



IE2060
Computer Systems Administration
2nd Year, 2nd Semester

Assignment

Individual Assignment

Submitted to
Sri Lanka Institute of Information Technology

In partial fulfillment of the requirements for the
Bachelor of Science Special Honors Degree in Information Technology

25/04/2024

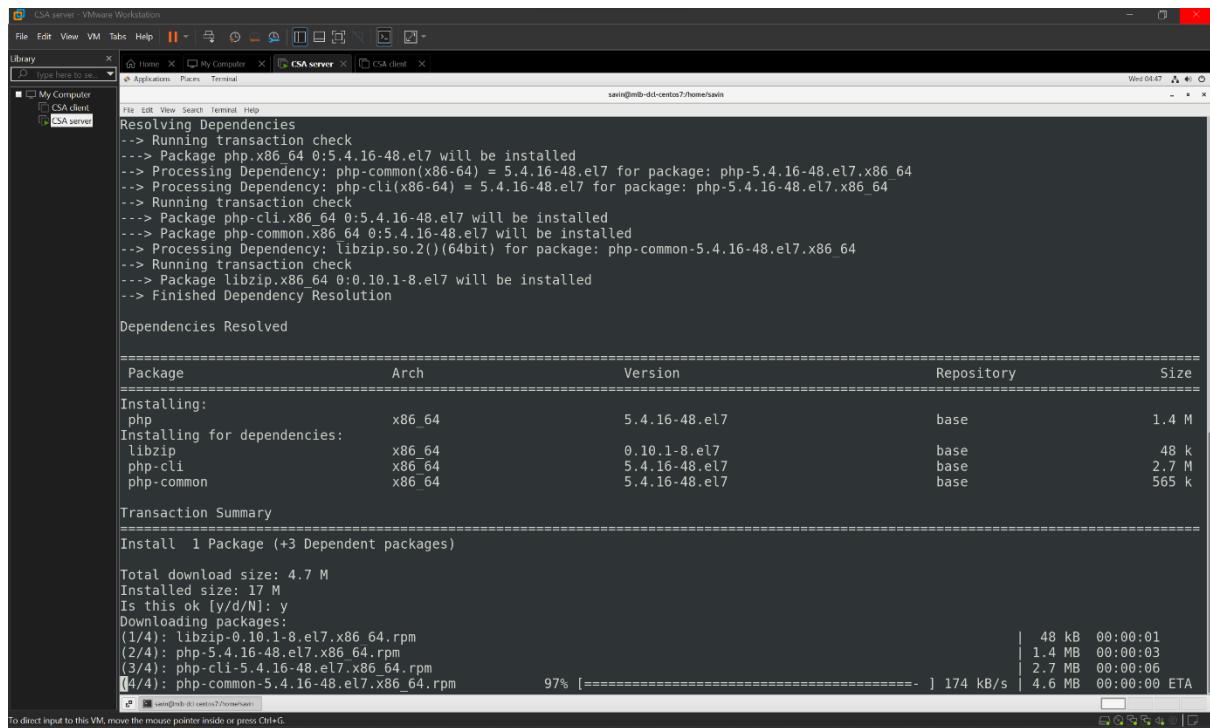
Declaration

I certify that this report does not incorporate without acknowledgement, any material previously submitted for a degree or diploma in any university, and to the best of my knowledge and belief it does not contain any material previously published or written by another person, except where due reference is made in text.

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Part 1: Nagios Monitoring Setup with CentOS Server and Fedora Client/s



```
saving@mlb-dcl-centos7:~$ sudo yum install php
Resolving Dependencies
--> Running transaction check
--> Package php.x86_64 0:5.4.16-48.el7 will be installed
--> Processing Dependency: php-common(x86-64) = 5.4.16-48.el7 for package: php-5.4.16-48.el7.x86_64
--> Processing Dependency: php-cli(x86-64) = 5.4.16-48.el7 for package: php-5.4.16-48.el7.x86_64
--> Running transaction check
--> Package php-cli.x86_64 0:5.4.16-48.el7 will be installed
--> Package php-common.x86_64 0:5.4.16-48.el7 will be installed
--> Processing Dependency: libzip.so.2()(64bit) for package: php-common-5.4.16-48.el7.x86_64
--> Running transaction check
--> Package libzip.x86_64 0:0.10.1-8.el7 will be installed
--> Finished Dependency Resolution

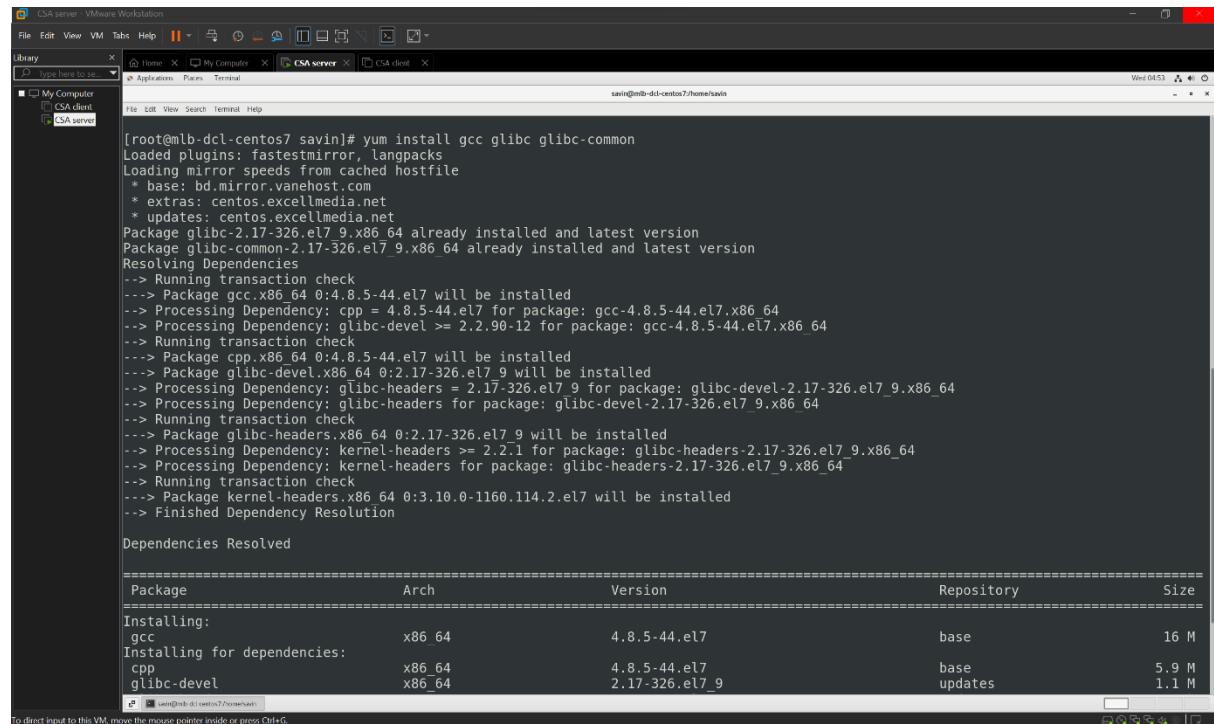
Dependencies Resolved

=====
Package           Arch      Version            Repository      Size
=====
Installing:
php              x86_64   5.4.16-48.el7      base          1.4 M
Installing for dependencies:
libzip           x86_64   0.10.1-8.el7      base          48 k
php-cli          x86_64   5.4.16-48.el7      base          2.7 M
php-common       x86_64   5.4.16-48.el7      base          565 k

Transaction Summary
=====
Install  1 Package (+3 Dependent packages)

Total download size: 4.7 M
Installed size: 17 M
Is this ok [y/d/N]: y
Downloading packages:
(1/4): libzip-0.10.1-8.el7.x86_64.rpm | 48 kB 00:00:01
(2/4): php-5.4.16-48.el7.x86_64.rpm | 1.4 MB 00:00:03
(3/4): php-cli-5.4.16-48.el7.x86_64.rpm | 2.7 MB 00:00:06
(4/4): php-common-5.4.16-48.el7.x86_64.rpm | 4.6 MB 00:00:ETA
97% [=====] 174 kB/s
```

Figure 1.1 - Apache web server with PHP module installed



```
[root@mlb-dcl-centos7 ~]$ sudo yum install gcc glibc glibc-common
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
 * base: bd.mirror.vanehost.com
 * extras: centos.excellmedia.net
 * updates: centos.excellmedia.net
Package glibc-2.17-326.el7_9.x86_64 already installed and latest version
Package glibc-common-2.17-326.el7_9.x86_64 already installed and latest version
Resolving Dependencies
--> Running transaction check
--> Package gcc.x86_64 0:4.8.5-44.el7 will be installed
--> Processing Dependency: cpp = 4.8.5-44.el7 for package: gcc-4.8.5-44.el7.x86_64
--> Processing Dependency: glibc-devel >= 2.2.90-12 for package: gcc-4.8.5-44.el7.x86_64
--> Running transaction check
--> Package cpp.x86_64 0:4.8.5-44.el7 will be installed
--> Package glibc-devel.x86_64 0:2.17-326.el7_9 will be installed
--> Processing Dependency: glibc-headers = 2.17-326.el7_9 for package: glibc-devel-2.17-326.el7_9.x86_64
--> Processing Dependency: glibc-headers for package: glibc-devel-2.17-326.el7_9.x86_64
--> Running transaction check
--> Package glibc-headers.x86_64 0:2.17-326.el7_9 will be installed
--> Processing Dependency: kernel-headers >= 2.2.1 for package: glibc-headers-2.17-326.el7_9.x86_64
--> Processing Dependency: kernel-headers for package: glibc-headers-2.17-326.el7_9.x86_64
--> Running transaction check
--> Package kernel-headers.x86_64 0:3.10.0-1160.114.2.el7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package           Arch      Version            Repository      Size
=====
Installing:
gcc              x86_64   4.8.5-44.el7      base          16 M
Installing for dependencies:
cpp              x86_64   4.8.5-44.el7      base          5.9 M
glibc-devel      x86_64   2.17-326.el7_9    updates       1.1 M

Transaction Summary
=====
Install  3 Packages (1 Dependent package)

Total download size: 23 M
Installed size: 33 M
Is this ok [y/d/N]: y
Downloading packages:
(1/3): kernel-headers-3.10.0-1160.114.2.el7.x86_64.rpm | 16 M 00:00:01
(2/3): glibc-headers-2.17-326.el7_9.x86_64.rpm | 5.9 M 00:00:02
(3/3): glibc-devel-2.17-326.el7_9.x86_64.rpm | 1.1 M 00:00:01
97% [=====] 174 kB/s
```

Figure 1.2- GCC C compiler with GLIBC libraries installed

```

[root@mlb-dcl-centos7 savin]# yum install gd-devel
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
 * base: bd.mirror.vanehost.com
 * extras: centos.excellmedia.net
 * updates: centos.excellmedia.net
Package gd-2.0.35-27.el7_9.x86_64 already installed and latest version
Resolving Dependencies
--> Running transaction check
--> Package gd-devel.x86_64 0:2.0.35-27.el7_9 will be installed
--> Processing Dependency: libpng-devel for package: gd-devel-2.0.35-27.el7_9.x86_64
--> Processing Dependency: libjpeg-devel for package: gd-devel-2.0.35-27.el7_9.x86_64
--> Processing Dependency: libXpm-devel for package: gd-devel-2.0.35-27.el7_9.x86_64
--> Processing Dependency: freetype-devel for package: gd-devel-2.0.35-27.el7_9.x86_64
--> Processing Dependency: fontconfig-devel for package: gd-devel-2.0.35-27.el7_9.x86_64
--> Running transaction check
--> Package fontconfig-devel.x86_64 0:2.13.0-4.3.el7 will be installed
--> Processing Dependency: pkgconfig(uuid) for package: fontconfig-devel-2.13.0-4.3.el7.x86_64
--> Package freetype-devel.x86_64 0:2.8-14.el7_9.1 will be installed
--> Package libXpm-devel.x86_64 0:3.5.12-2.el7_9 will be installed
--> Package libjpeg-turbo-devel.x86_64 0:1.2.90-8.el7 will be installed
--> Package libpng-devel.x86_64 2:1.5.13-8.el7 will be installed
--> Running transaction check
--> Package libuuid-devel.x86_64 0:2.23.2-65.el7_9.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package           Arch      Version            Repository      Size
=====
Installing:
gd-devel          x86_64   2.0.35-27.el7_9    updates        79 k
Installing for dependencies:
fontconfig-devel  x86_64   2.13.0-4.3.el7    base          138 k
freetype-devel    x86_64   2.8-14.el7_9.1   updates        447 k

=====

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

Figure 1.3- Graphics libraries installed

```

[root@mlb-dcl-centos7 savin]# useradd -m nagios
[root@mlb-dcl-centos7 savin]# passwd nagios
Changing password for user nagios.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
[root@mlb-dcl-centos7 savin]# groupadd nagcmd
[root@mlb-dcl-centos7 savin]# usermod -a -G nagcmd nagios
[root@mlb-dcl-centos7 savin]# usermod -a -G nagcmd apache

