such as if we were using the callout or an authentication virtual server in conjunction with a load balancing virtual server or content switching and the destination load balancing virtual servers could be combined together. This could also be useful to keep track of HTTP and HTTPS virtual servers that frontend the same application. This step was meant to illustrate the concept that an application does not have to be defined 1:1 per virtual server. Also note a given virtual server can appear in more than one Application definition in MAS, so different "views" can be used to monitor the same virtual server.

6.	Use Applications Dashboard to manage NetScaler entities and perform operational tasks: • Remain on **Applications** tab. • Navigate to **Dashboard > Load Balancing > Virtual Servers**. • Select (check) **lb_vsrv_afweb** and **lb_vsrv_webgoat** and click **Disable**. Click **Yes** to confirm. View Applications Dashboard: • Navigate to **Dashboard** node in left-pane (on Applications tab). • Scroll down to the **State** summary graph and verify 2 virtual servers are listed as "out of service".
7.	Switch to **Tab (1)** in Chrome for the NetScaler Configuration Utility for NS_VPX_01 at http://192.168.10.101. Log on as **nsroot / nsroot** if needed. • Click ok on Infomational Pop-up • Navigate to **Traffic Management > Load Balancing > Virtual Servers**. • Refresh the view, if necessary. • Verify lb_vsrv_afweb and lb_vsrv_webgoat are disabled and listed as "out of service". View the Saved v/s Running Configuration: • Navigate to **System > Diagnostics**. • Click **Saved v/s Running** in the right-pane under View Configuration. • Notice that the configuration was saved when changes were applied by NetScaler MAS. • Click **Close** to exit the Saved v/s Running Configuration display.
8.	Return to **Tab (2)** in Chrome for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
9.	Manage a service using NetScaler MAS: • Remain on the **Applications** tab. • Navigate to **Dashboard > Load Balancing > Services**. • Select (check) **svc_callout** and click **Bound Virtual Servers** to see all references to this service before making changes. (Bound Service Groups are separate). • Use the Navigational breadcrumb to return to the Services view. • Select (check) **svc_callout** and click **Enable** and **Yes** to return the service to an UP state.
10.	Return to the Virtual Servers node and view virtual server states. • Navigate to **Dashboard > Load Balancing > Virtual Servers**. Notice after enabling svc_callout, lb_vsrv_callout is still DOWN. This is due to the polling frequency. • Click **Poll Now** and click **Yes** to confirm on the Virtual Servers plage to update all virtual servers. • Click **OK** to confirm polling initiatied successfully. • Click the in-page **refresh** to verify lb_vsrv_callout is now UP.

11.	Return to the Virtual Servers node to re-enable the virtual servers. • Select (check) **lb_vsrv_afweb** and **lb_vsrv_webgoat**. • Click **Enable** and click **Yes**.

Takeaways:

- NetScaler MAS can view NetScaler instance, entity, and application status and key dashboard metrics and top-n statistics.
- NetScaler MAS dasbhoards and related drill-down views allow administrators to manage NetScaler instance configurations and backups.
- NetScaler MAS application and infrastructure dashboards can allow administrators to enable/disable entities across multiple managed NetScalers.
- NetScaler MAS allows administrators to switch from dashboard statistics and summary views to entity configuration and management views.

Exercise 2-2: Viewing Events and Syslog

In this exercise, you will use NetScaler MAS as a syslog destination for one or more managed NetScaler instances. NetScaler MAS can remotely configure the appropriate syslog audit policies configuring itself as the syslog audit destination server.

NetScaler MAS will act as an event dashboard and a centralized Syslog management server for all managed NetScalers.

In this exercise, you will perform the following tasks:

- Integrate NetScaler Syslog Auditing with NetScaler MAS

Integrate NetScaler Syslog Auditing with NetScaler MAS

Step	Action
1.	Continue to keep the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
3.	Attempt to view Syslog events for managed NetScaler instances using NetScaler MAS: • Click on **Infrastructure** tab. • Navigate to **Events > Syslog Messages**. • Verify no syslog events are currently displayed for any NetScaler instance.
4.	View the NetScaler MAS Syslog events. This is the MAS's own local syslog: • Click on **Applications** tab. • Navigate to **Dashboard > Auditing**. • Verify mas and mas_config messages are displayed here.
5.	Switch to **Tab (1)** and view the NetScaler Configuration utility. View the NetScaler's local Syslog settings: • Navigate to **System > Auditing**. • Click **Change Auditing Syslog Settings** in the right pane. o Verify current Syslog settings are logging locally (127.0.0.1) o Click **Close** to exit without making changes. View the NetScaler syslog policies: • Navigate to **System > Auditing > Syslog**. • Confirm there are no additional Syslog policies defined (Just the default SETSYSLOGPARAMS_POL.)
6.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.

7.	Integrate external syslog reporting from the managed NetScaler (192.168.10.101) to NetScaler MAS: • Click on the **Infrastructure** tab. • Navigate to **Instances > NetScaler VPX** node in the left-pane. • Select **192.168.10.101** and click **Action > Configure Syslog**. • Select (check) **Enable**. Click **OK**.
8.	Switch to **Tab (1)** and view the NetScaler Configuration utility. View the NetScaler syslog policies: • Navigate to **System > Auditing > Syslog**. • Click in the in-page Refresh. • Verify a new policy named **policy_name_192.168.10.15 appears** in the policy tab and that the summary page indicates it is Globally Bound. View the Syslog action: • Click the **Servers** tab within the Syslog Auditing pane to view the policy action. • Select (check) **action_name_192.168.10.15** and click **Edit**. • Verify the Syslog policy directs logging to the NetScaler MAS IP Address (192.168.10.15). Click **Close**. **NOTE**: Logging level default to ALL in this configuration instead of ALL except for DEBUG.
9.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
10.	View NetScaler syslog events within NetScaler MAS: • Click on the **Infrastructure** tab. • Navigate to **Events > Syslog Messages** in the left-pane. • Verify Syslog events from NetScaler appear in the viewer.

Takeaways:

- Syslog logging to NetScaler MAS just requires the necessary syslog policy to be bound to the global system object on the managed NetScalers. NetScaler MAS helps streamline the configuration by enabling remote configuration of the necessary syslog policies, in the same way NetScaler MAS can configure AppFlow integration.

Exercise 2-3: Managing SSL Certificates

In this exercise, you will use NetScaler MAS to identify SSL certificates in use and perform SSL certificate management tasks. The NetScaler MAS SSL Certificate summary will be used to identify time to expiry for certificates in use and which certificates have expired.

Once expired certificates have been identified, NetScaler MAS can be used to perform certificate update tasks by uploading new certificate and private key files to the existing NetScaler appliances using the existing certkey objects.

Replacement certificate and private key files are uploaded to the NetScaler MAS before being distributed to the managed NetScaler appliance. Once a replacement set of files are on the NetScaler MAS the instance of the files on the NetScaler MAS can then be used to distribute the updated certificate and private keys to other managed NetScaler instances.

Requirements for this scenario:

- Identify the NetScaler certkey(s) that have expired.
- Upload replacement certificate and private key files to the NetScaler MAS for distribution to the managed NetScaler systems.

In this exercise, you will perform the following tasks:

- SSL Certificate Expiration and Updates

SSL Certificate Expiration and Updates

Step	Action
1.	Continue to keep the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.

3.	View the SSL Certificates summary under Infrastructure: • Click the **Infrastructure** tab. • Navigate to **SSL Certificates** node in the left pane. • Click **Settings** in the right pane. • Click **Edit** (pencil icon) next to Certificate Settings. Notice the SSL Certificates console in NetScaler MAS can be tailored to highlight recommended information: • Supported Trusted Certificate Authorities • Recommended Signature Algorithms and Recommended Key Strengths. • If the values highlighted are changed, this will affect the display graphs reporting. Keep the default values for now. • SSL Certificate notification settings can be adjusted here. Default expiration warning is 30 days from expiry. If NetScaler MAS is configured with Email (SMTP) and SMS notification details, then additional notifications may be generated. Click **Close** to close settings without applying changes.
4.	Return to the SSL Certificates view: • Use the navigation breadcrumbs to return to the SSL Certificates view.
5.	View expired SSL Certificates: • Click on **Expired** in the Expiry graph. One certificate is currently expired. • This takes you to the certificate management page for the list of expired certificates.
6.	View certificates already uploaded to NetScaler MAS: • Navigate to **SSL Certificates > SSL Certificate Files**. • Verify no SSL Certificates, SSL Keys, or SSL CSRs are currently present on NetScaler MAS.

7.	Update the Expired SSL Certkey: • Navigate to **SSL Certifcates** in the left pane again. • Click on **Expired** in the Expiry graph. One certificate is currently expired. • This takes you to the certificate management page for the list of expired certificates. • Select (check) **wc-training.certkey** and click **Update**. Update the Certificate and Private Key files associated with the SSL Certkey: • Click **Choose File** under the Certificate File drop-down list to browse the NetScaler MAS Appliance. Notice there are no files in the file browser list. Click **Cancel**. • Click the **down arrow** next to Choose File under the Certificate File drop-down list and click **Local** to browse the Student Desktop. o Browse to **C:\resources\SSL Certs\NEWCerts_v2\**. o Select **wc-training-v2.cer** and click **Open**. • Click the **down arrow** next to Choose File under the Key File drop-down list and click **Local** to browse the Student Desktop. o Browse to **C:\resources\SSL Certs\NEWCerts_v2\**. o Select **wc-training-v2.pem** and click **Open**. • Verify Certificate Format is set to PEM. • Enter **Password1** in the Password field. Click **OK** to upload the files to the managed NetScaler and update the SSL Certkey file paths. **NOTE**: • When updating the files an SSL certkey points to using the NetScaler native tools, the new certificate and private key file names can be the same name as the original files and will overwrite them. • When updating the files an SSL certkey points to using the NetScaler MAS tools, the private key and certificate file names must be different than the existing files in use on the destination NetScalers as MAS will not overwrite files currently in use by a certkey. (Files on the NetScaler not in use with a certkey object will be overwritten.)
8.	In the SSL Certificates list view: • Verify **wc-training.certkey** is listed as valid instead of expired.
9.	Return to the SSL Certificates view: • Use the navigation breadcrumbs to return to the **SSL Certificates** view. • Verify all Certificates are listed as not expired. All should expire after 90 days.
10.	View certificates already uploaded to NetScaler MAS: • Navigate to **SSL Certificates > SSL Certificate Files**. • Click **SSL Certificates** tab: 1 SSL Certificate is listed for wc-training-v2.cer. • Click **SSL Keys** tab: 1 SSL Key is listed for wc-training-v2.pem. **NOTE**: The files for this certificate-key pair distributed to the managed NetScaler are now stored on NetScaler MAS and could be used to update other SSL certkeys on other managed NetScalers. These could then use the Choose File (from Appliance) option.

11.	Return to the NetScaler GUI in **Tab (1)**. - If the option to save the configuration was not enabled when updating the certkey, the changes to the running configuration are not yet saved. Save the NetScaler configuration.

Takeaways:

- Certificate and Private keys are stored on the NetScaler MAS prior to distribution to managed NetScalers. NetScaler MAS will look for files on its own system if the "appliance" option is selected under upload.
- Once certificate files have been distributed to one NetScaler, NetScaler MAS archives a copy of the certificate and private key and can use its own copy of the files when distributing the files to subsequent managed NetScalers.
- If using the native NetScaler Configuration Utilty to update a certkey with replacement certificate and private key files, the new files can retain the same name as the original certificate and private key files that they are replacing. When performing the same update using NetScaler MAS, the replacement certificate and private key files must have a different name from the files that they will be replacing. NetScaler MAS will not overwrite existing certificate and private key file names that are still in use by an active SSL certkey. The lab exercise got around this by replacing the original files with new files with a different name.

Module 3: NetScaler MAS: Managing NetScaler Configurations and Integrated Analytics

Overview:

In this module, you will use NetScaler MAS to push configuration changes to managed NetScaler systems and to view analytics using Web and Security Insight.

This module will demonstrate the use of StyleBooks and configuration templates to manage configuration changes across individual or multiple managed NetScalers. The default StyleBooks included in the NetScaler MAS, will be used to demonstrate one method for an administrator to add entities to the NetScaler. This module also demonstrates how to use the job configuration tasks to build custom configuration templates leveraging existing built-in templates, manually creating templates, and the use of Record & Play to generate lists of commands for use in custom templates and tasks. The construction of command templates and command variables are used to illustrate how to create re-usable tasks on NetScaler MAS to push command changes to multiple NetScalers for multiple object instances.

This module will also demonstrate the integration of NetScaler Insight with NetScaler MAS. The exercise in this module will demonstrate Web Insight with HTML Injection. Security Insight will also be explored to demonstrate the Application firewall statistics.

After completing this lab module, you will be able to:

- Manage NetScaler configuration changes, using StyleBooks to push changes to one or more NetScalers and use the job generated by the StyleBook to remove configured objects.
- Manage NetScaler configuration changes, using templates and jobs, by performing the following tasks:
    - Create custom configuration templates using manual configuration tasks or using the Record & Play feature.
    - Define variables in a custom job and save as a template for re-use.
    - Use templates to create specific configuration jobs and either run in real-time or schedule for future deployment.
- Configure and integrate NetScaler MAS Analytics reporting using AppFlow, by:
    - Enable NetScaler MAS Web Insight, HTML Injection, and Security Insight data gathering.
    - View Web Insight and HTML Injection statistics within NetScaler MAS.
    - View Security Insight statistics within NetScaler MAS.

This module contains the following exercises using the NetScaler Configuration Utility GUI:

• Exercise 3.1: NetScaler Configuration Management with StyleBooks	10 min
• Exercise 3.2: NetScaler Configuration Management with Record & Play	35 min
• Exercise 3-3: Analytics using Web Insight and Security Insight	25 min

Before you begin:

Estimated time to complete this lab module: 70 minutes

Exercise 3.1: NetScaler Configuration Management with StyleBooks

In this exercise, you will use NetScaler MAS to deploy configuration changes to the managed NetScaler system using the built-in StyleBooks.

StyleBooks act as a template for configuring specific features on the managed NetScaler. StyleBooks can be used to provide a configuration pack (template) that can be used to configure entities that conform to a specific naming convention and pre-defined set of parameters.

Requirements for this scenario:

- Use the built-in StyleBook to create a new load balancing virtual server for CMY services (192.168.30.54-56). The services do not actually exist in the lab, but the configuration process will be demonstrated.
- Use the StyleBook wizard to perform a dry run prior to performing the live configuration.

In this exercise, you will perform the following tasks:

- Use Default StyleBooks for NetScaler Configuration

Use Default StyleBooks for NetScaler Configuration

Step	Action
1.	Continue to keep the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**.
3.	In NetScaler MAS, access StyleBooks: • Click on **Applications** tab. • Navigate to **Configuration > Stylebooks** in the left pane. • View the list of available Stylebooks. From here the existing StyleBooks can be viewed and new ones uploaded. • Click **View Definition** for **HTTP/SSL Content Switched Application with Monitors** • Close the definition window (Click "X" in upper right corner).
4.	Use a StyleBook to create a new configuration: • Navigate to the **Configuration** node in the left pane. • Click **Create New** next to Configurations in the right-pane. • Click **HTTP/SSL LoadBalancing StyleBook** (4th from top) to create a configuration from this StyleBook. NOTE: The StyleBook "HTTP/SSL Load Balancing (with monitors) generates errors when a monitor is included. One of the parameters causes problems. Be sure to use the provided in Stylebook in the lab step; be careful of using random stylebook.

5.	Configure the load balancing configuration using a StyleBook. Enter the following values for the fields listed: • Load Balanced Application Name: **cmy** • Load Balanced App Virtual IP Address: **172.21.10.113** Expand the **Advanced Load Balancer Settings**. • Load Balanced App URL Redirect: **http://rbg.training.lab** • Load Balanced App Algorithm: **ROUNDROBIN** • Load Balanced App Persistence Type: **NONE**. • Minimize the **Advanced Load Balancer Settings**. Configure Load Balancing Server/Services: • Click "+" next to Application Servers IP Addresses until you have 3 IP Address fields. • Enter the following IP Addresses in the Application Servers IP Addresses (list): o **192.168.30.54** o **192.168.30.55** o **192.168.30.56** Expand the **Advanced Application Server Settings**: • Service Group Compression: **YES** Select Target Instance (managed NetScalers to apply configuration too): • Click **Click to Select** under Target Instance. • Select **192.168.10.101** and click **Select**. Continue with the next step. **NOTE**: The service IP addresses used in this step are not real IP addresses in the lab. They are being used for demonstration purposes. These services will be deleted later. **DO NOT** use IP Addresses for the actual RBG, AFWeb, or WebGoat services in this exercises, unless noted.
6.	Perform a Dry Run of the configuration: • Check **Dry Run**. • Click **Create**. Review the output of the objects that would be created: • Verify the settings for the LB vServer, ServiceGroup, and Service Group bindings. • Close the preview window.
7.	Apply settings: • Uncheck **Dry Run**. • Click **Create**. Verify configuration: • Click **View objects created**. • When done reviewing the objects, close the Objects Created dialog: Click "X" in upper right corner. • Verify the configuration named **cmy** appears in the configurations list. **NOTE**: Note the naming convention used with the objects is defined by this StyleSheet. The app name "cmy" is then prepended to the LB vServer, Service Group entity names. A different StyleBook could be used to support a different naming convention.

8.	Switch to **Tab (1)** and view the objects in the NetScaler Configuration Utility at http://192.168.10.101. Log on as **nsroot / nsroot** if needed.
9.	View objects configured using StyleBooks: Load Balancing Virtual Servers • Navigate to **Traffic Management > Load Balancing > Virtual Servers**. • View the new object **cmy-lb**. (Virtual server will be down as the destination services don't exist.) • Select (check) **cmy-lb** and click **Edit**. • Verify Service Group Binding, Load Balancing Method, and Persistence match values selected with StyleBook. Click **Done**.
10.	View objects configured using StyleBooks: Service Groups • Navigate to **Traffic Management > Load Balancing > Service Groups**. • Select (check) **cmy-svcgrp** and click **Manage Members**. • Verify service group members for the 192.168.30.54-56 IP Addresses were created. Click **Close**. **NOTE**: The IP addresses in use in this step are IP Addresses for fictitious CMY services and do not match any entity in the lab. These values must be used to avoid conflicts with other lab entities.
11.	Verify configuration is saved by the StyleBook task: • Navigate to **System > Diagnostics**. • Click **Saved v/s Running** under View Configuration in the right-pane. • Verify "No difference found" is returned. • Click **OK**. Click **Close**.
12.	Return to **Tab (2)** to access the NetScaler MAS console at http://mas.training.lab. Log on as **nsroot / nsroot** if required.
13.	Use the StyleBook configuration to delete the added settings: • Click **Applications** tab. • Navigate to the **Configuration** node. • Find the **cmy** configuration in the right-pane and click the **"X"** in the row to delete the configuration. This will actually undo the settings applied to the managed NetScaler. • Click **Yes** to confirm to remove the configuration for the application 'lb'. Confirm the deletion completed successfully without error.

Takeaways:

- NetScaler StyleBooks are based on YAML format, which is case-sensitive and requires proper indentation. Spaces must be used instead of tabs when formatting YAML output.
- NetScaler MAS StyleBooks and their configuration packs are based on YAML and the NetScaler Nitro API.

Exercise 3.2: NetScaler Configuration Management with Record & Play

In this exercise, you will use the NetScaler MAS to manage NetScaler configuration settings using configuration templates. InBuilt templates provide pre-defined command definitions that can be used to create new configuration jobs or as starting points for manually creating custom jobs. These templates can also contain variable definitions so that the templates can be used to repeat configuration tasks.

To allow for greater flexibility in building complex tasks, NetScaler MAS contains a Record & Play feature that allows an administrator to configure settings in a NetScaler (test or production) and then use the configuration commands executed during the Record & Play session as the commands to seed the job with. These commands can then be converted to a template, modified with variables, and then used to create additional jobs.

In this scenario, the Record & Play scenario will be used to generate a template that can be used to generate a load balancing virtual server, create a service group, and bind the service group to the virtual server. The template will allow administrators to supply custom values such as Virtual IP Address, port, virtual server name, and service group name. To make the template truly useful as a repeatable task for multiple entities across multiple NetScalers, the template will allow any number of service members to be bound to the service group by defining a service IP or service IP range.

Requirements for this scenario:

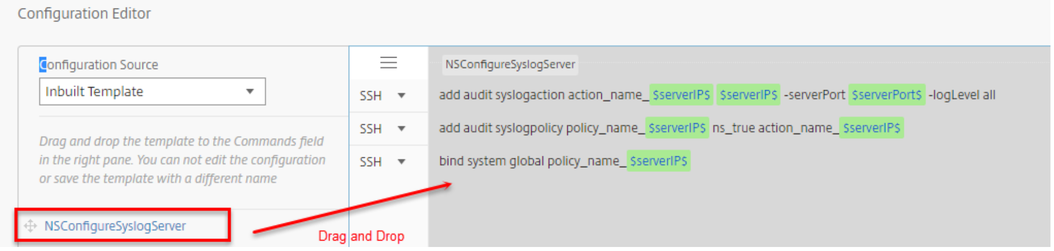
- View commands and variable definitions in the InBuilt template.
- Use Record & Play to generate a template that can be used to create a service group with service group members, create a load balancing virtual server, and bind the service group.
- Convert the explicit commands to a generic task and define the custom variables.
- Save the job as a template so it can be reused.
- Create a job from the template and apply the settings to the managed NetScaler.

