



IE2060
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Assignment

Individual Assignment

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Bachelor of Science Special Honors Degree in Information Technology

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

1.1 Setting up Nagios Core 4.5.1 within a CentOS Server-Fedora Client Architecture^[1]

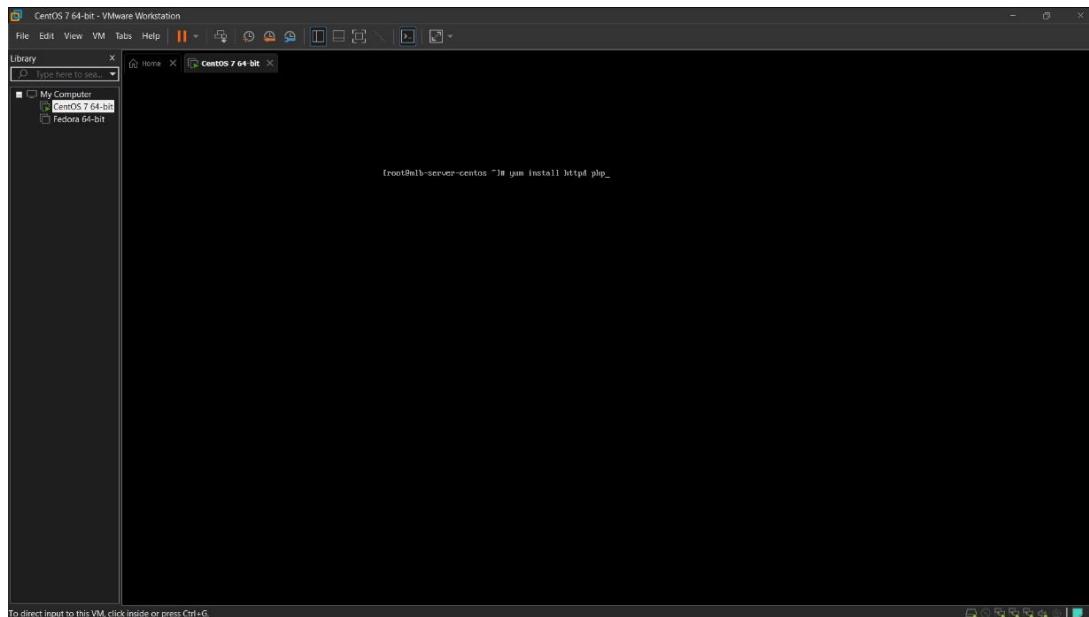


Figure 1.1.1: Install Apache web server with PHP module

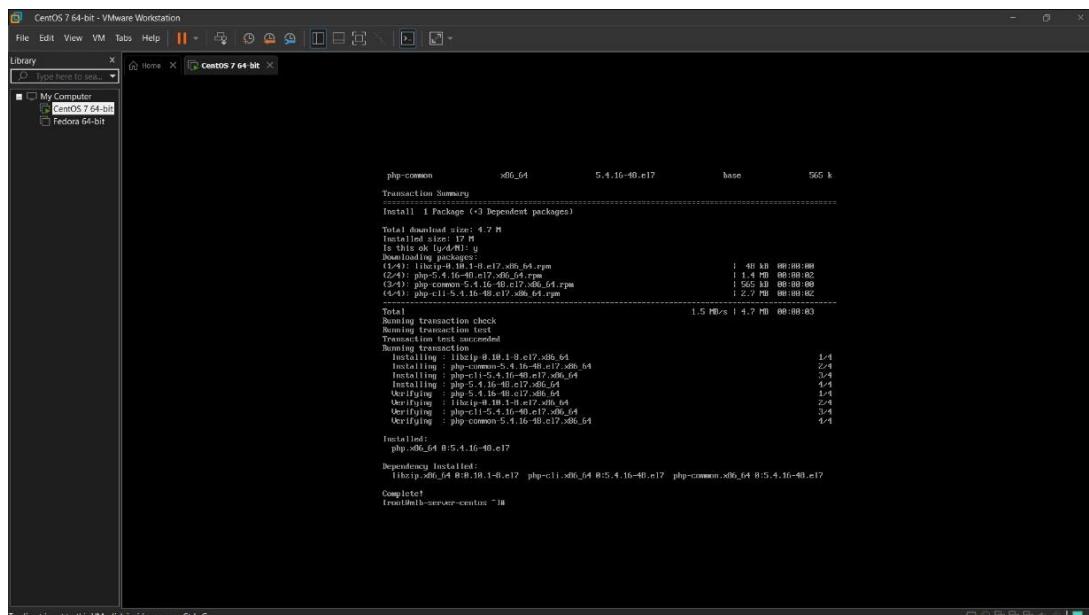


Figure 1.1.2: Apache web server with PHP module installed

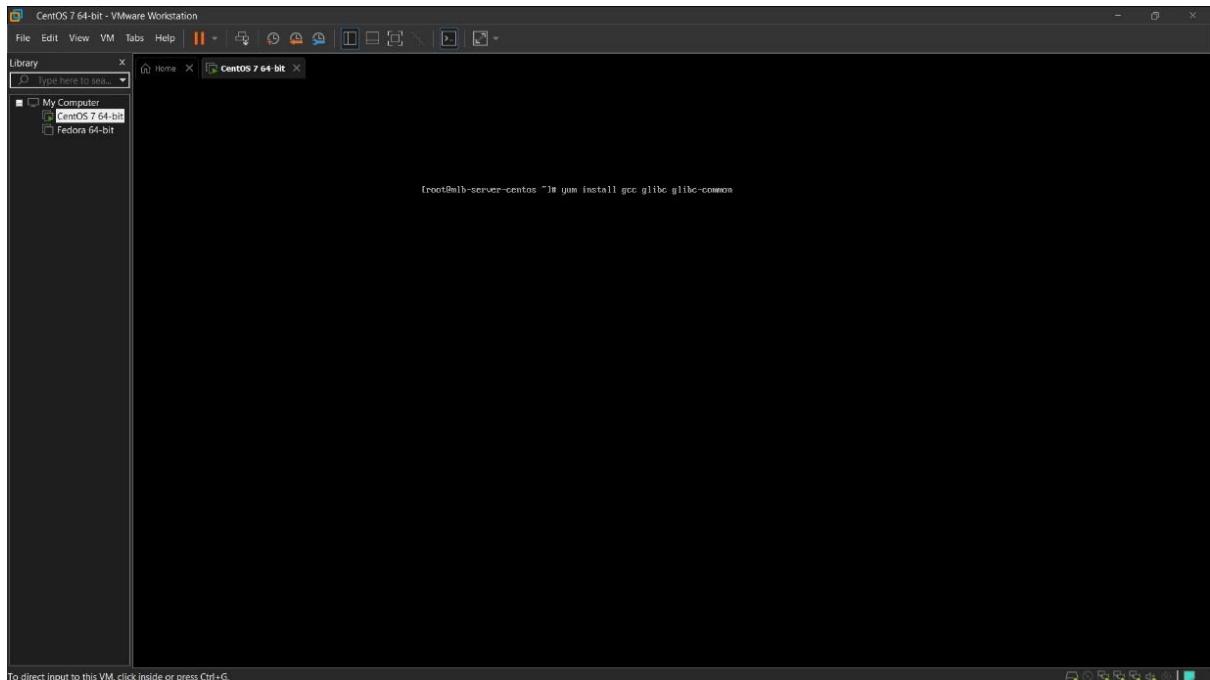


Figure 1.1.3: Install GCC C compiler with GLIBC libraries