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

28°C High winds today

ENG US 9:49 AM 4/17/2024

Figure 1.4- Create Nagios user and group

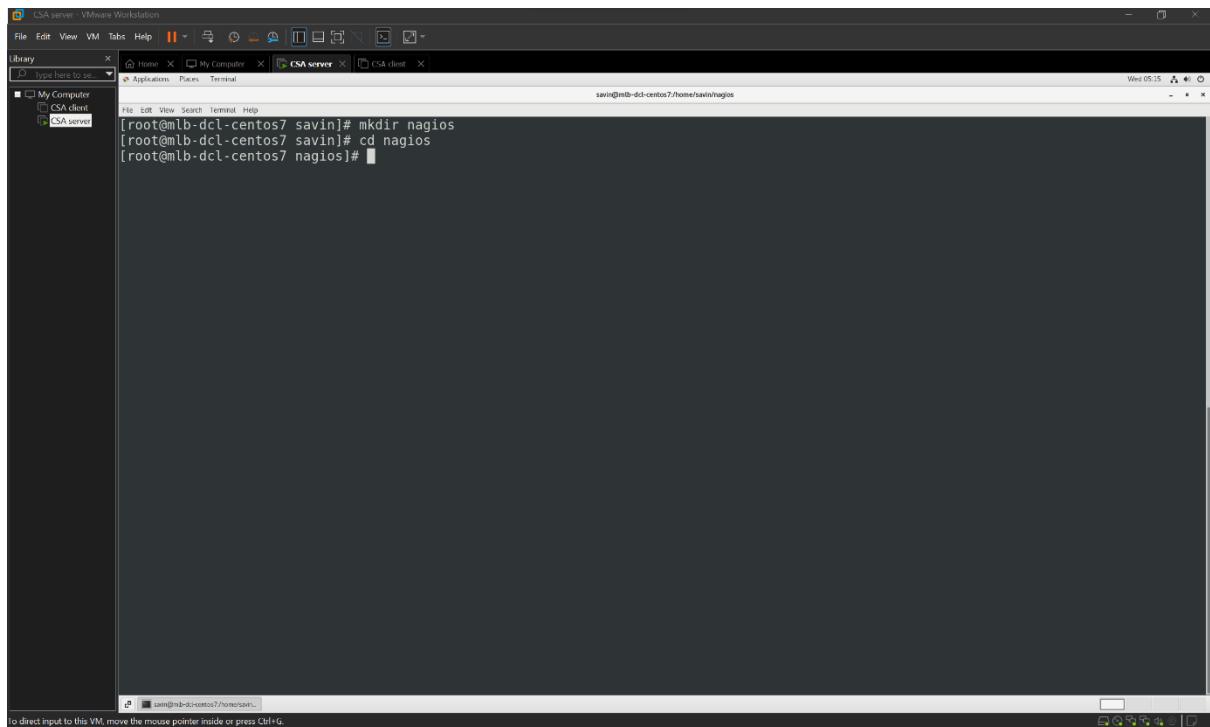


Figure 1.5- Create and move into Nagios folder

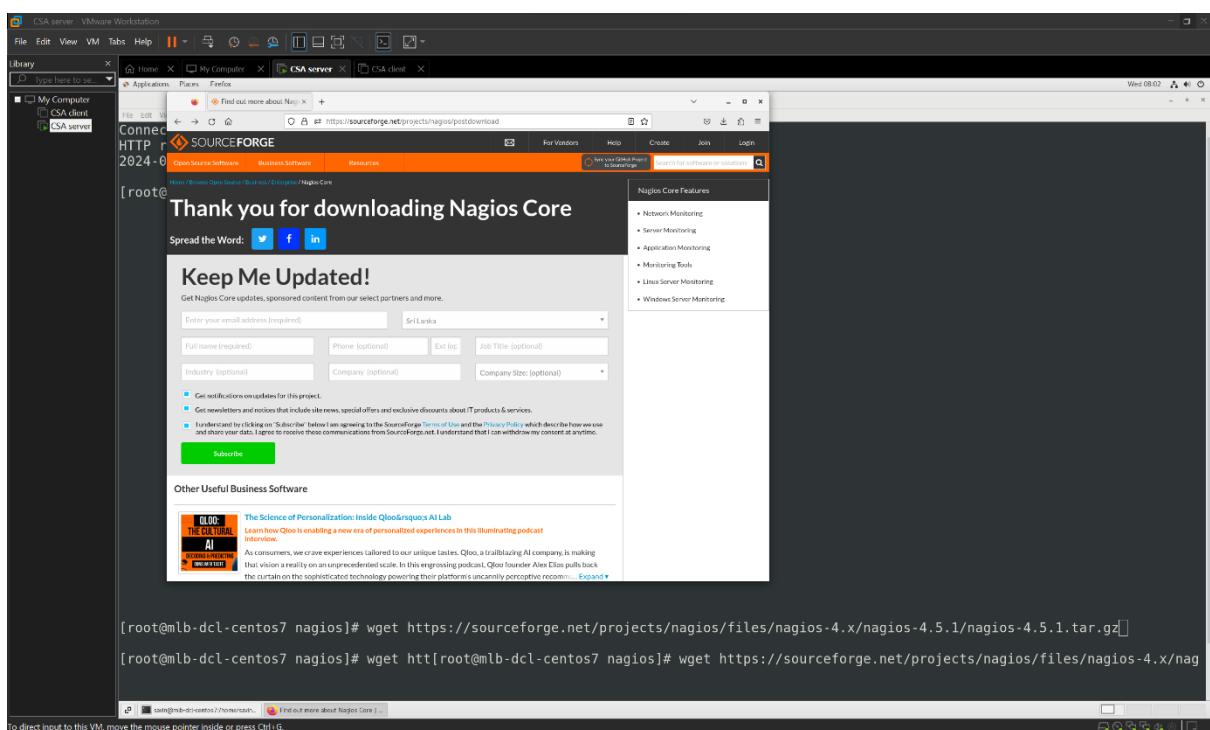


Figure 1.6- Download Nagios 4.5.1 source code

```

[root@mlb-dcl-centos7 nagios]# wget https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
--2024-04-17 08:14:12-- https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
Resolving sourceforge.net (sourceforge.net) ... 172.64.150.145, 104.18.37.111, 2606:4700:4400::6812:256f, ...
Connecting to sourceforge.net (sourceforge.net)|172.64.150.145|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz/ [following]
--2024-04-17 08:14:13-- https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz/
Reusing existing connection to sourceforge.net:443.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz/download [following]
--2024-04-17 08:14:13-- https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz/download
Reusing existing connection to sourceforge.net:443.
HTTP request sent, awaiting response... 302 Found
Location: https://downloads.sourceforge.net/project/nagios/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz?ts=gAAAAABmH3bGpiIjTP_CJah7RPDbu-dU7d9bDC237etY30iLVcn-K3LWg_z7ZEdiYw-lg0_uFE6c4fJ0AMcwkaBFJyR0t0Ucw%3D&use_mirror=webwerks&r= [following]
--2024-04-17 08:14:14-- https://downloads.sourceforge.net/project/nagios/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz?ts=gAAAAABmH3bGpiIjTP_CJah7RPDbu-dU7d9bDC237etY30iLVcn-K3LWg_z7ZEdiYw-lg0_uFE6c4fJ0AMcwkaBFJyR0t0Ucw%3D&use_mirror=webwerks&r=
Resolving downloads.sourceforge.net (downloads.sourceforge.net)... 204.68.111.105
Connecting to downloads.sourceforge.net (downloads.sourceforge.net)|204.68.111.105|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 11540195 (11M) [application/x-gzip]
Saving to: 'nagios-4.5.1.tar.gz'

100%[=====] 11,540,195 93.9KB/s  in 1m 56s

2024-04-17 08:16:13 (97.1 KB/s) - 'nagios-4.5.1.tar.gz' saved [11540195/11540195]

[root@mlb-dcl-centos7 nagios]#

```

Figure 1.7- Nagios 4.5.1 source code downloaded

```

[root@mlb-dcl-centos7 nagios]# tar -xvf nagios-4.5.1.tar.gz
nagios-4.5.1/tap/tests/plan/too-many-tests/test.pl
nagios-4.5.1/tap/tests/plan/too-many-tests/test.t
nagios-4.5.1/tap/tests/skip/
nagios-4.5.1/tap/tests/skip/Makefile.am
nagios-4.5.1/tap/tests/skip/Makefile.in
nagios-4.5.1/tap/tests/skip/test.c
nagios-4.5.1/tap/tests/skip/test.pl
nagios-4.5.1/tap/tests/skip/test.t
nagios-4.5.1/tap/tests/todo/
nagios-4.5.1/tap/tests/todo/Makefile.am
nagios-4.5.1/tap/tests/todo/Makefile.in
nagios-4.5.1/tap/tests/todo/test.c
nagios-4.5.1/tap/tests/todo/test.pl
nagios-4.5.1/tap/tests/todo/test.t
nagios-4.5.1/test/
nagios-4.5.1/test/test-downtime.pl
nagios-4.5.1/update-version
nagios-4.5.1/worker/
nagios-4.5.1/worker/Makefile.in
nagios-4.5.1/worker/ping/
nagios-4.5.1/worker/ping/.gitignore
nagios-4.5.1/worker/ping/Makefile.in
nagios-4.5.1/worker/ping/worker-ping.c
nagios-4.5.1/xdata/
nagios-4.5.1/xdata/.gitignore
nagios-4.5.1/xdata/Makefile.in
nagios-4.5.1/xdata/xddefaulth.c
nagios-4.5.1/xdata/xddefaulth.h
nagios-4.5.1/xdata/xodtemplate.c
nagios-4.5.1/xdata/xodtemplate.h
nagios-4.5.1/xdata/xpdefaulth.
nagios-4.5.1/xdata/xpdefaulth.h
nagios-4.5.1/xdata/xrdefaulth.
nagios-4.5.1/xdata/xrdefaulth.h
nagios-4.5.1/xdata/xsdefaulth.c
nagios-4.5.1/xdata/xsdefaulth.h
[root@mlb-dcl-centos7 nagios]#

```

Figure 1.8- Extract Nagios 4.5.1 file

File Edit View VM Tabs Help || CSA server | CSA client | CSA client | CSA client | Terminal

Library type here to search Applications Processes Terminal

File Edit View Search Terminal Help

savin@mlb-dcl-centos7:~/home/savin/nagios/nagios-4.5.1

```
config.status: creating t-tap/Makefile
config.status: creating include/config.h
config.status: creating lib/sprintf.h
config.status: creating lib/iobroker.h

Creating sample config files in sample-config/ ...

*** Configuration summary for nagios 4.5.1 2024-02-28 ***:

General Options:
-----
    Nagios executable: nagios
    Nagios user/group: nagios,nagios
    Command user/group: nagios,nagios
        Event Broker: yes
        Install ${prefix}: /usr/local/nagios
        Install ${includedir}: /usr/local/nagios/include/nagios
            Lock file: /run/nagios.lock
    Check result directory: /usr/local/nagios/var/spool/checkresults
        Init directory: /lib/systemd/system
    Apache conf.d directory: /etc/httpd/conf.d
        Mail program: /usr/bin/mail
            Host OS: linux-gnu
    IOBroker Method: epoll

Web Interface Options:
-----
        HTML URL: http://localhost/nagios/
        CGI URL: http://localhost/nagios/cgi-bin/
Traceroute (used by WAP): /usr/bin/traceroute

Review the options above for accuracy. If they look okay,
type 'make all' to compile the main program and CGIs.

[root@mlb-dcl-centos7 nagios-4.5.1]#
```

Figure 1.9- Configuration summary for Nagios 4.5.1

```
CSA server - VMware Workstation
File Edit View VM Tab Help ||| Applications Files Terminal
Library type here to se... Home My Computer CSA server CSA direct
File Edit View Search Terminal Help
make install-exfoliation
- This installs the Exfoliation theme for the Nagios
  web interface

make install-classicui
- This installs the classic theme for the Nagios
  web interface

*** Support Notes ****
If you have questions about configuring or running Nagios,
please make sure that you:
  - Look at the sample config files
  - Read the documentation on the Nagios Library at:
    https://library.nagios.com

before you post a question to one of the mailing lists.
Also make sure to include pertinent information that could
help others help you. This might include:
  - What version of Nagios you are using
  - What version of the plugins you are using
  - Relevant snippets from your config files
  - Relevant error messages from the Nagios log file

For more information on obtaining support for Nagios, visit:
  https://support.nagios.com

*****
Enjoy.

[root@mlb-dcl-centos7 nagios-4.5.1]#
```

Figure 1.10- Nagios 4.5.1 source code compiled

```

[root@mlb-dcl-centos7 nagios-4.5.1]# make install
cd ./base && make install
make[1]: Entering directory `/home/savin/nagios/nagios-4.5.1/base'
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/bin
/usr/bin/install -c -s -m 774 -o nagios -g nagios nagios /usr/local/nagios/bin
/usr/bin/install -c -s -m 774 -o nagios -g nagios nagiosstats /usr/local/nagios/bin
make[1]: Leaving directory `/home/savin/nagios/nagios-4.5.1/base'
cd ./.cgi && make install
make[1]: Entering directory `/home/savin/nagios/nagios-4.5.1/cgi'
make[2]: Entering directory `/home/savin/nagios/nagios-4.5.1/cgi'
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/sbin
for file in *.cgi; do \
    /usr/bin/install -c -s -m 775 -o nagios -g nagios $file /usr/local/nagios/sbin; \
done
make[2]: Leaving directory `/home/savin/nagios/nagios-4.5.1/cgi'
make[1]: Leaving directory `/home/savin/nagios/nagios-4.5.1/cgi'
cd ./.html && make install
make[1]: Entering directory `/home/savin/nagios/nagios-4.5.1/html'
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/media
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/stylesheets
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/contexthelp
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/docs
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/docs/images
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/jsp
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/images
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/images/logos
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/includes
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/ssi
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/angularjs
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/angularjs/angular-1.3.9
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/angularjs/ui-utils-0.2.3
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/bootstrap-3.3.7
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/bootstrap-3.3.7/css
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/share/d3

```

figure 1.11 - Place compiled files into default system path

```

[root@mlb-dcl-centos7 nagios-4.5.1]# make install-config
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/etc
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/etc/objects
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/nagios.cfg /usr/local/nagios/etc/nagios.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/cgi.cgi /usr/local/nagios/etc/cgi.cgi
/usr/bin/install -c -b -m 660 -o nagios -g nagios sample-config/resource.cfg /usr/local/nagios/etc/resource.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/templates.cfg /usr/local/nagios/etc/templates.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/commands.cfg /usr/local/nagios/etc/commands.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/contacts.cfg /usr/local/nagios/etc/objects/contacts.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/timeperiods.cfg /usr/local/nagios/etc/objects/timeperiods.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/localhost.cfg /usr/local/nagios/etc/objects/localhost.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/windows.cfg /usr/local/nagios/etc/objects/windows.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/printer.cfg /usr/local/nagios/etc/objects/printer.cfg
/usr/bin/install -c -b -m 664 -o nagios -g nagios sample-config/template-object/switch.cfg /usr/local/nagios/etc/objects/switch.cfg

*** Config files installed ***

Remember, these are *SAMPLE* config files. You'll need to read
the documentation for more information on how to actually define
services, hosts, etc. to fit your particular needs.

[root@mlb-dcl-centos7 nagios-4.5.1]#

```

Figure 1.12 - Install sample configuration files

The screenshot shows a Linux desktop environment with a terminal window open. The terminal window title is "File Edit View VM Tabs Help" and the tab bar includes "Library", "File", "Edit", "View", "VM", "Tabs", "Help", "Applications", "Places", "Terminal", "CSA server", and "CSA client". The terminal window displays the contents of a file named "CONTACTS.CFG". The file is a Nagios configuration file containing contact definitions. It starts with a header, followed by a note about its purpose, and then defines a single contact named "nagiosadmin". The configuration includes inheritance from a template and specifies a full name and email address. Below the configuration, there is a section titled "-- INSERT --". The status bar at the bottom shows the command "savin@nmb-dc1-centos7: /home/savin/nagios/nagios-4.5.1" and a message "Nagios Core download | Server or...". A tooltip at the bottom left says "To direct input to this VM, move the mouse pointer inside or press Ctrl+G."

```
File Edit View VM Tabs Help || Applications Places Terminal CSA server CSA client
File Edit View Search Terminal Help
savin@nmb-dc1-centos7:/home/savin/nagios/nagios-4.5.1
#####
# CONTACTS.CFG - SAMPLE CONTACT/CONTACTGROUP DEFINITIONS
#
#
# NOTES: This config file provides you with some example contact and contact
# group definitions that you can reference in host and service
# definitions.
#
# You don't need to keep these definitions in a separate file from your
# other object definitions. This has been done just to make things
# easier to understand.
#
#####
#
# CONTACTS
#
#####
# Just one contact defined by default - the Nagios admin (that's you)
# This contact definition inherits a lot of default values from the
# 'generic-contact' template which is defined elsewhere.

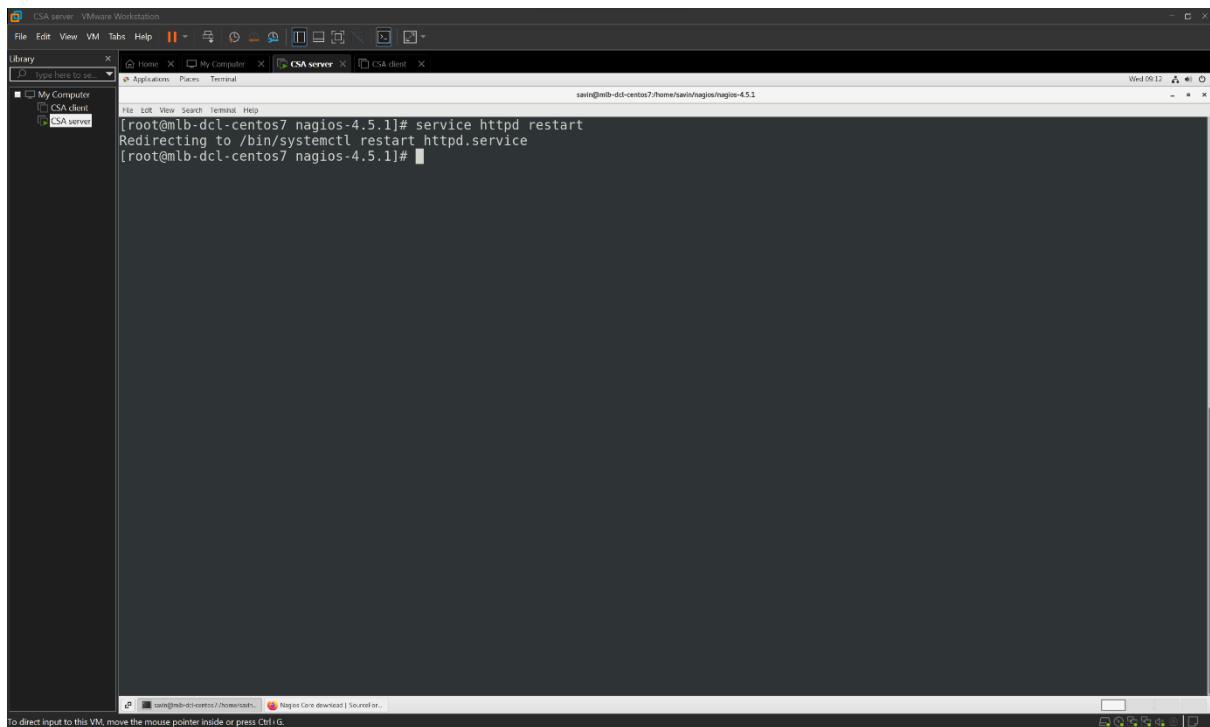
define contact {

    contact_name      nagiosadmin          ; Short name of user
    use               generic-contact       ; Inherit default values from generic-contact template (defined above)
    alias             Nagios Admin        ; Full name of user
    email             it22123000@my.slit.lk; <***** CHANGE THIS TO YOUR EMAIL ADDRESS *****
}

-- INSERT --
```