In this exercise, you will perform the following tasks:

- Create a Job from the InBuilt Template
- Create a Custom Template and Job using Record & Play

Create a Job from the InBuilt Template

Step	Action
1.	Continue to keep the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Return to **Tab (2)** for the NetScaler MAS management console at http://mas.training.lab. Log on as **nsroot / nsroot**. **NOTE**: For this exercise, ensure you are using Chrome. In order to use the Record & Play option, pop-up blockers in the browser must be disabled. This has already been done on the lab system in the Chrome browser.

3.	Manage configuration jobs: • Click the **Infrastructure** tab. • Navigate to **Configuration Jobs** in the left-pane. • Click **Create Job** on the initial welcome pane.
4.	Create a Test Job based on an existing Template: • Verify you are on the Select Configuration tab. • Enter **Job1_syslog_demo** in the **Job Name** field. • Verify **NetScaler** is selected in the Instance Type field.
5.	View the InBuilt Template as an example: • Select **Inbuilt Template** under Configuration Source. • Verify **NSConfigureSyslogServer** appears in the left pane. • Drag and drop **NSConfigureSyslogServer** to the editor pane to view the commands.  Configuration Editor Configuration Source: Inbuilt Template *Drag and drop the template to the Commands field in the right pane. You can not edit the configuration or save the template with a different name* NSConfigureSyslogServer SSH add audit syslogaction action_name_$serverIP$ $serverIP$ -serverPort $serverPort$ -logLevel all SSH add audit syslogpolicy policy_name_$serverIP$ ns_true action_name_$serverIP$ SSH bind system global policy_name_$serverIP$ Notice how the command incorporates variables as $<variable name>$, making the task generic and repeatable. Click **Next** to proceed to Select Instances.
6.	Select NetScaler Instance(s) to apply job to: • Click **Add Instances**. • Select (check) **192.168.10.101** and click **OK**. Click **Next** to proceed to Specify Variable Values.
7.	Enter values to be used with the variables: • Select **Common Variable Values for all Instances**. • Enter **192.168.10.15** in the Syslog Server IP Address field. • Keep the default port 514 for the Syslog Server Port. Click **Next** to continue to the Execute screen to view execution options. **NOTE**: This is the procedure to run a task defined on the fly or based on a previously created template. The next step will be used to view the "execute now" and the "schedule for later" options, but the exercise is not going to run this task against the selected NetScaler.
8.	View job execution options, but do not run the task: • View options in the **On Command Failure** list. • Change Execution Mode from Now to **Later**. • View Execution Frequency for scheduled tasks. Click **Cancel** to abandon the job.

Create a Custom Template and Job using Record & Play

Step	Action
1.	Create a JOB using Record and Play to create a virtual server and bind a service group with services. • Click on **Infrastructure** tab. • Navigate to **Configuration Jobs**. • Click **Create Job**.
2.	Create initial job settings on the Select configuration tab: • Enter **job1_lbv_demo1** in the Job Name field. • Select **NetScaler** under Instance Type. • Select **Record and Play** under Configuration Source. • Select **ns_vpx_01 (192.168.10.101)** under Source Instance. Click **Record**. If the NetScaler Configuration Utility for NS_VPX_01 doesn't open in a new window, verify pop-up blockers are disabled in your browser. This browser window will be restricted to the NetScaler Configuration Utility only.
3.	Create a Service Group: • Navigate to **Traffic Management > Load Balancing > Service Groups**. • Click **Add**. Configure the Service Group settings: • Enter **svcg_cmy** in the Name Field. • Click **OK**. • Click No **Service Group Member** under the Service Group Members category. • Enter IP Address Range: **192.168.30.54**. • Enter **80** in the Port field. • Click **Create**. Click **OK** under Service Group Members to advance the wizard. Click **Done** to complete the Service Group. **NOTE**: The IP address(es) in use in this step are IP Addresses for fictitious CMY services and do not match any entity in the lab. These values must be used to avoid conflicts with other lab entities.

4.

Create a Load Balancing Virtual Server:

- Navigate to **Traffic Management > Load Balancing > Virtual Servers**.
- Click **Add**.
- Enter **lb_vsrv_cmy** in the Name field.
- Enter **172.21.10.113** in the IP Address field.
- Click **OK**.

Bind a Service Group to the Load Balancing Virtual Server:

- Click No **Load Balancing Virtual Server ServiceGroup Binding** under the Services and Service Group category.
- Click **Click to Select** under Select Service Group Name*.
- Select **svcg_cmy** and click **Select**.
- Click **Bind**.
- Click **Continue**.

Click **Done** to complete the Load Balancing Virtual Server.

5.

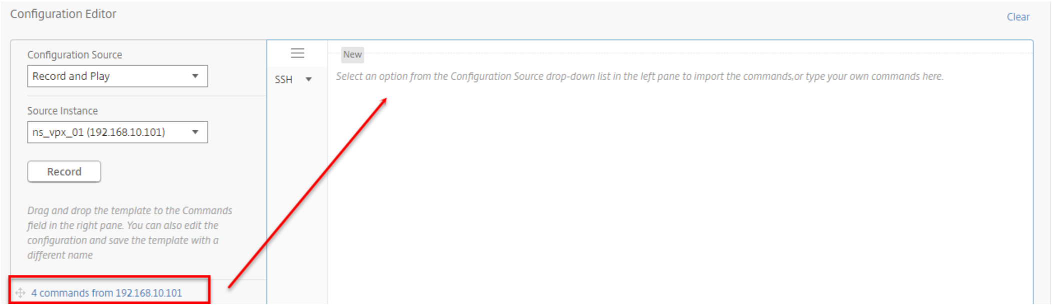
Close the browser running the pop-up session of the NetScaler Configuration Utility (http://192.168.10.101). This will return you to the Record & Play session the browser instance running NetScaler MAS.

Click **Stop** in the Configuration Editor to stop the Record and Play recording session.

A link of 4 commands from 192.168.10.101 should appear in the configuration pane (left pane).

6.

Drag the command link from the left pane to the right pane:



Configuration Editor

Configuration Source: Record and Play

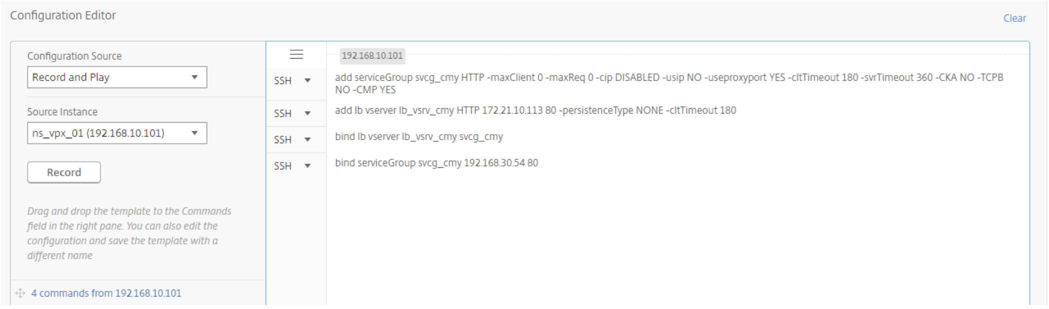
Source Instance: ns_vpx_01 (192.168.10.101)

Drag and drop the template to the Commands field in the right pane. You can also edit the configuration and save the template with a different name

4 commands from 192.168.10.101

Select an option from the Configuration Source drop-down list in the left pane to import the commands.or type your own commands here.

A list of commands from the Record and Play session will be displayed in the right-pane.



Configuration Editor

Configuration Source: Record and Play

Source Instance: ns_vpx_01 (192.168.10.101)

Drag and drop the template to the Commands field in the right pane. You can also edit the configuration and save the template with a different name

4 commands from 192.168.10.101

192.168.10.101

```
add serviceGroup svcg_cmy HTTP -maxClient 0 -maxReq 0 -cip DISABLED -usip NO -useproxyport YES -cltTimeout 180 -svrTimeout 360 -CKA NO -TCPB NO -CMP YES
add lb vserver lb_vsrv_cmy HTTP 172.21.10.113 80 -persistenceType NONE -cltTimeout 180
bind lb vserver lb_vsrv_cmy svcg_cmy
bind serviceGroup svcg_cmy 192.168.30.54 80
```

7. Update the list of commands, to make a generic task that can be used to create any LB vServer with a Service Group binding. Several lines will need to be edited.

Notes on editing the CLI commands in the Configuration Editor:

- To delete a command, highlight one command row at a time and use Backspace to delete. This will delete the row.
- Variables can be defined using "$" signs around the variable name. Specific references to IP Addresses and Entity names will be replaced with variables to make a generic task.

Before proceeding, let's save the configuration at this point, so it can be recovered if a mistake is made:

- Check **Save as Configuration Template**.
- Enter **Template_lbv_withSvcGroup** in the Configuration Template Name field.
- Click **Save**.

If you have an issue, you can re-drag and drop content from the template to replace commands. The template will be updated once all tasks have been completed.

8. Below is the current command list in the Configuration Editor (indented lines continue from preceding line):

```
add serviceGroup svcg_cmy HTTP -maxClient 0 -maxReq 0 -cip
   DISABLED -usip NO -useproxyport YES -cltTimeout 180 -
   svrTimeout 360 -CKA NO -TCPB NO -CMP YES

add lb vserver lb_vsrv_cmy HTTP 172.21.10.113 80 -
   persistenceType NONE -cltTimeout 180

bind lb vserver lb_vsrv_cmy svcg_cmy

bind serviceGroup svcg_cmy 192.168.30.54 80
```

Edit the commands so they match the commands listed below. Notice that default settings are being removed to simplify commands. Detailed settings can be adjusted in the native console.

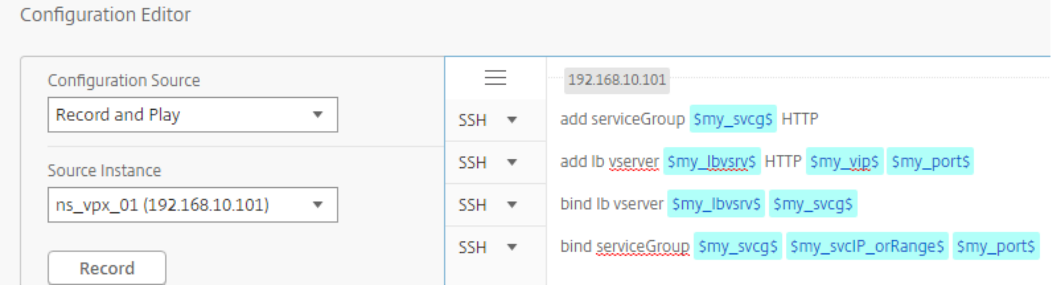
```
add serviceGroup $my_svcg$ HTTP

add lb vserver $my_lbvsrv$ HTTP $my_vip$ $my_port$

bind lb vserver $my_lbvsrv$ $my_svcg$

bind serviceGroup $my_svcg$ $my_svcIP_orRange$ $my_port$
```

The service members IP in the ServiceGroup bind command are meant to allow a user to supply an individual service IP Address or an IP Range using the following notation. Allowing this template to be used to bind any number of services in a single task:

Example:
bind serviceGroup svcg_demo 192.168.30.[1-3]

NOTE: The IP addresses in use in this step are IP Addresses for fictitious CMY services and do not match any entity in the lab. These values must be used to avoid conflicts with other lab entities.

9. Verify the final command set looks like this:



Configuration Editor

Configuration Source: Record and Play

Source Instance: ns_vpx_01 (192.168.10.101)

192.168.10.101

```
SSH  add serviceGroup $my_svcg$ HTTP
SSH  add lb vserver $my_lbvsrv$ HTTP $my_vip$ $my_port$
SSH  bind lb vserver $my_lbvsrv$ $my_svcg$
SSH  bind serviceGroup $my_svcg$ $my_svcIP_orRange$ $my_port$
```

10. Next, define the variables.

Define each of the following by clicking on the variable name, updating the specified values, and then click **Save** for each variable. Configured variables will be GREEN instead of BLUE.

- **Variable 1: my_svcg**
  - Name: **my_svcg**
  - Display name: **ServiceGroup Name**
  - Type **Text Field**.

- **Variable 2: my_lbvsrv**
  - Name: **my_lbvsrv**
  - Display name: **LB vServer Name**
  - Type **Text Field**.

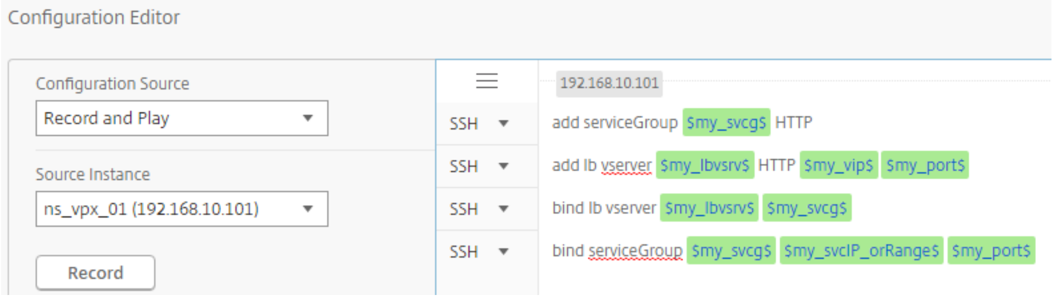
- **Variable 3: my_vip**
  - Name: **my_vip**
  - Display name: **Virtual IP Address**
  - Type **IP Address Field**.

- **Variable 4: my_port**
  - Name: **my_port**
  - Display name: **Port**
  - Type **Numeric Text Field**.

- **Variable 5: $my_svcIP_orRange$**
  - Name: **my_svcIP_orRange**
  - Display name: **Service IP or IP Range**
  - Type **Text Field**.
    IMPORTANT: Do not use the IP Address Field type here.

NOTE: The variables my_svcg and my_lbvsrv are used in multiple places. Therefore, when the first instances of my_svcg is defined in line 1, the references in lines 3 and 4 should also be defined. The same is true for my_lbvsrv; updating the definition in line 2 also updates the corresponding references in line 3.

If you have issues with this step, verify the names are consistent between lines for my_svcg, my_lbvsrv, and my_port.

11.	Once all variables have been defined, the values will be listed in GREEN instead of BLUE:  Configuration Editor Configuration Source: Record and Play Source Instance: ns_vpx_01 (192.168.10.101) Record 192.168.10.101 SSH add serviceGroup my_svcg HTTP SSH add lb vserver my_lbvsrv HTTP my_vip my_port SSH bind lb vserver my_lbvsrv my_svcg SSH bind serviceGroup my_svcg $my_svcIP_orRange$ my_port
12.	Update the template to save the commands to this point: • Check **Save as Configuration Template**. • Enter **Template_lbv_withSvcGroup** in the Configuration Template Name field. • Check **Overwrite if exists**. • Click **Save**.
13.	Cancel the current job and start a new one based on the template. • Click **Cancel**. • Click **Create Job** on the Welcome to Jobs Screen.
14.	Create initial job settings on the Select configuration tab: • Enter **job1_lb_vsrv_demo1** in the Job Name field. • Select **NetScaler** under Instance Type. • Select **Configuration Template** under Configuration Source. The template **Template_lbv_withSvcGroup** will be displayed in the left pane. • Drag the template **Template_lbv_withSvcGroup** from the left-pane to the right-pane. • Notice that all the variables are GREEN indicating they have all been defined.
15.	Run Job based on this template • Click **Next** to continue to the Select Instances tab. Configure Instances to apply the task to: • Click **Add Instances**. • Select (check) **192.168.10.101** and click **OK**. Click **Next** to continue to the Specify Variable Values.

16.	Configure variables in task: • Select **Common Variable Values for all Instances**. Enter the following values for the specified fields: • ServiceGroup Name: **svcg_demo1** • LB vServer Name: **lb_vsrv_demo1** • Virtual IP Address: **172.21.10.114** • Port: **80** • Service IP or IP Range: **192.168.30.[21-25]** Click **Next**. This will create new entities that do not conflict with existing settings on the NetScaler. They can be removed after this exercise. **NOTE**: The IP addresses in use in this step are IP Addresses for fictitious CMY services and do not match any entity in the lab. These values must be used to avoid conflicts with other lab entities.
17.	Configure Job Execution details: Set the following values for each of the fields specified: • On Command Failure: **Ignore error and continue**. • Execution Mode **Now**. • Execution Settings: **Execute in Parallel**. Click **Finish**. The job should complete successfully. Use the in-page refresh if necessary to update the status of the job.
18.	View the job status and verify it completed successfully. To view job results (for success or failure): • Select (check) **job1_lbv_demo1** and click **Details**. • Click **Execution Summary**. • Click instance **192.168.10.101** to view individual command status on this NetScaler. • Verify all commands succeeded or identify reason for any failures that occurred. When done reviewing output, return to Jobs pane. • Close the Command Log window by clicking "X" when done reviewing. • Close the Execution Summary by clicking "X" to return to the Job Details pane. • Click **Jobs** in the navigational breadcrumbs to return to the Jobs list. **NOTE**: If you need to run the task again, you must remove conflicting entities before repeating.

19.	Use the custom template to create another virtual server. Select Configuration: • Click **Create Job**. • Enter **job2_lb_vsrv_demo2** in the Job Name field. • Select **NetScaler** under instance Type. • Select **Configuration Template** under Configuration Source. • Drag and Drop the **Template_lbv_withSvcGroup** to the right-pane. (Verify all variable definitions are GREEN.) • Click **Next** to continue to Select Instances. Select Instances: • Click **Add Instances**. • Select (check) **192.168.10.101** and click **OK**. • Click **Next**.
20.	Specify Variable Values: • Select **Common Variable Values for all Instances**. Enter the following values for the specified fields: • ServiceGroup Name: **svcg_demo2** • LB vServer Name: **lb_vsrv_demo2** • Virtual IP Address: **172.21.10.115** • Port: **80** • Service IP or IP Range: **192.168.30.[26-28]** Click **Next** to continue to the Execute settings.
21.	Configure Execution settings: • Click **Finish** to run the task now. This task should complete successfully.

22. Before continuing, remove the previously created entities.

Open a Putty session to 192.168.10.101:

- To open putty: Right click on **Start > Run > putty 192.168.10.101**.
- Log on as **nsroot / nsroot**.

Run the following commands:

```
rm lb vserver lb_vsrv_cmy
rm lb vserver lb_vsrv_demo1
rm lb vserver lb_vsrv_demo2

rm serviceGroup svcg_cmy
rm serviceGroup svcg_demo1
rm serviceGroup svcg_demo2

rm server 192.168.30.[54-56]
rm server 192.168.30.[21-28]
```

Save the NetScaler configuration:

```
save ns config
```

Close putty.

Takeaways:

- Jobs are a specific task instance. Repeating a job uses the exact same conditions and values as when the job was created. This is useful for recreating entities again, but doesn't allow you to run the task with different values.
- A template is a capture of a set of commands that can also contain variables and the variable definitions. Templates can therefore represent a simple or complex set of conditions that can be run multiple times with different values (in different jobs) or across multiple instances.
- For complex configurations, consider defining small templates with individual elements like creating a virtual server, binding services, binding service groups, and then binding policies. Then these templates can be combined into more complex templates or jobs for re-use.
- Templates and jobs can be generated manually, based on inbuilt templates, custom templates that you've built, or by reviewing commands generated on a specific NetScaler within a specific time period, or by using Record & Play.

Exercise 3-3: Analytics using Web Insight and Security Insight

In this exercise, you will enable Web Insight with HTML injection and review the web site performance metrics available within NetScaler MAS. Security Insight will also be demonstrated as NetScaler MAS can replace the use of NetScaler Insight.

Requirements for this scenario:

- Enable Web Insight with HTML Injection for the RBG web server. Review Web Insight metrics and HTML Injection.
- Enable Security Insight for the AFWeb and WebGoat (HTTP) virtual servers. Briefly review Security Insight settings.
- Verify that NetScaler Insight Center functions are fully embedded in NetScaler MAS, allowing MAS to replace independent NetScaler Insight deployments.

In this exercise, you will perform the following tasks:

- Configure Web and Security Insight using NetScaler MAS Analytics
- Generate and View AppFlow Web Insight Data
- Generate and View AppFlow Security Insight Data

Configure Web and Security Insight using NetScaler MAS Analytics

Step	Action
1.	Switch to the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Enable the Application Firewall feature, so that that AppFw policies are in effect on the AFWeb and WebGoat virtual servers (policies are already bound). • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Enable (check) **Application Firewall**. (Do not modify any other existing features.) • Click **OK**. **NOTE**: The existing profiles are not fully configured for use with the SSL virtual servers. Connections to Https:// will not be tested during this exercise.
3.	Save the NetScaler configuration.