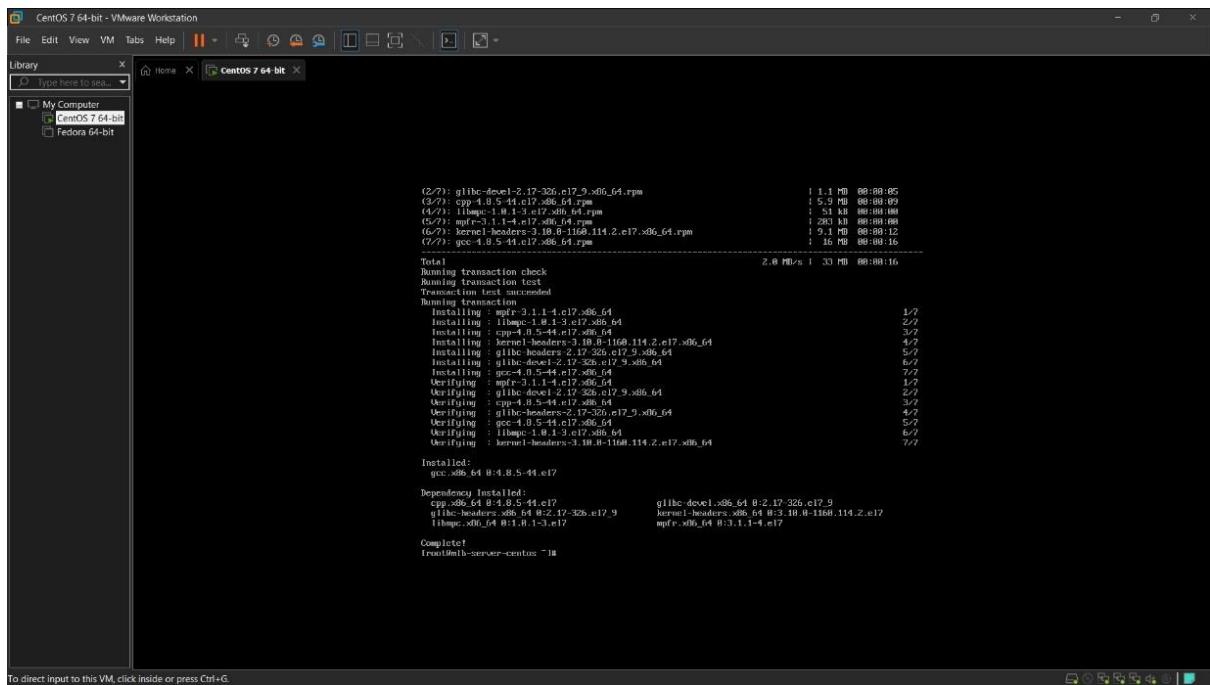


Figure 1.1.4: GCC C compiler with GLIBC libraries installed

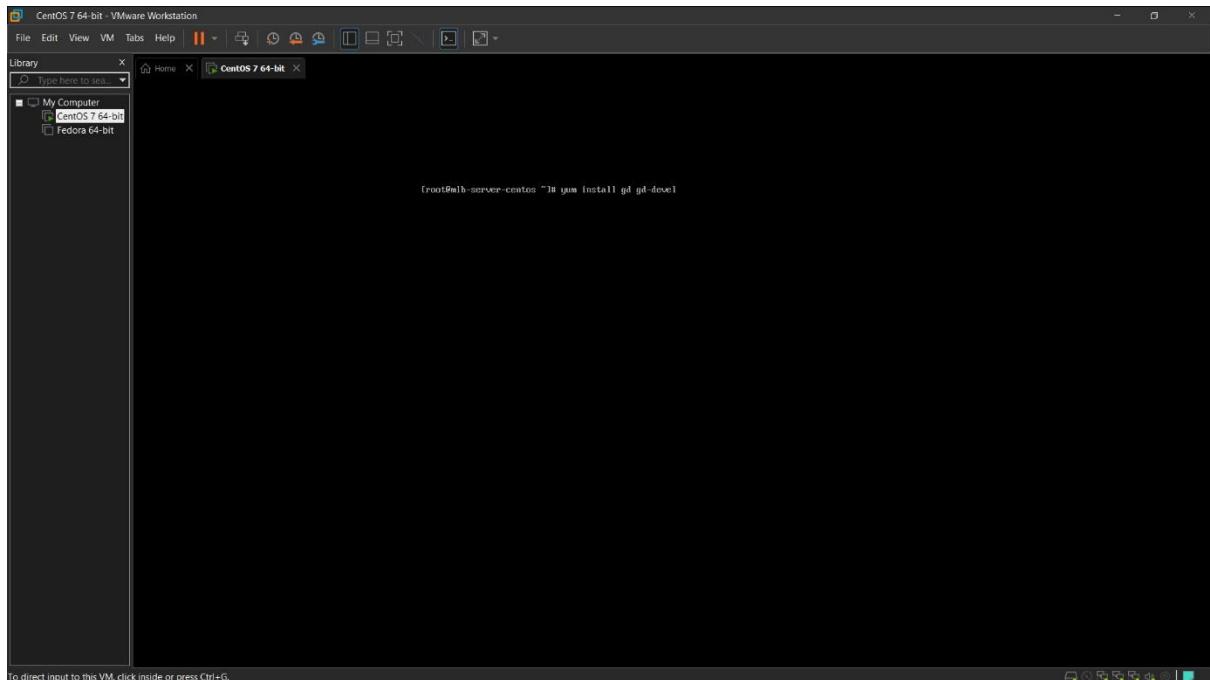


Figure 1.1.5: Install graphics libraries

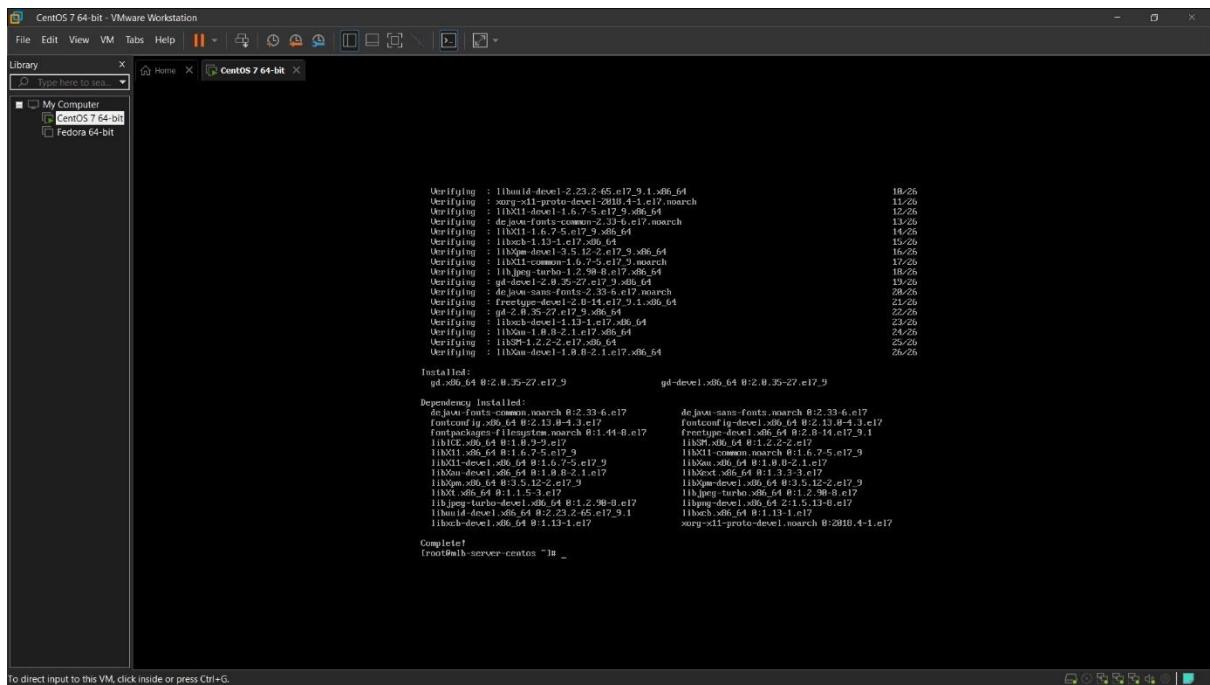
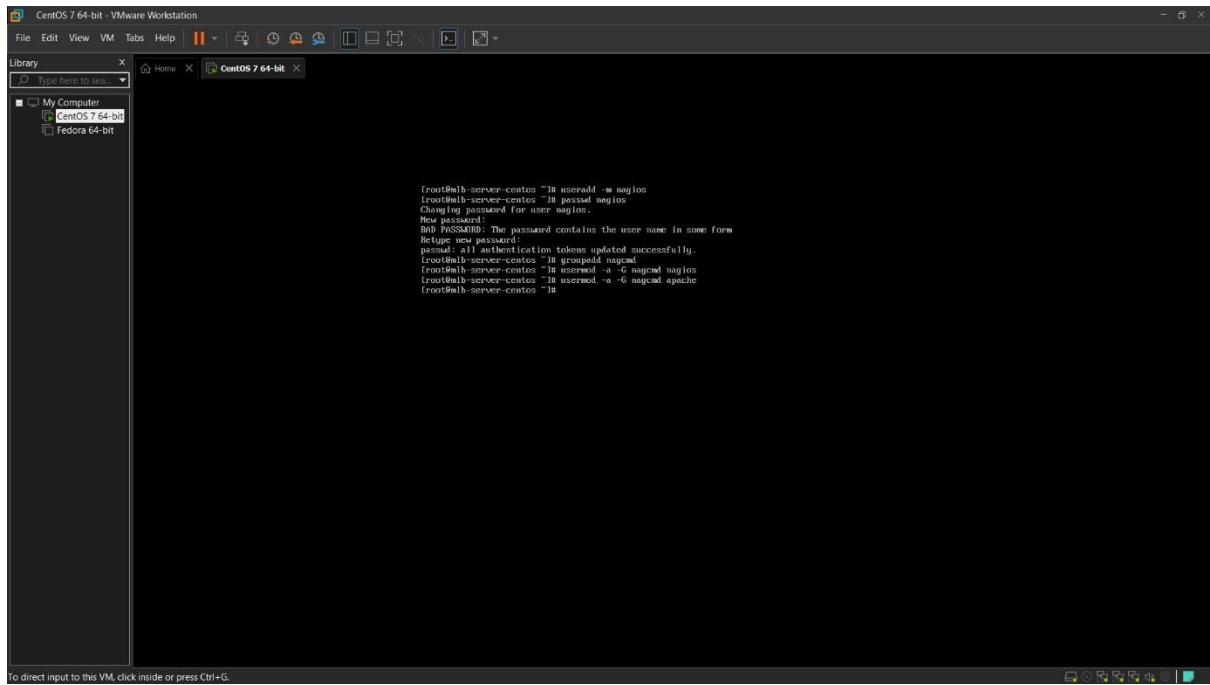
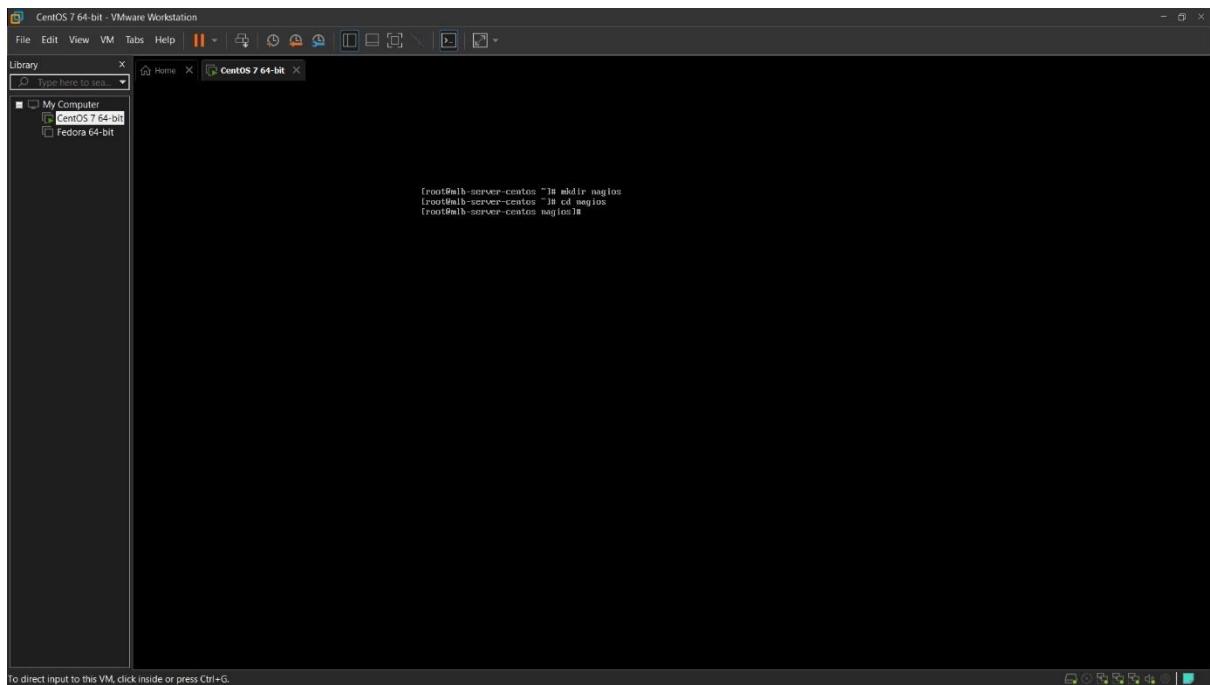


Figure 1.1.6: Graphics libraries installed



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

Figure 1.1.7: Create Nagios user and group. Add user and Apache to the group



```
[root@mlb-server-centos ~]# mkdir nagios
[root@mlb-server-centos ~]# cd nagios
[root@mlb-server-centos nagios]
```