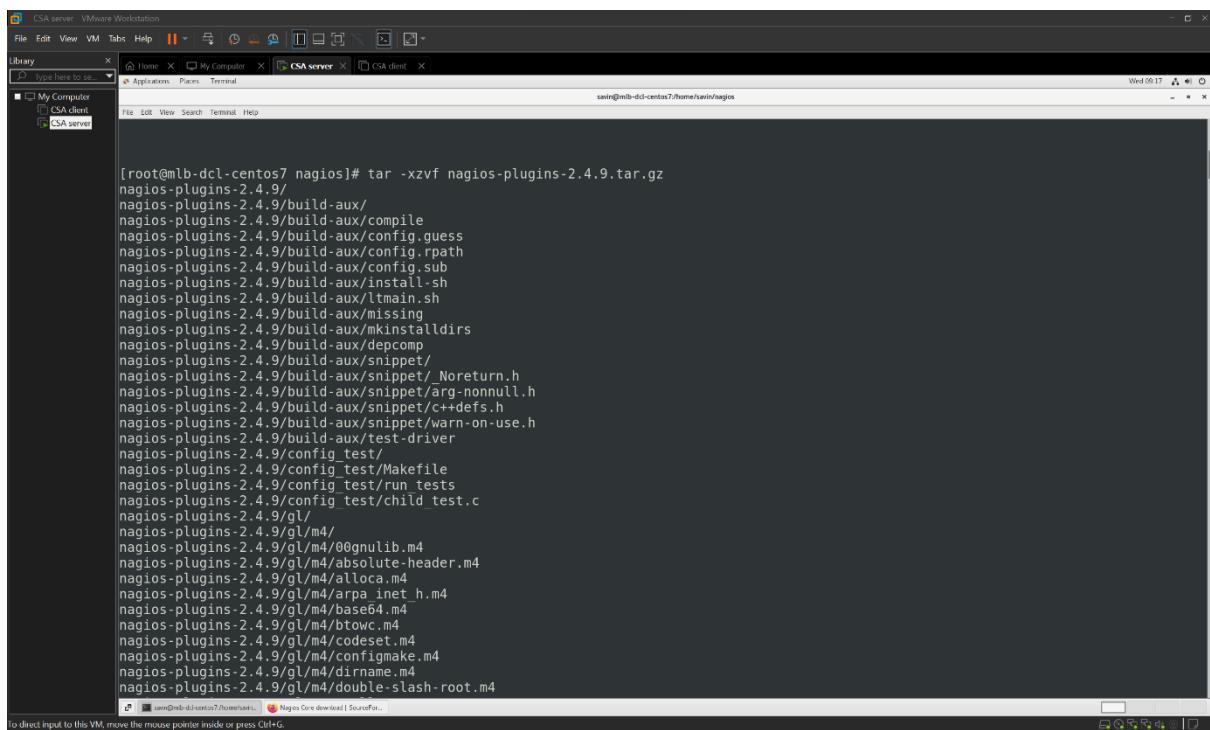
Figure 1.13- Change email address of Nagios admin

Figure 1.14- Install Nagios/Apache configuration file



```
[root@mlb-dcl-centos7 nagios-4.5.1]# service httpd restart
Redirecting to /bin/systemctl restart httpd.service
[root@mlb-dcl-centos7 nagios-4.5.1]#
```

Figure 1.15- Restart Apache web services



```
[root@mlb-dcl-centos7 nagios]# tar -xzvf nagios-plugins-2.4.9.tar.gz
nagios-plugins-2.4.9/
nagios-plugins-2.4.9/build-aux/
nagios-plugins-2.4.9/build-aux/compile
nagios-plugins-2.4.9/build-aux/config.guess
nagios-plugins-2.4.9/build-aux/config.rpath
nagios-plugins-2.4.9/build-aux/config.sub
nagios-plugins-2.4.9/build-aux/install-sh
nagios-plugins-2.4.9/build-aux/ltsmain.sh
nagios-plugins-2.4.9/build-aux/missing
nagios-plugins-2.4.9/build-aux/mkinstalldirs
nagios-plugins-2.4.9/build-aux/depcomp
nagios-plugins-2.4.9/build-aux/snippet/
nagios-plugins-2.4.9/build-aux/snippet/_Noreturn.h
nagios-plugins-2.4.9/build-aux/snippet/_arg-nonnull.h
nagios-plugins-2.4.9/build-aux/snippet/c++defs.h
nagios-plugins-2.4.9/build-aux/snippet/warn-on-use.h
nagios-plugins-2.4.9/build-aux/test-driver
nagios-plugins-2.4.9/config_test/
nagios-plugins-2.4.9/config_test/Makefile
nagios-plugins-2.4.9/config_test/run_tests
nagios-plugins-2.4.9/config_test/child_test.c
nagios-plugins-2.4.9/glib/
nagios-plugins-2.4.9/glib/m4/
nagios-plugins-2.4.9/glib/m4/00gnulib.m4
nagios-plugins-2.4.9/glib/m4/absolute-header.m4
nagios-plugins-2.4.9/glib/m4/alloca.m4
nagios-plugins-2.4.9/glib/m4/arp_inet.h.m4
nagios-plugins-2.4.9/glib/m4/base64.m4
nagios-plugins-2.4.9/glib/m4/btowc.m4
nagios-plugins-2.4.9/glib/m4/codeset.m4
nagios-plugins-2.4.9/glib/m4/configmake.m4
nagios-plugins-2.4.9/glib/m4/dirname.m4
nagios-plugins-2.4.9/glib/m4/double-slash-root.m4
```

Figure 1.16- Extract Nagios Plugins 2.4.9 file

The screenshot shows a terminal window titled 'Terminal' running on a 'CSA server' host. The user is at the root prompt on a CentOS 7 system. They are in the directory '/home/savin/nagios/nagios-4.5.1'. The user has run 'make all' and is watching the output scroll through the terminal. The output shows the compilation of various C source files into object files, with some files being linked into larger shared libraries like 'nagios.o' and 'query-handler.o'. The terminal also displays several environment variable definitions starting with '-DHAVE_CONFIG_H'.

```
[root@mlb-dcl-centos7 nagios-4.5.1]# clear
[root@mlb-dcl-centos7 nagios-4.5.1]# make all
cd ./base && make
make[1]: Entering directory '/home/savin/nagios/nagios-4.5.1/base'
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o nagios.o ./nagios.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o broker.o broker.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o nebmod.o nebmod.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o common/shared.o common/shared.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o query-handler.o query-handler.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o workers.o workers.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o checks.o checks.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o config.o config.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o commands.o commands.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o events.o events.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o flapping.o flapping.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o logging.o logging.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o macros-base.o common/macros.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o netutils.o netutils.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o notifications.o notifications.c
gcc -Wall -I. -I./lib -I./include -I./include -I.. -g -O2 -I/usr/include/krb5 -DHAVE_CONFIG_H -DNSCORE -c -o sehandlers.o sehandlers.c
```

Figure 1.17- : Compile Nagios Plugins 2.4.9 source code

```
File Edit View VM Tabs Help || ■ X
library type here to se... Applications Places Terminal CSA server CSA client CSA server
File Edit View Search Terminal Help
savini@mlb-dcl-centos7:~/home/savin/nagios/nagios-plugins-2.4.9#
savini@mlb-dcl-centos7:~/home/savin/nagios/nagios-plugins-2.4.9# ./install.sh
Making install in plugins-root
make[1]: Entering directory '/home/savin/nagios/nagios-plugins-2.4.9/plugins-root'
make[2]: Entering directory '/home/savin/nagios/nagios-plugins-2.4.9/plugins-root'
/usr/bin/install -c -o nagios -g nagios check_dhcp /usr/local/nagios/libexec/check_dhcp
  chmod root /usr/local/nagios/libexec/check_dhcp
  chmod ug=rx,u+s /usr/local/nagios/libexec/check_dhcp
/usr/bin/install -c -o nagios -g nagios check_icmp /usr/local/nagios/libexec/check_icmp
  chmod root /usr/local/nagios/libexec/check_icmp
  chmod ug=rx,u+s /usr/local/nagios/libexec/check_icmp
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory '/home/savin/nagios/nagios-plugins-2.4.9/plugins-root'
make[1]: Leaving directory '/home/savin/nagios/nagios-plugins-2.4.9/plugins-root'
Making install in po
make[1]: Entering directory '/home/savin/nagios/nagios-plugins-2.4.9/po'
/usr/bin/mkdir -p /usr/local/nagios/share
installing fr.mo as /usr/local/nagios/share/locale/fr/LC_MESSAGES/nagios-plugins.mo
installing de.mo as /usr/local/nagios/share/locale/de/LC_MESSAGES/nagios-plugins.mo
if test "nagios-plugins" = "gettext-tools"; then \
    /usr/bin/mkdir -p /usr/local/nagios/share/gettext/po; \
    for file in Makefile.in.in remove-potde.iin Makevars.template; do \
        /usr/bin/install -c -o nagios -g nagios -m 644 ./file \
            /usr/local/nagios/share/gettext/po/$file; \
    done; \
    for file in Makevars; do \
        rm -f /usr/local/nagios/share/gettext/po/$file; \
    done; \
else \
    : ; \
fi
make[1]: Leaving directory '/home/savin/nagios/nagios-plugins-2.4.9/po'
make[1]: Entering directory '/home/savin/nagios/nagios-plugins-2.4.9'
make[2]: Entering directory '/home/savin/nagios/nagios-plugins-2.4.9'
make[2]: Nothing to be done for `install-exec-am'.
make[2]: Nothing to be done for `install-data-am'.
make[2]: Leaving directory '/home/savin/nagios/nagios-plugins-2.4.9'
make[1]: Leaving directory '/home/savin/nagios/nagios-plugins-2.4.9'
[savini@mlb-dcl-centos7 nagios-plugins-2.4.9]#
```

Figure 1.18 - Compiled files placed into default system path

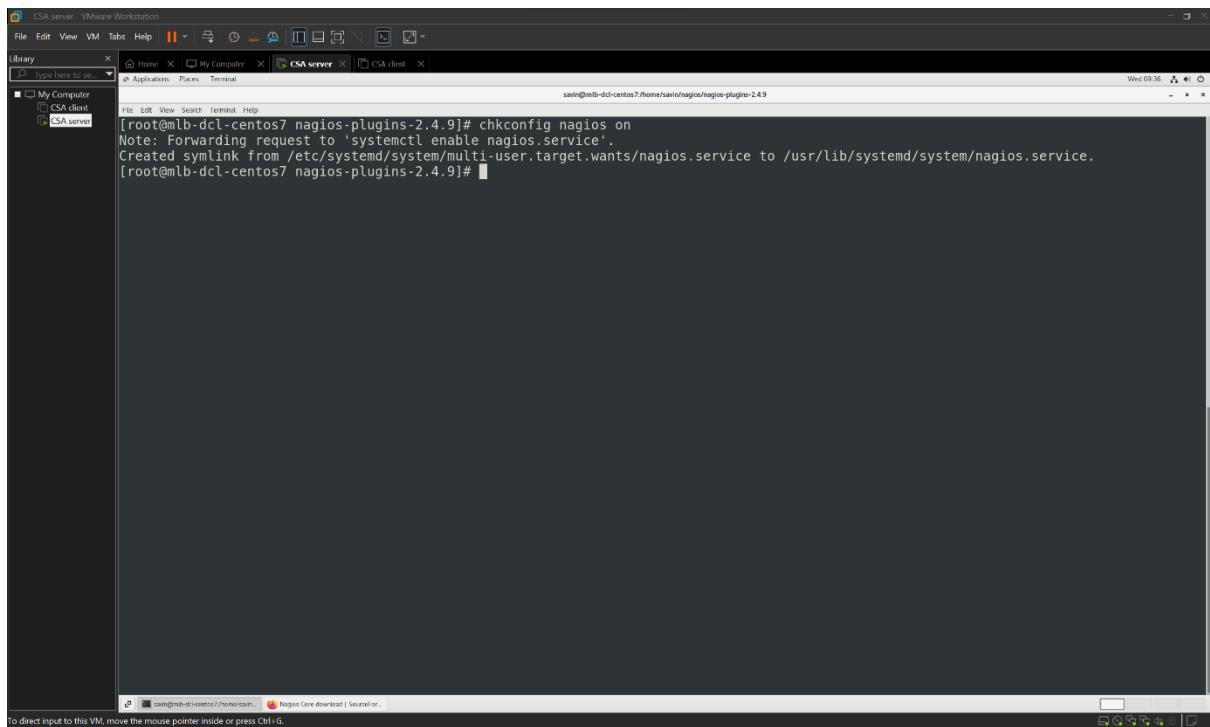


Figure 1.19 - Specify run-level to start Nagios

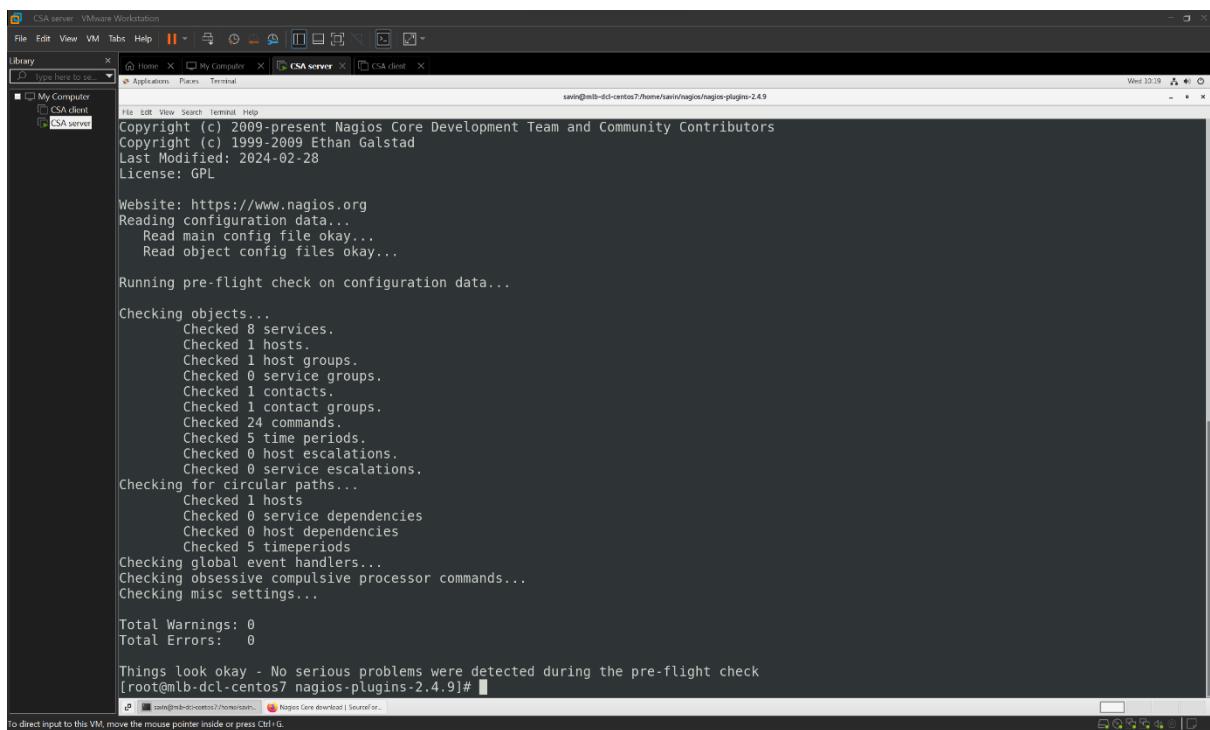


Figure 1.20 - Configuration verified

The screenshot shows a terminal window titled 'Terminal' running on a Linux system. The command entered is:

```
[root@mlb-dcl-centos7 nagios-plugins-2.4.9]# getenforce  
Enforcing  
[root@mlb-dcl-centos7 nagios-plugins-2.4.9]# chcon -R -t httpd_sys_content_t /usr/local/nagios/sbin  
[root@mlb-dcl-centos7 nagios-plugins-2.4.9]# chcon -R -t httpd_sys_content_t /usr/local/nagios/share  
[root@mlb-dcl-centos7 nagios-plugins-2.4.9]#
```

Figure 1.21 - Disable Security-Enhanced Linux (SELinux)