4.	Open **Firefox** and verify Application Firewall settings are in effect. For best results, test applications in Firefox and manage NetScaler and NetScaler MAS configurations in Chrome.
	Test AFWeb in Firefox:
	• Browse to **http://afweb.training.lab/**. Return to this page between tests.
	• Click the **Allow Demo** link and verify page is successfully displayed.
	• Click the **Deny Demo** link and verify page is blocked by application firewall. The URL displays "/blocked.htm".
	Test WebGoat:
	• Browse to **http://webgoat.training.lab/WebGoat/attack** or use the WebGoat bookmark. (Error will be generated if trailing "/" is included after attack.)
	• Log on as **guest / guest**.
	• Click **Start WebGoat** on the main page.
	• Navigate to **Admin Functions > Report Card**. This page should load successfully using the following URL:
	`http://webgoat.training.lab/WebGoat/attack?Screen=XXXX &menu=XXXX`
	Attack 1: Generate a parameter violation in WebGoat:
	• Adjust the URL you are currently on and append the following query parameter to the current URL:
	`&admin=true`
	The final URL will look like the following thought the Screen and Menu parameters will change.
	`http://webgoat.training.lab/WebGoat/attack?Screen=XXXX &menu=XXXX&admin=true`
	• This modified URL should generate a violation and an Application Firewall custom output page.
	This confirms that the Application Firewall settings are properly configured.
	NOTE: Many of the AppFw protections have been adjusted to allow certain behavior as part of the Application Firewall exercises. Meaning, not all attacks in WebGoat or AFWeb will generate the expected violations. During the NetScaler MAS demonstration of Security Insight, the attacks generated will be limited.

5.	Return to Chrome and **Tab (2)** for the NetScaler MAS management console at **http://192.168.10.15**. Log on as **nsroot / nsroot**. • Verify you are connected by IP address and not FQDN: **http://192.168.10.15/** **IMPORTANT**: For this exercise you must connect to MAS by IP address and not FQDN. There is a current issue in both NetScaler Insight Center and NetScaler MAS that when enabling AppFlow connections the server name in the management console connection is used as the AppFlow collector destination name. Connections by name fail, but connections by IP Address succeed.
6.	Enable Web and Security Insight using NetScaler MAS: • Click on **Infrastructure** tab. • Navigate to **Instances > NetScaler VPX**. • Select (check) **192.168.10.101** and click **Action > Enable/Disable Insight**.

7.	Enable Web Insight with HTML Injection for lb_vsrv_rbg: • Select (check) **172.21.10.101 lb_vsrv_rbg** and click **Enable AppFlow**. • Enter **true** in the Expression field. • Check **Web Insight**. • Check **HTML Injection**. • Click **OK**. • Deselect (uncheck) **172.21.10.101** after the settings are applied.
8.	Enable Web Insight, HTML Injection, and Security Insight for lb_vsrv_afweb and lb_vsrv_webgoat. • Select (check) **172.21.10.111 lb_vsrv_afweb (HTTP)**. • Select (check) **172.21.10.112 lb_vsrv_webgoat (HTTP)**. • Click **Enable AppFlow**. • Enter **true** in the Expression field. • Check **Web Insight**. • Check **HTML Injection**. • Check **Security Insight**. • Click **OK**. **NOTE**: There are both SSL and HTTP virtual servers for AFWeb and Webgoat. Be sure you select the HTTP virtual servers, as App Firewall policies are not bound to the SSL virtual servers.
9.	Switch to the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
10.	Update the AppFlow parameters on NetScaler to enable Security Insight: • Navigate to **System > AppFlow**. • Click **Change AppFlow Settings**. • Enable (check) **Security Insight Traffic**. • Enter **60** into the **Security Insight Record Interval** field. • Keep all other values as is. • Click **OK**. **NOTE**: These two parameters are not enabled by NetScaler MAS (or NetScaler Insight Center) when enabling AppFlow and Security Insight. The parameters can be updated manually.
11.	Save the NetScaler configuration.

Generate and View AppFlow Web Insight Data

Step	Action
1.	Return to **Tab (2)** for the NetScaler MAS management console at **http://192.168.10.15**. Log on as **nsroot / nsroot**.

<table>
<tr><td>2.</td><td>

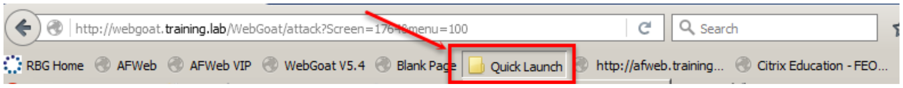
View the Analytics tab:

- Click **Analytics**.
- Navigate to **Web Insight > Instances**. No data is currently displayed.

</td></tr>
<tr><td>3.</td><td>

Switch to Firefox and generate data for RBG, AFWeb, and WebGoat:

- Click the **Quick Launch** folder in the bookmarks toolbar in Firefox.


http://webgoat.training.lab/WebGoat/attack?Screen=1768&menu=100
Search
RBG Home
AFWeb
AFWeb VIP
WebGoat V5.4
Blank Page
Quick Launch
http://afweb.training...
Citrix Education - FEO...

- Click **Open All in Tabs**.
- Repeat once or twice to generate additional data.

Generate additional data, if needed in Firefox or Chrome by navigating links in the following web sites (Optional):

- RBG URLs:
  - http://rbg.training.lab/ or http://172.21.10.101/
  - /home.php
  - /red.php, /blue.php, /green.php
  - /dist_red.php, /dist_blue.php, /dist_green.php
  - /media.php
- AFWeb: http://afweb.training.lab or http://172.21.10.111
  - Navigate any of the available links, though some will overlap with AppFw testing.
- WebGoat: http://webgoat.training.lab/WebGoat/attack or http://172.21.10.112/WebGoat/attack
  - Log on as **guest / guest**, if prompted.
  - Click **Start WebGoat**.
  - Navigate any of the links to generate content.

</td></tr>
<tr><td>4.</td><td>

Return to NetScaler MAS in Chrome **Tab (2)** at http://192.168.10.15/.

</td></tr>
<tr><td>5.</td><td>

View the Web Insight data:

- Click Analytics.
- Navigate to **Web Insight > Instances**. No data is currently displayed.
- Click the in-page **Refresh**.

</td></tr>
<tr><td>6.</td><td>

View data per NetScaler Instances:

- Verify time frame is set to **1 hour** as opposed to 1 day.

Drill down into data per NetScaler Instance:

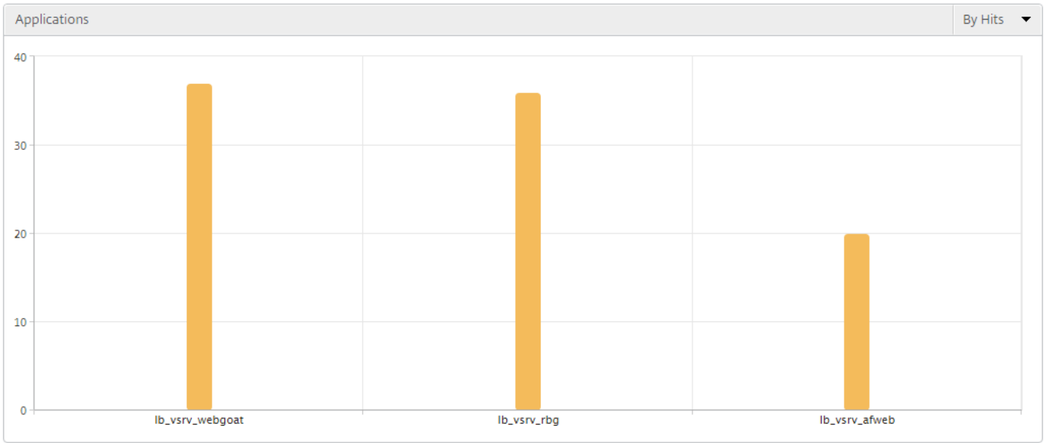
- Click the **NS_VPX_01** bar in the Instances bar graph.
- View the hits table for this NetScaler instance.
- View the Bandwidth table.
- View the Applications bar graph which displays hits per RBG, AFWeb, and WebGoat virtual servers.
- View the Domains bar graph which displays hits by FQDN or IP Address.

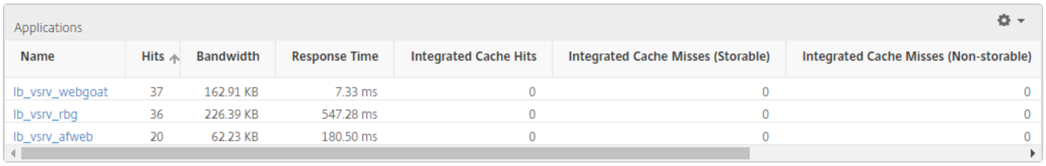
NOTE: All the bars in these tables can be used to drill down into the data.

</td></tr>
</table>

7. View Web Insight Data per Application:

- Navigate to **Web Insight > Applications**.
- View the hits per application (lb vserver).
- View the App performance metrics table which shows Hits, Bandwidth, and Response Time:

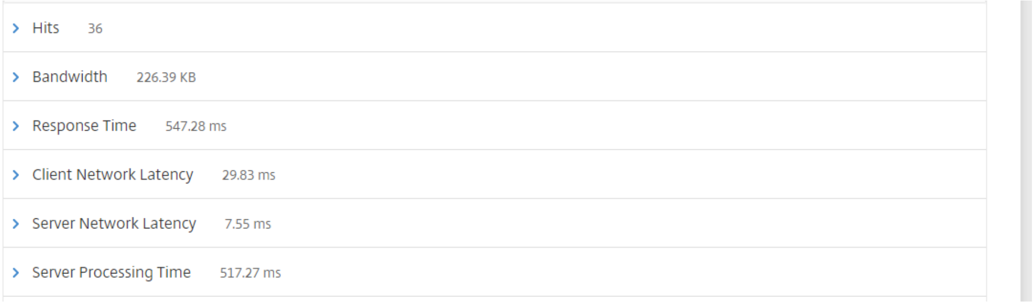



Applications

Name	Hits	Bandwidth	Response Time	Integrated Cache Hits	Integrated Cache Misses (Storable)	Integrated Cache Misses (Non-storable)
lb_vsrv_webgoat	37	162.91 KB	7.33 ms	0	0	0
lb_vsrv_rbg	36	226.39 KB	547.28 ms	0	0	0
lb_vsrv_afweb	20	62.23 KB	180.50 ms	0	0	0

8. View AppFlow details per application:

- Click **lb_vsrv_rbg** in the bar graph or in the metric table.
- View at the application level, you can display: Hits, Bandwidth, Response Time, Client Network Latency, and Server Network Latency (along with other data breakdowns)


Hits 36
Bandwidth 226.39 KB
Response Time 547.28 ms
Client Network Latency 29.83 ms
Server Network Latency 7.55 ms
Server Processing Time 517.27 ms

9. View HTML Injection in web page:

- Switch to Firefox and browse to http://rbg.training.lab/home.php.
- Right-click on the lower-half of the page in the red/blue/green background color and click **View Page Source**.
- At the top of the page between the <html><script>…</script> tags is the HTML Injection script that gathers the client-side metrics and returns to NetScaler MAS.

10. Close Firefox and re-open to close unnecessary tabs.

Generate and View AppFlow Security Insight Data

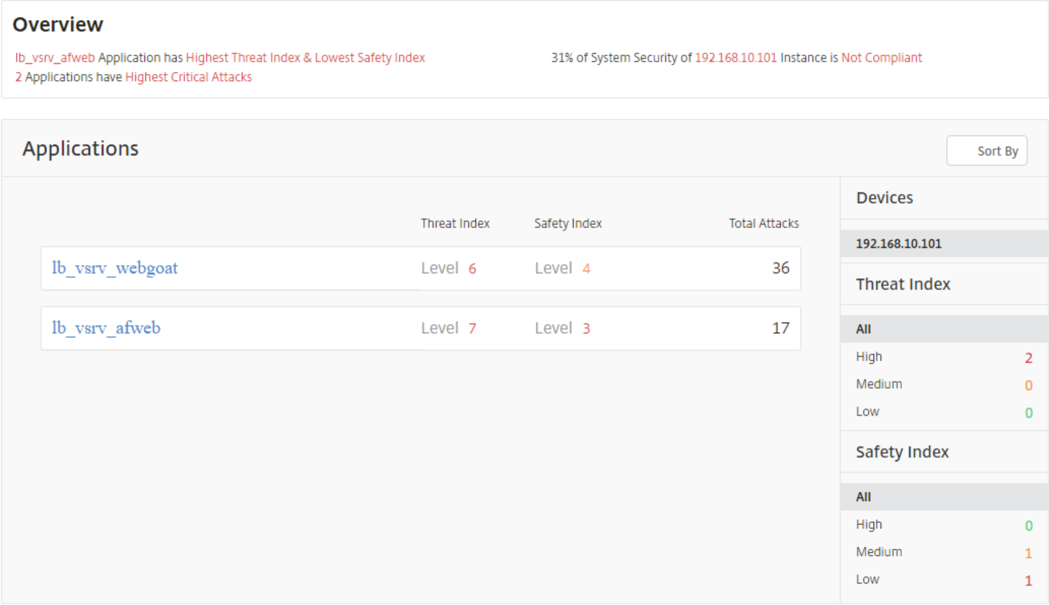
Step	Action
1.	Switch to Chrome and return to **Tab (2)** for the NetScaler MAS management console at **http://192.168.10.15**. Log on as **nsroot / nsroot**.
2.	View the Analytics tab: • Click **Analytics**. • Navigate to **Security Insight**. • Click **Get Started**. Depending on timing, there may or may not be any virtual servers listed in the Applications list, just yet. It may take up to 10 minutes from when Security Insight was enabled for data to display. If the applications are not yet displayed, continue with data generation in the next step.
3.	Open **Firefox** and verify Application Firewall settings are in effect. For best results, test applications in Firefox and manage NetScaler and NetScaler MAS configurations in Chrome. Generate violations for AFWeb. The current Application Firewall profile has a mixture for block, transform, and allowed behavior. Not all attack demonstrations will generate block violations at this time. Basic Navigation • Browse to **http://afweb.training.lab/**. (Return to the main page between tests.) • Click the **Allow Demo** link and verify page is successfully displayed. • Click the **Deny Demo** link and verify pate is blocked by application firewall. Application Firewall Violations: • Click the **Buffer Overflow 2 Demo** link to generate a buffer overflow violation. • Click the **SQL Injection Demo** to generate a SQL Injection attack: o Enter **Select '** in the Lookup Value field. o Click **Submit**. • Click **Credit Card Demo** to output a list of credit cards. • Manually browse to **http://afweb.training.lab/private.htm**. • Manually browse to **http://afweb.training.lab/private2.htm**. **NOTE**: Many of the AppFw protections have been adjusted to allow certain behavior as part of the Application Firewall exercises. Meaning, not all attacks in WebGoat or AFWeb will generate the expected violations. During the NetScaler MAS demonstration of Security Insight, the attacks generated will be limited.

4.	Generate some violations for WebGoat:
	
	Access WebGoat:
	- Browse to **http://webgoat.training.lab/WebGoat/attack**.
	- Log on as **guest / guest**.
	- Click **Start WebGoat** on the main page.
	- Return to the /WebGoat/attack page between tests.
	
	Basic Attack 1: Parameter Manipulation / Start URL Violations:
	- Navigate to **Admin Functions > Report Card**. This page should load successfully using the following URL:
	`http://webgoat.training.lab/WebGoat/attack?Screen=XXXX`
	`&menu=XXXX`
	- Adjust the URL you are currently on and append the following query parameter to the current URL:
	`&admin=true`
	The final URL will look like the following thought the Scree and Menu parameters will change.
	`http://webgoat.training.lab/WebGoat/attack?Screen=XXXX`
	`&menu=XXXX&admin=true`
	- This modified URL should generate a violation and an Application Firewall custom output page.
	
	Basic Attack 2: SQL Injection (Transformation)
	- Navigate to **Injection Flaws > String SQL Injection**.
	- Enter the following into the last name field:
	`Smith' OR '1'='1`
	- Click **Go**.
	
	Basic Attack 3: Parameter Tampering
	- Navigate to **Parameter Tampering > Exploit Hidden Fields**.
	- Click **Tools > Web Developer Extension > Forms > Display Form Details**.
	- Clear the contents of the **as_fid** field so that it is <blank>.
	- Click **Purchase**.

5.	Return to **Tab (2) in Chrome** for the NetScaler MAS management console at **http://192.168.10.15**. Log on as **nsroot / nsroot**.
6.	View the Analytics tab: - Click **Analytics**. - Navigate to **Security Insight**. - Click **Get Started**, if displayed. **NOTE**: It may take 1-3 minutes before the applications are displayed. - Try switching display from 1 hour to 1 day and then back to 1 hour to refresh view.

7. View the Applications in the summary page:

- Verify lb_vsrv_webgoat and lb_vsrv_afweb are listed.
- Identify the threat index and safety index for both applications.



Overview

lb_vsrv_afweb Application has Highest Threat Index & Lowest Safety Index

2 Applications have Highest Critical Attacks

31% of System Security of 192.168.10.101 Instance is Not Compliant

Applications

	Threat Index	Safety Index	Total Attacks
lb_vsrv_webgoat	Level 6	Level 4	36
lb_vsrv_afweb	Level 7	Level 3	17

Devices

192.168.10.101

Threat Index

All	
High	2
Medium	0
Low	0

Safety Index

All	
High	0
Medium	1
Low	1

8. View details for lb_vsrv_webgoat:

- Click on **lb_vsrv_webgoat**.
- View the Threat Index (tab) for WebGoat
  - Note that you can view the details of the violations reported.
- View the Safety Index (tab) for WebGoat.
  - Under Safety Index, view the Application Firewall Configuration summary which also shows the profile settings in effect.
  - Click on **NetScaler System Security** to review configuration recommendations that are not yet implemented.

Use the navigational breadcrumbs to return to the Security Insight view.

NOTE: A full review of insight data and reports is not included in the NetScaler MAS training as it was discussed in the NetScaler Insight training. This exercise was to demonstrate that NetScaler MAS can handle the NetScaler Insight AppFlow data integration.

9. Use the navigation breadcrumbs to return to the Security Insight view.

10.	View details for lb_vsrv_afweb: • Click on **lb_vsrv_afweb**. • View the Threat Index (tab) for AFWeb o Note that you can view the details of the violations reported. • View the Safety Index (tab) for AFWeb. o Under Safety Index, view the Application Firewall Configuration summary which also shows the profile settings in effect. o Click on **NetScaler System Security** to review configuration recommendations that are not yet implemented. Use the navigational breadcrumbs to return to the Security Insight view.
11.	NetScaler Web Insight and NetScaler MAS will remain enabled for later exercises. • Keep the Web Insight settings in effect.
12.	Switch to the NetScaler Configuration Utility open in **Tab (1)** using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
13.	Disable the Application Firewall feature to prevent interference with later exercises. • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Disable (uncheck) **Application Firewall**. (Keep existing features as is.) • Click **OK**.
14.	Save the NetScaler configuration.

Takeaways:

- Web Insight provides web site performance data including client load times, bandwidth, latency, and server performance times.
- Security Insight uses AppFlow to report Application Firewall violations and statistics to NetScaler Insight Center. It includes reporting for Application Firewall security check violations, signature violations, and IP Reputation.
- NetScaler MAS integrates NetScaler Insight with the MAS framework. As a result, NetScaler MAS can be used as the AppFlow collector and a separate analytics systems is not required.

Module 4: NetScaler Web Server Logging (NSWL)

Overview:

In this module, you will configure NetScaler Web Server Logging (NSWL) to log web transaction details to a web transaction client. The NSWL feature allows NetScaler administrators to generate and track web transaction logs for web content served by the NetScaler either in place of gathering web transaction logs from the web servers behind the NetScaler or in addition to the regular web transaction logs. The web transaction logs record client IP addresses, web requests, response codes returned, server IP addresses where the content was fulfilled and other transaction details. These logs are often used by NetScaler and/or web server administrators to audit requests from users, verify responses returned, or used to identify certain types of issues during troubleshooting. Since web transaction logs are not generated natively by the NetScaler, the NSWL client is deployed to write the content to file on behalf of the NetScaler.

After completing this lab module, you will be able to:

- Enable NSWL on the NetScaler.
- Configure the NSWL agent to receive log content from one or more NetScaler appliances.
- Customize the logging details and output locations based on application logging requirements.

This module contains the following exercises using the NetScaler Configuration Utility GUI:

• Exercise 4-1: Configuring NSWL	25 min

Before you begin:

Estimated time to complete this lab module: 25 minutes

Exercise 4-1: Configuring NSWL

In this exercise, you will configure NetScaler Web Server Logging using the NSWL client and customize logging output for RBG, AFWeb, WebGoat, and NetScaler Configuration Utility applications.

The NSWL web client is managed through a set of settings in a configuration file that determines the applications to generate logs for and the log output formats and locations. This exercise will demonstrate multiple configuration options that affects the logging output.

Requirements for this scenario:

- Integrate the NSWL client to report logging from NetScaler NS_VPX_01.
- Configure the NSWL log.conf file to log the following output for each application:
  - Generate all transaction logs in the C:\nswl\LOGS\ directory.
  - Enable logging for RBG content using W3C format for connections to name or IP.
  - Enable logging for AFWeb content using NCSA.
  - Separate logs for the NetScaler Configuration Utility (GUI) to C:\nswl\LOGS\NSGUI\.
  - And log all other applications using the default filter.
- Ensure debug files are output to the C:\nswl\DEBUG\ directory.
- Test and run NSWL as a standalone process and as a windows service.