Figure 1.1.8: Create and move into Nagios folder

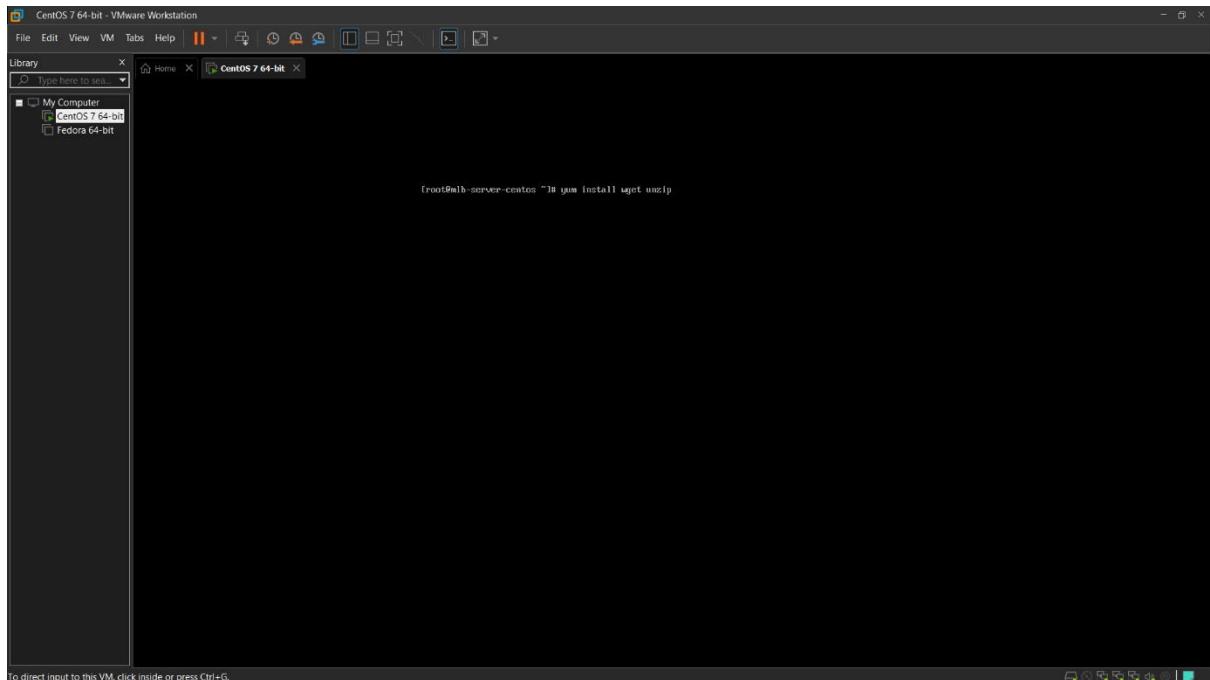


Figure 1.1.9: Install utilities to download files over a network and extract files from zip archive files

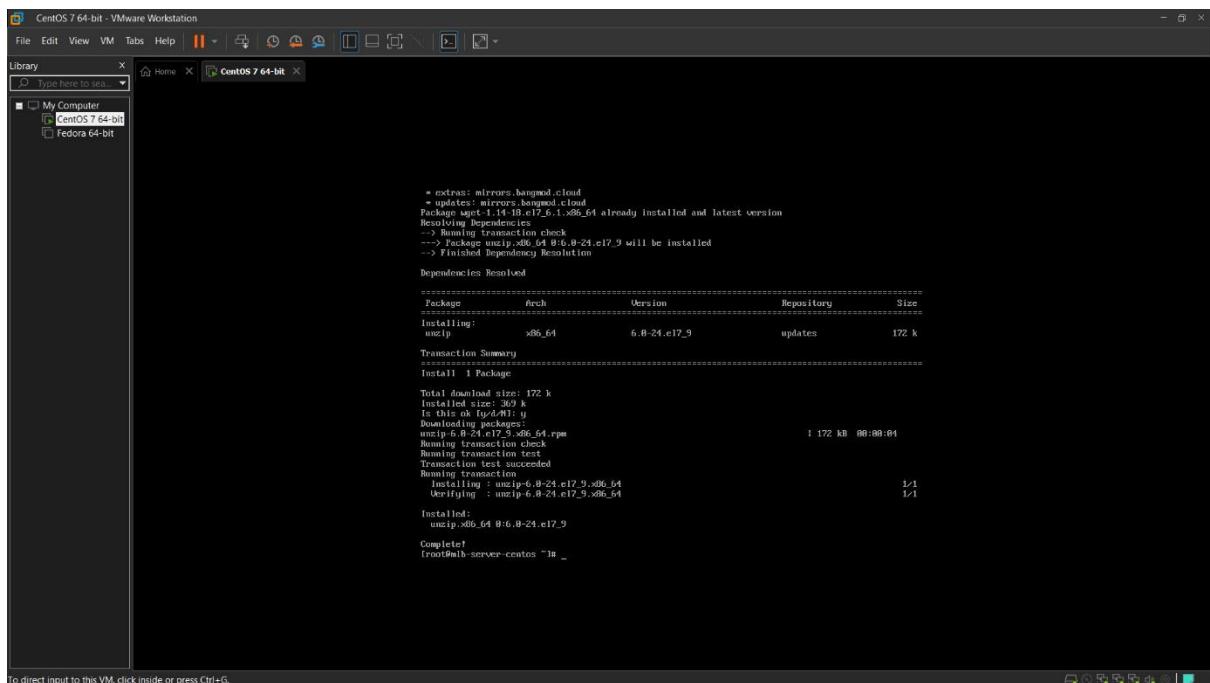
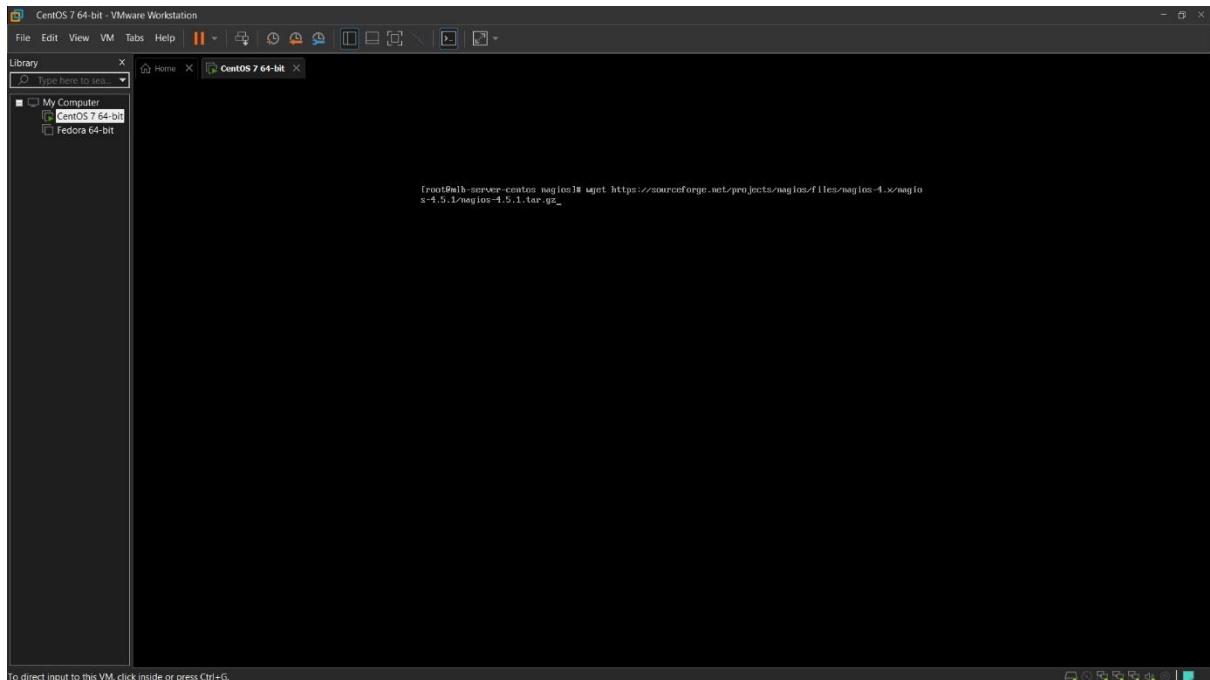
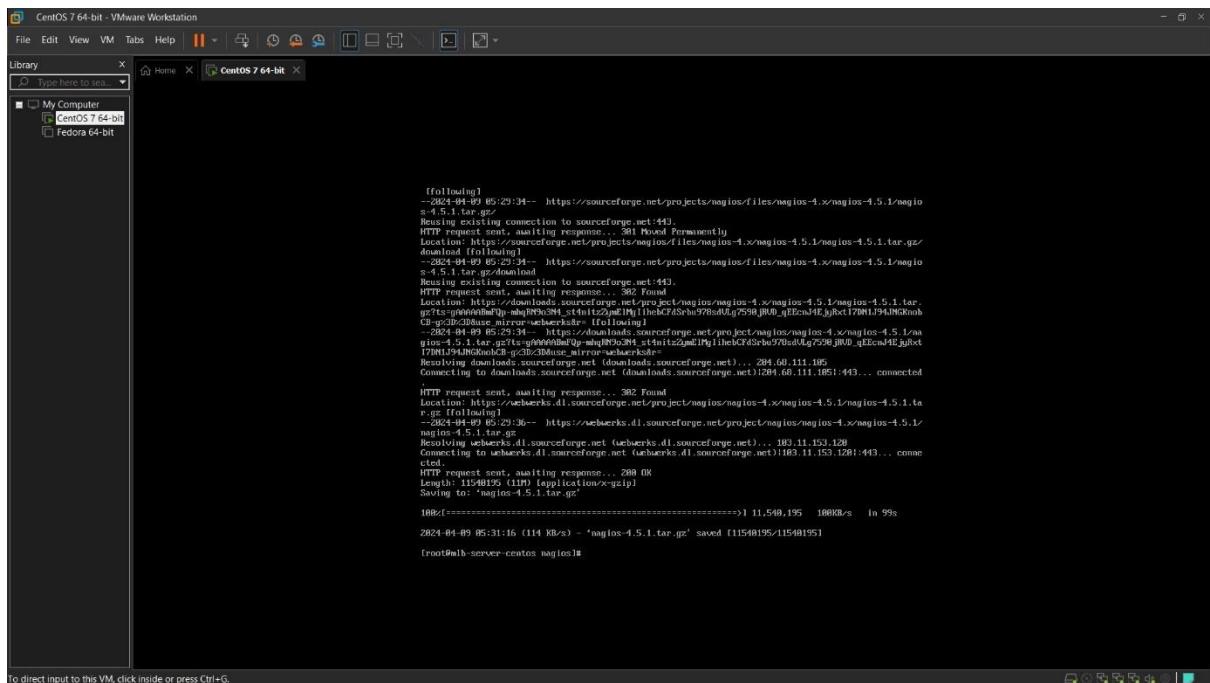


Figure 1.1.10: Utilities installed



```
[root@mlb-server-centos nagios]# wget https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
```