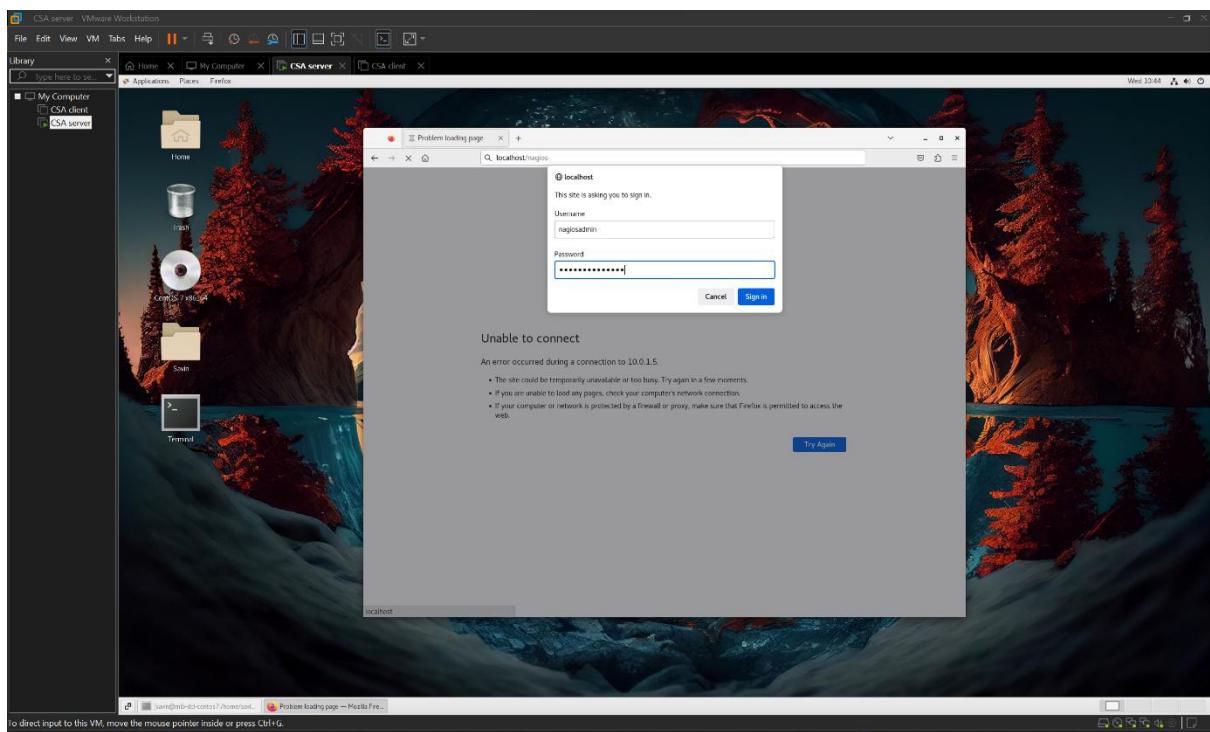


Figure 1.22 - Sign in as Nagios admin

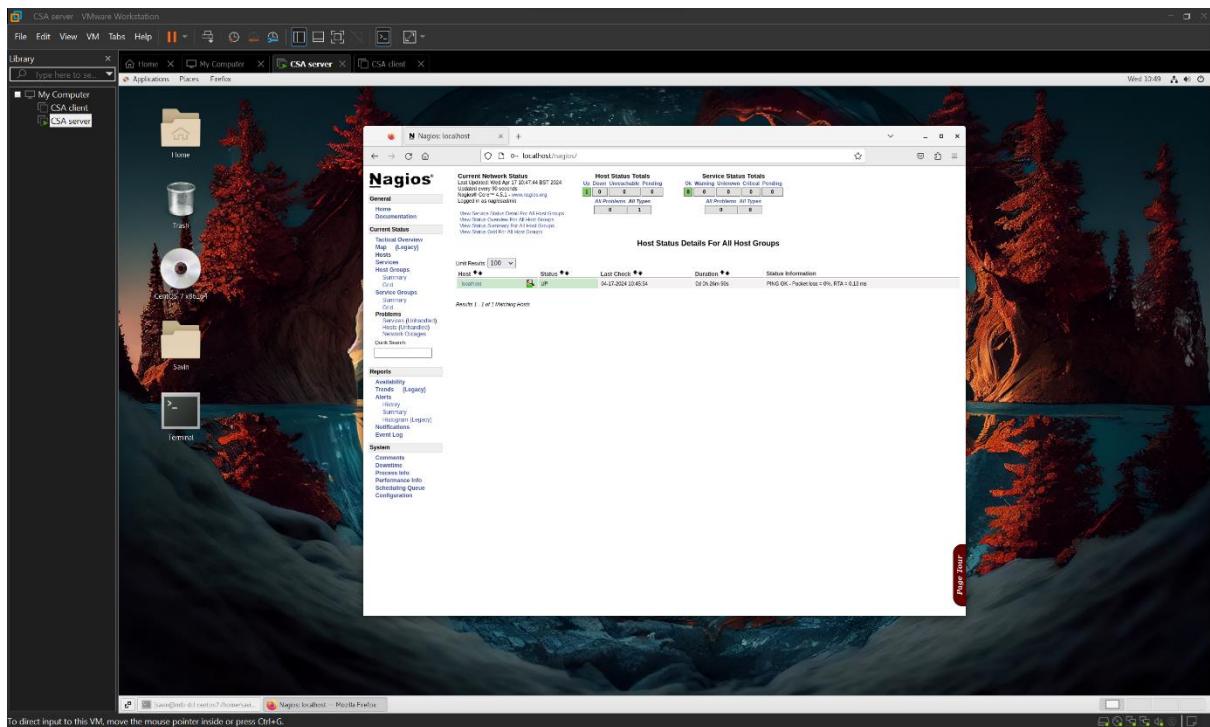


Figure 1.23 - Host status details

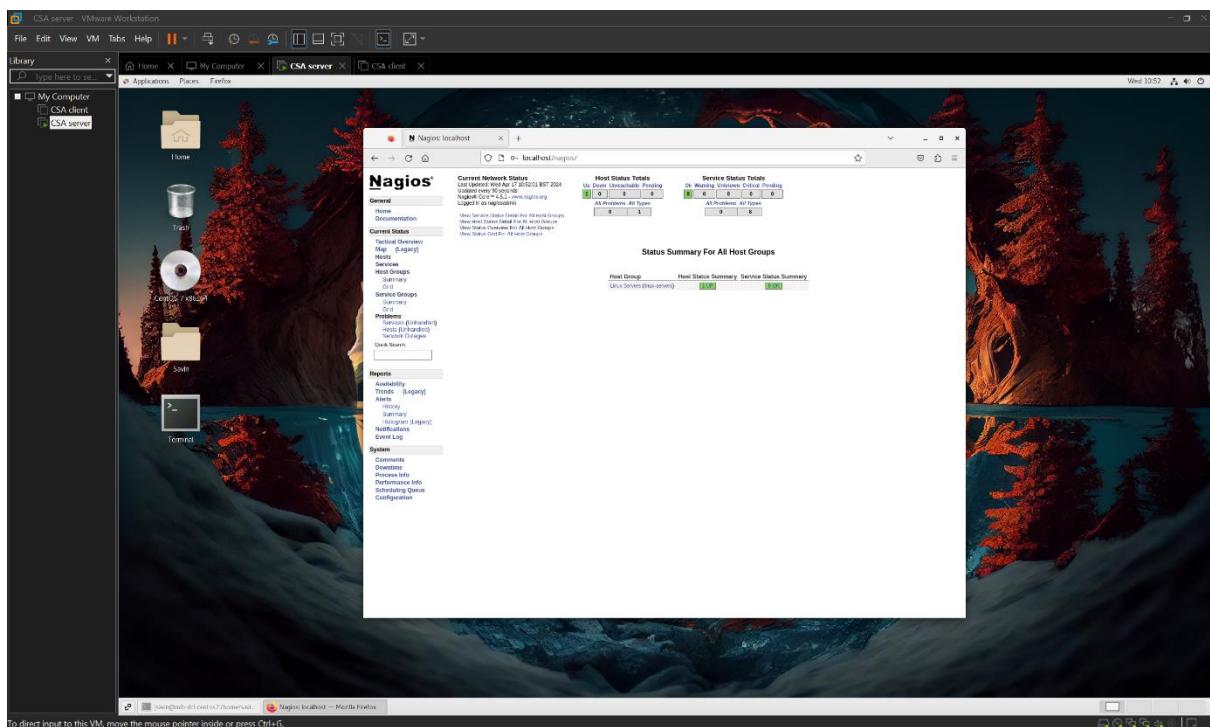
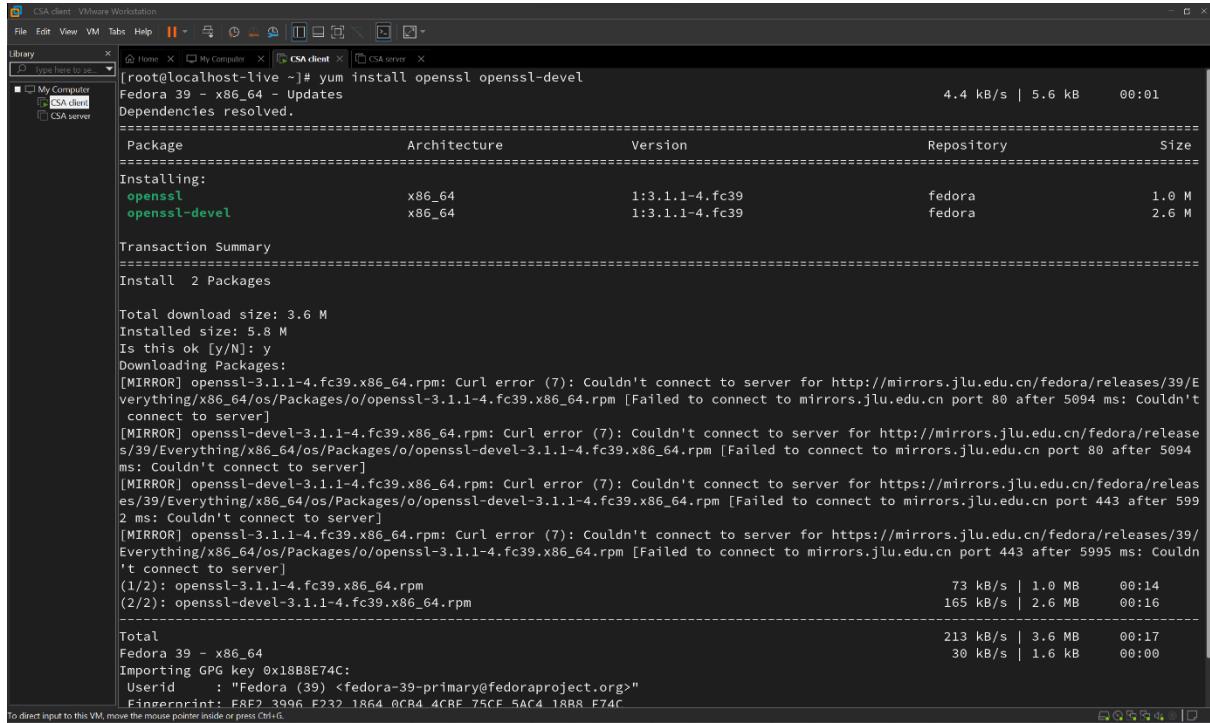


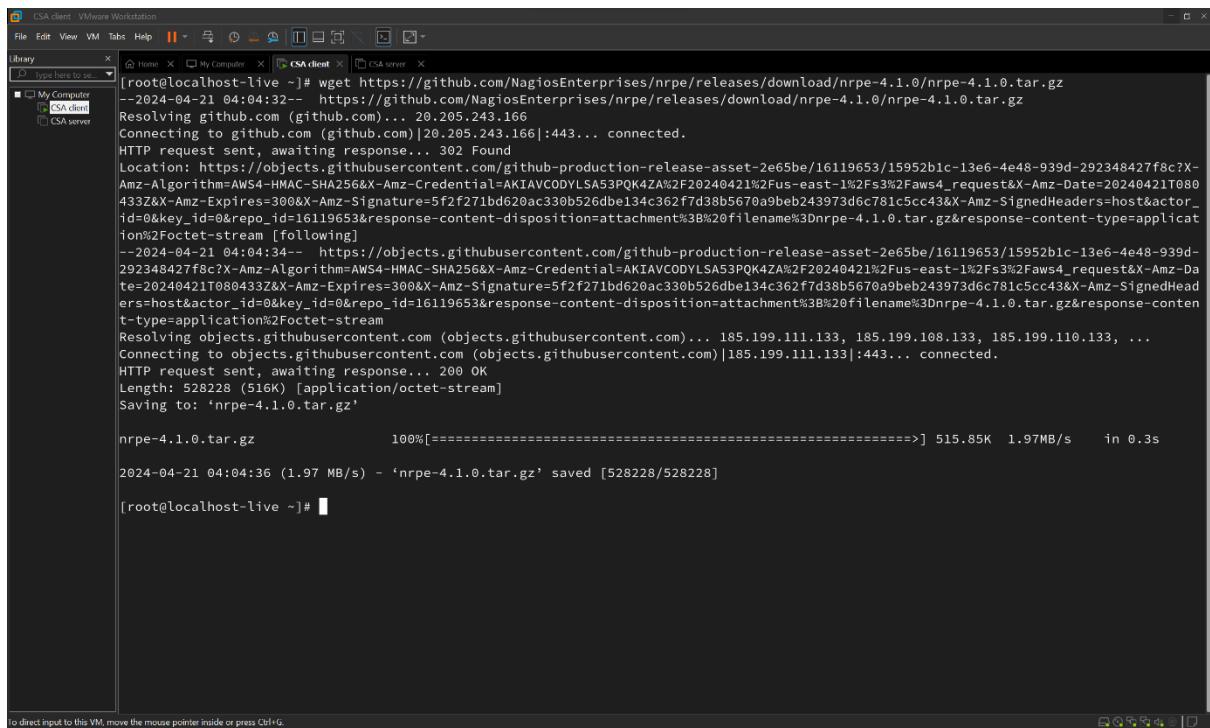
Figure 1.24 - Status summary

Configuring Nagios Server For Fedora Client



```
[root@localhost-live ~]# yum install openssl openssl-devel
Dependencies resolved.
=====
| Package           | Architecture | Version   | Repository | Size
=====
| Installing:
|   openssl          | x86_64       | 1:3.1.1-4.fc39 | fedora      | 1.0 M
|   openssl-devel    | x86_64       | 1:3.1.1-4.fc39 | fedora      | 2.6 M
|
| Transaction Summary:
|=====
|   Install  2 Packages
|
| Total download size: 3.6 M
| Installed size: 5.8 M
| Is this ok [y/N]: y
| Downloading Packages:
| [MIRROR] openssl-3.1.1-4.fc39.x86_64.rpm: Curl error (7): Couldn't connect to server for http://mirrors.jlu.edu.cn/fedora/releases/39/E/Everything/x86_64/os/Packages/o/openssl-3.1.1-4.fc39.x86_64.rpm [Failed to connect to mirrors.jlu.edu.cn port 80 after 5094 ms: Couldn't connect to server]
| [MIRROR] openssl-devel-3.1.1-4.fc39.x86_64.rpm: Curl error (7): Couldn't connect to server for http://mirrors.jlu.edu.cn/fedora/releases/39/E/Everything/x86_64/os/Packages/o/openssl-devel-3.1.1-4.fc39.x86_64.rpm [Failed to connect to mirrors.jlu.edu.cn port 80 after 5094 ms: Couldn't connect to server]
| [MIRROR] openssl-devel-3.1.1-4.fc39.x86_64.rpm: Curl error (7): Couldn't connect to server for https://mirrors.jlu.edu.cn/fedora/releases/39/E/Everything/x86_64/os/Packages/o/openssl-devel-3.1.1-4.fc39.x86_64.rpm [Failed to connect to mirrors.jlu.edu.cn port 443 after 5992 ms: Couldn't connect to server]
| [MIRROR] openssl-3.1.1-4.fc39.x86_64.rpm: Curl error (7): Couldn't connect to server for https://mirrors.jlu.edu.cn/fedora/releases/39/E/Everything/x86_64/os/Packages/o/openssl-3.1.1-4.fc39.x86_64.rpm [Failed to connect to mirrors.jlu.edu.cn port 443 after 5995 ms: Couldn't connect to server]
| (1/2): openssl-3.1.1-4.fc39.x86_64.rpm                                73 kB/s | 1.0 MB   00:17
| (2/2): openssl-devel-3.1.1-4.fc39.x86_64.rpm                            165 kB/s | 2.6 MB   00:16
|
| Total
| Fedora 39 - x86_64                                         213 kB/s | 3.6 MB   00:17
| Importing GPG key 0x18B8E74C:
|   Userid      : "Fedora (39) <fedora-39-primary@fedoraproject.org>"        30 kB/s | 1.6 kB   00:00
|   Fingerprint: E8F2_3996_E232_1864_0CB4_4CBE_75CE_5AC4_18BB_F74C
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.
```