In this exercise, you will perform the following tasks:

- Configure NSWL
- Configure logging with default and custom filters
- Install and Configure NSWL as a Service

Configure NSWL and Use with Default Filters

Step	Action
1.	Connect to the NetScaler Configuration Utility in Chrome and open using the NSIP at http://192.168.10.101. Log on as **nsroot / nsroot**.
2.	Verify Web Logging feature is enabled: • Navigate to **System > Settings**. • Click **Configure Advanced Features**. • Verify **Web Logging** is enabled. Click **OK**.
3.	Verify Web Logging Parameters on NetScaler: • Navigate to **System > Settings**. • Click **Change Global System Settings**. • Scroll down to the Web Logging section. Verify the following: • Buffer Size is set to 16 Mbytes. • Custom HTTP Request Header and Custom HTTP Response Header fields are blank. Click **OK**.
4.	Save the NetScaler configuration.

5.	Open an elevated CMD Prompt to run NSWL commands during this exercise.: • Open an elevated CMD Prompt on the Student Desktop. Use the CMD prompt pinned to the taskbar. • Run the following CMD to change the working directory: `cd c:\nswl\LOGS\` Keep this window open during this exercise. If this CMD prompt is closed, don't forget to change directory to the correct working directory before continuing.
6.	View the NSWL components: • Open Windows Explorer. • Browse to **C:\nswl\bin\**. o Verify **nswl.exe** is located in this directory. • Browse to **C:\nswl\etc\**. o Verify **log.conf** is located in this directory. o A backup copy of the default log.conf is also located here as default.log.conf. It can be used to restore the original logging settings during later exercises, if required. Open the log.conf file for editing: • Right-click **log.conf** and click **Edit with Notepad++** (Any text editor can be used.) • Keep the file open in Notepad++. • If an update warning appears click **Ignore** Switch to Windows Explorer: • Browse to **C:\nswl\DEBUG\** and confirm the directory is empty. • Browse to **C:\nswl\LOGS\** and confirm the directory is empty. • For now, keep Windows Explorer on the C:\nswl\LOGS\ directory. Keep an instance of Windows Explorer open that can be used to browse the necessary directories. The log.conf file will be edited in Notepad++ as well.
7.	View the log.conf file in Notepad++: • Scroll to the bottom of the file and not there is no information listed below the "End Filter Configuration" line.
8.	Switch to the CMD prompt. • Verify the working directory is C:\nswl\logs\. • Run the following command to display the nswl command line switches: `c:\nswl\bin\nswl.exe -help` **NOTE**: By manipulating the working directory when calling the nswl executable, you can manipulate the output file locations for debug logs and transaction logs. This will be demonstrated in later exercises.

9.	Use the addns command to configure the list of NetScalers to manage: • Run the following commands to add NetScaler and credentials to the log.conf file: `c:\nswl\bin\nswl.exe -addns -f c:\nswl\etc\log.conf` Enter the following when prompted: • NSIP: **192.168.10.101** • userid: **nsroot** • password: **nsroot**. Verify a Done !! message is received. This indicates success. **Note**: NSWL requires the use of the nsroot account. Alternate superuser accounts are not valid. NSWL must also use the NSIP of the NetScaler instead of a management enabled SNIP. To monitor traffic in an HA pair, configure both NSIP addresses in the same NSWL client.
10.	Switch to Notepad++ • Click **Yes** to reload file. • Scroll to the bottom and verify the NSIP for 192.168.10.101 and nsroot credentials are included in the log.conf file.
11.	Return to the CMD prompt. Run NSWL with the default log output settings: • Run the following command to run NSWL: `c:\nswl\bin\nswl.exe -start -f c:\nswl\etc\log.conf` Keep the command running until instructed to stop output.
12.	Switch to Firefox and browse to the following URLs to generate web log content: Browse RBG content by FQDN and VIP: • Browse to **http://rbg.training.lab/**. • Browse to **http://rbg.training.lab/home.php**. • Browse to **http://rbg.training.lab/dist_blue.php**. • Browse to **http://rbg.training.lab/media.php?a1=b1&a2=b2**. • Browse to **http://172.21.10.101/home.php**. Browse AFWeb content: • Browse to **http://afweb.training.lab/**. • Click on **Allow Demo** link. • Click on **Credit Card Demo** link. Browse WebGoat content: • Browse to **http://webgoat.training.lab/WebGoat/attack**. o If prompted, log on as guest / guest and click Start WebGoat. • Navigate to **Parameter Tampering > Bypass HTML Field Restrictions**.
13.	Return to the CMD prompt. • Run the following command to stop the NSWL output: `CTRL+C`

14.

View web transaction log output:

- Return to Windows Explorer and browse the **C:\nswl\LOGS\** directory.
- Select the file named **Ex*yymmdd*.log**. The log file is named after the date in yymmdd format. If the nswl command has been run more than once, the newest file will have a number appended to the end: Ex######.log.0, Ex######.log.1, etc….
- Open the file with Notepad (if prompted).

Notice that web transaction logs for the RBG, AFWeb, and WebGoat applications are displayed. Content may also appear for the NetScaler NSIP (192.168.10.101) and will contain paths starting with /nitro/v1/stat/, if the NetScaler Configuration Utility is still running in a web browser.

This output is in the default W3C format using the standard output parameters, using the default output file naming convention and path.

Close the transaction log when done.

NOTE: Web transaction Logs

- Web transaction logs will be generated in the working directory if no path is specified in the transaction log file name field.
- The output location for web transaction logs can be modified.

15.

View debug log output:

- In Windows Explorer, browse to **C:\nswl\LOGS\** directory.
- Select the most recent debug log in the directory. The debug log uses the following naming convention: nswl.log-yymmddhhmmss.
- Use **Select a program from a list of installed programs** and select **Notepad**.

The debug log was captured with debug level 1 and includes minimum messaging.

Close the debug log file when done.

16.

Generate a debug log using Debug Level 3 (verbose mode):

- Switch to the CMD prompt.
- Run the following command to start the NSWL logging:

```
c:\nswl\bin\nswl.exe -start -f c:\nswl\etc\log.conf -d 3
```

Switch to Firefox and generate a single log event:

- Browse to **http://rbg.training.lab/home.php**.

Return to the CMD prompt and stop the logging output:

- Run the following command to halt the logging process:

```
CTRL+C
```

17.

View debug log output at level 3:

- In Windows Explorer, browse to **C:\nswl\LOGS\** directory.
- Select the newest debug log in the directory (with the most recent timestamp): nswl.log-*yymmddhhmmsss*

Notice that the debug log output is more verbose than the default logging level of 1. If the debug flag is not supplied when running nswl, then logging level 1 is assumed.

18.	Cleanup the current unnecessary windows: • Close the notepad windows with previous debug and transaction logs. Keep the following applications open: • Keep the log.conf file (c:\nswl\etc\log.conf) open in Notepad++. • Keep the CMD prompt open to run additional NSWL commands.
19.	Switch to Windows Explorer and archive the previous log files: • Copy all logs in the **C:\nswl\LOGS\** directory to **C:\nswl\ARCHIVE\**. C:\nswl\LOGS\ directory should be empty now.
20.	Close and re-open Firefox before continuing.

Configure NSWL and Run with Custom Filters

Step	Action

1.	Edit the log.conf in Notepad++
	
	Add the following Filter declarations to the log.conf file (above the default filter):
	`Filter F1 HOST rbg.training.lab 172.21.10.101 IP 172.21.10.101 ON`
	`Filter F2 IP 172.21.10.111 ON`
	`Filter F3 IP 192.168.10.101 ON`
	`Filter default`

2.	Continue editing the log.conf in Notepad++
	
	Create a filter definition block for rbg (Note: It is easier if you copy the begin default…end default block and update settings.) Insert the new block after the Filter declarations and before the begin default…end default block.
	
	F1 Filter: Add a new filter definition to the log.conf file:
	`begin F1`
	`      logFormat         W3C`
	`      logInterval       Hourly`
	`      logFileSizeLimit  10`
	`      logFilenameFormat \nswl\LOGS\rbg_%{%y%m%d}t.log`
	`      logTime           GMT`
	`end F1`

3.	Add the F2 Filter definition to the log.conf file:
	
	`begin F2`
	`      logFormat         NCSA`
	`      logInterval       Hourly`
	`      logFileSizeLimit  10`
	`      logFilenameFormat \nswl\LOGS\afweb_%{%y%m%d}t.log`
	`      logExclude        .jpg .gif .ico .png`
	`end F2`

4.

Add the F3 Filter definition to the log.conf file:

```
begin F3
      logFormat           W3C
      logInterval         hourly
      logFileSizeLimit    10
      logFilenameFormat \nswl\LOGS\NSGUI\nsip_%{%y%m%d}t.log
end F3
```

5.

Update the Default filter for all other content:

```
begin default
      logFormat           W3C
      logInterval         Hourly
      logFileSizeLimit    10
      logFilenameFormat \nswl\LOGS\Ex%{%y%m%d}t.log
end default
```

Click **File > Save** to save the log.conf file to C:\nswl\etc\.

6.

Switch to the CMD prompt:

- Change the working directory to C:\nswl\DEBUG\. Run the following command:

  ```
  cd c:\nswl\DEBUG\
  ```

7.

Verify the edits to the log.conf file are minimally valid:

- Run the following command to validate the log.conf file:

  ```
  c:\nswl\bin\nswl.exe -verify -f c:\nswl\etc\log.conf
  ```

Verify that the an output message stating log.conf is correct and Done !! is received.

NOTE: In some cases excessive the verify command cannot identify all syntax errors, but it provides a minimal test case. If issues occur when running the conf file either rever to the copy of the default file and try testing one filter declaration/definition at a time until the issue is resolved. Don't forget to reconfigure the conf file with the NSIP and credentials using the addns command.

8.

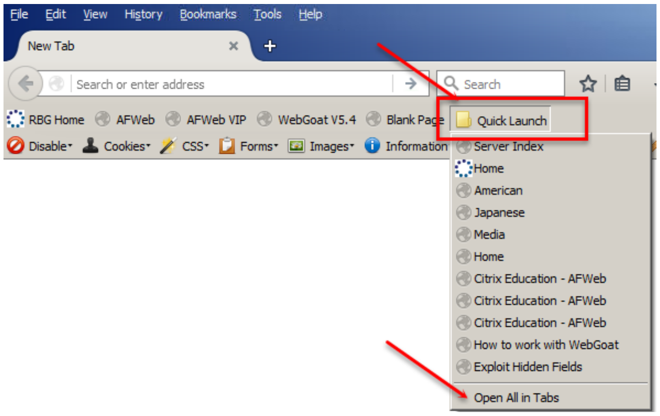
Run nswl with the new conf file:

- Run the following command to start logging:

```
c:\nswl\bin\nswl.exe -start -f c:\nswl\etc\log.conf
```

Open Firefox:

- Click the **Quick Launch** folder in the Bookmarks Toolbar and click **Open All in tabs**. This will launch content against RBG FQDN, RBG VIP, AFWeb, and WebGoat in one step.
    - If prompted to authenticate to WebGoat, log on as **guest / guest** and click **Start WebGoat**.



- To generate additional requests, right-click on any Tab and click **Reload All Tabs**.

Return to CMD prompt and stop the NSWL output:

- Run the following command to stop:

```
CTRL+C
```

NOTE:

- The working directory controls the output of the DEBUG log files and they should appear in C:\nswl\DEBUG\ at the end of this demonstration.
- The paths specific for the transaction logs in the filter definitions determine the transaction log output paths which should be in C:\nswl\LOGS\ or in its subdirectories.
- For best results, avoid output paths with spaces in the name.

9.

View debug log output:

- Switch to Windows Explorer and browse to C:\nswl\DEBUG\ and verify debug log file or files are present: nswl.log-<datetime>
- You do not have to view the debug content.

10.	View web transaction logs: • Browse to **C:\nswl\LOGS\**. • Verify log file for rbg_<date>.log and afweb_<date>.log are present. This will contain the transaction logs for these specific applications only. • The Ex<date>.log is generated by the default filter and will contain WebGoat and all other unmatched traffic. • The NSGUI director contains the logs for the NetScaler GUI. Select any of the transaction logs and view the output. Note the following: • The RBG transaction log should contain content the lb vserver whether users connected by name or VIP. This output is in W3C format. • The AFWeb log is capturing output in NCSA format but all image content was excluded for .jpeg, .gif, .png, and .ico extensions.
11.	Cleanup the current unnecessary windows: • Close the notepad windows with previous debug and transaction logs. Keep the following applications open: • Keep the log.conf file (c:\nswl\etc\log.conf) open in Notepad++. • Keep the CMD prompt open to run additional NSWL commands.
12.	Switch to Windows Explorer and archive the previous log files: • Delete all logs in the **C:\nswl\LOGS\** directory. • Delete all logs in the **C:\nswl\DEBUG\** directory. C:\nswl\LOGS\ and C:\nswl\DEBUG\ directories should be empty now.

Complete filter definition for the custom log.conf file in the above example:

```
Filter F1 HOST rbg.training.lab 172.21.10.101 IP 172.21.10.101 ON
Filter F2 IP 172.21.10.111 ON
Filter F3 IP 192.168.10.101 ON
Filter default

begin F1
      logFormat         W3C
      logInterval       Hourly
      logFileSizeLimit  10
      logFilenameFormat \nswl\LOGS\rbg_%{%y%m%d}t.log
      logTime           GMT
end F1

begin F2
      logFormat         NCSA
      logInterval       Hourly
      logFileSizeLimit  10
      logFilenameFormat \nswl\LOGS\afweb_%{%y%m%d}t.log
      logExclude        .jpg .gif .ico .png
end F2

begin F3
      logFormat         W3C
      logInterval       hourly
      logFileSizeLimit  10
      logFilenameFormat \nswl\LOGS\NSGUI\nsip_%{%y%m%d}t.log
end F3


begin default
      logFormat         W3C
      logInterval       Hourly
      logFileSizeLimit  10
      logFilenameFormat \nswl\LOGS\Ex%{%y%m%d}t.log
end default
```

Configure NSWL and Run as a Service

Step	Action
1.	Return to the CMD prompt running NSWL. Run the following command to install NSWL as a service on Windows: `c:\nswl\bin\nswl.exe -install -f c:\nswl\etc\log.conf` Verify a confirmation message stating NetScaler Weblogging Service installed with a Done !! message is returned.
2.	Open the Windows Services console: • Open the services console: **Start > Run > services.msc**. • Verify the service **NetScaler Weblogging Service** appears in the services console. Notice the service is not running yet. • Right-click **NetScaler Weblogging Service** and click **Properties**. o Verify Startup Type on the General tab is **Automatic**. o Click on the **Recovery** tab. Note that recovery is not configured. o Do not adjust these settings at this time. (Though for production Recovery is recommended upon service failure.) • Click **OK** to close the Service Properties dialog. **NOTE**: • The NetScaler Weblogging Service can be started and stopped via the Services.msc console like any other Windows service or it can be started and stopped using the nswl.exe command, which will be demonstrated. • For lab purposes. we do not want the service running non-stop so recovery will not be configured at this time.

3.	View the NSWL registry settings:
	• Open regedit: **Start > Run > regedit**.
	• In regedit browse to the following registry key:
	`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\nswlsvc\`
	• Verify the **ImagePath** registry key contains the location of the log.conf file:
	`c:\nswl\bin\nswl.exe -log -f c:\nswl\etc\log.conf`
	NOTE:
	• Installing nswl as a service requires that the path to the log.conf file is supplied at the time of install.
	• The command parameter in the registry key is slightly different than the command used running manually from the command line.

4.	Return to the CMD prompt to start NSWL as a service: • Run the following command: `c:\nswl\bin\nswl.exe -startservice`
5.	Switch to Firefox and generate transaction logs: • Right-click any of the open tabs in Firefox and click **Reload all tabs**. • Click **Resend** if prompted to resubmit content.

6.	View Debug Logs and output locations: • Open Windows Explorer and browse to **C:\nswl\DEBUG\**. ○ No new debug logs are created in this directory. • Browse to **C:\windows\system32\**. ○ Look for a log file named **nswl.log-<datetime>** in this directory. ○ Windows services use C:\windows\system32\ as the working directory and there is no method to control the debug log output directory.
7.	View Web Transaction Logs and output locations: • Open Windows Explorer and browse to **C:\nswl\LOGS\**. ○ The web transaction logs are generated in this directory based on the path and file name information in the current log.conf file.
8.	Return to the CMD prompt to stop NSWL as a service: • Run the following command: `c:\nswl\bin\nswl.exe -stopservice`
9.	Uninstall NSWL as a service: • Run the following command: `c:\nswl\bin\nswl.exe -remove`
10.	Cleanup unnecessary application windows: • Close the CMD prompt for NSWL. • Close Notepad++ • Close any remaining Notepad windows viewing log content. • Close any remaining Windows Explorer windows. • Close Regedit. • Close Services.msc (Services console).
11.	Close Firefox.

Takeaways:

- NSWL allows administrators to generate web transaction logs from the web content served by the NetScaler.
    - NSWL logs generated on the NetScaler are generally the same type of web transaction logs that can be collected from the web servers behind the NetScaler. However, the NetScaler web transaction logs will include logging for any cached content served by the NetScaler.
    - If original client IP addresses are required in web transaction logs collected at the web servers behind the NetScaler, remember to enable some form of client IP address header insertion on the NetScaler, so original source IPs can be passed to the web servers behind the NetScaler.
- Web Logging is enabled by default; only a NSWL client is required to retrieve the log content.
- For NetScaler systems in an HA pair, both members of the pair should point to the same NSWL client to ensure no gaps in logs regardless of which NetScaler is primary in the pair.
- NSWL logging must be configured using the NetScaler NSIP and the nsroot account.

Module 5: Integrated Caching

Overview: Dynamic caching evaluates HTTP requests and responses based on parameter-value pairs, strings, string patterns, or other data

In this module, you will perform hands-on exercises that will demonstrate the configuration of Integrated Caching and the impact of those settings on web site performance. Adding integrated caching to existing traffic management virtual servers (such as load balancing and content switching) provides an additional performance benefit for application delivery using the NetScaler and reduces load on backend servers.

After completing this lab module, you will be able to:

- Configure Integrated Caching feature and key parameters.
- Manage caching behavior per content group.
- Create cache, nocache, and invalidation policies to manage cacheability.
- Identify and confirm when content is served by cache from the NetScaler

This module contains the following exercises using the NetScaler Configuration Utility GUI:

- Exercise 5-1: Integrated Caching 35 min

Before you begin:

Estimated time to complete this lab module: 35 minutes

Exercise 5-1: Integrated Caching

In this exercise, you will configure integrated caching for the RBG web application. This exercise demonstrate basic caching configuration using policies and content groups for static caching; caching based on dynamic content using parameterized caching or cache selectors is not included in this exercise.

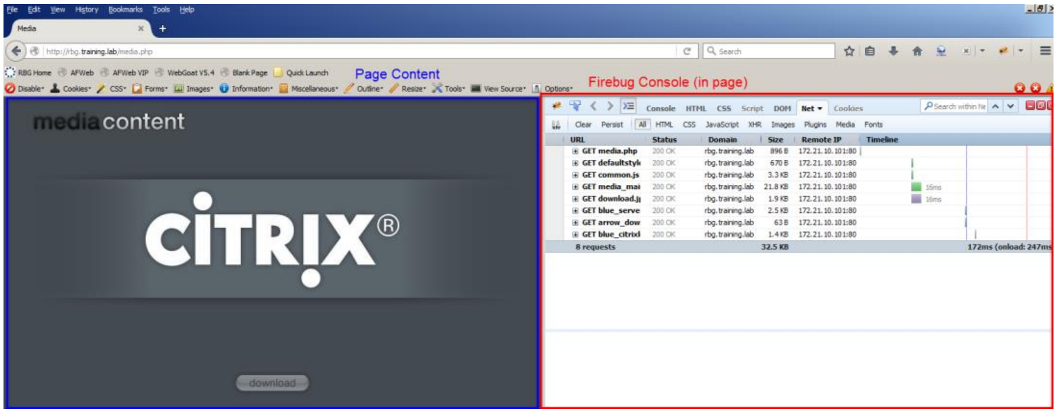
Requirements for this scenario:

- Enable caching for RBG content by using policies to identify static and image-based content.
- Manage content group settings for each content type.
    - Ensure static content expires every 300 seconds.
    - Ensure image content expires every 600 seconds.
- Use requests to /red.php to generate an Invalidation action for both content groups.
- View website performance and cache-control headers before and after caching is in effect.

In this exercise, you will perform the following tasks:

- Configure Integrated Caching Settings
- Configure Integrated Cache, No Cache, and Invalidation policies
- Test caching and confirm cache content by viewing headers

View Website Performance for Content while Integrated Caching Disabled

Step	Action
1.	Reset Firefox before continuing: • Close all open tabs and windows in Firefox. • Open a new instance of Firefox. • Browse to **http://rbg.training.lab/media.php**.
2.	Open Firebug in Firefox: • Click **Tools > Web Developer > Firebug > Open Firebug**. • The Firebug console should open in the right-pane. While this layout can be customized, this will be the assumed view. • If Firebug is closed during a page refresh, re-open using the above procedure or use the command keys: F12 (to open) and SHIFT+F12 (to close). 