Figure 1.1.11: Download Nagios 4.5.1 source code



```
[root@mlb-server-centos nagios]# wget https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
--2024-04-09 05:29:34--  https://sourceforge.net/projects/nagios/files/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
Resolving existing connection to sourceforge.net:443...
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://downloads.sourceforge.net/project/nagios/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
[following]
--2024-04-09 05:29:34--  https://downloads.sourceforge.net/project/nagios/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
Resolving existing connection to sourceforge.net:443...
HTTP request sent, awaiting response... 302 Found
Location: https://sewerks.dl.sourceforge.net/project/nagios/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
[following]
--2024-04-09 05:29:36--  https://sewerks.dl.sourceforge.net/project/nagios/nagios-4.x/nagios-4.5.1/nagios-4.5.1.tar.gz
Resolving sewerks.dl.sourceforge.net (sewerks.dl.sourceforge.net) ... 103.11.153.128
Connecting to sewerks.dl.sourceforge.net (sewerks.dl.sourceforge.net)|103.11.153.128|:443... connected
HTTP request sent, awaiting response... 200 OK
Length: 11540195 (1.1M) [application/x-gzip]
Saving to: 'nagios-4.5.1.tar.gz'

100%[=====] 11,540,195  100KB/s   in 95s
2024-04-09 05:31:16 (114 KB/s) - 'nagios-4.5.1.tar.gz' saved [11540195/11540195]
[root@mlb-server-centos nagios]#
```

Figure 1.1.12: Nagios 4.5.1 source code downloaded

```
root@mlb-server-centos nagios]# wget https://github.com/nagios-plugins/nagios-plugins/releases/download/release-2.4.9/nagios-plugins-2.4.9.tar.gz
--2024-04-09 05:39:22-- https://github.com/nagios-plugins/nagios-plugins/releases/download/release-2.4.9/nagios-plugins-2.4.9.tar.gz
Resolving github.com (github.com)... 28.295.243.166
Connecting to github.com (github.com)|28.295.243.166|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 254483 (2.6M) [application/x-tar]
Saving to: 'nagios-plugins-2.4.9.tar.gz'

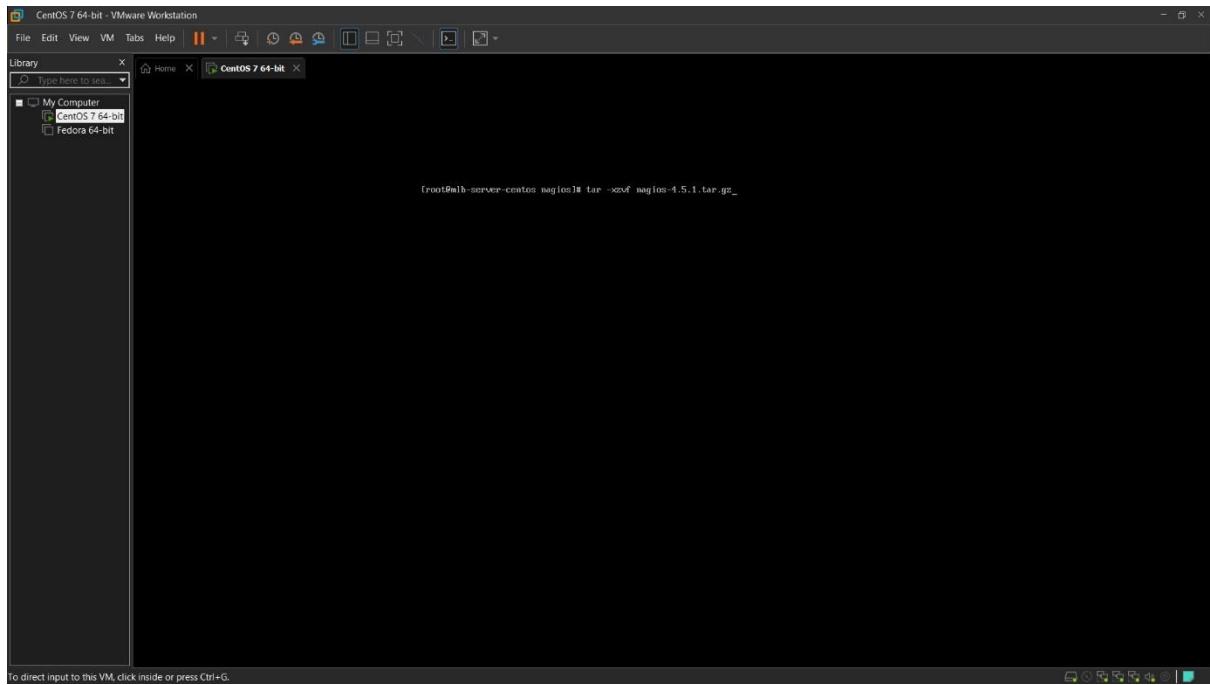
[  =----->] 2,754,463  22.5KB/s   in 2m 28s
2024-04-09 05:39:22 (19.2 KB/s) - "nagios-plugins-2.4.9.tar.gz" saved [2754463/2754463]

[root@mlb-server-centos nagios]#
```

Figure 1.1.13: Download Nagios Plugins 2.4.9

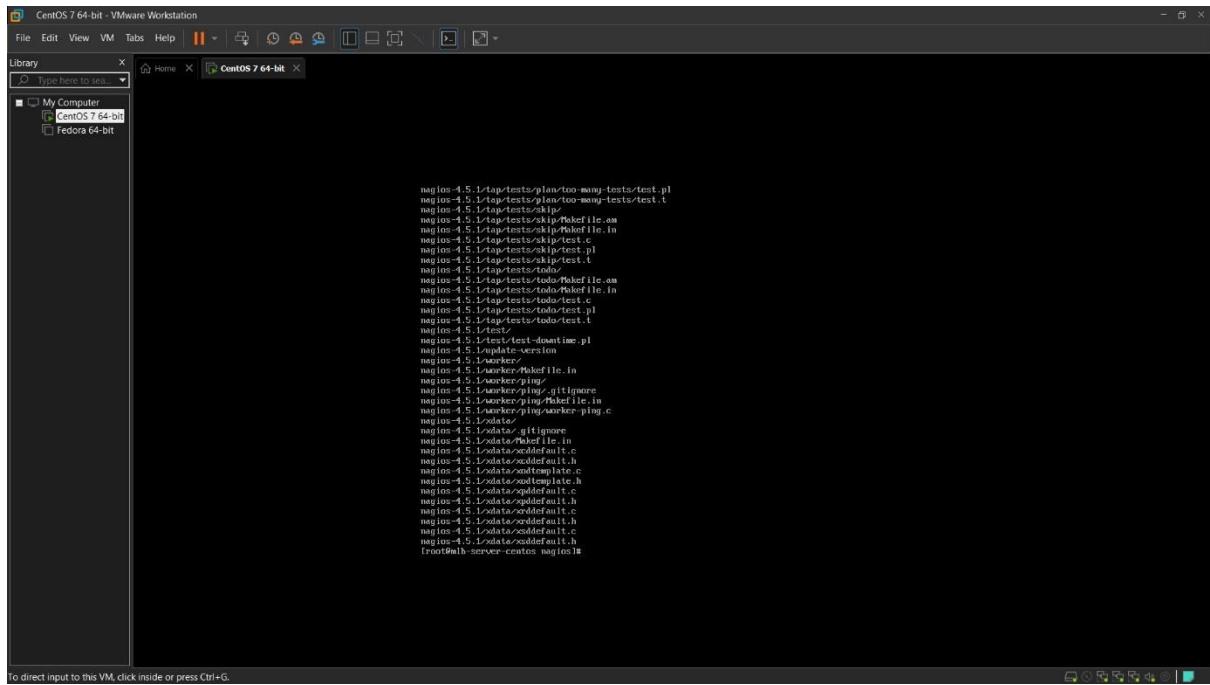
```
root@mlb-server-centos nagios]# ls
nagios-4.5.1.tar.gz  nagios-plugins-2.4.9.tar.gz
[root@mlb-server-centos nagios]#
```

Figure 1.1.14: Contents of ‘nagios’ folder



```
[root@mlb-server-centos nagios]# tar -xvf nagios-4.5.1.tar.gz
```

Figure 1.1.15: Extract Nagios 4.5.1 file



```
nagios-4.5.1-test/tests/plan/too-many-tests/test.pl
nagios-4.5.1-test/tests/plan/too-many-tests/test.t
nagios-4.5.1-test/tests/skip/
nagios-4.5.1-test/tests/skip/nagios.conf
nagios-4.5.1-test/tests/skip/nagios.in
nagios-4.5.1-test/tests/skip/nagios.c
nagios-4.5.1-test/tests/skip/test.pl
nagios-4.5.1-test/tests/skip/test.t
nagios-4.5.1-test/tests/todo/nagios.conf
nagios-4.5.1-test/tests/todo/nagios.in
nagios-4.5.1-test/tests/todo/test.c
nagios-4.5.1-test/tests/todo/test.t
nagios-4.5.1-test/test/
nagios-4.5.1-test/test/delay-downtime.pl
nagios-4.5.1-update/version
nagios-4.5.1-worker/
nagios-4.5.1-worker/nagios.conf
nagios-4.5.1-worker/nagios.in
nagios-4.5.1-worker/ping/gtignore
nagios-4.5.1-worker/ping/nagios.conf
nagios-4.5.1-worker/ping/nagios.in
nagios-4.5.1-worker/ping/worker-ping.c
nagios-4.5.1-xlate/
nagios-4.5.1-xlate/gtignore
nagios-4.5.1-xlate/nagios.conf
nagios-4.5.1-xlate/nagios.in
nagios-4.5.1-xlate/xddfault.c
nagios-4.5.1-xlate/xddfault.h
nagios-4.5.1-xlate/xddfault.c
nagios-4.5.1-xlate/xddfault.h
nagios-4.5.1-xlate/xddfault.c
nagios-4.5.1-xlate/xddfault.h
[root@mlb-server-centos nagios]#
```

Figure 1.1.16: Nagios 4.5.1 file extracted

The screenshot shows a terminal window titled 'CentOS 7 64-bit - VMware Workstation'. The command 'cd nagios-4.5.1' has been run, and the output of 'ls' is displayed:

```
root@rhel-server-centos nagios]# cd nagios-4.5.1
[root@rhel-server-centos nagios-4.5.1]# ls
aclocal.m4      configure      include      LICENSE      README.md    t-ldap
autom4te-1.14.1 configure.ac   lib          Makefile.in  sample-config  update-version
bzcat          contrib       indent      indent-all.sh  make-tarball  UPGRADE
bzdiff         COPYING       indent.sh    indent.sh    package      startup
bzgrep         COPYING       INSTALL     INSTALL-DEB  install      subst.in
bzless         COPYING       INSTALL-HTML  INSTALL-HTML  nagios       worker
bzmore         doxygen      LEGAL      nagios.spec  nagios.spec  xlate
```

Figure 1.1.17: Contents of ‘nagios-4.5.1’ folder

The screenshot shows a terminal window titled 'CentOS 7 64-bit - VMware Workstation'. The command './configure --with-command-group=nagcmd' has been run.

```
root@rhel-server-centos nagios-4.5.1]# ./configure --with-command-group=nagcmd
```