Figure 2.1- Install packages for cryptography and secure communication



```
[root@localhost-live ~]# wget https://github.com/NagiosEnterprises/nrpe/releases/download/nrpe-4.1.0/nrpe-4.1.0.tar.gz
--2024-04-21 04:04:32-- https://github.com/NagiosEnterprises/nrpe/releases/download/nrpe-4.1.0/nrpe-4.1.0.tar.gz
Resolving github.com (github.com)... 20.205.243.166
Connecting to github.com (github.com)|20.205.243.166|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/16119653/15952b1c-13e6-4e48-939d-292348427f8c?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAVCDYLSA53PQK4ZAM2F20240421%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240421T080433Z&X-Amz-Expires=300&X-Amz-Signature=5f2f271bd620ac330b526dbe134c362fd38b5670a9beb243973d6c781c5cc43&X-Amz-SignedHeaders=host&actor_id=&key_id=&repo_id=16119653&response-content-disposition=attachment%3B%20filename%3Dnrpe-4.1.0.tar.gz&response-content-type=application%2Foctet-stream [following]
--2024-04-21 04:04:34-- https://objects.githubusercontent.com/github-production-release-asset-2e65be/16119653/15952b1c-13e6-4e48-939d-292348427f8c?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAVCDYLSA53PQK4ZAM2F20240421%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20240421T080433Z&X-Amz-Expires=300&X-Amz-Signature=5f2f271bd620ac330b526dbe134c362fd38b5670a9beb243973d6c781c5cc43&X-Amz-SignedHeaders=host&actor_id=&key_id=&repo_id=16119653&response-content-disposition=attachment%3B%20filename%3Dnrpe-4.1.0.tar.gz&response-content-type=application%2Foctet-stream
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.111.133, 185.199.108.133, 185.199.110.133, ...
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.111.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 528228 (516K) [application/octet-stream]
Saving to: 'nrpe-4.1.0.tar.gz'

nrpe-4.1.0.tar.gz          100%[=====] 515.85K  1.97MB/s   in 0.3s

2024-04-21 04:04:36 (1.97 MB/s) - 'nrpe-4.1.0.tar.gz' saved [528228/528228]

[root@localhost-live ~]#
```

Figure 2.2- Download Nagios Remote Plugin Executor (NRPE) 4.1.0

```
[root@localhost-live ~]# ls
anaconda-ks.cfg  nrpe-4.1.0.tar.gz
[root@localhost-live ~]# tar -xvf nrpe-4.1.0.tar.gz
nrpe-4.1.0/
nrpe-4.1.0/.gitignore
nrpe-4.1.0/.travis.yml
nrpe-4.1.0/CHANGELOG.md
nrpe-4.1.0/CONTRIBUTING.md
nrpe-4.1.0/LEGAL
nrpe-4.1.0/LICENSE.md
nrpe-4.1.0/Makefile.in
nrpe-4.1.0/README.SSL.md
nrpe-4.1.0/README.md
nrpe-4.1.0/SECURITY.md
nrpe-4.1.0/THANKS
nrpe-4.1.0/aclocal.m4
nrpe-4.1.0/build-aux/
nrpe-4.1.0/build-aux/config.guess
nrpe-4.1.0/build-aux/config.sub
nrpe-4.1.0/build-aux/custom_help.m4
nrpe-4.1.0/build-aux/install-sh
nrpe-4.1.0/configure
nrpe-4.1.0/configure.ac
nrpe-4.1.0/contrib/
nrpe-4.1.0/contrib/README.nrpe_check_control
nrpe-4.1.0/contrib/nrpe_check_control.c
nrpe-4.1.0/docs/
nrpe-4.1.0/docs/NRPE.odt
nrpe-4.1.0/docs/NRPE.pdf
nrpe-4.1.0/include/
nrpe-4.1.0/include/acl.h
nrpe-4.1.0/include/common.h.in
nrpe-4.1.0/include/config.h.in
nrpe-4.1.0/include/nrpe.h
nrpe-4.1.0/include/utils.h
nrpe-4.1.0/macros/
nrpe-4.1.0/macros/.gitignore
nrpe-4.1.0/macros/CHANGELOG.md
```

Figure 2.3- Extract NRPE 4.1.0 file

```
[root@localhost-live ~]# ls
anaconda-ks.cfg  nrpe-4.1.0  nrpe-4.1.0.tar.gz
[root@localhost-live ~]# cd nrpe-4.1.0
[root@localhost-live nrpe-4.1.0]# ls
aclocal.m4  configure  CONTRIBUTING.md  LICENSE  Makefile.in  README.md  SECURITY.md  test-wrapper  uninstall.in
build-aux  configure.ac  docs            nrpe.spec.in  README.SSL.md  src        THANKS      update-cfg.pl
CHANGELOG.md  contrib   include          macros    paths.in     sample-config  startup    travis-test-1  update-version
[root@localhost-live nrpe-4.1.0]#
```

figure 2.4 - ‘nrpe-4.1.0’ folder

```
[root@localhost-live nrpe-4.1.0]# yum groupinstall "development tools"
Last metadata expiration check: 0:16:51 ago on Sun 21 Apr 2024 03:54:58 AM EDT.
Dependencies resolved.

=====
| Package           | Architecture | Version   | Repository | Size |
|=====             |=====         |=====      |=====       |===== |
| Installing group/module packages: |
|   difstat          | x86_64       | 1.65-3.fc39 | fedora     | 44 k |
|   doxygen          | x86_64       | 2:1.9.7-3.fc39 | fedora     | 5.0 M |
|   gettext           | x86_64       | 0.22-2.fc39 | fedora     | 1.1 M |
|   patch             | x86_64       | 2.7.6-22.fc39 | fedora     | 125 k |
|   patchutils        | x86_64       | 0.4.2-11.fc39 | fedora     | 107 k |
|   subversion        | x86_64       | 1.14.3-1.fc39 | updates    | 1.0 M |
|   systemtap        | x86_64       | 5.1~pre17062192g5fd8daba-1.fc39 | updates    | 8.9 k |
| =====             | =====         | =====      | =====       | ===== |
| Installing dependencies: |
|   bison             | x86_64       | 3.8.2-5.fc39 | fedora     | 1.0 M |
|   clang16-libs      | x86_64       | 16.0.6-3.fc39 | fedora     | 22 M |
|   clang16-resource-filesystem | x86_64       | 16.0.6-3.fc39 | fedora     | 13 k |
|   dyninst           | x86_64       | 12.3.0-3.fc39 | fedora     | 3.9 M |
|   ed                | x86_64       | 1.19-4.fc39 | fedora     | 79 k |
|   elfutils-devel    | x86_64       | 0.189-4.fc39 | fedora     | 50 k |
|   elfutils-libelf-devel | x86_64       | 0.189-4.fc39 | fedora     | 23 k |
|   flex               | x86_64       | 2.6.4-13.fc39 | fedora     | 312 k |
|   gc                | x86_64       | 8.2.2-4.fc39 | fedora     | 110 k |
|   gcc               | x86_64       | 13.2.1-3.fc39 | fedora     | 34 M |
|   glibc-devel        | x86_64       | 2.38-7.fc39 | fedora     | 85 k |
|   glibc-headers-x86 | noarch      | 2.38-7.fc39 | fedora     | 567 k |
|   guile22           | x86_64       | 2.2.7-9.fc39 | fedora     | 6.5 M |
|   kernel-headers     | x86_64       | 6.8.3-200.fc39 | updates    | 1.6 M |
|   libserf           | x86_64       | 1.3.10-3.fc39 | updates    | 59 k |
|   libxcrypt-devel    | x86_64       | 4.4.36-2.fc39 | fedora     | 30 k |
|   libzstd-devel      | x86_64       | 1.5.5-4.fc39 | fedora     | 51 k |
|   m4                | x86_64       | 1.4.19-6.fc39 | fedora     | 303 k |
|   make               | x86_64       | 1:4.4.1-2.fc39 | fedora     | 589 k |
|   subversion-libs     | x86_64       | 1.14.3-1.fc39 | updates    | 1.5 M |
|   systemtap-client    | x86_64       | 5.1~pre17062192g5fd8daba-1.fc39 | updates    | 4.0 M |
|   systemtap-devel    | x86_64       | 5.1~pre17062192g5fd8daba-1.fc39 | updates    | 2.4 M |
|   systemtap-runtime   | x86_64       | 5.1~pre17062192g5fd8daba-1.fc39 | updates    | 463 k |
| =====             | =====         | =====      | =====       | ===== |
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.
```

figure 2.4 - Install "Development Tools" group

```
config.status: creating startup/default-init
config.status: creating startup/default-inetd
config.status: creating startup/default-service
config.status: creating startup/default-socket
config.status: creating startup/default-socket-svc
config.status: creating startup/default-xinetd
config.status: creating startup/mac-init.plist
config.status: creating startup/mac-inetd.plist
config.status: creating startup/newbsd-init
config.status: creating startup/openbsd-init
config.status: creating startup/openrc-conf
config.status: creating startup/openrc-init
config.status: creating startup/solaris-init.xml
config.status: creating startup/solaris-inetd.xml
config.status: creating startup/tmpfile.conf
config.status: creating startup/upstart-init
config.status: creating startup/rh-upstart-init
config.status: creating include/common.h
config.status: creating include/config.h

*** Configuration summary for nrpe 4.1.0 2022-07-18 ***:

General Options:
-----
NRPE port: 5666
NRPE user: nagios
NRPE group: nagios
Nagios user: nagios
Nagios group: nagios

Review the options above for accuracy. If they look okay,
type 'make all' to compile the NRPE daemon and client
or type 'make' to get a list of make options.

[root@localhost-live nrpe-4.1.0]#
```

figure 2.5 - Configuration summary for NRPE 4.1.0

The screenshot shows a terminal window titled 'CSA client - VMware Workstation'. The terminal is running as root on a host named 'localhost-live' with the IP 'nrpe-4.1.0'. The user is in the directory '/root/nrpe-4.1.0/src'. They run the command 'make' which compiles the source code. The output shows the compilation process, including entering the source directory, compiling files with gcc, and exiting the directory. A message at the end indicates that the compilation is finished and the user can continue with the installation or upgrade process. The terminal window has a dark background and light-colored text.

```
[root@localhost-live nrpe-4.1.0]# make all
cd ./src; make
make[1]: Entering directory '/root/nrpe-4.1.0/src'
gcc -g -O2 -DHAVE_CONFIG_H -I ../../include -o nrpe ./nrpe.c ./utils.c ./acl.c
gcc -g -O2 -DHAVE_CONFIG_H -I ../../include -o check_nrpe ./check_nrpe.c ./utils.c
make[1]: Leaving directory '/root/nrpe-4.1.0/src'

*** Compile finished ***

You can now continue with the installation or upgrade process.

Read the PDF documentation (docs/NRPE.pdf) for information on the next
steps you should take to complete the installation or upgrade.

[root@localhost-live nrpe-4.1.0]#
```

figure 2.6 - Compile NRPE source code

The screenshot shows a terminal window titled 'CSA client - VMware Workstation'. The terminal is running as root on a host named 'localhost-live' with the IP 'nrpe-4.1.0'. The user runs 'useradd nagios' to add a new user. Then they run 'make install' which places the compiled files into the default system paths. The output shows the creation of the 'nagios' user, the execution of the 'make install' command, and the copying of files to '/usr/local/nagios/bin', '/usr/local/nagios/libexec', and '/usr/local/nagios/var'. The terminal window has a dark background and light-colored text.

```
[root@localhost-live nrpe-4.1.0]# useradd nagios
[root@localhost-live nrpe-4.1.0]# make install
cd ./src; make install
make[1]: Entering directory '/root/nrpe-4.1.0/src'
make install-plugin
make[2]: Entering directory '/root/nrpe-4.1.0/src'
/usr/bin/install -c -m 755 -d /usr/local/nagios/bin
/usr/bin/install -c -m 755 ..../uninstall /usr/local/nagios/bin/nrpe-uninstall
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/libexec
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/libexec
/usr/bin/install -c -m 775 -o nagios -g nagios check_nrpe /usr/local/nagios/libexec
make[2]: Leaving directory '/root/nrpe-4.1.0/src'
make install-daemon
make[2]: Entering directory '/root/nrpe-4.1.0/src'
/usr/bin/install -c -m 755 -d /usr/local/nagios/bin
/usr/bin/install -c -m 755 ..../uninstall /usr/local/nagios/bin/nrpe-uninstall
/usr/bin/install -c -m 755 nrpe /usr/local/nagios/bin
/usr/bin/install -c -m 755 -o nagios -g nagios -d /usr/local/nagios/var
/usr/bin/install -c -m 755 -d /usr/lib/tmpfiles.d
/usr/bin/install -c -m 644 ..../startup/tmpfile.conf /usr/lib/tmpfiles.d/nrpe.conf
make[2]: Leaving directory '/root/nrpe-4.1.0/src'
make[1]: Leaving directory '/root/nrpe-4.1.0/src'
[root@localhost-live nrpe-4.1.0]#
```

figure 2.7 - Add user and place compiled files into default system path

```

[CSA client] VMware Workstation
File Edit View VM Tabs Help || type here to search
Library My Computer CSA client CSA server
[root@localhost-live ~]# cd
[root@localhost-live ~]# dnf copr enable brandfbb/xinetd
Enabling a Copr repository. Please note that this repository is not part
of the main distribution, and quality may vary.

The Fedora Project does not exercise any power over the contents of
this repository beyond the rules outlined in the Copr FAQ at
<https://docs.pagure.org/copr.copr/user_documentation.html#what-i-can-build-in-copr>,
and packages are not held to any quality or security level.

Please do not file bug reports about these packages in Fedora
Bugzilla. In case of problems, contact the owner of this repository.

Do you really want to enable copr.fedorainfracloud.org/brandfbb/xinetd? [y/N]: y
Repository successfully enabled.
[root@localhost-live ~]#

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.8 - Enable repository for a service

```

[CSA client] VMware Workstation
File Edit View VM Tabs Help || type here to search
Library My Computer CSA client CSA server
[root@localhost-live ~]# yum install xinetd
Copr repo for xinetd owned by brandfbb
Dependencies resolved.
=====
 Package           Architecture      Version          Repository
=====
 Installing:
 xinetd            x86_64          2:2.3.15-34.fc39   copr:copr.fedorainfracloud.org:brandfbb:xinetd
                                                               size 125 k

 Transaction Summary
=====
 Install 1 Package

 Total download size: 125 k
 Installed size: 264 k
 Is this ok [y/N]: y
 Downloading Packages:
 xinetd-2.3.15-34.fc39.x86_64.rpm                                         53 kB/s | 125 kB   00:02

 Total
 Copr repo for xinetd owned by brandfbb                                         53 kB/s | 125 kB   00:02
 Importing GPG key 0x25C0E6E3:                                                 470 B/s | 1.0 kB   00:02
   Userid : "brandfbb_xinetd (None) <brandfbb#xinetd@copr.fedorahosted.org>"
   Fingerprint: 9FE5 C109 8A72 921C D347 70CA 4273 8B7C 25C0 E6E3
   From   : https://download.copr.fedorainfracloud.org/results/brandfbb/xinetd/pubkey.gpg
 Is this ok [y/N]: y
 Key imported successfully
 Running transaction check
 Transaction check succeeded.
 Running transaction test
 Transaction test succeeded.
 Running transaction
   Preparing :
   Installing    : xinetd-2:2.3.15-34.fc39.x86_64
   Running scriptlet: xinetd-2:2.3.15-34.fc39.x86_64
   Created symlink /etc/systemd/system/multi-user.target.wants/xinetd.service → /usr/lib/systemd/system/xinetd.service.

 Verifying : xinetd-2:2.3.15-34.fc39.x86_64

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.9 - Install xinetd

The screenshot shows a terminal window titled 'CSA client' running in VMware Workstation. The window displays a configuration file being edited. The file contains the following content:

```
# default: on
# description: NRPE (Nagios Remote Plugin Executor)
service nrpe
{
    flags          = REUSE
    port           = 5666
    socket_type   = stream
    wait           = no
    user           = nagios
    group          = nagios
    server         = /usr/local/nagios/bin/nrpe
    server_args    = -c /usr/local/nagios/etc/nrpe.cfg --inetd
    log_on_failure += USERID
    disable        = no
    only_from     = 127.0.0.1
}
```

The status bar at the bottom indicates '-- INSERT --' and shows coordinates 15,23-36 All. A note at the bottom left says 'To direct input to this VM, move the mouse pointer inside or press Ctrl+G.'