Page Content
Firebug Console (in page)
media content
CITRIX®
download
Console HTML CSS Script DOM Net Cookies
Clear Persist All HTML CSS JavaScript XHR Images Plugins Media Fonts

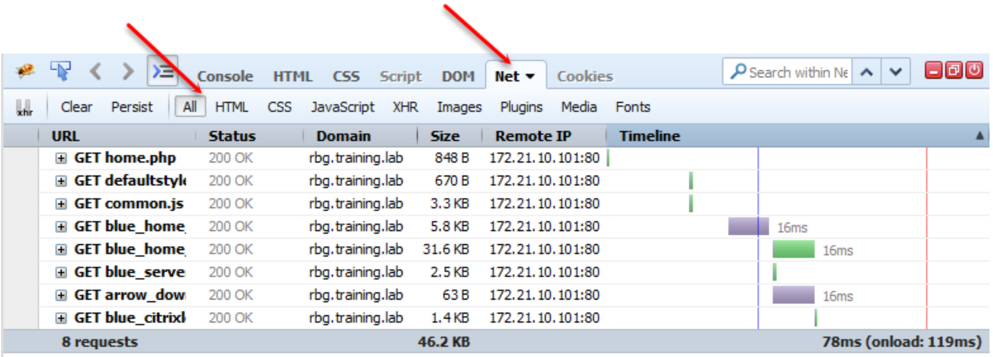
URL	Status	Domain	Size	Remote IP	Timeline
GET media.php	200 OK	rbg.training.lab	896 B	172.21.10.101:80	
GET defaultstyl	200 OK	rbg.training.lab	670 B	172.21.10.101:80	
GET common.js	200 OK	rbg.training.lab	3.3 KB	172.21.10.101:80	
GET media_mai	200 OK	rbg.training.lab	21.8 KB	172.21.10.101:80	16ms
GET download.j	200 OK	rbg.training.lab	1.9 KB	172.21.10.101:80	16ms
GET blue_serve	200 OK	rbg.training.lab	2.5 KB	172.21.10.101:80	
GET arrow_dow	200 OK	rbg.training.lab	63 B	172.21.10.101:80	
GET blue_citrix	200 OK	rbg.training.lab	1.4 KB	172.21.10.101:80	
8 requests			32.5 KB		172ms (onload: 247ms

3.

Adjust Firebug display options:

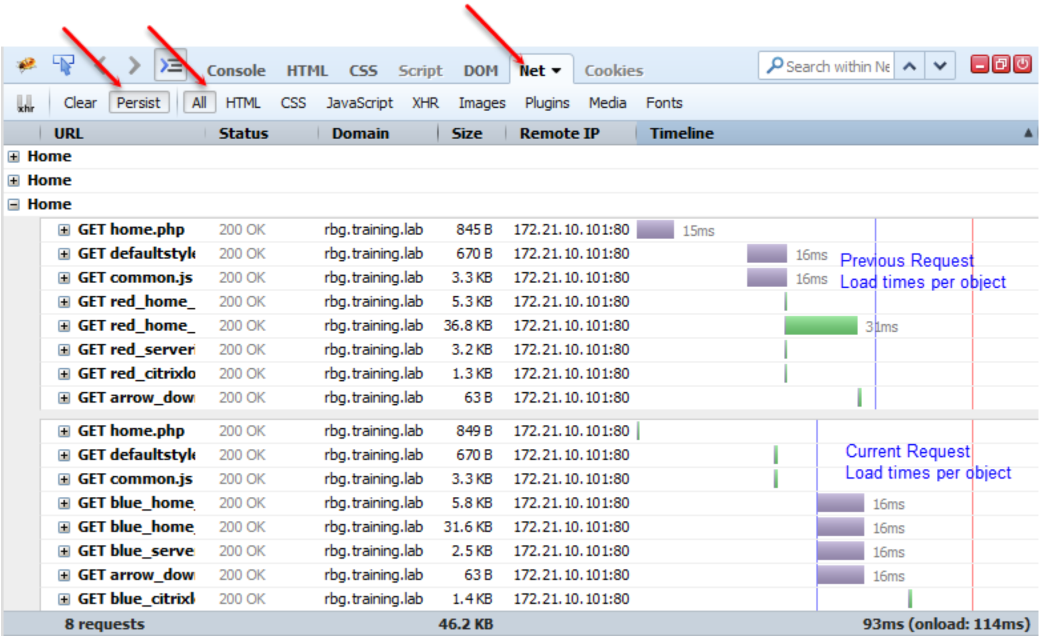
- In the Firebug Console (pane), Click **Net**.
- Click **All**.
- If you want to compare stats to previous tests, also click **Persist**. (Click again to remove the setting.). To clear display, click **Clear**.

Firebug with Net > All console. (Persist disabled) Displays current requests only.



URL	Status	Domain	Size	Remote IP	Timeline
⊞ GET home.php	200 OK	rbg.training.lab	848 B	172.21.10.101:80	
⊞ GET defaultstyle	200 OK	rbg.training.lab	670 B	172.21.10.101:80	
⊞ GET common.js	200 OK	rbg.training.lab	3.3 KB	172.21.10.101:80	
⊞ GET blue_home_	200 OK	rbg.training.lab	5.8 KB	172.21.10.101:80	16ms
⊞ GET blue_home_	200 OK	rbg.training.lab	31.6 KB	172.21.10.101:80	16ms
⊞ GET blue_serve	200 OK	rbg.training.lab	2.5 KB	172.21.10.101:80	
⊞ GET arrow_dow	200 OK	rbg.training.lab	63 B	172.21.10.101:80	16ms
⊞ GET blue_citrixl	200 OK	rbg.training.lab	1.4 KB	172.21.10.101:80	
8 requests			46.2 KB		78ms (onload: 119ms)

Firebug with Net > All console. (Persist enabled). Displays current request and previous requests.



URL	Status	Domain	Size	Remote IP	Timeline
⊞ Home					
⊞ Home					
⊟ Home					
⊞ GET home.php	200 OK	rbg.training.lab	845 B	172.21.10.101:80	15ms
⊞ GET defaultstyle	200 OK	rbg.training.lab	670 B	172.21.10.101:80	16ms
⊞ GET common.js	200 OK	rbg.training.lab	3.3 KB	172.21.10.101:80	16ms
⊞ GET red_home_	200 OK	rbg.training.lab	5.3 KB	172.21.10.101:80	
⊞ GET red_home_	200 OK	rbg.training.lab	36.8 KB	172.21.10.101:80	31ms
⊞ GET red_server	200 OK	rbg.training.lab	3.2 KB	172.21.10.101:80	
⊞ GET red_citrixlo	200 OK	rbg.training.lab	1.3 KB	172.21.10.101:80	
⊞ GET arrow_dow	200 OK	rbg.training.lab	63 B	172.21.10.101:80	
⊞ GET home.php	200 OK	rbg.training.lab	849 B	172.21.10.101:80	
⊞ GET defaultstyle	200 OK	rbg.training.lab	670 B	172.21.10.101:80	
⊞ GET common.js	200 OK	rbg.training.lab	3.3 KB	172.21.10.101:80	
⊞ GET blue_home_	200 OK	rbg.training.lab	5.8 KB	172.21.10.101:80	16ms
⊞ GET blue_home_	200 OK	rbg.training.lab	31.6 KB	172.21.10.101:80	16ms
⊞ GET blue_serve	200 OK	rbg.training.lab	2.5 KB	172.21.10.101:80	16ms
⊞ GET arrow_dow	200 OK	rbg.training.lab	63 B	172.21.10.101:80	16ms
⊞ GET blue_citrixl	200 OK	rbg.training.lab	1.4 KB	172.21.10.101:80	
8 requests			46.2 KB		93ms (onload: 114ms)

Previous Request
Load times per object

Current Request
Load times per object

4.	View RBG page performance in the Firebug Console: • In Firefox on Tab (1), browse to **http://rbg.training.lab/blue.php**. o Note the total time to load the page and all objects as displayed in Firebug. • Next browse to **http://rbg.training.lab/media.php**. o Note the total time to load the page and all objects as displayed in Firebug. • Next, click the **download** button to download a really, large PNG. o Note the total time to download and display the PNG. o Also note the size of the media_main.png file. Keep the RBG website in Tab (1) in Firefox and keep the Firebug console active. (If it closes, re-open it.) These are your baseline metrics prior to enabling caching.

Configure Integrated Caching Settings:

Step	Action
1.	Use Chrome to access the NetScaler configuration utility for the duration of this exercise. Connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
2.	Enable Integrated Caching feature: • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Enable (check) **Integrated Caching**. Click **OK**.
3.	Disable AppFlow feature: • Navigate to **System > Settings**. • Click **Configure Advanced Features**. • Disable (uncheck) **AppFlow**. Click **OK**.

4.	Configuring global Integrated Caching Parameters: • Navigate to **Optimization > Integrated Caching**. • Click **Change Cache Settings** in the right-pane. Change the following Cache Global Settings (Parameters): • Memory Usage Limit: **100** (MB) • Via Header: **NS-CACHE-11.1: 101**. • Keep the default values for all other settings. Click **OK**.
5.	Next create a Content Group for RBG Image content: • Navigate to **Content Groups**. • Click **Add**. • Enter **cache_cg_rbg_images** in the Name field. Enter the following values on the Expiry Method tab: • Click **Expiry Method** tab. • Expire Content After: **600 seconds**. Enter the following values on the Memory tab: • Click **Memory** tab. • Do not cache - if size exceeds: **4000 KB** (4 MB). • Maximum memory usage limit: **10 MB**. View the settings on the Others tab: • Click **Others** tab. • Verify **Via** header insertion is enabled under the HTTP Header Insertions section. Click **Create**. Deselect (uncheck) the **cache_cg_rbg_images** content group in the list pane. **NOTE**: Content Group settings can be tuned based on the application and the content being cached. Content in different groups can be handled differently.

6.	Next create a Content Group for RBG Static content: • Click **Add**. • Enter **cache_cg_rbg_static** in the Name field. Enter the following values on the Expiry Method tab: • Click **Expiry Method** tab. • Expire Content After: **300 seconds**. Enter the following values on the Memory tab: • Click **Memory** tab. • Do not cache - if size exceeds: **4000 KB** (4 MB). • Maximum memory usage limit: **65536 MB** (Default value; unlimited). View the settings on the Others tab: • Click **Others** tab. • Verify **Via** header insertion is enabled under the HTTP Header Insertions section. Click **Create**.
7.	Create a pattern set for Image content: • Navigate to **AppExpert > Pattern Sets**. • Click **Add**. Configure the pattern set: • Enter **ps_imagestuff** in the Name field. • Click **Insert**. o Enter **jpg** in the Pattern field and Insert. • Click **Insert**. o Enter **jpeg** in the Pattern field and Insert. • Click **Insert**. o Enter **gif** in the Pattern field and Insert. • Click **Insert**. o Enter **png** in the Pattern field and Insert. Click **Create**.
8.	Create a pattern set for static content: • Navigate to **AppExpert > Pattern Sets**. • Click **Add**. Configure the pattern set: • Enter **ps_staticstuff** in the Name field. • Click **Insert**. o Enter **html** in the Pattern field and Insert. • Click **Insert**. o Enter **htm** in the Pattern field and Insert. • Click **Insert**. o Enter **css** in the Pattern field and Insert. Click **Create**.

9. Create a cache policy (1) to CACHE image content to the cache_cg_rbg_images content group:

- Navigate to **Optimization > Integrated Caching > Policies**.
- Click **Add**.

Configure the policy with the following settings:

- Enter **cache_pol_doCache_imagestuff** in the Name field.
- Select **CACHE** under Actions.
- Select **cache_cg_rbg_images** in the Store in Group field.
- Enter the following expression in the expression field (or use the Expression Editor):

```
HTTP.REQ.URL.SUFFIX.SET_TEXT_MODE(IGNORECASE).
EQUALS_ANY("ps_imagestuff")
```

Click **Create**.

10. Create a cache policy (2) to CACHE static web content to the cache_cg_rbg_static content group:

- Click **Add**.

Configure the policy with the following settings:

- Enter **cache_pol_doCache_staticstuff** in the Name field.
- Select **CACHE** under Actions.
- Select **cache_cg_rbg_static** in the Store in Group field.
- Enter the following expression in the expression field (or use the Expression Editor):

```
HTTP.REQ.URL.SUFFIX.SET_TEXT_MODE(IGNORECASE).
EQUALS_ANY("ps_staticstuff")
```

Click **Create**.

11. Create a cache policy (3) to INVALIDATE all cached content for RBG when requests are sent to /red.php:

- Click **Add**.

Configure the policy with the following settings:

- Enter **cache_pol_doInval_onRed** in the Name field.
- Select **INVAL** under Actions.
- Enter the following expression in the expression field (or use the Expression Editor):

```
HTTP.REQ.URL.PATH.SET_TEXT_MODE(ignorecase).EQ("/red.php")
```

Configure the Inval Groups (Content Groups to be Invalidated):

- Click the **+ ADD** button to display a list of available groups.
- Add the following groups from the Available list to the Configured list by clicking the **"+"** to the right of the group name:
  - **cache_cg_rbg_static**
  - **cache_cg_rbg_images**

Click **Create**.

12.	Create a cache policy (4) to NOT CACHE other content for RBG. - Click **Add**. Configure the policy with the following settings: - Enter **cache_pol_doNoCache** in the Name field. - Select **NOCACHE** under Actions. - Enter the following expression in the expression field (or use the Expression Editor): `true` Click **Create**.
13.	Use Policy Manager to bind the policies to the RBG lb vServer. Select the bind point: - Click **Policy Manager**. - Select **Load Balancing Virtual Server** under Bind Point. - Select **Request** under Connection Type. - Select **lb_vsrv_rbg** under Virtual Server. Click **Continue**.
14.	Bind the cache policy (1): - Click **Click to Select** under Select Policy. - Change the items per page to show 50 (or more) to see all available policies. - Select **cache_pol_doCache_imagestuff** and click **Select**. - Keep Priority set to **100**. Click **Bind**.
15.	Bind the cache policy (2): - Click **Add Binding** to bind another policy to this bind point: - Click **Click to Select** under Select Policy. - Change the items per page to show 50 (or more) to see all available policies. - Select **cache_pol_doCache_staticstuff** and click **Select**. - Keep Priority set to **110**. Click **Bind**.
16.	Bind the cache policy (3) to invalidate content. This policy must be bound with a higher priority than the other two policies: - Click **Add Binding** to bind another policy to this bind point: - Click **Click to Select** under Select Policy. - Change the items per page to show 50 (or more) to see all available policies. - Select **cache_pol_doInval_onRed** and click **Select**. - Enter **10** in the Priority field. Click **Bind**.

17.	Bind the cache policy (4) to not cache other objects. This policy must be bound with a lower priority than the other policies: • Click **Add Binding** to bind another policy to this bind point: • Click **Click to Select** under Select Policy. • Change the items per page to show 50 (or more) to see all available policies. • Select **cache_pol_doNoCache** and click **Select**. • Enter **200** in the Priority field. Click **Bind**. Click **Done** to close the policy manager.
18.	Save the NetScaler configuration.

Test Caching

Step	Action
1.	View initial cache objects on the NetScaler before testing content: • Navigate to **Optimization > Integrated Caching**. • Click **View Cache Objects**. • Select **All** and click **Continue**. • Verify no objects are currently cached. Click **Done**.
2.	View initial cache stats on the NetScaler before testing content: • Click **Statistics** (right pane). • Click **Details** to change from the summary view to the detailed view. • Verify all stats are 0.
3.	**Switch to Firefox.** View RBG page performance in the Firebug Console: • Remain on Tab (1) to test URLs. • Verify Firebug is still open. Open Live HTTP Headers: • Click **Tools > Live HTTP Headers**. • Live HTTP Headers should display in Tab (2) in Firefox. (Close unnecessary tabs or drag Live HTTP Headers to the Tab (2) position).

4.	In **Tab (1)**, test the following content: • Browse to **http://rbg.training.lab/blue.php**. • Refresh the page a few times. Switch to **Tab (2)** and determine which content objects in the /blue.php request were served from Cache. • Identify which responses contain a VIA header indicating content was served from cache by the NetScaler. Responses without a VIA header were served by the web server. • Objects such as: /blue_top.jpg, /defaultstyles.css, and other extensions matching the imagestuff and staticstuff policies should be cached. • Objects such as: /common.js and the .php pages are not cached.
5.	Switch to Chrome and return to the Integrated Caching Statistics view in the NetScaler Configuration Utility: • The statistics page should still be displayed. If not, Navigate to **Optimization > Integrated Caching** and then click **Statistics** in the right-pane. • View the Cache Stats so far. Take note of the following stats: o Hits o Misses o Requests o Hit Ratio (%) o Origin Bandwidth Saved o Cached Objects
6.	View cached objects on the NetScaler: • Click **Integrated Caching** in the navigational breadcrumbs to return to the Integrated Caching node. • Click **View Cache Objects**. • Select **All** and click **Continue**. • View objects in cache. Click **Done**.
7.	View cache policy hits: • Navigate to **Optimization > Integrated Caching > Policies**. • Change the items per page to 50 (or more). • Click **Statistics** under the Policies node to easily view policy hits per policy.
8.	Return to the cache feature statistics view: • Navigate to **Optimization > Integrated Caching**. • Click **Statistics** in the right-pane. • Click **Details** to display the details view.

9.	Return to Firefox, in **Tab (1)** and test the following content: • Browse to **http://rbg.training.lab/media.php**. o Refresh the page a few times. • Next, click the **download** button to download a really, large PNG. o Note the total time to download and display the PNG. (This is the first download and it is served from the server and not from cache). o Live HTTP Headers can be used to confirm the object was not cached yet. Look for /media_main.png. • Return to **http://rbg.training.lab/media.php** and click Download again. o This time the object should complete much faster. o Use Live HTTP Headers and verify /media_main.php was served from cache this time.
10.	Switch to Chrome and return to the Integrated Caching Statistics view in the NetScaler Configuration Utility: • The statistics page should still be displayed. If not, Navigate to **Optimization > Integrated Caching** and then click **Statistics** in the right-pane. • View the Cache Stats so far. Take note of the following stats: o Hits o Misses o Requests o Hit Ratio (%) o Origin Bandwidth Saved o Cached Objects
11.	View cached objects on the NetScaler: • Click **Integrated Caching** in the navigational breadcrumbs to return to the Integrated Caching node. • Click **View Cache Objects**. • Select **All** and click **Continue**. • View objects in cache. Click **Done**.
12.	View Memory in use per Content Group: • Navigate to **Optimization > Integrated Caching > Content Groups**. • View the Memory Usage (Bytes) for the cache content groups: o cache_cg_rbg_images o cache_cg_rbg_static The size of the media_main.png is taking up the bulk of the memory in use.
13.	Return to Firefox, in **Tab (1)** and test the following content: • Browse to **http://rbg.training.lab/red.php**. This will invalidate objects in the affected content groups. This expires cached content.

14.	Re-retrieve the media_main.png file from /media.php: • Browse to **http://rbg.training.lab/media.php**. o Refresh the page a few times. • Next, click the **download** button to download a really, large PNG. o Since the content was invalidated, it should take longer to download this time until the object is refreshed in cache.
15.	Switch to Chrome and return to the NetScaler Configuration Utility. Keep the integrated caching feature enabled for the next exercise with FEO.
16.	Save the NetScaler configuration.

Takeaways:

- Integrated Caching should be configured prior to enabling the feature. Existing policies are already present on the NetScaler which will result in automatically cached content once the feature is enabled. Care should be taken to create necessary policies to prevent caching for content for which it is not wanted.
- Memory must be allocated for use by the integrated caching feature.
- Cache content groups control cache retention and expiration settings and therefore can be configured with content-specific settings for different content types and content groups.

Module 6: Front End Optimization (FEO)

Overview:

In this module, you will perform hands-on exercises that will demonstrate the configuration of Front End Optimization features and their impact on web content performance. FEO provides optimizations for JavaScript, CSS, and image-rich content that can impact browser-level performance by reducing page load and page render times.

After completing this lab module, you will be able to:

- Enable and configure FEO policies to apply custom optimizations to a web application.
- Review modifications made to content by reviewing headers and browser response and load times for optimized content.

This module contains the following exercises using the NetScaler Configuration Utility GUI:

Exercise 6-1: Front End Optimizations	20 min

Before you begin:

Estimated time to complete this lab module: 20 minutes

Exercise 6-1: Front End Optimizations

In this exercise, you will configure custom a custom FEO action and policy to apply optimizations to the FEO demonstration page hosted on the AFWeb web server. As different optimizations for CSS and Image content are applied, the effects of the optimizations will be observed using browser-based tools.

Requirements for this scenario:

- Enable FEO with basic CSS optimizations and observe impact of Combine CSS, Convert Imported CSS to links, and Minify optimizations.
- Update CSS optimizations and observe impact of Inline image and Move to head options on multiple linked stylesheets.
- Enable FEO with image optimizations and observe impact of Shrink to attributes, Make inline, optimize, and convert GIF to PNG.
- Update FEO optimizations to include LazyLoad options and observe impact on large, content-rich page load times and performance.

In this exercise, you will perform the following tasks:

- View page performance for an un-optimized page
- Enable Front End Optimization feature by configuring parameters and policies

View Demo Page Before Optimizations

Step	Action
1.	Connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
2.	Disable Integrated Caching: • Navigate to **System > Settings**. • Click **Configure Basic Feature**. • Deselect (uncheck) **Integrated Caching**. Click **OK**. Verify FEO is Disabled: • Click **Configure Advanced Features**. • Verify Front End Optimization is disabled. • Verify AppFlow is disabled. Click **OK**. **Note**: The AppFlow settings in the lab will interfere with CSS optimizations that we are attempting to test. There is no problem using both features in a production environment.