Figure 1.1.18: Check system for required software to build Nagios 4.5.1

The screenshot shows a terminal window in a CentOS 7 VM. The user has run the command 'make config' to generate configuration files. The output shows the creation of files like 'Makefile', 'config.h', 'lib/nagios/libnagios.h', and 'lib/ibroker.h'. It then displays a detailed configuration summary for Nagios 4.5.1, including paths for executables, configuration files, and web interface options. The summary includes paths like '/usr/local/nagios', '/usr/local/nagios/var/spool/checkresults', and '/etc/httpd/conf.d'. It also specifies the mail program as 'sbin/sendmail' and the host OS as 'Linux'. The configuration ends with a note to review options and compile the main program.

```
config.status: creating t-tap/Makefile
config.status: creating include/config.h
config.status: creating lib/nagios/libnagios.h
config.status: creating lib/ibroker.h
Creating sample config files in sample-config/ ...
*** Configuration summary for nagios 4.5.1 2024-02-28 ***
General Options:
-----
  Nagios executable: nagios
  Nagios configuration: /usr/local/nagios/include/nagios
  Command user/group: nagios:nagcmd
  Command Event Broker: yes
  Install $prefix: /usr/local/nagios
  Install $includedir: /usr/local/nagios/include/nagios
  Lock file: /var/nagios.lock
  Check result directory: /usr/local/nagios/var/spool/checkresults
  Inode limit: 10000
  Apache config d directory: /etc/httpd/conf.d
  Mail program: /sbin/sendmail
  Host OS: Linux
  IOBroker Method: epoll

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

Review the options above for accuracy. If they look okay,
type 'make all' to compile the main program and CGIs.
[root@nlab-server centos nagios-4.5.1]
```

Figure 1.1.19: Configuration summary for Nagios 4.5.1

The screenshot shows a terminal window in a CentOS 7 VM. The user has run the command 'make all' to compile the Nagios 4.5.1 source code. The output shows the command being run at the root prompt.

```
[root@nlab-server centos nagios-4.5.1]# make all_
```

Figure 1.1.20: Compile Nagios 4.5.1 source code

The screenshot shows a terminal window titled 'CentOS 7 64-bit' running on a CentOS 7 host. The terminal displays the Nagios 4.5.1 source code, specifically the 'make install-exfoliation' and 'make install-classicui' sections. It also includes support notes and instructions for reporting issues. The command 'make install' is shown at the bottom.

```
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 troubleshoot. 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@nmb-server-centos nagios-4.5.1]# make install
```

Figure 1.1.21: Nagios 4.5.1 source code compiled

The screenshot shows a terminal window titled 'CentOS 7 64-bit' running on a CentOS 7 host. The command 'make install' is being typed into the terminal, indicated by the cursor position.

```
[root@nmb-server-centos nagios-4.5.1]# make install
```

Figure 1.1.22: Place compiled files into default system path

Figure 1.1.23: Compiled files placed into default system path

CentOS 7 64-bit - VMware Workstation

File Edit View VM Tabs Help

Library Type here to search

My Computer

- CentOS 7 64-bit
- Fedora 64-bit

CentOS 7 64-bit

```
[root@rhel-server-centos nsgios-4.5.1]# make install-init
/usr/bin/mkdir -p /lib/systemd/system
/usr/bin/install -c -m 755 -o root -g root -s startup/default-service /lib/systemd/system/nsgios.service
[root@rhel-server-centos nsgios-4.5.1]#
```

Figure 1.1.24: Install init script

```

root@mlb-server-centos nagios-4.5.1# make install-commandmode
/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/etc
/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/etc/objects
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-nagios.cfg /usr/local/nagios/etc/nagios.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-cgi.cfg /usr/local/nagios/etc/cgi.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-object-templates.cfg /usr/local/nagios/etc/objects/templates.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-template-object-commands.cfg /usr/local/nagios/etc/objects/commands.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-template-object-contacts.cfg /usr/local/nagios/etc/objects/contacts.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-template-object-timeperiods.cfg /usr/local/nagios/etc/objects/timeperiods.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-template-object-localhost.cfg /usr/local/nagios/etc/objects/localhost.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-template-object-windows.cfg /usr/local/nagios/etc/objects/windows.cfg
/bin/install -c -b -m 664 -o nagios -g nagios sample-config-template-object-printer.cfg /usr/local/nagios/etc/objects/printer.cfg
/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-server-centos nagios-4.5.1#

```

Figure 1.1.25: Install sample configuration files

```

root@mlb-server-centos nagios-4.5.1# make install-commandmode
/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/etc
/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/resource
*** External command directory configured ***
root@mlb-server-centos nagios-4.5.1#