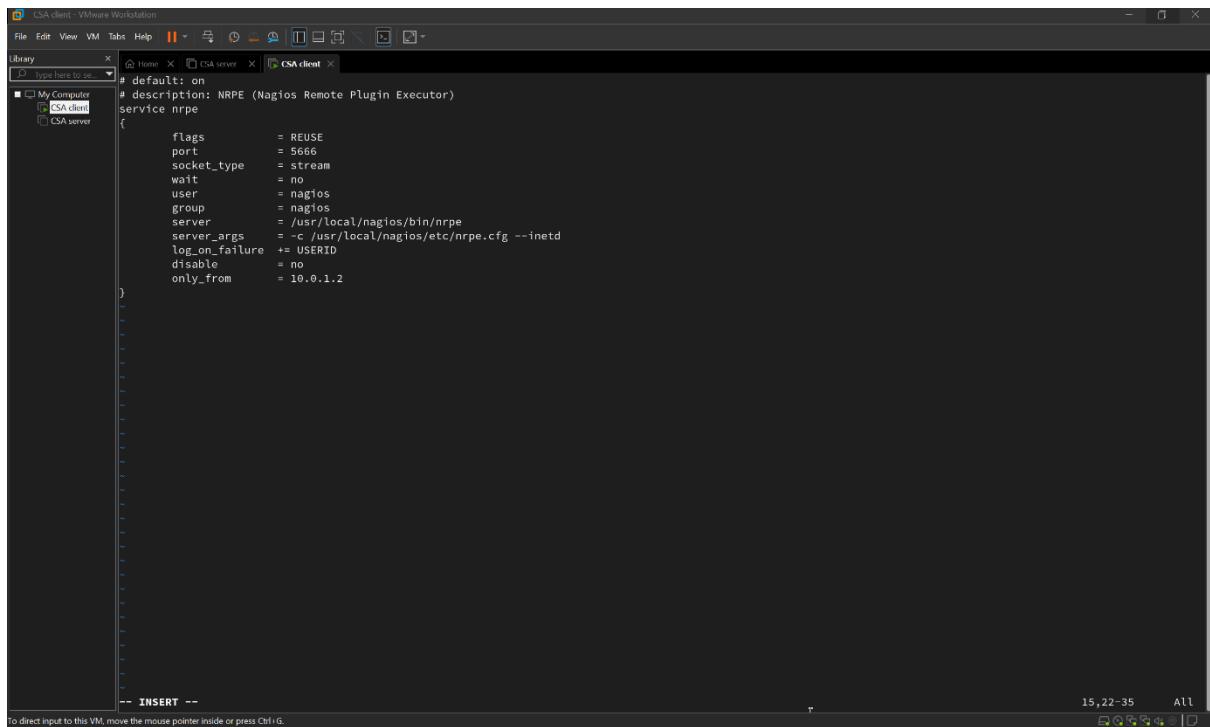
figure 2.10 - Create ‘nrpe.xinetd’ file

The screenshot shows a terminal window titled 'CSA client' running in VMware Workstation. The window displays a series of shell commands being run by a root user on a Linux system. The commands are:

```
[root@localhost-live sample-config]# cd
[root@localhost-live ~]# cd nrpe-4.1.0
[root@localhost-live nrpe-4.1.0]# cd sample-config
[root@localhost-live sample-config]# cd nrpe-4.1.0/sample-config
[root@localhost-live sample-config]# cd nrpe-4.1.0
[bash: cd: nrpe-4.1.0: No such file or directory
[root@localhost-live sample-config]# cd
[root@localhost-live ~]# cd nrpe-4.1.0
[root@localhost-live nrpe-4.1.0]# ls
aclocal.m4      config.status  CONTRIBUTING.md  LICENSE.md    nrpe.spec    README.SSL.md  startup      uninstall
build-aux       configure     docs            macros        nrpe.spec.in  sample-config  test-wrapper  uninstall.in
CHANGELOG.md    configure.ac  include         Makefile     paths.in     SECURITY.md   THANKS       update-cfg.pl
config.log      contrib       LEGAL          Makefile.in  README.md    src          travis-test-1  update-version
[root@localhost-live nrpe-4.1.0]# cd sample-config
[root@localhost-live sample-config]# ls
nrpe.cfg  nrpe.cfg.in  nrpe.xinetd
[root@localhost-live sample-config]# cp nrpe.xinetd /etc/xinetd.d/
```

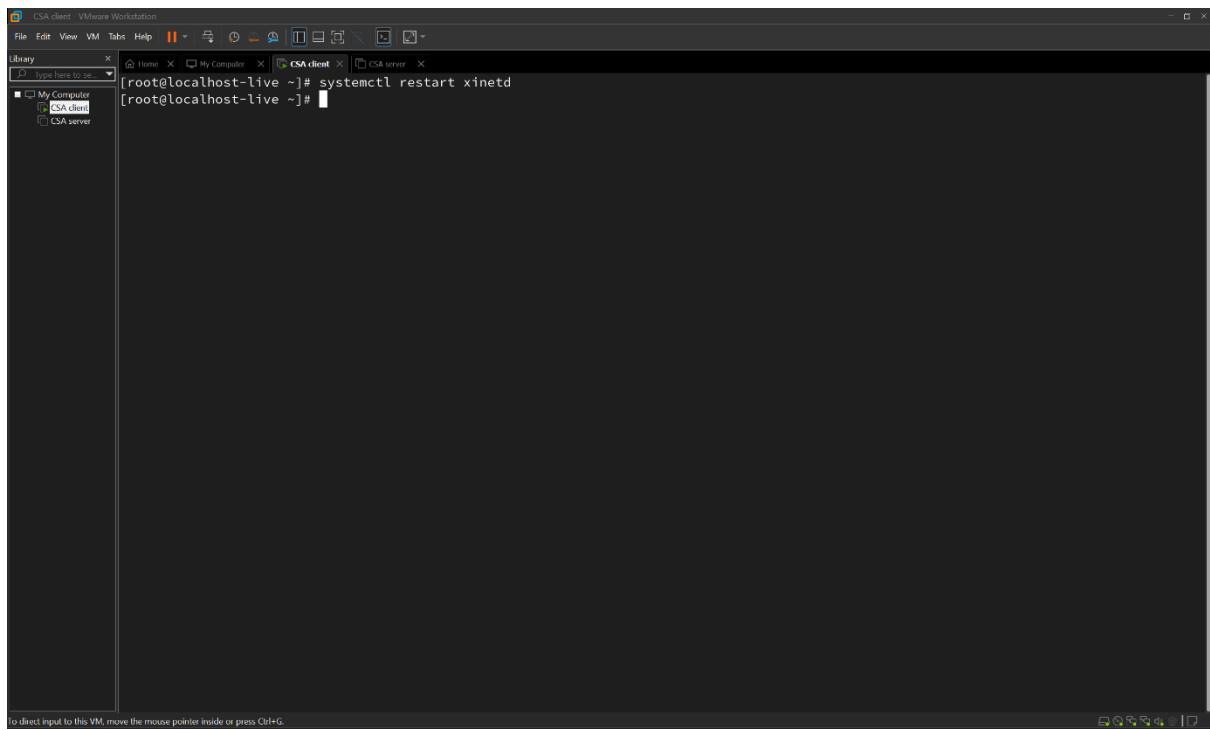
The status bar at the bottom indicates 'To direct input to this VM, move the mouse pointer inside or press Ctrl+G.'

figure 2.11 - : Copy file into directory containing xinetd configuration files



```
# default: on
# description: NRPE (Nagios Remote Plugin Executor)
service nrpe
{
    flags         = REUSE
    port          = 5666
    socket_type   = stream
    wait          = no
    user          = nagios
    group         = nagios
    server        = /usr/local/nagios/bin/nrpe
    server_args   = -c /usr/local/nagios/etc/nrpe.cfg --inetd
    log_on_failure += USERID
    disable       = no
    only_from     = 10.0.1.2
}
```

figure 2.12 - Edit the xinetd configuration file for NRPE service on port 5666



```
[root@localhost-live ~]# systemctl restart xinetd
[root@localhost-live ~]#
```

figure 2.13 - Restart xinetd service

```

File Edit View VM Tabs Help || CSA client CSAclient CSA server
Library type here to se a4-sdunode 5605/udp # A4-SDUNode
efr 5618/tcp # Fiscal Registering Protocol
ninaf 5627/tcp # Node Initiated Network Association Forma
ninaf 5627/udp # Node Initiated Network Association Forma
htrust 5628/tcp # HTrust API
htrust 5628/udp # HTrust API
symantec-sfdb 5629/tcp # Symantec Storage Foundation for Database
symantec-sfdb 5629/udp # Symantec Storage Foundation for Database
precise-comm 5630/tcp # PreciseCommunication
precise-comm 5630/udp # PreciseCommunication
pcanywheredata 5631/tcp # pcANYWHEREdata
pcanywheredata 5631/udp # pcANYWHEREdata
pcanywherestat 5632/tcp # pcANYWHEREstat
pcanywherestat 5632/udp # pcANYWHEREstat
beorl 5633/tcp # BE Operations Request Listener
beorl 5633/udp # BE Operations Request Listener
xprtld 5634/tcp # SF Message Service
xprtld 5634/udp # SF Message Service
sfmss0 5635/tcp # SFM Authentication Subsystem
sfm-db-server 5636/tcp # SFMd - SFM DB server
cssc 5637/tcp # Symantec CSSC
flcrs 5638/tcp # Symantec Fingerprint Lookup and Container Reference
ics 5639/tcp # Symantec Integrity Checking
vfmobile 5646/tcp # Ventureforth Mobile
nrpe 5666/tcp # Nagios Remote Plugin Executor
filemq 5670/tcp # ZeroMQ file
zre-disc 5670/udp # Local area discovery and msging over ZeroMQ
amqps 5671/tcp # amqp protocol over TLS/SSL
amqps 5671/udp # amqp protocol over TLS/SSL
amqp 5672/tcp # AMQP
amqp 5672/udp # AMQP
amqp 5672/sctp # AMQP
jms 5673/tcp # JACL Message Server
jms 5673/udp # JACL Message Server
hyperscsi-port 5674/tcp # HyperSCSI Port
hyperscsi-port 5674/udp # HyperSCSI Port

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.14 - configuration file that maps port numbers to named services

```

File Edit View VM Tabs Help || CSA client CSAclient CSA server
Library type here to se [root@localhost-live ~]# cd nrpe-4.1.0
[root@localhost-live nrpe-4.1.0]# cd sample-config
[root@localhost-live sample-config]# more nrpe.xinetd
# default: on
# description: NRPE (Nagios Remote Plugin Executor)
service nrpe
{
    flags          = REUSE
    port           = 5666
    socket_type   = stream
    wait           = no
    user           = nagios
    group          = nagios
    server         = /usr/local/nagios/bin/nrpe
    server_args    = -c /usr/local/nagios/etc/nrpe.cfg --inetd
    log_on_failure += USERID
    disable        = no
    only_from      = 127.0.0.1
}
[root@localhost-live sample-config]#

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.15 - Check the path to be created for NRPE configuration file

```

File Edit View VM Tabs Help □ type here to se
Library □ My Computer □ CSA client □ CSA server
[root@localhost-live sample-config]# cp nrpe.cfg /usr/local/nagios/etc
[root@localhost-live sample-config]# cd /usr/local/nagios/etc
[root@localhost-live etc]# ls
nrpe.cfg
[root@localhost-live etc]# vi nrpe.cfg

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.16 - Copy NRPE configuration file to the path and edit the file

```

File Edit View VM Tabs Help □ type here to se
Library □ My Computer □ CSA client □ CSA server
server_port=5666

# SERVER ADDRESS
# Address that nrpe should bind to in case there are more than one interface
# and you do not want nrpe to bind on all interfaces.
# NOTE: This option is ignored if NRPE is running under either inetd or xinetd

server_address=10.0.1.5

# LISTEN QUEUE SIZE
# Listen queue size (backlog) for serving incoming connections.
# You may want to increase this value under high load.

#listen_queue_size=5

# NRPE USER
# This determines the effective user that the NRPE daemon should run as.
# You can either supply a username or a UID.
#
# NOTE: This option is ignored if NRPE is running under either inetd or xinetd

nrpe_user=nagios

# NRPE GROUP
# This determines the effective group that the NRPE daemon should run as.
# You can either supply a group name or a GID.
#
-- INSERT --

```

81,1 15%

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.17 - Change server address and allowed hosts in the file

figure 2.18 - Install Linux firewall

figure 2.19 - Edit iptables configuration file

The screenshot shows a terminal window titled "CSA client - VMware Workstation". The terminal is running on a Fedora system. The user has run the command "systemctl status iptables.service" which outputs:

```
* iptables.service - IPv4 firewall with iptables
   Loaded: loaded (/usr/lib/systemd/system/iptables.service; disabled; )
   Drop-In: /usr/lib/systemd/system/iptables.service.d
             └─no-timeout-abort.conf
     Active: active (exited) since Thu 2024-04-25 21:46:53 +0530; 17s ago
       Process: 3746 ExecStart=/usr/libexec/iptables/iptables.init start (code=exited, status=0/SUCCESS)
      Main PID: 3746 (code=exited, status=0/SUCCESS)
        CPU: 41ms

Apr 25 21:46:53 fedora systemd[1]: Starting iptables.service - IPv4 firew...
Apr 25 21:46:53 fedora iptables.init[3746]: iptables: Applying firewall...
Apr 25 21:46:53 fedora systemd[1]: Finished iptables.service - IPv4 firew...
```

figure 2.20 - Restart the firewall

The screenshot shows a terminal window titled "CSA client - VMware Workstation". The terminal is running on a Fedora system. The user has run the command "iptables --list" which outputs:

```
root@fedora:~# iptables --list
Chain INPUT (policy ACCEPT)
  target     prot opt source               destination
  ACCEPT    all  --  anywhere             anywhere            state RELATED,ESTABLISHED
  ACCEPT    icmp --  anywhere             anywhere
  ACCEPT    all  --  anywhere             anywhere
  ACCEPT    tcp --  anywhere             anywhere            state NEW tcp dpt:ssh
  ACCEPT    tcp --  anywhere             anywhere            state NEW tcp dpt:nrpe
  REJECT    all  --  anywhere             anywhere           reject-with icmp-host-prohibited
  ACCEPT    tcp --  anywhere             anywhere           tcp dpt:http

Chain FORWARD (policy ACCEPT)
  target     prot opt source               destination
  REJECT    all  --  anywhere             anywhere           reject-with icmp-host-prohibited

Chain OUTPUT (policy ACCEPT)
  target     prot opt source               destination
root@fedora:~#
```

figure 2.21 - List of iptables entries

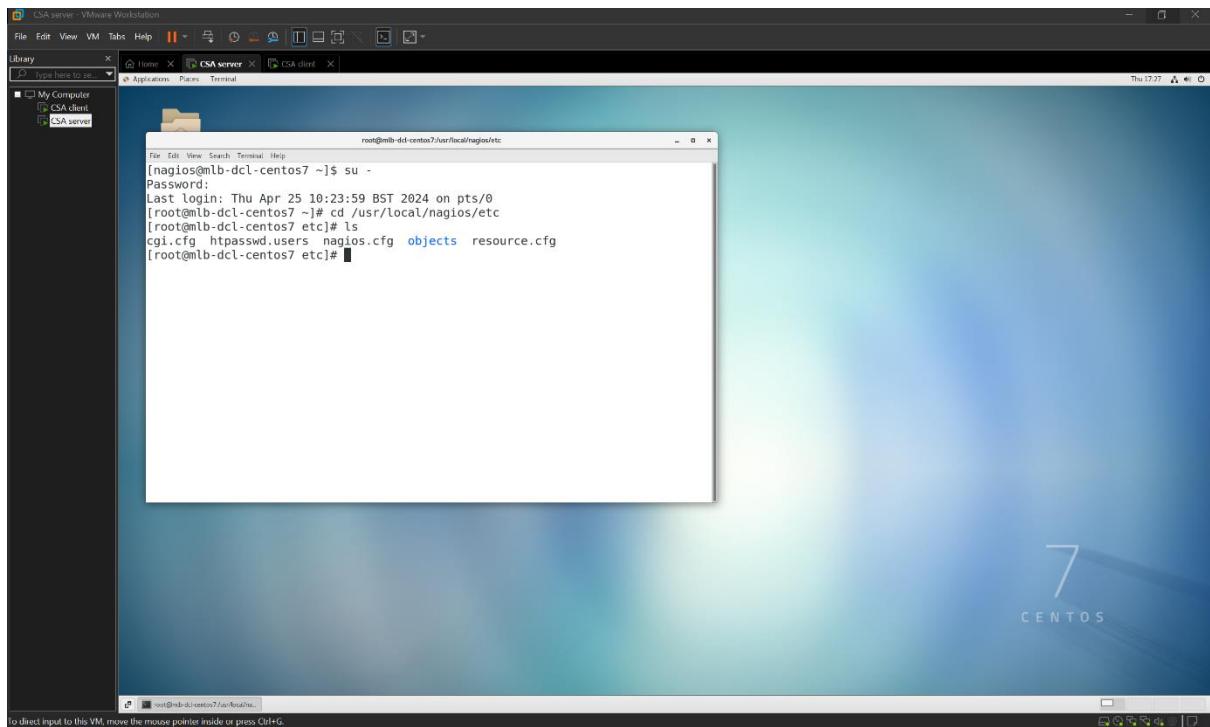


figure 2.22 - Nagios server configuration file

The screenshot shows a Linux desktop environment with a blue gradient background. A terminal window is open in the foreground, displaying the contents of the 'nagios.cfg' file:

```

root@mlb-dcl-centos7 ~]$ cat /usr/local/nagios/nagios.cfg
#####
# NAGIOS.CFG - Sample Main Config File for Nagios 4.5.1
#
# Read the documentation for more information on this configuration
# file. I've provided some comments here, but things may not be so
# clear without further explanation.
#
#####

# LOG FILE
# This is the main log file where service and host events are logged
# for historical purposes. This should be the first option specified
# in the config file!!!
log_file=/usr/local/nagios/var/nagios.log

# OBJECT CONFIGURATION FILE(S)
# These are the object configuration files in which you define hosts,
# host groups, contacts, contact groups, services, etc.
# You can split your object definitions across several config files
# if you wish (as shown below), or keep them all in a single config file.