3.	Close all existing instances of Firefox and re-open a new window. • In **Tab (1)**, open Firebug: **Tools > Web developer > Firebug > Open Firebug**. (Or use F12). Firebug should open in the right pane. Maximize the browser for best effect. • Browse in **Tab (1)** to **http://afweb.training.lab/feo1.htm**. Scroll down to view the page content. • Note that there are many images of different image size and quality Take note of the following in Firebug: • How much data was loaded by all objects in the page. • The load time for all objects in the page. Note: The NetScaler may have trouble delivering all content on the un-optimized site as the lab NetScalers have an artificially low bandwidth cap of 1 Mbps.
4.	View the original page source within the Firefox: • Right-click the gray background in the **/feo1.htm** page and click **View Page Source**. • Keep this in **Tab (2)** for future reference. Take note of the following elements in the page source: • There are comments with the phrase "FEODEMO" around the stylesheets. o Three of the stylesheets are linked in <link> tags. o Two additional stylesheets are imported. • Four Image Demos are included. o Each Demo has three different images. o The demos incorporate images in GIF, JPG, and PNG formats. o Some images are imported with specific size specifications. Some images are referenced through relative links and others through explicit links. o The images are mixture of small, medium, and large file sizes.
5.	Keep the content in Firefox Tab (1) and Tab (2) open until further notice.

Enable and Test FEO

Step	Action
1.	Return to the NetScaler Configuration Utility in Chrome.
2.	Enable Integrated Caching and FEO features: Enable Integrated Caching: • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Enable (check) **Integrated Caching**. Click **OK**. Enable FEO: • Navigate to **System > Settings**. • Click **Configure Advanced Features**. • Enable (check) **Front End Optimization**. Click **OK**.

3.	Clear existing cache objects: • Navigate to **Optimization > Integrated Caching**. • Click **View Cache Objects**. • Select **All** and click **Continue**. • Select all objects (if present) and click **Flush**. Click **Yes** to confirm. Click **Done**.
4.	Adjust FEO global parameters: • Navigate to **Optimization > Front End Optimization**. • Click **Change Front End Optimization settings** in the right-pane. • Enter **2048** under **Inline CSS Threshold Size (Bytes)**. • Enter **2048** under **Inline JavaScript Threshold Size (Byte)**. • Enter **2048** under **Inline Image Threshold Size (Bytes)**. Click **OK**. NOTE: • A few of the stylesheets in the demonstration are 2KB in size. Therefore some of the inline optimizations will not be applied, with the default limit of 1024 Bytes.
5.	Create a FEO Action with basic settings for stylesheets optimizations: • Navigate to **Optimization > Front End Optimization > Actions**. • Click **Add**. • Enter **feo_act_custom** in the Name field. Enable the following settings under the **CSS** category: • Enable (check) **Combine** • Enable (check) **Convert Imports to Links** • Enable (check) **Minify** Click **Create**.
6.	Create a FEO Policy with the custom action: • Navigate to **Optimization > Front End Optimization > Policies**. • Click **Add**. • Enter **feo_pol_custom**. • Select **feo_act_custom** under the Action field. • Enter **true** in the Expression field. Click **Create**.

7. Bind the policy to the AFWeb load balancing virtual server:

- Click **Policy Manager**.
- Select **Load Balancing Virtual Server** under Bind Point.
- Select **Request** under Connection Type.
- Select **lb_vsrv_afweb** under Virtual Sever.

Click **Continue**.

Add Policy Binding:

- Click **Click to Select** under Select Policy.
- Select **feo_pol_custom** and click **Select**.
- Keep priority at 100 and GoTo Expression set to End.
- Click **Bind**.

Click **Done**.

8. Save the NetScaler configuration.

9. Switch to Firefox to test the policy.

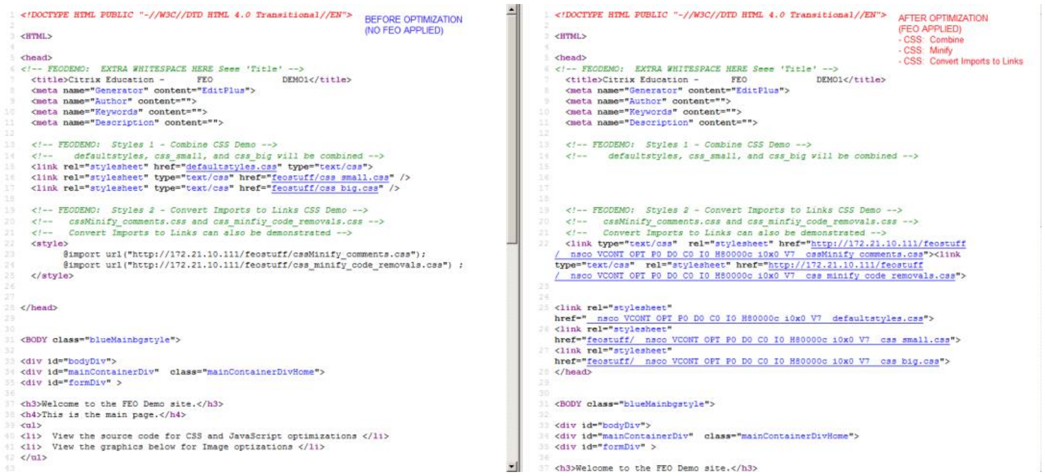
- Open a new tab in Firefox as **Tab (3)**.
- Verify the Firebug pane is still open. (If not re-open.)
- Browse to **http://afweb.training.lab/feo1.htm**.
  (The page load will not be faster yet as no image optimizations have been applied and caching is not in effect on this first load.)
- Next, refresh the page. Some optimizations should be in effect now.

View the Page Source:

- Right-click the gray background in the **/feo1.htm** page and click **View Page Source**.
- Keep this in **Tab (4)** for future reference.
- If necessary, compare to the unmodified source in **Tab (2)**.

The following changes should be observed in the Page Source under the FEODEMO: Styles 1 and Styles 2 comments.

- The stylesheet linked to the content were modified and moved to the end of the <HEAD> section. They now appear below the Styles 2 demo.
- The imported stylesheets were converted to links and combined into one line.



BEFORE OPTIMIZATION
(NO FEO APPLIED)

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">

<HTML>

<head>
<!-- FEODEMO:  EXTRA WHITESPACE HERE Seee 'Title' -->
  <title>Citrix Education -      FEO              DEMO1</title>
  <meta name="Generator" content="EditPlus">
  <meta name="Author" content="">
  <meta name="Keywords" content="">
  <meta name="Description" content="">

  <!-- FEODEMO:  Styles 1 - Combine CSS Demo -->
  <!--    defaultstyles, css_small, and css_big will be combined -->
  <link rel="stylesheet" href="defaultstyles.css" type="text/css">
  <link rel="stylesheet" type="text/css" href="feostuff/css_small.css" />
  <link rel="stylesheet" type="text/css" href="feostuff/css_big.css" />

  <!-- FEODEMO:  Styles 2 - Convert Imports to Links CSS Demo -->
  <!--   cssMinify_comments.css and css_minfiy_code_removals.css -->
  <!--   Convert Imports to Links can also be demonstrated -->
  <style>
        @import url("http://172.21.10.111/feostuff/cssMinify_comments.css");
        @import url("http://172.21.10.111/feostuff/css_minify_code_removals.css") ;
  </style>


</head>


<BODY class="blueMainbgstyle">

<div id="bodyDiv">
<div id="mainContainerDiv"  class="mainContainerDivHome">
<div id="formDiv" >

<h3>Welcome to the FEO Demo site.</h3>
<h4>This is the main page.</h4>
<ul>
<li>  View the source code for CSS and JavaScript optimizations </li>
<li>  View the graphics below for Image optizations </li>
</ul>
```

AFTER OPTIMIZATION
(FEO APPLIED)
- CSS: Combine
- CSS: Minify
- CSS: Convert Imports to Links

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">

<HTML>

<head>
<!-- FEODEMO:  EXTRA WHITESPACE HERE Seee 'Title' -->
  <title>Citrix Education -      FEO              DEMO1</title>
  <meta name="Generator" content="EditPlus">
  <meta name="Author" content="">
  <meta name="Keywords" content="">
  <meta name="Description" content="">

  <!-- FEODEMO:  Styles 1 - Combine CSS Demo -->
  <!--    defaultstyles, css_small, and css_big will be combined -->




  <!-- FEODEMO:  Styles 2 - Convert Imports to Links CSS Demo -->
  <!--   cssMinify_comments.css and css_minfiy_code_removals.css -->
  <!--   Convert Imports to Links can also be demonstrated -->
  <link type="text/css"  rel="stylesheet" href="http://172.21.10.111/feostuff
/__nsco_VCONT_OPT_P0_D0_C0_I0_H80000c_i0x0_V7__cssMinify_comments.css"><link
type="text/css"  rel="stylesheet" href="http://172.21.10.111/feostuff
/__nsco_VCONT_OPT_P0_D0_C0_I0_H80000c_i0x0_V7__css_minify_code_removals.css">


<link rel="stylesheet"
href="__nsco_VCONT_OPT_P0_D0_C0_I0_H80000c_i0x0_V7__defaultstyles.css">
<link rel="stylesheet"
href="feostuff/__nsco_VCONT_OPT_P0_D0_C0_I0_H80000c_i0x0_V7__css_small.css">
<link rel="stylesheet"
href="feostuff/__nsco_VCONT_OPT_P0_D0_C0_I0_H80000c_i0x0_V7__css_big.css">
</head>


<BODY class="blueMainbgstyle">

<div id="bodyDiv">
<div id="mainContainerDiv"  class="mainContainerDivHome">
<div id="formDiv" >

<h3>Welcome to the FEO Demo site.</h3>
```

10. Return to the NetScaler Configuration Utility in Chrome.

11. Update the FEO policy action with additional settings:

- Navigate to **Optimization > Front End Optimization > Actions**.
- Select **feo_act_custom** and click **Edit**.

Enable the following settings under the **Image** category:

- Enable (check) **Shrink to Attributes**.
- Enable (check) **Make Inline**.
- Enable (check) **Optimize**.
- Enable (check) **Convert GIF to PNG**.

Enable the following additional settings under the **CSS** category:

- Enable (check) **Move to Head Tag**.
- Enable (check) **Image Inline**.
- Keep other settings enabled as previously indicated.

Click **OK**.

12. Save the NetScaler configuration.

13. Switch to Firefox to test the policy.

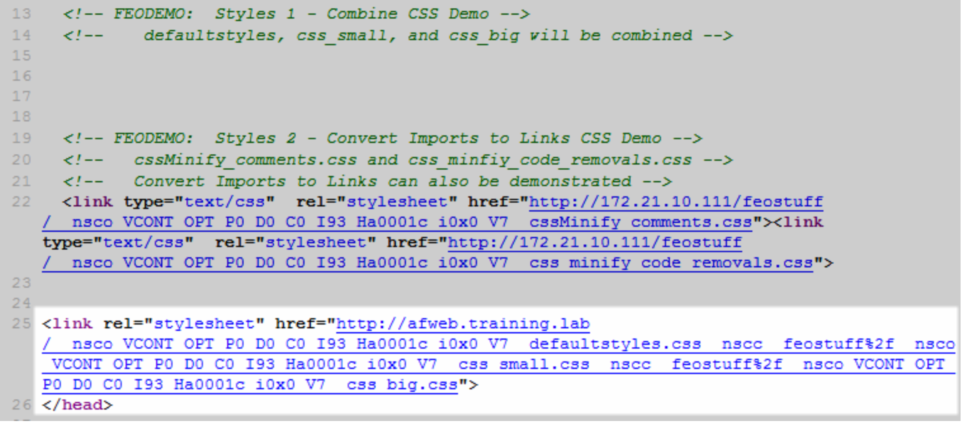
- Open a new tab in Firefox as **Tab (5)**.
- Verify the Firebug pane is still open. (If not re-open.)
- Browse to **http://afweb.training.lab/feo1.htm**.
- Refresh the page.

14. View the Page Source:

- Right-click the gray background in the **/feo1.htm** page and click **View Page Source**.
- Keep this in **Tab (6)** for future reference.
- If necessary, compare to the previous optimizations in **Tab (4)**.

View StyleSheets Modifications first:

- Verify the StyleSheets from the Styles 1 section are now combined into a single style-sheet: defaultstyles.css, css_small.css, and css_big.css.



```
  <!-- FEODEMO:  Styles 1 - Combine CSS Demo -->
  <!--    defaultstyles, css_small, and css_big will be combined -->




  <!-- FEODEMO:  Styles 2 - Convert Imports to Links CSS Demo -->
  <!--   cssMinify_comments.css and css_minfiy_code_removals.css -->
  <!--   Convert Imports to Links can also be demonstrated -->
  <link type="text/css"  rel="stylesheet" href="http://172.21.10.111/feostuff
/  nsco VCONT OPT P0 D0 C0 I93 Ha0001c i0x0 V7  cssMinify comments.css"><link
type="text/css"  rel="stylesheet" href="http://172.21.10.111/feostuff
/  nsco VCONT OPT P0 D0 C0 I93 Ha0001c i0x0 V7  css minify code removals.css">


<link rel="stylesheet" href="http://afweb.training.lab
/  nsco VCONT OPT P0 D0 C0 I93 Ha0001c i0x0 V7  defaultstyles.css  nscc  feostuff%2f  nsco
 VCONT OPT P0 D0 C0 I93 Ha0001c i0x0 V7  css small.css  nscc  feostuff%2f  nsco VCONT OPT
P0 D0 C0 I93 Ha0001c i0x0 V7  css big.css">
</head>
```

15.	Switch to **Tab (5)** and view the image optimizations: • Scroll down through the page and view the image content. • Notice that all images in page content have already loaded. Return to the Page Source in **Tab (6)**: • Scroll down to the **FEO Image DEMO 4** section and verify the small image objects were converted to inline image objects. Close **Tab (5)** and **Tab (6)**.
16.	Return to the NetScaler Configuration Utility in Chrome.
17.	Update the FEO policy action with additional settings: • Navigate to **Optimization > Front End Optimization > Actions**. • Select **feo_act_custom** and click **Edit**. Enable the following settings under the **Image** category: • Enable (check) **Lazy Load**. • Keep other settings enabled as previously indicated. Enable the following additional settings under the **CSS** category: • No changes. Keep other settings enabled as previously indicated. Enable the following additional settings under the **HTML** category: • Enable (check) **Remove comments from HTML**. Click **OK**.
18.	Save the NetScaler configuration.
19.	Switch to Firefox to test the policy. • Open a new tab in Firefox as **Tab (5)**. • Verify the Firebug pane is still open. (If not re-open.) • Browse to **http://afweb.training.lab/feo1.htm**. Do not scroll down yet. **NOTE**: This time the page load time is much faster due to a combination of caching and lazy load. Images in non-displayed parts of the pages are not downloaded unless needed. You will see the timeline in Firebug include additional requests as you scroll down. The file size for all objects loaded in this request starts out significantly smaller but will increase as additional objects are retrieved. Take note of both values.
20.	Scroll down the page and notice how page objects are loaded only when needed. The output in Firebug will indicate additional object requests.

21.	View the Page Source: • Right-click the gray background in the **/feo1.htm** page and click **View Page Source**. • Keep this in **Tab (6)** for future reference. • If necessary, compare to the previous optimizations in **Tab (4)**. View HTML Comments Modifications first: • Verify none of the FEODEMO comments are present in the page source. View the LazyLoad impact on the Image section: • Scroll down to the **FEO Image Demo 1** section. Notice how all image references have image tags (<img>) that have been modified with the class="lazy" attribute.
22.	Close Firefox (when done reviewing output and page source for all tabs).
23.	Return to the NetScaler Configuration Utility in Chrome.
24.	Disable the Integrated Caching and FEO features: Disable Integrated Caching: • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Disable (uncheck) **Integrated Caching**. • Click **OK** to acknowledge that FEO is still enabled. Click **OK**. Disable FEO: • Navigate to **System > Settings**. • Click **Configure Advanced Features**. • Disable (uncheck) **Front End Optimization**. Click **OK**.
25.	Save the NetScaler Configuration.

Takeaways:

- FEO requires that the Integrated Caching feature is also enabled, as FEO optimized content is stored in a cache content group to allow the NetScaler to apply optimizations or rewrites.
- FEO global parameters control the size of CSS, images, and JavaScript content that can be optimized.
- Several pre-defined FEO policies and actions are already defined on the NetScaler to achieve pre-configured optimizations for specific content types. Additional custom policies and actions can be defined as required.

Module 7: Tuning and Optimizations

Overview:

In this module, you will perform hands-on exercises for configuring and tuning the NetScaler appliance. The focus of these exercises are to reinforce the use of HTTP, TCP, and SSL profiles to manage tuning, optimization, and security settings per application as opposed to limiting settings to globally managed parameters. While not all optimization settings are appropriate for all environments, the settings highlighted as part of the exercise are generally useful for a broad range of scenarios. The profiles can then be used to specify application specific settings when needed.

After completing this lab module, you will be able to:

- Configure and use profiles to manage HTTP, TCP, and SSL settings per virtual server or service/service group and override default or global settings.
- Configure and use Network Profiles to assign IP Addresses to virtual servers, services, or monitors to manage NetScaler to server communications.
- Update the SSL certificates used by the NetScaler for its own services

This module contains the following exercises using the NetScaler Configuration Utility GUI:

• Exercise 7-1: NetScaler MAS Configuration Advice	10 min
• Exercise 7-2: Configuring TCP/HTTP Profiles	15 min
• Exercise 7-3: Configuring Network Profiles	20 min
• Exercise 7-4: Replacing NetScaler Default Certificates with Trusted Certs	10 min

Before you begin:

Estimated time to complete this lab module: 55 minutes

Exercise 7-1: NetScaler MAS Configuration Advice

In this exercise, you will use the NetScaler MAS Configuration Advice utility to review the NetScaler system's current configuration and to generate a list of configuration changes based on security, optimizations, and known best practices. The configuration advice settings will be reviewed along with the methods available to deploy the settings. However, settings will not be applied using NetScaler MAS at this time; instead, key settings recommended by MAS will be applied in later exercises demonstrating the use of HTTP, TCP, SSL, and network profiles.

Requirements for this scenario:

- Use the NetScaler MAS configuration advice utility to provide a list of configuration recommendations for the NetScaler's current configuration state.
- Review the list of recommendations for possible security and optimization settings still needed.
- Identify how to use the configuration advice utility to generate configuration commands to apply to a managed NetScaler.

In this exercise, you will perform the following tasks:

- Use MAS for Configuration Advice

Using NetScaler MAS for Configuration Advice

Step	Action
1.	Open Chrome and in **Tab (1)** connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
2.	Enable Application Firewall features. • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Select (check) **Application Firewall**. Click **OK**.
3.	Save the NetScaler Configuration.
4.	In Chrome, open a new tab **Tab (2)** and connect to NetScaler MAS management utility at http://mas.training.lab. Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**

5.	Use the MAS configuration advice feature to review the NetScaler's current configuration: • Click **Infrastructure** tab. • Navigate to **Configuration Audit > Configuration Advice**. • Select **Select Device**. • Verify **192.168.10.101** (NS_VPX_01 NSIP) is selected in the drop-down list. • Click **Get Configuration**. Verify a list of recommendations are displayed. The list will include approximately 50 recommendations depending on exact state of the current NetScaler configuration. Due to the lab dependencies, DO NOT apply all recommendations as is.
6.	Review configuration advice recommendations by specific category. • Select **User Administration** under the Filter By: Category drop-down list. Review the recommendations being made.
7.	Review configuration advice recommendations by specific category. • Select **System Settings** under the Filter By: Category drop-down list. This section gives recommendations on syslog, snmp v3, default parameters, and various features. At this time, none of these recommendations apply to the lab environment.

8.

Review configuration advice recommendations by specific category.

- Select **PCI Compliance v3.0** under the Filter By: Category drop-down list.