```

Figure 1.1.26: Configure external command directory

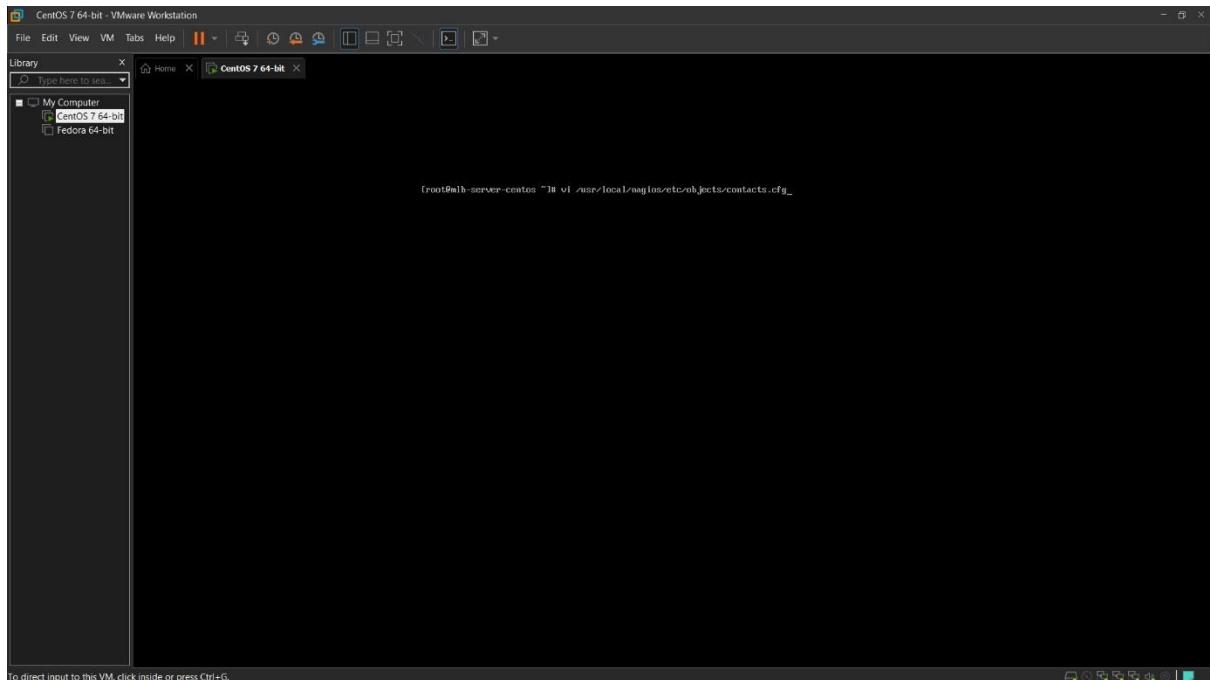


Figure 1.1.27: Modify ‘contacts.cfg’ file

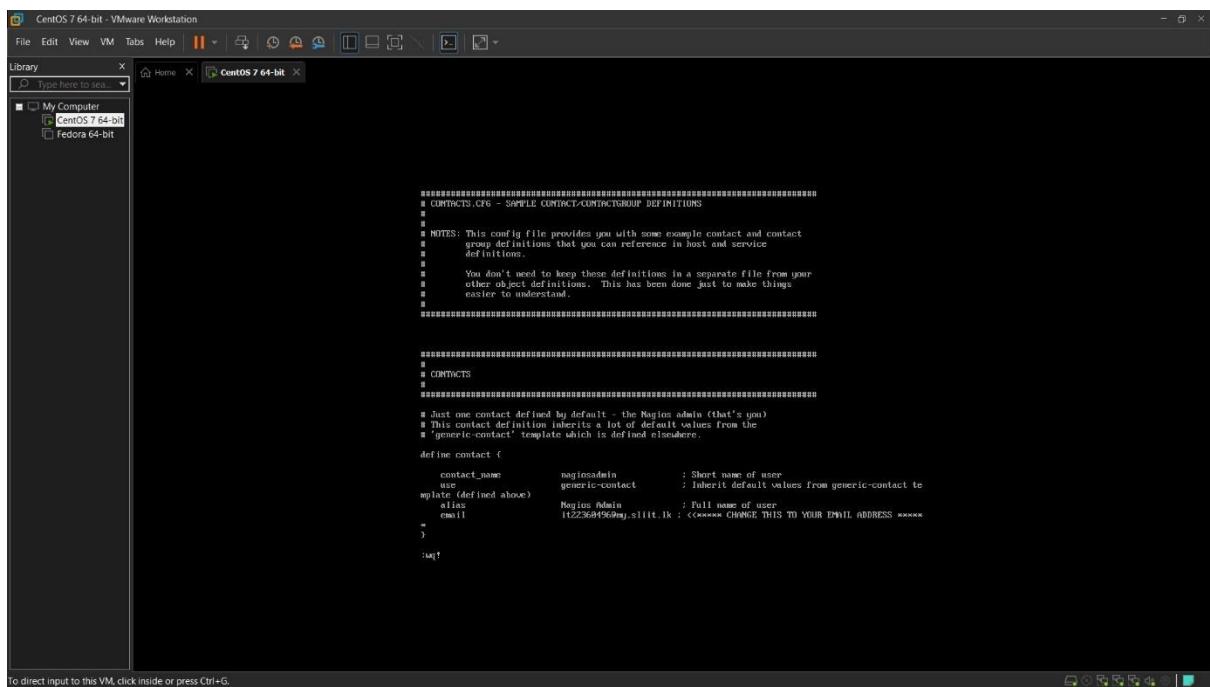
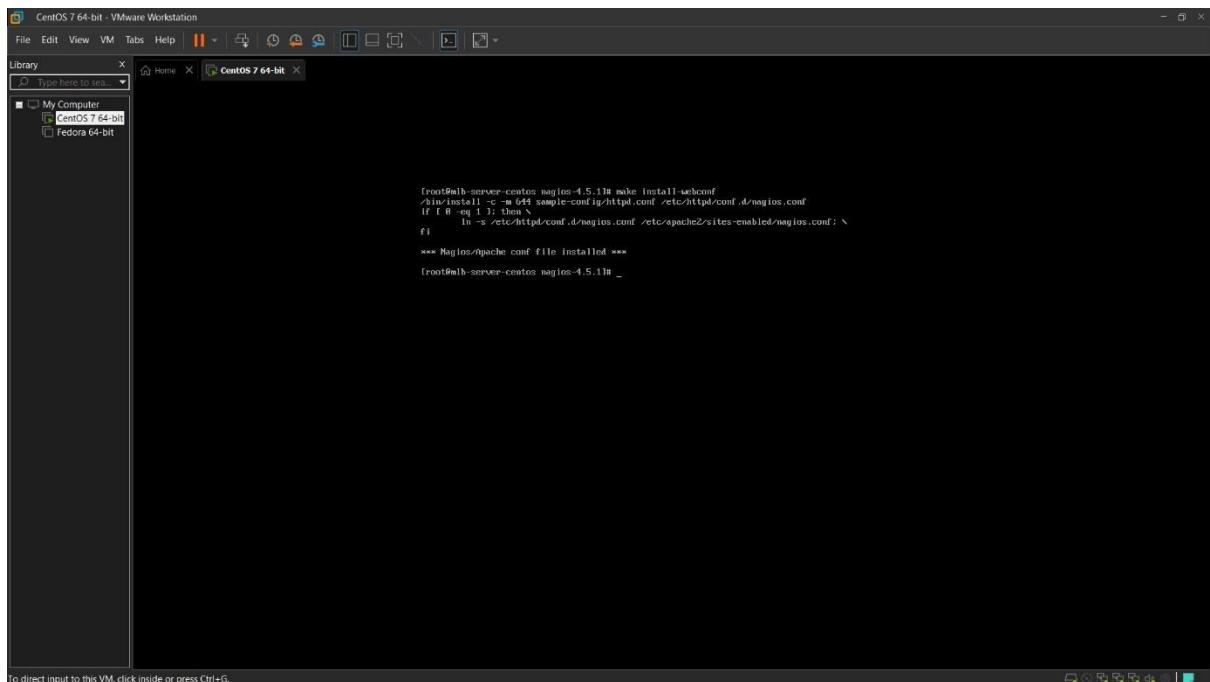
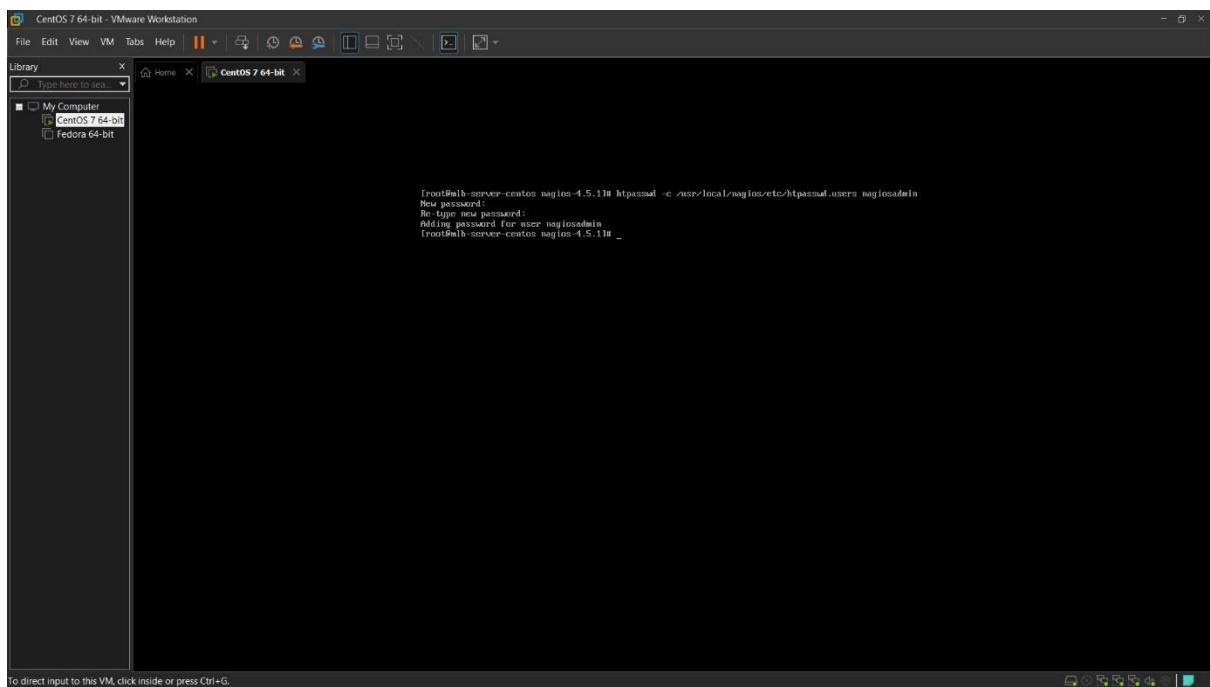


Figure 1.1.28: Change email address of Nagios admin



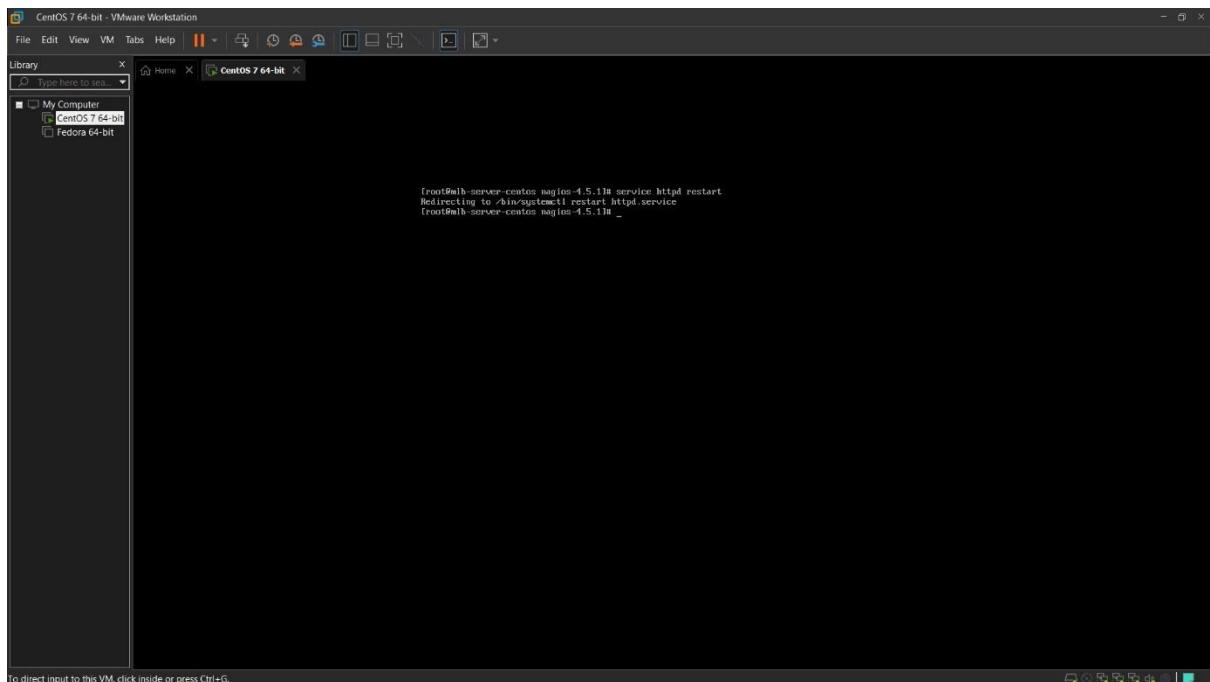
```
root@rhel-server-centos nagios-4.5.1# make install-webconf
>/bin/install -c -m 644 sample-config/httpd.conf /etc/httpd/conf.d/nagios.conf
if [ $? -eq 1 ]; then \
    ln -s /etc/httpd/conf.d/nagios.conf /etc/apache2/sites-enabled/nagios.conf; \
fi
*** Nagios/Apache conf file installed ***
[root@rhel-server-centos nagios-4.5.1]#
```

Figure 1.1.29: Install Nagios/Apache configuration file



```
[root@rhel-server-centos nagios-4.5.1]# htpasswd -c /usr/local/nagios/etc/htpasswd.users nagiosadmin
New password:
Re-type new password:
Adding password for user nagiosadmin
[root@rhel-server-centos nagios-4.5.1]#
```

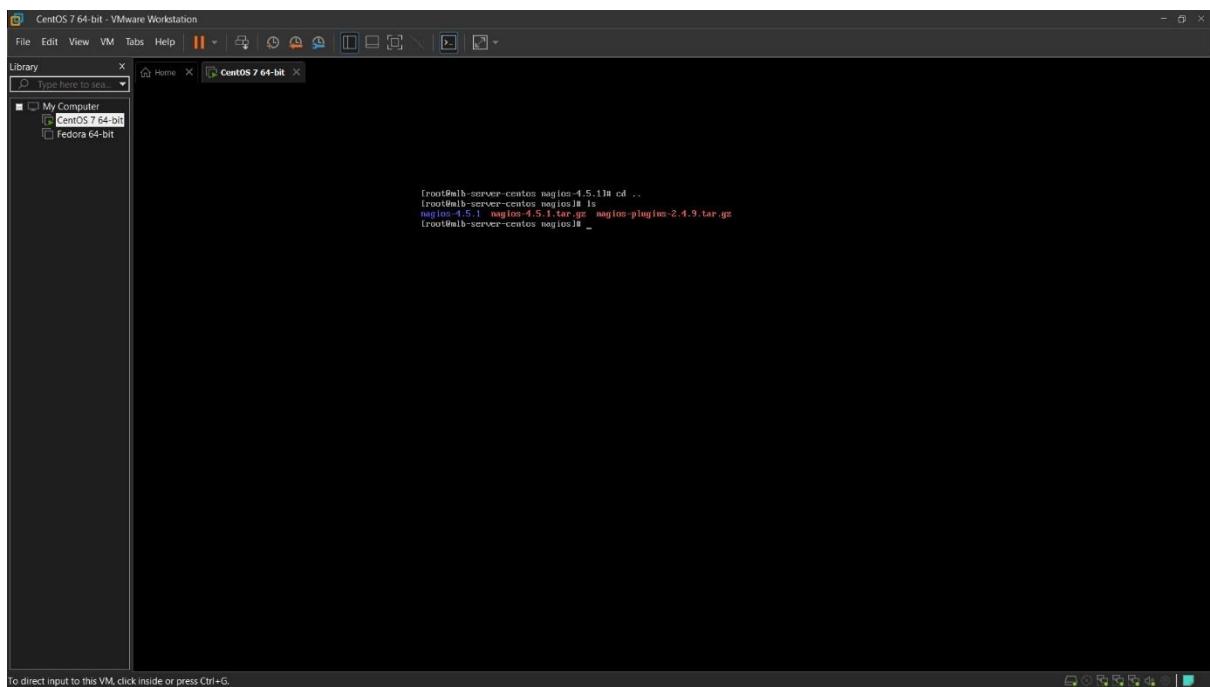
Figure 1.1.30: Create password for Nagios admin



The screenshot shows a terminal window titled 'CentOS 7 64-bit' running on a CentOS 7 host. The terminal displays the command 'service httpd restart' being run as root. The output shows the command being redirected to '/bin/systemctl restart httpd.service'. The terminal window has a dark background and white text. The VMware interface is visible around the window.