# You can specify individual object config files as shown below:
cfg_file=/usr/local/nagios/etc/objects/commands.cfg
cfg_file=/usr/local/nagios/etc/objects/contacts.cfg
cfg_file=/usr/local/nagios/etc/objects/timeperiods.cfg
ctg_file=/usr/local/nagios/etc/objects/templates.cfg

# Definitions for monitoring the local (Linux) host
cfg_file=/usr/local/nagios/etc/objects/localhost.cfg

# Definitions for monitoring a Windows machine
#cfg_file=/usr/local/nagios/etc/objects/windows.cfg

```

The desktop interface includes a menu bar with File, Edit, View, VM, Tabs, Help, and several application icons. A system tray icon for 'The 7.29' is visible.

figure 2.23 - Content of 'nagios.cfg' file

```

File Edit View VM Tabs Help □ □ □ □ □ □ □ □ □ □ □
Library type here to se □ Applications Places Terminal
My Computer □ CSA client □ CSA server
# LOCALHOST.CFG - SAMPLE OBJECT CONFIG FILE FOR MONITORING THIS MACHINE
#
#
# NOTE: This config file is intended to serve as an *extremely* simple
#       example of how you can create configuration entries to monitor
#       the local (Linux) machine.
#
#####
#
# HOST DEFINITION
#
# Define a host for the local machine
define host {
    use          linux-server      ; Name of host template to use
                ; This host definition will inherit all variables that are defined
                ; in (or inherited by) the linux-server host template definition.

    host_name   client-fedora
    alias       client-fedora
    address     10.0.1.2
}

#####
#
# HOST GROUP DEFINITION
#
# Define an optional hostgroup for Linux machines
-- INSERT --

```

figure 2.24 - Modify the host definition

```

File Edit View VM Tabs Help □ □ □ □ □ □ □ □ □ □ □
Library type here to se □ Applications Places Terminal
My Computer □ CSA client □ CSA server
# HOST GROUP DEFINITION
#
# Define an optional hostgroup for Linux machines
define hostgroup {
    # hostgroup_name      linux-servers      ; The name of the hostgroup
    # alias               Linux Servers      ; Long name of the group
    # members             localhost          ; Comma separated list of hosts that belong to this group
}

#####
#
# SERVICE DEFINITIONS
#
# Define a service to "ping" the local machine
define service {
    use          local-service      ; Name of service template to use
    host_name   localhost
    service_description PING
    check_command  check_ping!100.0,20%!5000.0,60%
}

#####
#
# Define a service to check the disk space of the root partition
# on the local machine. Warning if < 20% free, critical if
# < 10% free space on partition.
-- INSERT --

```

figure 2.25 - host group definition

```

# SERVICE DEFINITIONS
#
#####
# Define a service to "ping" the local machine
define service {
    use           local-service      ; Name of service template to use
    host_name    localhost
    service_description PING
    check_command  check_ping!100.0,20%!500.0,60%
}

# Define a service to check the disk space of the root partition
# on the local machine. Warning if < 20% free, critical if
# < 10% free space on partition.
define service {
    use           local-service      ; Name of service template to use
    host_name    localhost
    service_description Root Partition
    check_command  check_local_disk!20%!10%!
}

:1,$ s/localhost/client-fedora/g

# Define a service to check the number of currently logged in
# users on the local machine. Warning if > 20 users, critical
# if > 50 users.

define service {
    use           local-service      ; Name of service template to use
    host_name    localhost
-- INSERT --
}

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.26 - service definitions

```

[root@mlb-dcl-centos7 objects]# chown nagios:nagios linuxclient.cfg
[root@mlb-dcl-centos7 objects]# ls -l
total 60
-rw-rw-r--. 1 nagios nagios 6755 Apr 17 08:59 commands.cfg
-rw-rw-r--. 1 nagios nagios 1883 Apr 17 09:06 contacts.cfg
-rw-rw-r--. 1 nagios nagios 4834 Apr 25 17:47 linuxclient.cfg
-rw-rw-r--. 1 nagios nagios 4777 Apr 17 08:59 localhost.cfg
-rw-rw-r--. 1 nagios nagios 3091 Apr 17 08:59 printer.cfg
-rw-rw-r--. 1 nagios nagios 3484 Apr 17 08:59 switch.cfg
-rw-rw-r--. 1 nagios nagios 12533 Apr 17 08:59 templates.cfg
-rw-rw-r--. 1 nagios nagios 3512 Apr 17 08:59 timeperiods.cfg
-rw-rw-r--. 1 nagios nagios 4074 Apr 17 08:59 windows.cfg
[root@mlb-dcl-centos7 objects]#

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 2.27 - Change ownership of Nagios client configuration file

Part 2: DNS Caching Setup with CentOS Server and Fedora Clients

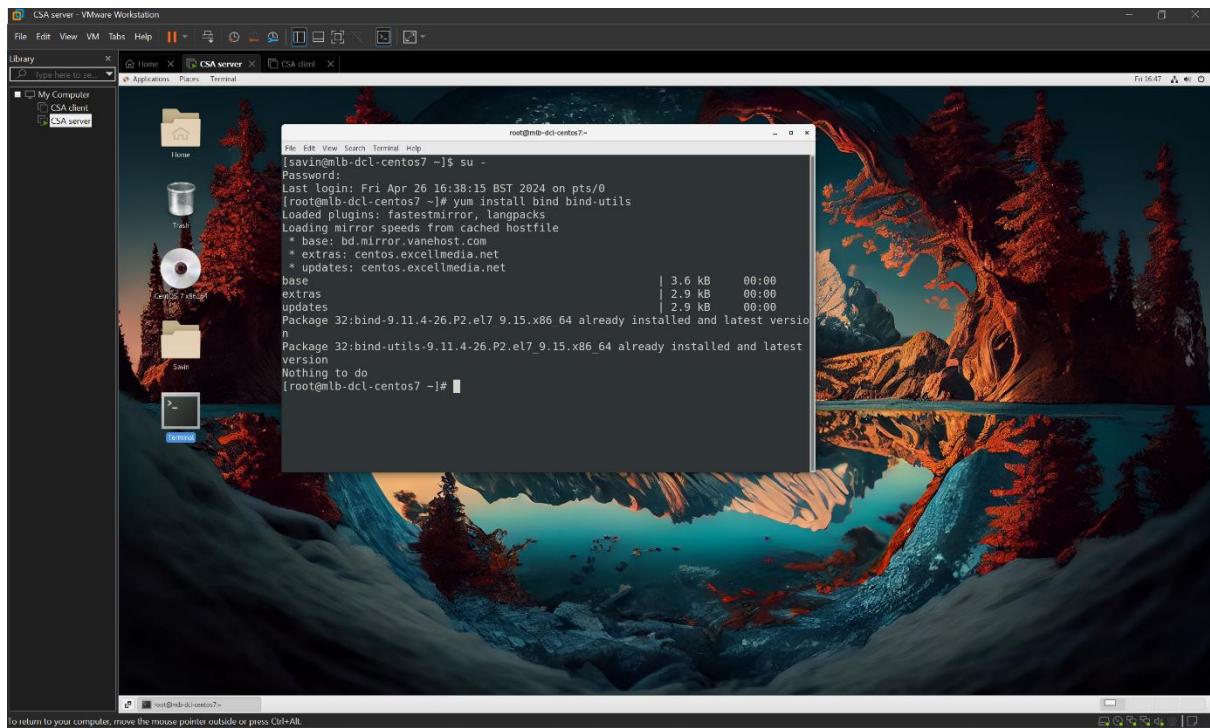


Figure 3.1 - Install packages

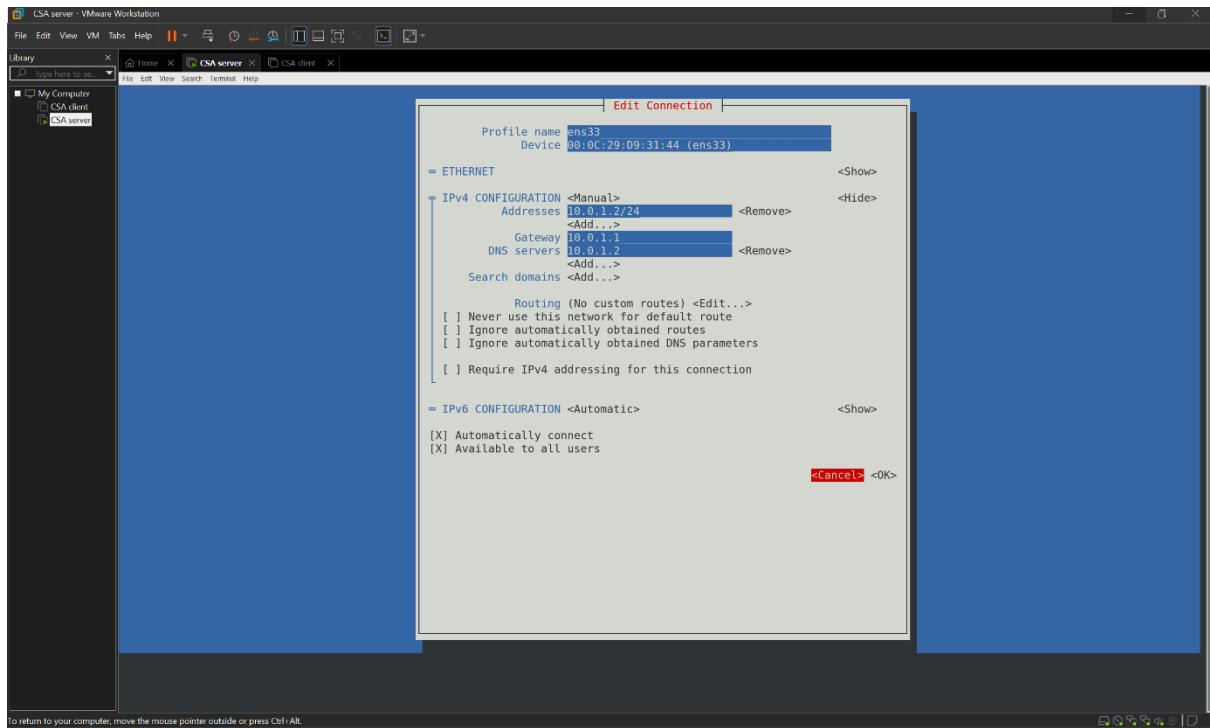


Figure 3.2 - Configure caching name server

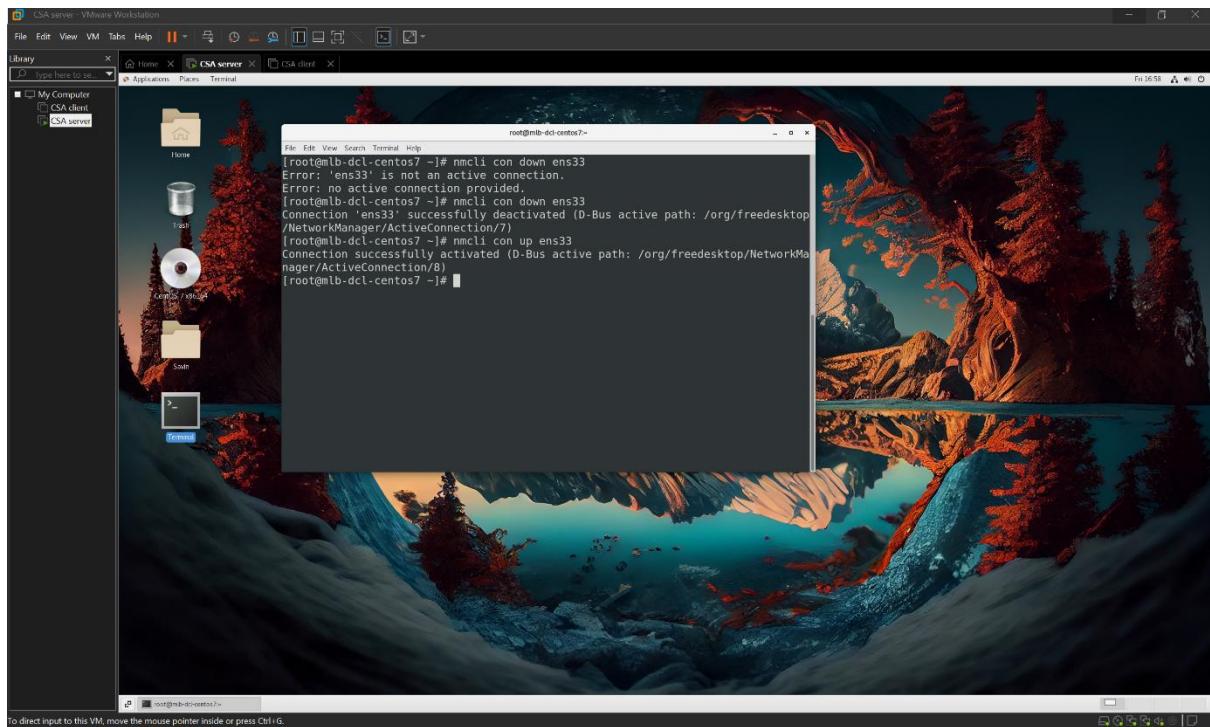


figure 3.3 - Restart the interface

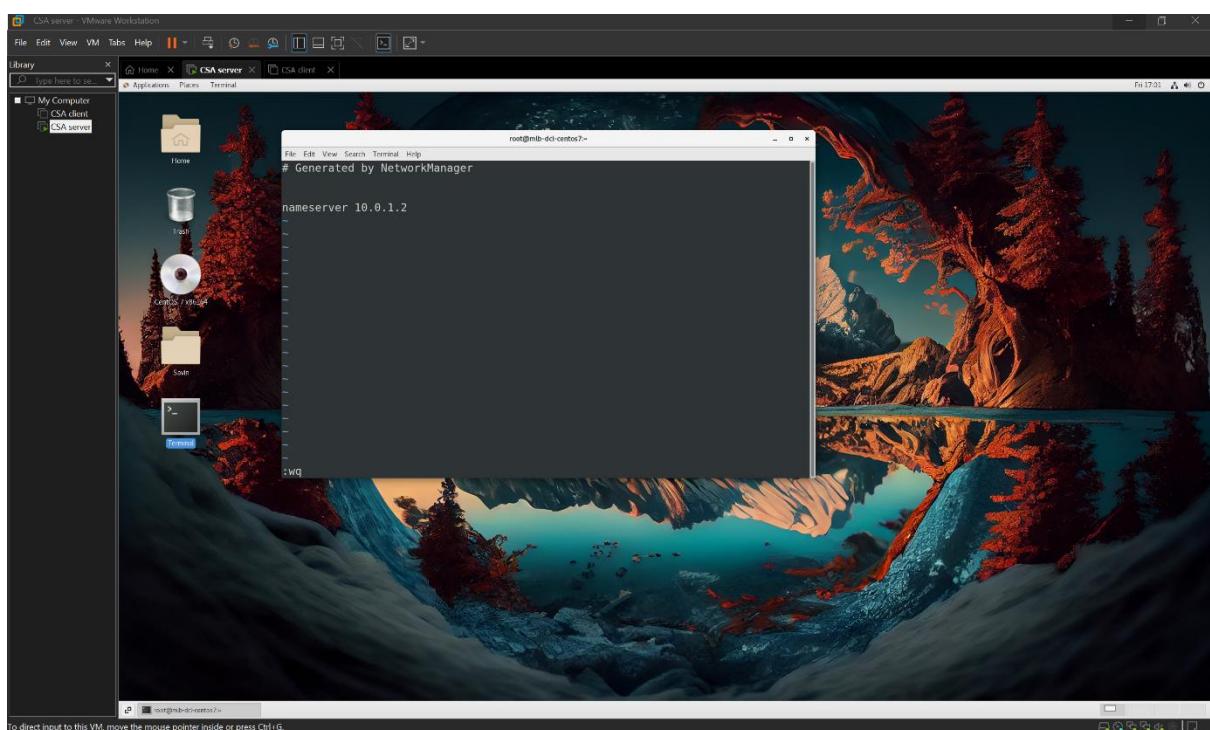


figure 3.4 - /etc/resolv.conf file