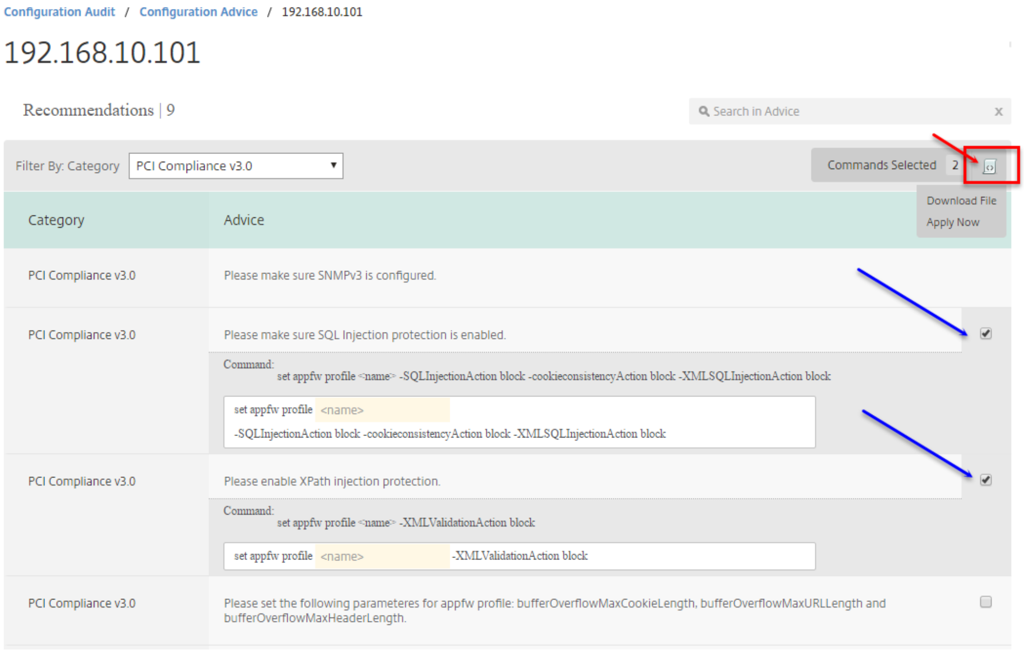
Recommendations include recommendations for Application Firewall settings and the use of end-to-end SSL (over SSL Offload or HTTP only virtual servers). This particular NetScaler configuration has existing Application Firewall profiles and policies applied to certain virtual servers, but some security checks have been modified to transform instead of block. The level of the Application Firewall profile configuration will affect the specific list of recommendations.

The Configuration Advice output is used to highlight areas of possible configuration changes needed and to generate commands to apply those changes.

- Check **Please make sure SQL Injection Protection is enabled**.
- Check **Please enable XPath injection protection**.
- Verify preview commands are displayed.

Generate command output:

- Click the **Generate Configuration** button (next to Commands Selected). See screenshot below.
  Notice that you can use the configuration advice interface to construct commands and either download a configuration file or Apply Now to managed NetScalers. DO NOT apply commands.
- Click **Download File**.
- Save **corrective_command.conf** to C:\resources\ and click **Save**.
- Do not apply the commands.



192.168.10.101

Recommendations | 9

Filter By: Category: PCI Compliance v3.0

Commands Selected 2

Category	Advice	
PCI Compliance v3.0	Please make sure SNMPv3 is configured.	
PCI Compliance v3.0	Please make sure SQL Injection protection is enabled. Command: set appfw profile <name> -SQLInjectionAction block -cookieconsistencyAction block -XMLSQLInjectionAction block set appfw profile <name> -SQLInjectionAction block -cookieconsistencyAction block -XMLSQLInjectionAction block	☑
PCI Compliance v3.0	Please enable XPath injection protection. Command: set appfw profile <name> -XMLValidationAction block set appfw profile <name> -XMLValidationAction block	☑
PCI Compliance v3.0	Please set the following parameteres for appfw profile: bufferOverflowMaxCookieLength, bufferOverflowMaxURLLength and bufferOverflowMaxHeaderLength.	□

9.	Review configuration advice recommendations by specific category. • Select **Best Practices** under the Filter By: Category drop-down list. Notice that these recommendations address various network and http settings affecting the NetScaler. The recommendations include Windows Scaling, Nagle's Algorithm, Drop invalid HTTP requests, SNMP Alarm recommendations, and Cookie Version (if still set to Version 0). Instead of using MAS to push these settings to the NetScaler. The next exercise will use HTTP and TCP profiles to manage some of the applicable settings.
10.	Close the NetScaler MAS management console in **Tab (2)**.
11.	Return to **Tab (1)** for the NetScaler configuration utility.
12.	Disable the Application Firewall feature before continuing: • Navigate to **System > Settings**. • Click **Configure Basic Features**. • Deselect (uncheck) **Application Firewall**. Click **OK**.
13.	Save the NetScaler configuration.

Takeaways:

- NetScaler MAS can generate a list of recommended configurations based on the current configuration of a managed NetScaler. Settings identify key requirements for security, system, optimization, and best practices.
- NetScaler MAS configuration advice can also be used to generate a configuration file to apply select recommendations or it can be used to directly apply commands to managed NetScalers.

Exercise 7-2: Configuring TCP/HTTP/SSL Profiles

In this exercise, you will use TCP, HTTP, and SSL profiles to apply specific optimization and tuning settings to individual virtual servers, in order to override global settings on the NetScaler. The TCP and HTTP profiles provide granular control of TCP and HTTP parameters that can be used to tune settings per virtual server and/or service to meet application specific requirements for WAN or LAN networks. The profiles can be used to override global parameters and provide the ability to manage additional settings not handled by the global parameters.

Please note that the settings in use in this exercise, are generally recommended optimizations for most NetScaler deployments. However, there may be some exceptions. Please review specific settings for applicability before deploying in production. Not all settings are suitable for all environments.

The NetScaler has several built-in profiles that are already tuned for specific traffic types and LAN or WAN network conditions. These existing profiles should be reviewed and used where applicable. Custom profiles can be created as needed.

In this exercise, you will perform the following tasks:

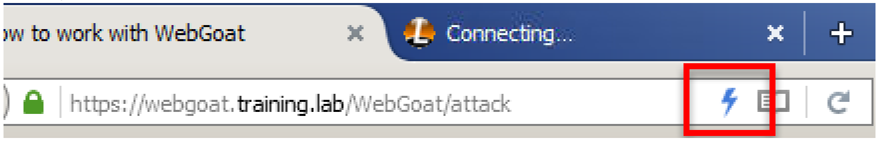
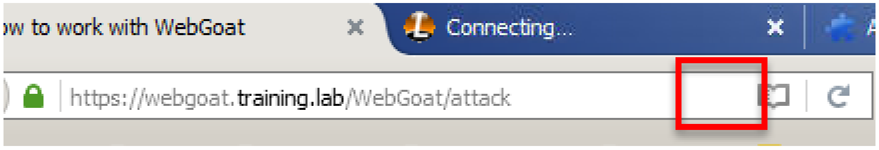
- Create a custom TCP Profile to apply basic optimizations:
  - Configure Windows Scaling with scaling factor 4
  - Enable Selective Acknowledgement
  - Enable Nagle's Algorithm
  - Review other settings configurable within TCP Profiles
- Create a custom HTTP Profile to apply basic optimizations:
  - Drop invalid HTTP requests
  - Mark HTTP/0.9 requests as invalid
  - Mark CONNECT requests as invalid
- Create a custom SSL Profile to manage SSL settings and enforce SSLv3 is disabled.
- Additional settings:
  - Enable support for HTTP/2.0 connections or SPDY protocol support for older clients that don't yet support HTTP/2.0 connections.
  - Determine how to identify HTTP/2.0 connections (and therefore optimizations) are in effect.

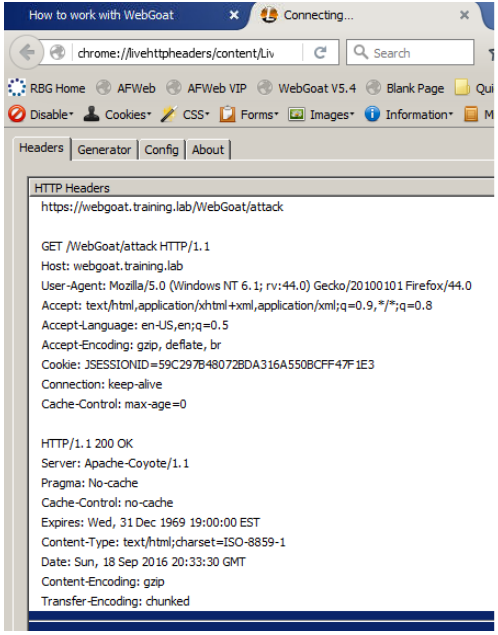
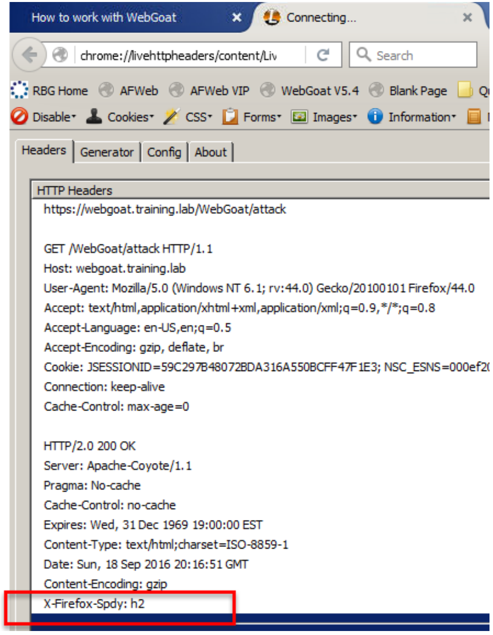
Use TCP/HTTP Profiles to Apply Optimizations

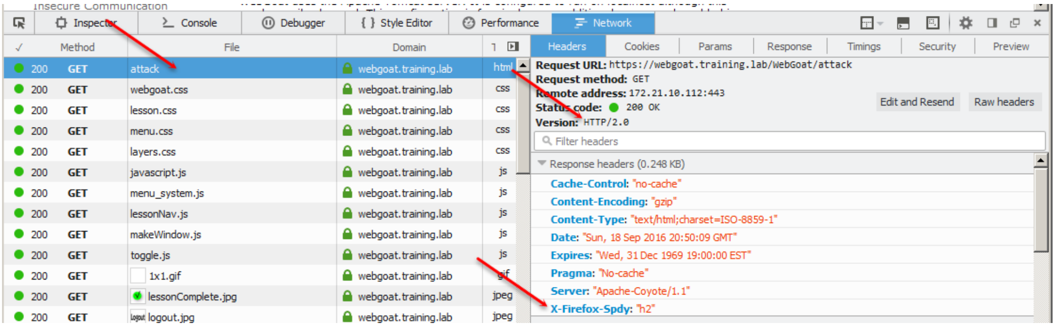
Step	Action
1.	Connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**

2.	Create a new TCP Profile with some basic optimizations and tuning settings for use: • Navigate to **System > Profiles**. • Click **TCP Profiles** tab. • Click **Add**. • Enter **tcp_prof_custom1** in the Name field. Configure settings for the following fields listed. Keep defaults for unspecified fields: • Enable (check) **Windows Scaling**. o Keep default Window Scaling Factor at 4. o Window Scaling must be tuned for your network and traffic type. • Verify TCP Flavor is set to Default. (This is used to set specific TCP congestion algorithm to use.) • Enable (check) **Selective Acknowledgement**. • Enable (check) **Use Nagle's Algorithm**. Click **Create**. **NOTE**: These settings will typically work for web traffic (and ICA traffic) in most situations, but are not universally applicable in all situations. The profiles can be used to override global TCP parameters and additional settings that cannot be managed at the global parameter level.
3.	Create a custom HTTP profile with some basic optimization settings for use: • Click **HTTP Profiles** tab. • Click **Add**. • Enter **http_prof_custom1** in the Name field. Configure settings for the following fields listed. Keep defaults for unspecified fields: • Enable (check) **Drop invalid HTTP requests**. • Enable (check) **Mark HTTP/0.9 requests as invalid**. • Enable (check) **Mark CONNECT requests as invalid**. Click **Create**. **NOTE**: Additional settings of note not tuned in this profile, include: • Client IP Header Expression which can be used to identify HEADER with client IP address so the NetScaler can extract the source IP. Such as an x-forwarded-for request arriving at the NetScaler • SPDY Protocol support, which will be demonstrated in a later exercise. • HTTP/2 connection support (HTTP 2.0 vs. 1.0 and 1.1 connection support), which will be demonstrated in a later exercise.

4.	Create a custom SSL Profile to disable SSLv3: • Click **SSL Profile** tab. • Click **Add**. • Enter **ssl_prof_custom1** in the Name field. Review the available settings in the profile. • Notice that Deny SSL Renegotiation is set to ALL. • Scroll down to the Protocol section. • Notice that SSLv3 is disabled by default. • Notice that TLSv1, TLSv11, TLSv12 are enabled by default. Click **OK** and click **Done** to create a profile with the default settings.
5.	Update the HTTP and SSL load balancing virtual servers for WebGoat: • Navigate to **Traffic Management > Load Balancing > Virtual Servers**.
6.	Apply TCP and HTTP Profiles to the HTTP virtual server for WebGoat: • Select (check) **lb_vsrv_webgoat** and click **Edit**. • Click **Profiles** under the Advanced Settings to add it to the configuration pane. • Select **tcp_prof_custom1** from the TCP Profile drop-down list. • Select **http_prof_custom1** from the HTTP Profile drop-down list. • Click **OK** under Profiles to apply settings. Click **Done** to close the virtual server properties for lb_vsrv_webgoat.
7.	Apply TCP and HTTP Profiles to the SSL virtual server for WebGoat: • Select (check) **lb_vsrv_webgoat_ssl** and click **Edit**. • Click **Profiles** under the Advanced Settings to add it to the configuration pane. • Select **tcp_prof_custom1** from the TCP Profile drop-down list. • Select **http_prof_custom1** from the HTTP Profile drop-down list. • Click **OK** under Profiles to apply settings. Apply the SSL Profile to the SSL Virtual Server for WebGoat: • Click **SSL Profile** under the Advanced Settings to add it to the configuration pane. • Select **ssl_prof_custom1** from the SSL Profile drop-down list. • Click **OK** under SSL Profile to apply settings. Click **Done** to close the virtual server properties for lb_vsrv_webgoat_ssl

8.	Close all existing instances of Firefox and re-open a new window. In **Tab (1)**, Browse in Tab (1) to **https://webgoat.training.lab/WebGoat/attack**. (**NOTE**: Use SSL and no trailing "/" in the URL after "attack".) • Enable browser to proceed to web page despite the untrusted certificate. • Enter **guest / guest** if prompted for credentials. • Click **Start WebGoat**. Open Live HTTP Headers in **Tab (2)**: • Click **Tools > Live HTTP Headers**. • Refresh **Tab (1)** to display https://webgoat.training.lab/WebGoat/attack again. Determine if HTTP/2 is in use or not.: • Switch to **Tab (2)** and use **Live HTTP Headers** to verify the client request to /WebGoat/attack (top object). ○ Note: The Connection type will still indicate HTTP/1.1 in the HTML action of the Get or Post even if HTTP/2 is inuse. • Verify there is no HTTP Response Header named X-Firefox-Spdy:h2 the output. (This indicator applies to Firefox only.) • Verify the HTTP/2 and SPDY Indicator (Firefox and Chrome add-on) indicates that HTTP/2 or SPDY are not in use. NOTE: When you browse please : no trailing "/" . If you browse to /WebGoat/attack/ it will create a security violation. See examples below.
	The HTTP/2 and SPDY Indicator add-on in Firefox: For Reference: • HTTP/2 or SPDY in use:  ow to work with WebGoat Connecting... https://webgoat.training.lab/WebGoat/attack • HTTP/2 or SPDY not in use:  ow to work with WebGoat Connecting... https://webgoat.training.lab/WebGoat/attack

	Response Headers With HTTP/1.1 (LEFT)  How to work with WebGoat Connecting... chrome://livehttpheaders/content/Liv Search RBG Home AFWeb AFWeb VIP WebGoat V5.4 Blank Page Qui Disable Cookies CSS Forms Images Information M Headers Generator Config About HTTP Headers https://webgoat.training.lab/WebGoat/attack GET /WebGoat/attack HTTP/1.1 Host: webgoat.training.lab User-Agent: Mozilla/5.0 (Windows NT 6.1; rv:44.0) Gecko/20100101 Firefox/44.0 Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8 Accept-Language: en-US,en;q=0.5 Accept-Encoding: gzip, deflate, br Cookie: JSESSIONID=59C297B48072BDA316A550BCFF47F1E3 Connection: keep-alive Cache-Control: max-age=0 HTTP/1.1 200 OK Server: Apache-Coyote/1.1 Pragma: No-cache Cache-Control: no-cache Expires: Wed, 31 Dec 1969 19:00:00 EST Content-Type: text/html;charset=ISO-8859-1 Date: Sun, 18 Sep 2016 20:33:30 GMT Content-Encoding: gzip Transfer-Encoding: chunked With HTTP/2.0 (RIGHT)  How to work with WebGoat Connecting... chrome://livehttpheaders/content/Liv Search RBG Home AFWeb AFWeb VIP WebGoat V5.4 Blank Page Q Disable Cookies CSS Forms Images Information Headers Generator Config About HTTP Headers https://webgoat.training.lab/WebGoat/attack GET /WebGoat/attack HTTP/1.1 Host: webgoat.training.lab User-Agent: Mozilla/5.0 (Windows NT 6.1; rv:44.0) Gecko/20100101 Firefox/44.0 Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8 Accept-Language: en-US,en;q=0.5 Accept-Encoding: gzip, deflate, br Cookie: JSESSIONID=59C297B48072BDA316A550BCFF47F1E3; NSC_ESNS=000ef2 Connection: keep-alive Cache-Control: max-age=0 HTTP/2.0 200 OK Server: Apache-Coyote/1.1 Pragma: No-cache Cache-Control: no-cache Expires: Wed, 31 Dec 1969 19:00:00 EST Content-Type: text/html;charset=ISO-8859-1 Date: Sun, 18 Sep 2016 20:16:51 GMT Content-Encoding: gzip X-Firefox-Spdy: h2
9.	Close all instances of Firefox.
10.	Return to the NetScaler Configuration Utility in Chrome.
11.	Update the HTTP profile with HTTP/2 and SPDY support enabled: • Navigate to **System > Profiles**. • Click **HTTP Profiles** tab. • Select **http_prof_custom1** and click **Edit**. • Select **Enabled** under **SPDY**. • Enable (check) **HTTP/2**. Click **OK**. **NOTE**: Standalone SPDY protocol support is largely deprecated in newer browsers and replaced with HTTP/2 protocol support. Enable SPDY for legacy browsers that cannot handle HTTP/2 connections.
12.	Save the NetScaler configuration.

13.	Close all existing instances of Firefox and re-open a new window. In **Tab (1)**, Browse in Tab (1) to **https://webgoat.training.lab/WebGoat/attack**. (NOTE: Use SSL.) - Enter **guest / guest** if prompted for credentials. - Click **Start WebGoat**. Open Live HTTP Headers in **Tab (2)**: - Click **Tools > Live HTTP Headers**. - Refresh **Tab (1)** to display https://webgoat.training.lab/WebGoat/attack again. Determine if HTTP/2 is in use or not.: - Verify the HTTP/2 and SPDY Indicator indicates that HTTP/2 or SPDY is in use. - Switch to **Tab (2)** and use **Live HTTP Headers to** verify the client request to /WebGoat/attack is an HTTP/2.0 connection by confirming the X-Firefox-Spdy:h2 header is present in the Response object.
14.	Alternate method to confirm HTTP version in use using the Firefox native Web Developer (not the Add-on Web Developer Extension): - Return to **Tab (1)**. - Click **Tools > Web Developer > Network**. - Browse to **https://webgoat.training.lab/WebGoat/attack** again. In the Web Developer pane (at bottom), view the following: - Scroll up to the first object requested: **attack** - Click the **attack** object. - In the new pane to the RIGHT, Headers are displayed. - Verify the Version is identified as **HTTP/2.0** and not HTTP/1.1. - Response Headers are displayed in the lower pane and still contain the X-Firefox-Spdy:h2 header, as well.  Insecure Communication Inspector Console Debugger { } Style Editor Performance Network Headers Cookies Params Response Timings Security Preview Edit and Resend Raw headers Filter headers ✓ Method File Domain 200 GET attack webgoat.training.lab html 200 GET webgoat.css webgoat.training.lab css 200 GET lesson.css webgoat.training.lab css 200 GET menu.css webgoat.training.lab css 200 GET layers.css webgoat.training.lab css 200 GET javascript.js webgoat.training.lab js 200 GET menu_system.js webgoat.training.lab js 200 GET lessonNav.js webgoat.training.lab js 200 GET makeWindow.js webgoat.training.lab js 200 GET toggle.js webgoat.training.lab js 200 GET 1x1.gif webgoat.training.lab gif 200 GET lessonComplete.jpg webgoat.training.lab jpeg 200 GET logout.jpg webgoat.training.lab jpeg **Request URL:** https://webgoat.training.lab/WebGoat/attack **Request method:** GET **Remote address:** 172.21.10.112:443 **Status code:** ● 200 OK **Version:** HTTP/2.0 Response headers (0.248 KB) Cache-Control: "no-cache" Content-Encoding: "gzip" Content-Type: "text/html;charset=ISO-8859-1" Date: "Sun, 18 Sep 2016 20:50:09 GMT" Expires: "Wed, 31 Dec 1969 19:00:00 EST" Pragma: "No-cache" Server: "Apache-Coyote/1.1" X-Firefox-Spdy: "h2"
15.	Close Firefox when done.

Takeaways:

- HTTP and TCP profiles can be applied to virtual servers or service/service groups.
  - Profiles override global settings.
  - Virtual server settings manage client-side connections and service/service group profiles manage server-side connections.

    - If no service-side profiles are specified, virtual server profiles are in use.
    - If no virtual server profiles are specified, global parameters are used.
- SSL Profiles provide granular control of SSL parameters and can be applied to virtual server or service/service groups as needed.

Exercise 7-3: Configuring Network Profiles

In this exercise, you will use Network profiles to assign unique IP addresses for NetScaler traffic for a specific virtual server in order to separate its traffic from the default SNIP that is assigned. To demonstrate the use of net profiles to assign IP addresses, one net profile will be assigned to a load balancing virtual server and a second net profile will be assigned for use with service monitors.