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

Figure 1.1.31: Restart Apache web services



The screenshot shows a terminal window titled 'CentOS 7 64-bit' running on a CentOS 7 host. The terminal displays the command 'tar -xzf nagios-4.5.1.tar.gz' being run as root. The output shows the command being redirected to '/bin/tar -xzf nagios-4.5.1.tar.gz'. The terminal window has a dark background and white text. The VMware interface is visible around the window.

```
[root@mlb-server-centos nagios-4.5.1# cd ..
[root@mlb-server-centos nagios-4.5.1# tar -xzf nagios-4.5.1.tar.gz
[root@mlb-server-centos nagios-4.5.1#]
```

Figure 1.1.32: Current contents of ‘nagios’ folder

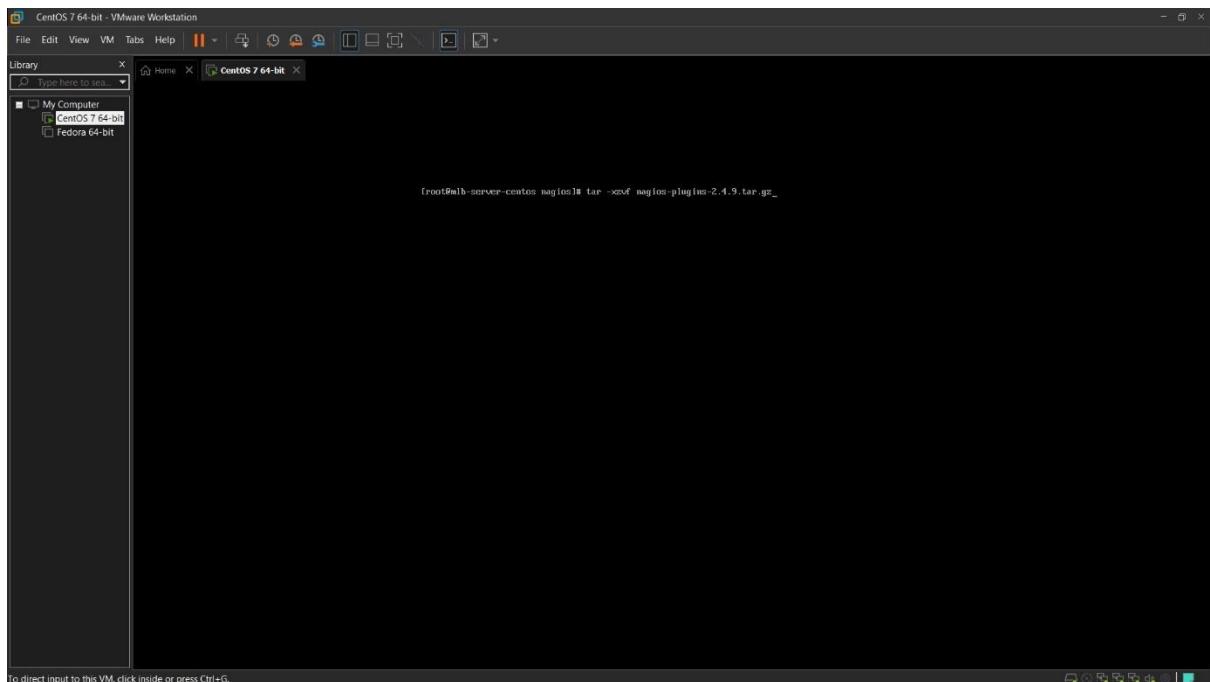


Figure 1.1.33: Extract Nagios Plugins 2.4.9 file

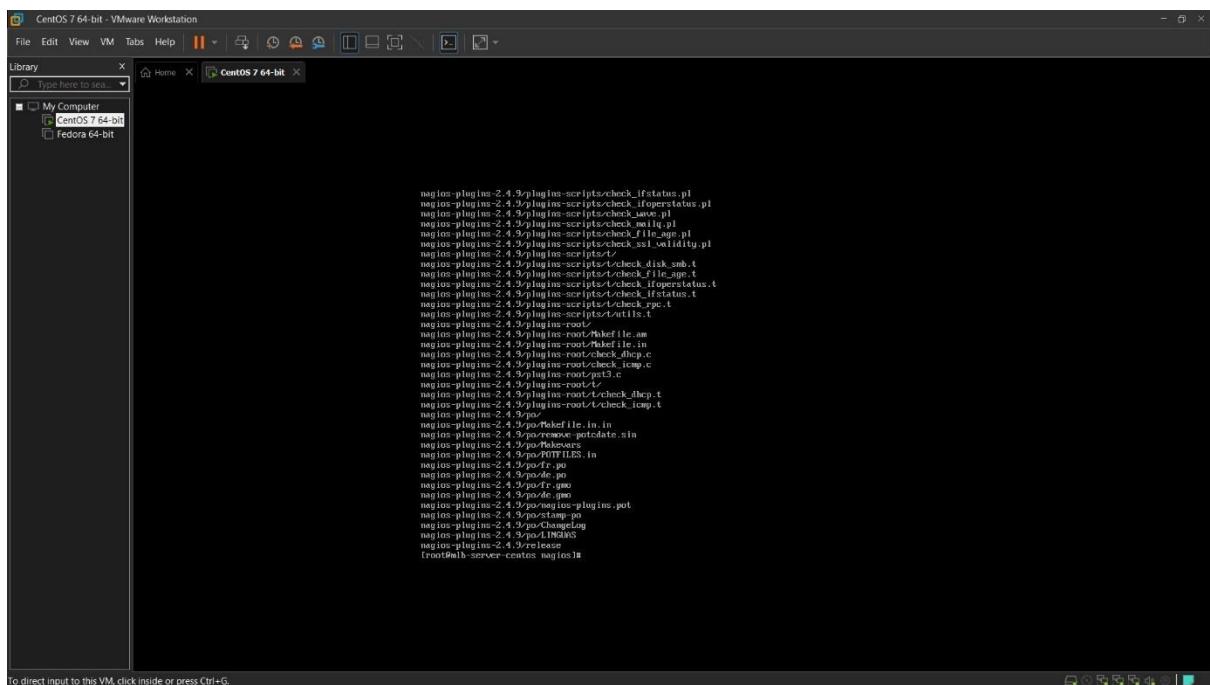


Figure 1.1.34: Nagios Plugins 2.4.9 file extracted

```
[root@localhost ~]# cd ngnios-plugins-2.4.9
[root@localhost ~]# ./configure --prefix=/usr/local/nms
[root@localhost ~]# make
[root@localhost ~]# make install
[root@localhost ~]# ./ngnios-test
[1] 11856 pts/0 S+ 0:00 ./ngnios-test
[root@localhost ~]# ./ngnios-test
[1]+ 11856 pts/0 Stopped ./ngnios-test
```

Figure 1.1.35: Contents of ‘nagios-plugins-2.4.9’ folder

The screenshot shows a VMware Workstation window for a CentOS 7 64-bit VM. The title bar reads "CentOS 7 64-bit - VMware Workstation". The menu bar includes File, Edit, View, VM, Tabs, Help, and various icons. A toolbar with icons for copy, paste, cut, etc., is at the top. The left sidebar is titled "Library" with a search bar "Type here to search...". It lists "My Computer" with entries for "CentOS 7 64-bit" (selected) and "Fedora 64-bit". The main pane is a terminal window titled "CentOS 7 64-bit" with the following command displayed:

```
[root@nagios-server centos nagios-plugins-2.4.9]# ./configure --with-nagios-user=nagios --with-nagios-group=nagios
```

Figure 1.1.36: Check system for required software to build Nagios Plugins 2.4.9

The screenshot shows a terminal window in a CentOS 7 VM. The terminal displays the contents of a Makefile, which includes configuration options like --with-ping, --with-ipinfo, and --enable-perl-modules. The output also shows the configuration process for Nagios plugins, including the creation of various files such as config.h, config.status, and Makefiles for different components like tools, perl modules, and Nagios scripts.

```
--with-ping command: /bin/ping -n -U -w 2d -c 2d -z
--with-ipinfo: yes
--with-wget: no
--with-xml: yes
--with-gnutls: no
--enable-extro-opts: yes
--enable-perl-modules: yes
--with-cgiurl: /nagios/cgi-bin
--with-testsuite: yes
--enable-kmp: no
checking that generated files are newer than configure... done
configure: creating ./config.status
config.status: creating config.h
config.status: creating nagios-plugins.spec
config.status: creating tools/build_perl_modules
config.status: creating Makefile
config.status: creating tools/Makefile
config.status: creating lib/Makefile
config.status: creating perlmods/Makefile
config.status: creating perlscripts/Makefile
config.status: creating perlutils/Makefile
config.status: creating perltests/Makefile
config.status: creating perlscripts/plugininfo
config.status: creating perlscripts/plugininfo
config.status: creating config.h
config.status: config.h is unchanged
config.status: executing aclocal commands
config.status: executing libtool commands
config.status: executing po/directories commands
config.status: creating po/Makefile.in
config.status: creating po/Makefile
```

Figure 1.1.37: Make file generated

The screenshot shows a terminal window in a CentOS 7 VM. The terminal command 'make' is being run, indicated by the prompt '[root@mib-server centos nagios-plugins-2.4.9]# make'. The output shows the compilation process starting with the command 'make'.

```
[root@mib-server centos nagios-plugins-2.4.9]# make
```

Figure 1.1.38: Compile Nagios Plugins 2.4.9 source code

Figure 1.1.39: Nagios Plugins 2.4.9 source code compiled

The screenshot shows a VMware Workstation interface with a terminal window open on a CentOS 7 64-bit VM. The terminal window title is "CentOS 7 64-bit". The command "make install" is visible at the bottom of the screen, indicating a build or deployment process. The desktop environment is a dark-themed desktop.