```

// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS
// server as a caching only nameserver (as a localhost DNS resolver only).
//
// See /usr/share/doc/bind*/sample/ for example named configuration files.
//
// See the BIND Administrator's Reference Manual (ARM) for details about the
// configuration located in /usr/share/doc/bind-{version}/Bv9ARM.html

options {
    listen-on port 53 { 127.0.0.1; 10.0.1.2; };
    listen-on-v6 port 53 { ::1; };
    directory   "/var/named";
    dump-file   "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named.stats.txt";
    memstatistics-file "/var/named/data/named.mem.stats.txt";
    recursing-file "/var/named/data/named.recurse";
    secrroots-file "/var/named/data/named.secrroots";
    allow-query  { localhost; 19.0.1.0/24; };

/*
- If you are building an AUTHORITATIVE DNS server, do NOT enable recursion.
- If you are building a RECURSIVE (caching) DNS server, you need to enable
  recursion.
- If your recursive DNS server has a public IP address, you MUST enable access
  control to limit queries to your legitimate users. Failing to do so will
  cause your server to become part of large scale DNS amplification
  attacks. Implementing BCP38 within your network would greatly
  reduce such attack surface
*/
    recursion yes;

    dnssec-enable yes;
    dnssec-validation yes;

    /* Path to ISC DLV key */
    bindkeys-file "/etc/named.root.key";

    managed-keys-directory "/var/named/dynamic";

    pid-file '/run/named/named.pid';
}

```

figure 3.5 - DNS's main configuration file

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State	PID/Program name
tcp	0	0	10.0.1.2:53	0.0.0.0:*	LISTEN	3748/named
tcp	0	0	10.0.1.2:153	0.0.0.0:*	LISTEN	3748/named
tcp	0	0	192.168.102.1:53	0.0.0.0:*	LISTEN	1470/dnsmasq
tcp	0	0	0.0.0.0:22	0.0.0.0:*	LISTEN	1244/sshd
tcp	0	0	127.0.0.1:631	0.0.0.0:*	LISTEN	1241/cupsd
tcp	0	0	127.0.0.1:953	0.0.0.0:*	LISTEN	3748/named
tcp	0	0	127.0.0.1:25	0.0.0.0:*	LISTEN	1558/master
tcp	0	0	0.0.0.0:111	0.0.0.0:*	LISTEN	768/rpcbind
tcp6	0	0	::1:53	::*	LISTEN	3748/named
tcp6	0	0	::22	::*	LISTEN	1244/sshd
tcp6	0	0	::1:631	::*	LISTEN	1241/cupsd
tcp6	0	0	::1:953	::*	LISTEN	3748/named
tcp6	0	0	::1:25	::*	LISTEN	1558/master
tcp6	0	0	:::443	::*	LISTEN	1256/httpd
tcp6	0	0	:::111	::*	LISTEN	768/rpcbind
tcp6	0	0	:::80	::*	LISTEN	1256/httpd

figure 3.6 - List all opened TCP ports

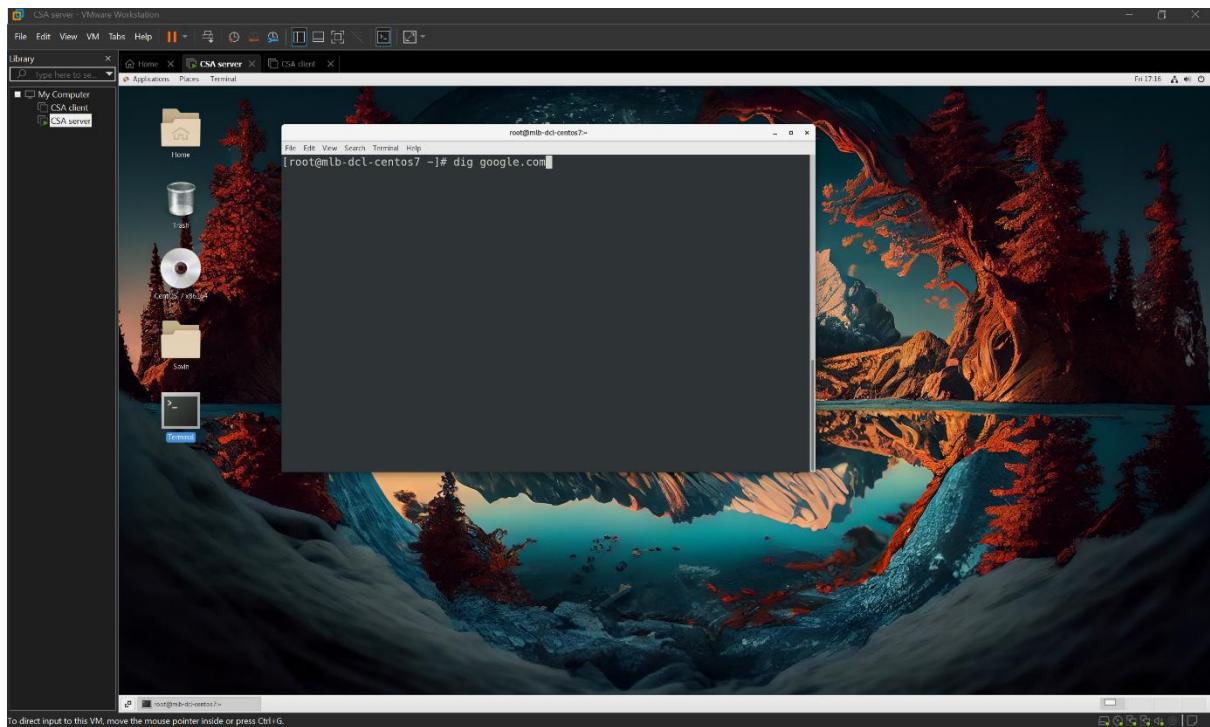


figure 3.7 - Display answer from ‘google.com’

```
[root@mlb-dcl-centos7 ~]# dig google.com

; <>> DiG 9.11.4-P2-RedHat-9.11.4-26.P2.el7_9.15 <>> google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<< opcode: QUERY, status: NOERROR, id: 65194
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9
: OPT PSEUDOSECTION:
: EDNS: version: 0, flags:: udp: 4096
: QUESTION SECTION:
:google.com.           IN      A

;; ANSWER SECTION:
google.com.        300     IN      A      216.58.199.238

;; AUTHORITY SECTION:
google.com.        172797   IN      NS      ns2.google.com.
google.com.        172797   IN      NS      ns1.google.com.
google.com.        172797   IN      NS      ns3.google.com.
google.com.        172797   IN      NS      ns4.google.com.

;; ADDITIONAL SECTION:
ns2.google.com.    172797   IN      A      216.239.34.10
ns1.google.com.    172797   IN      A      216.239.32.10
ns3.google.com.    172797   IN      A      216.239.36.10
ns4.google.com.    172797   IN      A      216.239.38.10
ns2.google.com.    172797   IN      AAAA   2001:4860:4802:34::a
ns1.google.com.    172797   IN      AAAA   2001:4860:4802:32::a
ns3.google.com.    172797   IN      AAAA   2001:4860:4802:36::a
ns4.google.com.    172797   IN      AAAA   2001:4860:4802:38::a

;; Query time: 3752 msec
;; SERVER: 10.0.1.2#53(10.0.1.2)
;; WHEN: Fri Apr 26 17:18:00 BST 2024
;; MSG SIZE rcvd: 303

[root@mlb-dcl-centos7 ~]# dig google.com
```

figure 3.7.1

```

File Edit View VM Tabs Help □ □ □ □ □ □ □ □ □ □ □
Library □ type here to se... □ Applications Places Terminal
root@mlb-dcl-centos7:~#
[root@mlb-dcl-centos7 ~]# dig google.com
; <>> Dig 9.11.4-P2-RedHat-9.11.4-26.P2.el7_9.15 <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 60328
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9
;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;google.com.           IN      A
;; ANSWER SECTION:
google.com.        219     IN      A      216.58.199.238
;; AUTHORITY SECTION:
google.com.        172716   IN      NS      ns1.google.com.
google.com.        172716   IN      NS      ns4.google.com.
google.com.        172716   IN      NS      ns2.google.com.
google.com.        172716   IN      NS      ns3.google.com.
;; ADDITIONAL SECTION:
ns2.google.com.    172716   IN      A      216.239.34.10
ns1.google.com.    172716   IN      A      216.239.32.10
ns3.google.com.    172716   IN      A      216.239.36.10
ns4.google.com.    172716   IN      A      216.239.38.10
ns2.google.com.    172716   IN      AAAA   2001:4860:4802:34::a
ns1.google.com.    172716   IN      AAAA   2001:4860:4802:32::a
ns3.google.com.    172716   IN      AAAA   2001:4860:4802:36::a
ns4.google.com.    172716   IN      AAAA   2001:4860:4802:38::a
;; Query time: 17 msec
;; SERVER: 10.0.1.29#53(10.0.1.2)
;; WHEN: Fri Apr 26 17:18:00 BST 2024
;; MSG SIZE rcvd: 303
[root@mlb-dcl-centos7 ~]#

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 3.8 - Caching name server verified

```

File Edit View VM Tabs Help □ □ □ □ □ □ □ □ □ □ □
Library □ type here to se... □ Applications Places Terminal
root@mlb-dcl-centos7:~#
[root@mlb-dcl-centos7 ~]# rndc dumpdb -cache
[root@mlb-dcl-centos7 ~]# cd /var/named/data
[root@mlb-dcl-centos7 data]# ls
cache dump.db named.run named.run-20240417
[root@mlb-dcl-centos7 data]# ls -la
total 64
drwxrwx---. 2 named named 70 Apr 26 17:24 .
drwxrwx---T 8 root root 220 Mar 4 04:27 ..
-rw-r--r--. 1 named named 13324 Mar 26 17:24 cache.dump.db
-rw-r--r--. 1 named named 4439 Apr 26 17:24 named.run
-rw-r--r--. 1 named named 39282 Mar 4 04:27 named.run-20240417
[root@mlb-dcl-centos7 data]# grep google.com cache.dump.db
google.com.          172409   NS      ns2.google.com.
                               172409   NS      ns1.google.com.
                               172409   NS      ns3.google.com.
                               172409   NS      ns4.google.com.
ns1.google.com.       172409   A      216.239.32.10
ns2.google.com.       172409   A      216.239.34.10
ns3.google.com.       172409   A      216.239.36.10
ns4.google.com.       172409   A      216.239.38.10
[root@mlb-dcl-centos7 data]#

```

To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

figure 3.9 - cached data

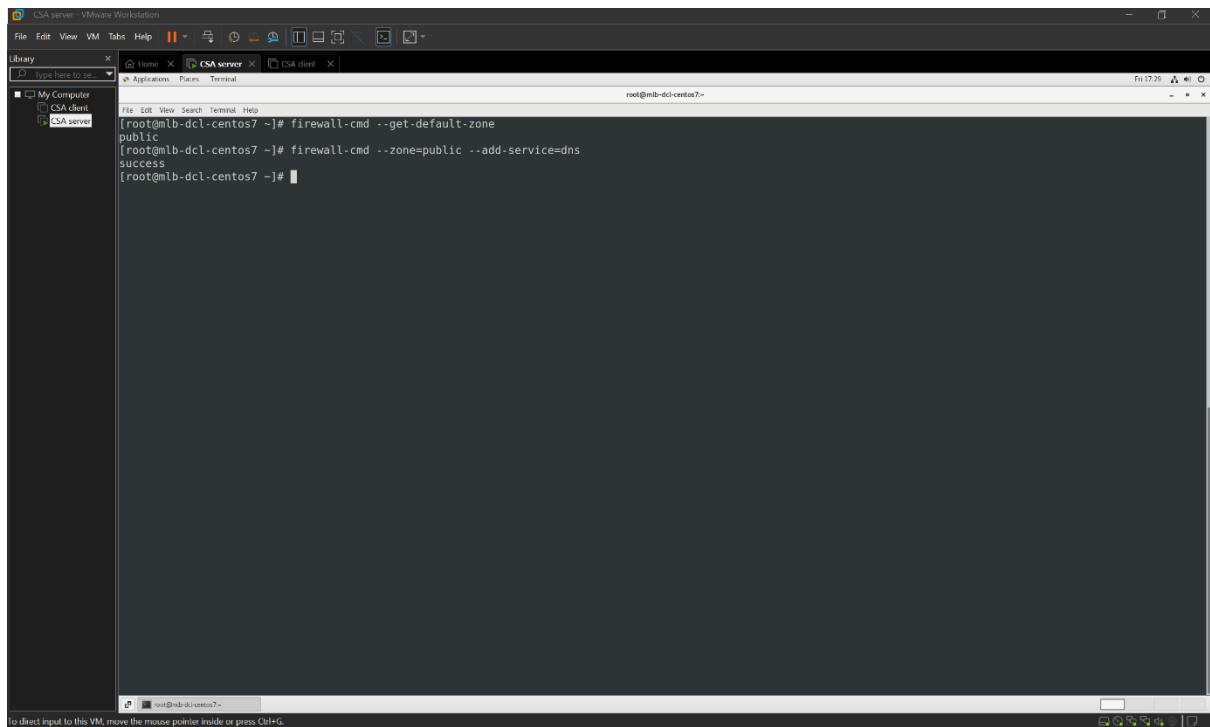


figure 3.10 - Allow DNS traffic through firewall

Configuring Fedora Client

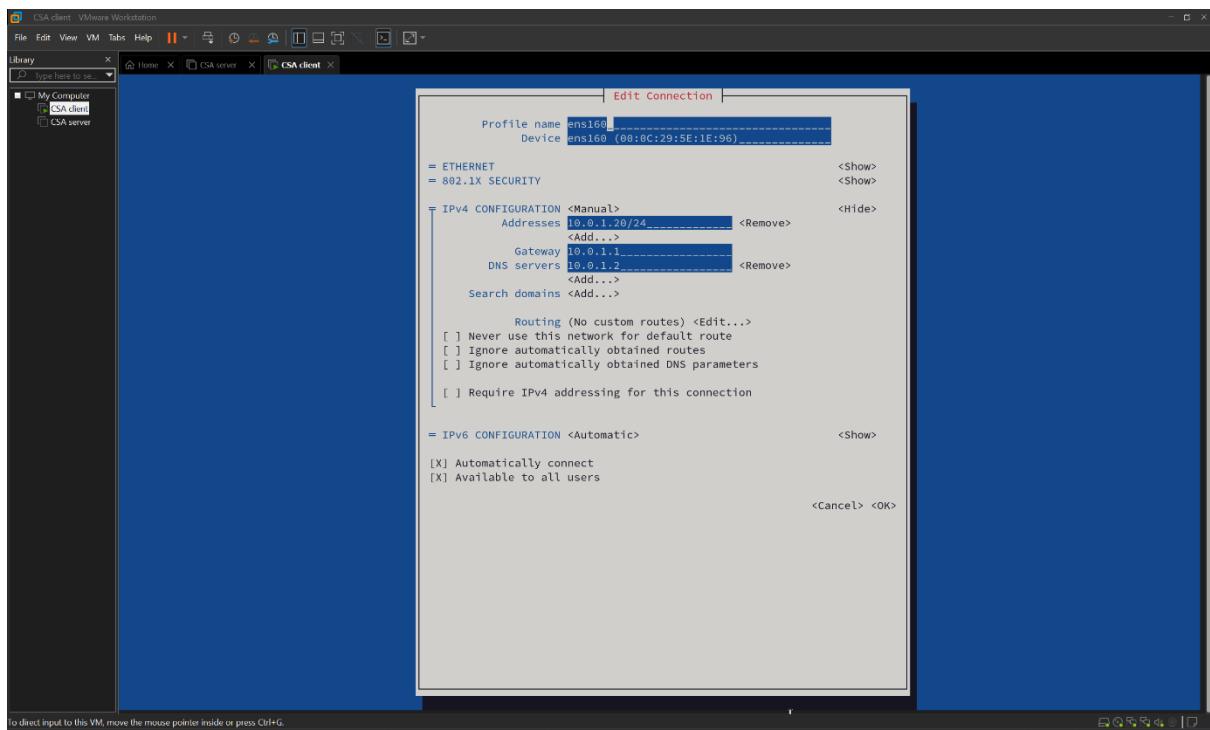


figure 4.1 - Client's DNS server IP address configured

```
root@fedora: # nmcli con down ens160
Connection 'ens160' successfully deactivated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/15)
root@fedora: # nmcli con up ens160
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/16)
root@fedora: #
```

figure 4.2 - Restart the interface

```
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-resolved(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /etc/resolv.conf and seeing this text, you have followed the symlink.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs should typically not access this file directly, but only
# through the symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a
# different way, replace this symlink by a static file or a different symlink.
#
# See man:systemd-resolved.service(8) for details about the supported modes of
# operation for /etc/resolv.conf.

nameserver 10.0.0.2
.
```

figure 4.3 - Edit the '/etc/resolv.conf' file