A network trace will be generated using the nstrace command and the results viewed to confirm which source IP addresses are assigned for NetScaler-to-server communication.

Requirements for this scenario:

- Traffic for AFWeb, WebGoat, and any other non-specified traffic on the NetScaler should continue using the default SNIP.
- Application traffic for the RBG virtual server will be assigned a unique IP address for NetScaler-to-server communication using 192.168.10.104.
- Monitor traffic for the RBG services will be assigned a unique IP address for NetScaler-to-server communication using 192.168.10.105.
- Confirm the results with a network trace.

In this exercise, you will perform the following tasks:

- Create and bind two Net Profiles for each of the custom IP Addresses.
- Generate a network trace to verify the configuration.

Create Net Profiles

Step	Action
1.	Connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**

2.	Create additional VIPs on the NetScaler: • Navigate to **System > Network > IPs**. • Click **Add**. Add new VIP (1): • Enter **192.168.10.104** in the IP Address field. • Enter **255.255.255.255** in the Netmask field. • Select **Virtual IP** in the IP Type field. • Disable (uncheck) **Enable Management Access control**. Click **Yes** to confirm. • Click **Create**. Add new VIP(2): • Enter **192.168.10.105** in the IP Address field. • Enter **255.255.255.255** in the Netmask field. • Select **Virtual IP** in the IP Type field. • Disable (uncheck) **Enable Access Management control**. Click **Yes** to confirm. • Click **Create**.
3.	Create a Net Profile using the VIP (1) address 192.168.10.104: • Navigate to **System > Network > Net Profiles**. • Click **Add**. • Enter **net_prof_rbgweb_from104** in the Name field. • Select **192.168.10.104** from the IP Address drop-down list. Click **OK**. Click **OK** and click **Done**.
4.	Create a Net Profile using the VIP(2) address 192.168.10.105: • Click **Add**. • Enter **net_prof_rbgmon_from105** in the Name field. • Select **192.168.10.105** from the IP Address drop-down list. Click **OK**. Click **OK** and click **Done**.
5.	Create a monitor for RBG using the Net Profile: • Navigate to **Traffic Management > Load Balancing > Monitors**. • Click **Add**. • Enter **mon_rbg_http** in the Name field. • Select **HTTP** in the Type field. Configure the following parameter on the Standard Parameters tab: • Click **Standard Parameters** tab. • Select **net_prof_rbgmon_from105** under Net Profile (at bottom). Configure the following parameter on the Special Parameters tab: • Click **Special Parameters** tab. • Verify **HEAD /** is entered in the HTTP Request field. • Verify **200** is listed in the Response Codes field. Click **Create**.

6.	Bind monitor to svc_red: • Navigate to **Traffic Management > Load Balancing > Services**. • Select (check) **svc_red** and click **Edit**. • Click **Service to Load Balancing Monitor Binding** under Monitors. • Click **Add Binding**. • Click **Click to Select** under Select Monitor. • Select **mon_rbg_http** and click **Select**. • Click **Bind** and click **Close**. Click **Done**. Bind monitor to svc_blue: • Select (check) **svc_blue** and click **Edit**. • Click **Service to Load Balancing Monitor Binding** under Monitors. • Click **Add Binding**. • Click **Click to Select** under Select Monitor. • Select **mon_rbg_http** and click **Select**. • Click **Bind** and click **Close**. Click **Done**. Bind monitor to svc_green: • Select (check) **svc_green** and click **Edit**. • Click **Service to Load Balancing Monitor Binding** under Monitors. • Click **Add Binding**. • Click **Click to Select** under Select Monitor. • Select **mon_rbg_http** and click **Select**. • Click **Bind** and click **Close**. Click **Done**.
7.	Bind the Net Profile to the RBG load balancing virtual server: • Navigate to **Traffic Management > Load Balancing > Virtual Servers**. • Select **lb_vsrv_rbg** and click **Edit**. • Click **Profiles** under the Advanced Settings to add the category to the configuration area. • Select **net_prof_rbgweb_from104** under **Net Profile**. • Click **OK** under the Profiles category. Click **Done**.
8.	Save the NetScaler configuration.

Generate a Network Trace using NSTrace to View IPs In Use

Step	Action

1.	Connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**
2.	Start the NetScaler Trace: • Navigate to **System > Diagnostics**. • Click **Start New Trace** under Technical Support Tools. Configure Trace with the following parameters: • Enter **0** in the Packet Size field. • Enable (check) **Capture Trace in .PCAP format**. • Enter the following expression in the **Filter Expression** field. Enter the expression manually or use the Expression Editor. (See Note below.) `CONNECTION.IP.EQ(192.168.10.111)||CONNECTION.IP.EQ(192.168.10.104)||CONNECTION.IP.EQ(192.168.10.105)` • Enable (check) **Trace Filtered connection's peer traffic**. • Enable (check) **Skip RPC**. Click **Start** and click **OK**. This expression is intended to capture any traffic using the SNIP or the VIPs associated with the net profiles regardless of whether the IP address is in the source or destination header of the packet. **NOTE**: When configuring the Expression in the Filter Expression field, ensure there are NO SPACES between the rules and the OR operator ("||"). While other advanced expressions can include spaces, the Trace screen treats this as an expression syntax error and will generate an error when starting the trace.
3.	Switch to Firefox and generate test data: • Browse to **http://rbg.training.lab/blue.php**. Refresh 3 times. • Browse to **http://afweb.training.lab/allow.demo**. Refresh 3 times. • Browse to **http://rbg.training.lab/blue.php**. Refresh 3 times.

4. Return to the NetScaler configuration Utility in Chrome.

- Click **Stop and Download** to stop trace.

Download trace to Student Desktop:

- Select (check) **nstrace1.pcap** and click **Download**.
- Save trace file to **C:\resources\** as **nstrace1.pcap**.
- Click **Save**.
- Click the file **nstrace1.pcap** from Chrome's download files bar (at bottom of browser) and click **Open**.
- Click **Close**.

The trace file should automatically open in Wireshark. Skip any prompts asking you to check for updates or to update Wireshark.

NOTE:

- If you run the nstrace multiple times, the NetScaler will generate the trace in a unique date/timestamped folder in /var/nstrace/ each time. The file will keep the same name unless you adjust additional settings when configuring the trace. However, the file will not overwrite previous traces as it is in its own unique folder.
- If you save the nstrace file locally, be sure to increment the name or else you could overwrite a previously downloaded file also named nstrace1.pcap.

5. In Wireshark, view content in Wireshark for the 192.168.10.111 SNIP only:

- Enter the following expression in the filter bar in Wireshark. (The filter field contains the hint text "Apply a Display filter…"). The field will be GREEN for correct syntax and RED for incorrect syntax.

```
ip.src==192.168.10.111||ip.dst==192.168.10.111
```

- Hit **Enter** to apply the filter.

Results:

SNIP 192.168.10.111 is used for all other SNIP functions on the NetScaler. Traffic will be seen going to and from any of the following IP Addresses, depending on the traffic tested:

- AFWeb Server (Monitors and Web traffic): 192.168.30.71
- WebGoatA and WebGoatB Servers: 192.168.30.72-73
- NetScaler MAS: 192.168.10.15
- Command Center: 192.168.10.13

There should be no communication to 192.168.10.111 for the following:

- RBG Servers: 192.168.30.51-53

<table>
<tr><th></th><th></th></tr>
<tr><td>6.</td><td>In Wireshark, view content in Wireshark for the 192.168.10.104 IP only:
- Enter the following expression in the filter bar in Wireshark. (Field contains the hint text "Apply a Display filter…"). The field will be GREEN for correct syntax and RED for incorrect syntax.
<code>ip.src==192.168.10.104||ip.dst==192.168.10.104</code>
- Hit <b>Enter</b> to apply the new filter.

<b>Results</b>:
IP 192.168.10.104 is used for traffic to and from the RBG services based on traffic sent to the load balancing virtual server (172.21.10.101) only. Traffic using the 192.168.10.104 IP represents traffic generated by users and excludes all monitoring traffic. In the above test, the load balancing traffic was directed to /blue.php (and related objects), whereas the monitor is probing "/" (and related objects).

Traffic will be seen going to and from any of the following IP Addresses:
- RBG Servers: 192.168.30.51-53 only
There should be no communication to 192.168.10.111 for the following:
- AFWeb Server (Monitors and Web traffic): 192.168.30.71
- WebGoatA and WebGoatB Servers: 192.168.30.72-73
- NetScaler MAS: 192.168.10.15</td></tr>
<tr><td>7.</td><td>In Wireshark, view content in Wireshark for the 192.168.10.105 IP only:
- Enter the following expression in the filter bar in Wireshark. (Field contains the hint text "Apply a Display filter…"). The field will be GREEN for correct syntax and RED for incorrect syntax.
<code>ip.src==192.168.10.105||ip.dst==192.168.10.105</code>
- Hit <b>Enter</b> to apply the new filter.

<b>Results</b>:
IP 192.168.10.105 is used for traffic generated by the Monitors for the RBG Services only. Traffic is now originating from the 192.168.10.105 IP instead of the 192.168.10.111 SNIP. This can also be used to separate monitor traffic from other traffic affecting the services that originated against the load balancing virtual server.

Traffic will be seen going to and from any of the following IP Addresses:
- RBG Servers: 192.168.30.51-53 only
There should be no communication to 192.168.10.111 for the following:
- AFWeb Server (Monitors and Web traffic): 192.168.30.71
- WebGoatA and WebGoatB Servers: 192.168.30.72-73
- NetScaler MAS: 192.168.10.15</td></tr>
</table>

<table>
<tr><td>8.</td><td>In Wireshark, view content in Wireshark for the RED Server only at 192.168.30.15 IP only:
• Enter the following expression in the filter bar in Wireshark. (Field contains the hint text "Apply a Display filter…"). The field will be GREEN for correct syntax and RED for incorrect syntax.
<code>ip.src==192.168.30.51||ip.dst==192.168.30.51</code>
• Hit <b>Enter</b> to apply the new filter.
<b>Results</b>:
This filter confirms that the only traffic being sent to and from the red server (192.168.30.51) is being sent to or from the 192.168.10.104 or 192.168.10.105 IPs. None of the RED traffic uses the SNIP 192.168.10.111.
Traffic will be seen going to and from any of the following IP Addresses:
• RBG Servers: 192.168.30.51-53 only
There should be no communication to 192.168.10.111 to or from the RED server (192.168.30.51).</td></tr>
<tr><td>9.</td><td>Close Wireshark when done reviewing the nstrace file.</td></tr>
</table>

Takeaways:

- Assigning specific SNIPs or VIPs to virtual servers (or services)
- Network profiles (net profiles) determine which IP Address (and/or Traffic Domain) to assign to specific traffic flows on the NetScaler.
  - Net profiles are ignored if USIP mode is enabled.
  - If Net profiles exist on both service/service group or virtual server, the service/service group profile overrides the virtual server profile.
  - If a profile only exits for the virtual server, then the virtual server's profile is in effect.

Exercise 7-4: Replacing NetScaler Default Certificates with Trusted Certs

In this exercise, you will update and replace the NetScaler's default system certificates with trusted certificates signed by the domain CA, to enable trusted HTTPS communication to the NetScaler Configuration Utility. This procedure allows NetScaler administrators to incorporate certificates signed by trusted CA's with the appropriate cipher support and bit-length keys to meet security requirements in their environments. The procedure is relatively straight-forward, but many administrators are unfamiliar with the task.

During this exercise, the internal services that rely on the built-in ns-server-certificate certkey will be viewed, to identify the components dependent on the certkey. The existing certkey will be kept in place, but will be updated to point to the new certificate and private key files.

Requirements for this scenario:

- Update the SSL certificate in use by internal NetScaler services and ensure the connection to the NetScaler configuration utility over HTTPS is trusted.

In this exercise, you will perform the following tasks:

- View internal services and certificate dependencies in the NetScaler configuration utility and in the CLI.
- Update the NetScaler ns-server-certificate certkey to use the new certificate files without breaking the services dependent on the certkey.

Replace NetScaler System Certificates with Trusted Certificates

Step	Action
1.	Connect to the NetScaler configuration utility for NS_VPX_01 using the NSIP at http://192.168.10.101. (Use Chrome for NetScaler Configuration Utility connections.) Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**

2.	Access the NetScaler Configuration Utility using SSL: • Update the URL in Chrome and browse to **https://192.168.10.101**. Verify that **Chrome** displays an issue with the SSL Cert • Click on the **RED error triangle** in the Chrome address bar and click **Details** to display the SSL Certificate related errors. • Click **View Certificate** in the error pane. • Click the **Details** tab in the Certificate properties window. o Verify the Issuer is listed as **default CQMICM, NS Internal**. o Verify the Public Key listed as **RSA (2048) Bits**. o Click **OK** to close the Certificate properties. • Close the error pane in Chrome. **NOTE**: If your NetScaler has been upgraded from an older appliance prior to NetScaler 11.0 to NetScaler 11.0 or 11.1, you may have slightly different issuer details and in some cases older NetScalers will contain a default certificate of only 512 bits which may cause additional certificate errors with newer browsers refusing to allow connections. New installations of NetScaler 11.0 and later contain 2048-bit default certificates. If you are not replacing the NetScaler's built-in certificates with your certificates signed by a trusted CA, but you still need 2048-bit certificates for the NetScaler internal services, delete the NetScaler's existing certificates that start with ns-.* from the /nsconfig/ssl/ directory and reboot. The NetScaler will regenerate these certificates with the 2048-bit default certificates as if it was a new 11.x installation.
3.	Reconnect to the NetScaler configuration Utility using HTTP: • Update the URL in Chrome and browse to **http://192.168.10.101**.
4.	View the NetScaler Internal Services: • Navigate to **Traffic Management > Load Balancing > Services**. • Click the **Internal Services** tab. Notice that the internal services for nsrpcs, nshttps, nskrpcs, and the nsrnatsip all use SSL and have a certkey bound.

5.	Open a Putty session to 192.168.10.101:
	• To open putty: Right click on **Start > Run > putty 192.168.10.101**.
	• Log on as **nsroot / nsroot**.
	Run the following commands to view the internal services with full names:
	`show service -internal -summary -fullValues`
	View the details for the following services:
	`show service nshttps-127.0.0.1-443`
	`show service nsrpcs-127.0.0.1-3008`
	`show service nskrpcs-127.0.0.1-3009`
	Notice that certificate details are not included in the show service command.

6.	View the details of the certificates in use for the following services:
	`show ssl service nshttps-127.0.0.1-443`
	`show ssl service nsrpcs-127.0.0.1-3008`
	`show ssl service nskrpcs-127.0.0.1-3009`
	`show ssl certkey ns-server-certificate`
	Notice that each service is bound to the ns-server-certificate certkey.

7.	View the SSL certkey details from the CLI: `show ssl certkey ns-server-certificate`
8.	View the current NetScaler HostName: `show ns hostname`
9.	Configure the NetScaler HostName to match the NEW SSL Certificate: `set ns hostname ns01.training.lab`
10.	Return to the NetScaler Configuration Utility in Chrome.

11.	Apply a new certificate to the NetScaler certkey: • Navigate to **Traffic Management > SSL > Certificates > Server Certificates**. • Select (check) **ns-server-certificate** and click **Update**. • Enable (check) **Update the certificate and key**. • Enable (check) **No Domain Check** (at bottom). Import Certificate file from local file system: • Click **Choose File (down arrow) > Local** under Certificate File Name. • Browse to **C:\resources\SSL Certs\NSMgmt\**. • Select **ns01-training.cer** and click **Open**. Click **Yes** to confirm. Import Key file from local file system: • Click **Choose File (down arrow) > Local** under Key File Name. • Browse to **C:\resources\SSL Certs\NSMgmt\**. • Select **ns01-training.pem** and click **Open**. • Click **OK** and ignore the invalid File message. Click **OK** to attempt to apply changes. The NetScaler will then prompt for the Password for the private key. • Enter **Password1** in the Password field when prompted. Click **OK**. Verify the Issuer Name now displays as "training-AD-CA" for the ns-server-certificate certkey.
12.	Connect to the NetScaler Configuration Utility using HTTPS: • Open a new tab in Chrome and browse to **https://ns01.training.lab**. • Log on as **nsroot / nsroot**. • Click the **Security Lock icon** in the address bar in Chrome and click **Details**. Verify the details confirm the page is secure (valid HTTPS).
13.	Save the NetScaler Configuration.

Takeaways:

- SSL certkeys on the NetScalers are objects that act as pointers to the certificate and private key files on the file system. Virtual servers and services point to the certkey object and not the files directly; the certkey object identifies the specific files in use.
- Updating certificates then is a matter of just updating the certificate and private key files referenced by the certkey; all objects referencing a specific certkey do not need to be updated.
- Internal services on the NetScaler which are used for NetScaler management and NetScaler system communication such HA Synchronization, HA Propagation, GSLB, and clustering, rely on the ns-server-certificate. Therefore, all that is needed to change the certificate in use by internal services to a cert signed by a trusted CA or to update the key bit-length in use is to update the files referenced by the ns-server-certificate certkey object. No changes to certkey-service bindings are required.

Appendix A: Transition to Part 2

Overview:

The steps to transition from Part 1 to Part 2 are included in the CNS-318 book for reference, in case it is needed. **Only perform these steps if instructed.**

These steps allow students completing the Part 1 content (CNS-318, Mon-Wed) to transition to the starting state required for Part 2(CNS-319, Thu-Fri).

- **IMPORTANT**: Only run these steps if going from Part 1 to Part 2 (CNS-318 to CNS-319).
- If starting in the Part 2 (CNS-3219) images, skip this procedure.

Estimated time to complete this task: 5 minutes

Procedure to Transition to Part 2 Start State (CNS-319):

Step	Action
1.	Connect to NS_VPX_01 using the NSIP Address (192.168.10.101) using the PuTTY SSH client. • Use the PuTTY shortcut on the desktop of your Student Desktop OR run the following command: **Start > Run > Putty 192.168.10.101** Log into the utility using the following credentials: User Name: **nsroot** Password: **nsroot**

2.	Run the following commands to set the config for the new start state:
	
	Restore the dependent files for the configuration from part 1(signatures, imports, and SSL certs):
	`batch -filename /var/labstuff/restore/restorefiles_part1end.bat`
	
	Restore the dependent files for the configuration (signatures, imports, and SSL certs):
	`batch -filename /var/labstuff/restore/restorefiles_part2start.bat`
	
	Restore the NetScaler configuration:
	`batch -filename /var/labstuff/restore/restoreconf_part2start.bat`
	
	Reboot the NetScaler:
	`reboot`
	
	NOTE: This configuration keeps all of the load balancing virtual servers and policies from part 1, with the exception of AppFlow integration with Insight has been remove. The AppQoE and IP Reputation features are disabled and their policies are no longer bound to the associated virtual servers. AppFw feature is disabled, but the policies are still bound to the WebGoat and AFWeb virtual servers, for later demonstrations.
	
	The transition scripts add an SSL certkey pointing to an expired certificate for *.training.lab. The SSL certkey is in use by two additional lb vservers for WebGoat and AFWeb on SSL and 443.

3.	Reconnect to NS_VPX_01 at 192.168.10.101 using PUTTY. Log on as **nsroot / nsroot**.

4.	Verify the configuration with the following commands:
	`show lb vserver -summary`
	Alternate command:
	`show lb vserver -summary -fullvalues`
	
	Verify all the following load balancing virtual servers are present.
	• lb_vsrv_rbg
	• lb_vsrv_afweb
	• lb_vsrv_webgoat
	• lb_vsrv_callout (will be listed as down)
	• lb_vsrv_afweb_ssl (NEW)
	• lb_vsrv_webgoat_ssl (NEW)

5.	Verify the configuration with the following commands: `show appfw signatures` Verify custom signature "webgoatsigs" appears in list.
6.	Verify the configuration with the following commands: `show lb vserver lb_vsrv_afweb` Verify the appfw policy appfw_pol_afweb is bound to lb_vsrv_afweb.
7.	Verify the configuration with the following commands: `show lb vserver lb_vsrv_webgoat` Verify the appfw policy appfw_pol_webgoat is bound to lb_vsrv_webgoat. Note: If dependencies referenced in the configuration such as Signatures or imported pages are not present on the NetScaler, the depdendent objects such as policy actions or profiles will be missing. Repeat step 2 and run all three scripts to fix the issue and reboot.
8.	Verify the configuration with the following commands: `show responder policy -summary -fullvalues` Verify the three custom responder policies are included in the summary list: • rs_pol_drop_bycallout • rs_pol_drop_bycallout2 • rs_pol_respondwith_err_reqrate
9.	Verify the configuration with the following commands: `show responder action -summary -fullvalues` Verify the one custom responder action is included in the summary list: • rs_act_respondwith_err_reqrate
10.	Save the NetScaler configuration.

11.	Open XenCenter and connect to your assigned XenServer: • Use XenCenter shortcut on Desktop. Shutdown NetScaler Insight Center VM and start NetScaler MAS Virtual Appliance: • Right-click **NS_InsightCenter** in left pane and click **Shutdown**. • Right-click **MAS Virtual Appliance** in left pane and click **Start**, if not running.
12.	Close XenCenter when Virtual Machine operations are complete.