Figure 1.1.40: Place compiled files into default system path

```

Making install in plugins-root
make[1]: Entering directory '/root/nagios/nagios-plugins-2.4.9/plugins-root'
make[2]: Entering directory '/root/nagios/nagios-plugins-2.4.9/plugins-root'
/bin/install -m 644 ntops -g ntops -f ntops check_dhcp /usr/local/nagios/libexec/check_dhcp
chmod ug+rx,ug+ws /usr/local/nagios/libexec/check_dhcp
/bin/install -m 644 ntops -g ntops -f ntops check_icmp /usr/local/nagios/libexec/check_icmp
chmod ug+rx,ug+ws /usr/local/nagios/libexec/check_icmp
make[2]: Nothing to be done for 'install-data'.
make[1]: Leaving directory '/root/nagios/nagios-plugins-2.4.9/plugins-root'
make[1]: Leaving directory '/root/nagios/nagios-plugins-2.4.9/plugins-root'
Making install in po
make[1]: Entering directory '/root/nagios/nagios-plugins-2.4.9/po'
/bin/mkdir -p /usr/local/nagios/share/gettext/po/
install fr.po as /usr/local/nagios/share/locale/fr/LC_MESSAGES/nagios-plugins.mo
install de.po as /usr/local/nagios/share/locale/de/LC_MESSAGES/nagios-plugins.mo
if test "x$po" != "x" then
  /bin/mkdir -p /usr/local/nagios/share/gettext/po/
  for file in Makefile.in remove-potde.in Makevars.template; do \
    /bin/install -c -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 '/root/nagios/nagios-plugins-2.4.9/po'
make[2]: Entering directory '/root/nagios/nagios-plugins-2.4.9'
make[2]: Entering directory '/root/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[1]: Nothing to be done for 'install-data-am'.
make[1]: Leaving directory '/root/nagios/nagios-plugins-2.4.9'
make[1]: Leaving directory '/root/nagios/nagios-plugins-2.4.9'
[root@mlb-server centos nagios-plugins-2.4.9]#

```

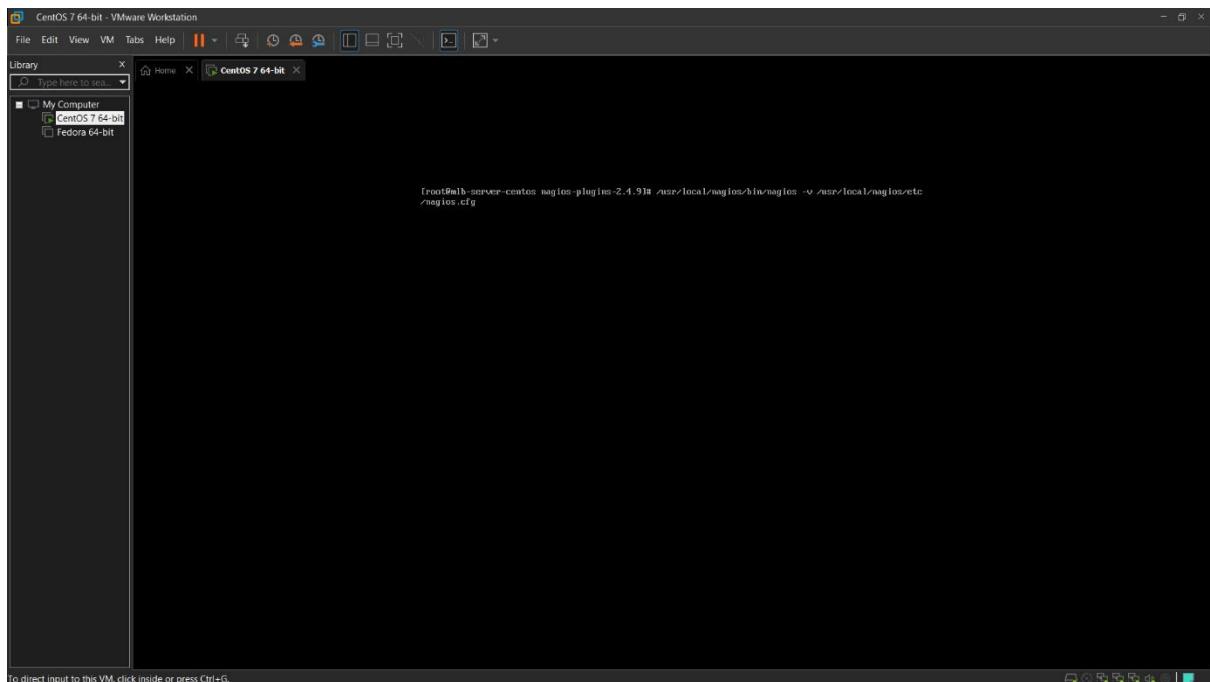
Figure 1.1.41: Compiled files placed into default system path

```

[root@mlb-server centos nagios-plugins-2.4.9]# chkconfig nagios on
Note: Previous request to 'enable' nagios.service
[root@mlb-server centos nagios-plugins-2.4.9]# systemctl start nagios
[root@mlb-server centos nagios-plugins-2.4.9]#

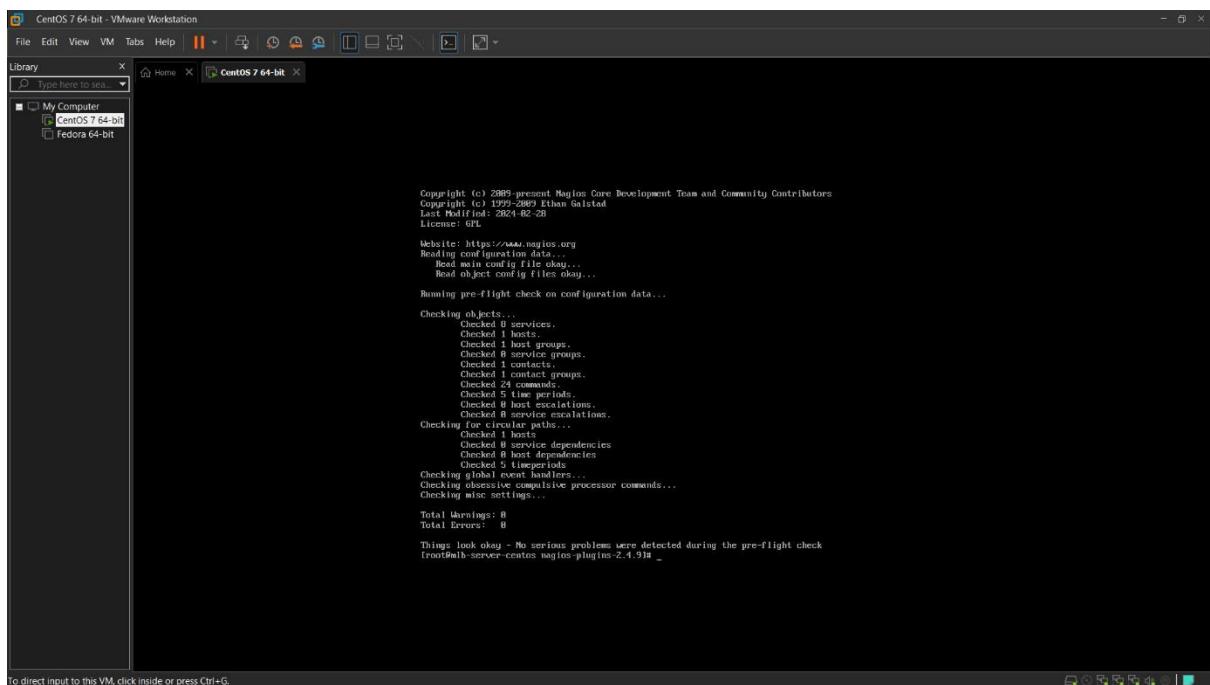
```

Figure 1.1.42: Specify run-level to start Nagios



```
root@nlb-server-centos nagios-plugins-2.4.9]# /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg
```

Figure 1.1.43: Verify configuration



```
Copyright (c) 2009-present Nagios Core Development Team and Community Contributors
Copyright (c) 1999-2009 Ethan Galstad
Last Modified: 2021-02-22
License: GPL

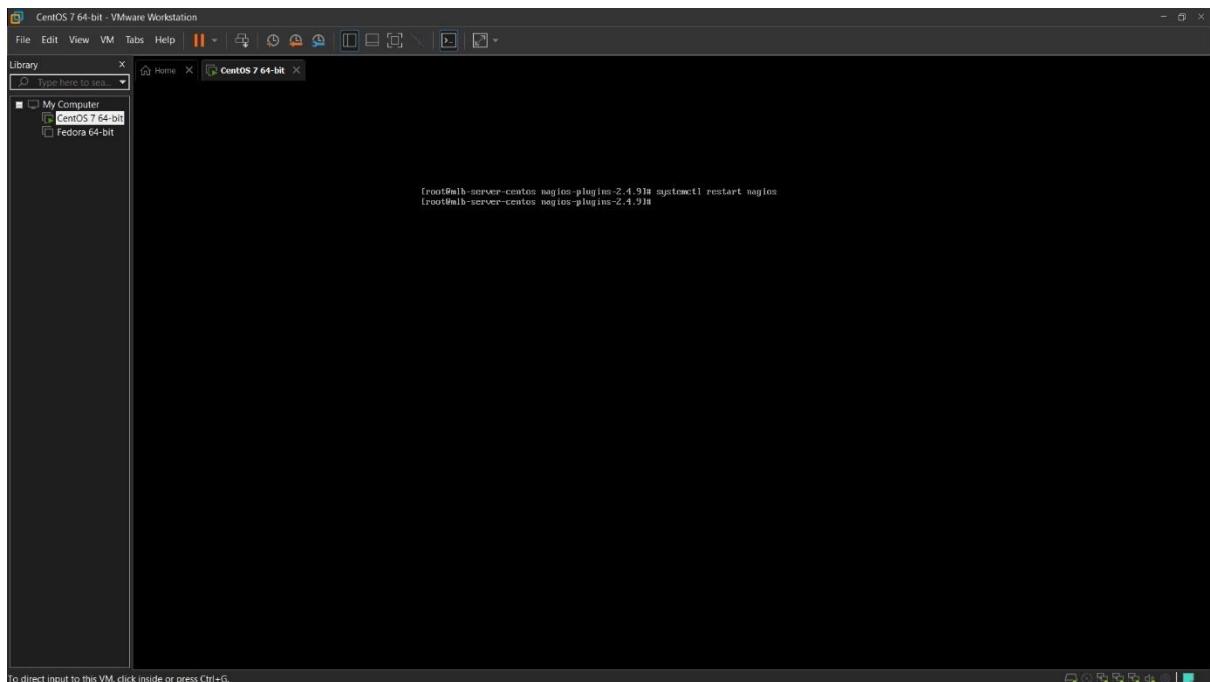
Website: https://www.nagios.org
Reading configuration data...
Read main config file okay...
Read object config files okay...

Running pre-flight check on configuration data...
Checking objects...
    Checked 0 services.
    Checked 1 hosts.
    Checked 1 host groups.
    Checked 0 service groups.
    Checked 1 contacts.
    Checked 1 contact groups.
    Checked 0 service dependencies.
    Checked 5 time periods.
    Checked 0 host escalations.
    Checked 0 service escalations.
    Checked for circular paths...
    Checked 1 hosts
    Checked 0 service dependencies
    Checked 0 host dependencies
    Checked 5 timeperiods
Checking global event handlers...
Checking excessive command processor commands...
Checking misc settings...

Total Warnings: 0
Total Errors: 0

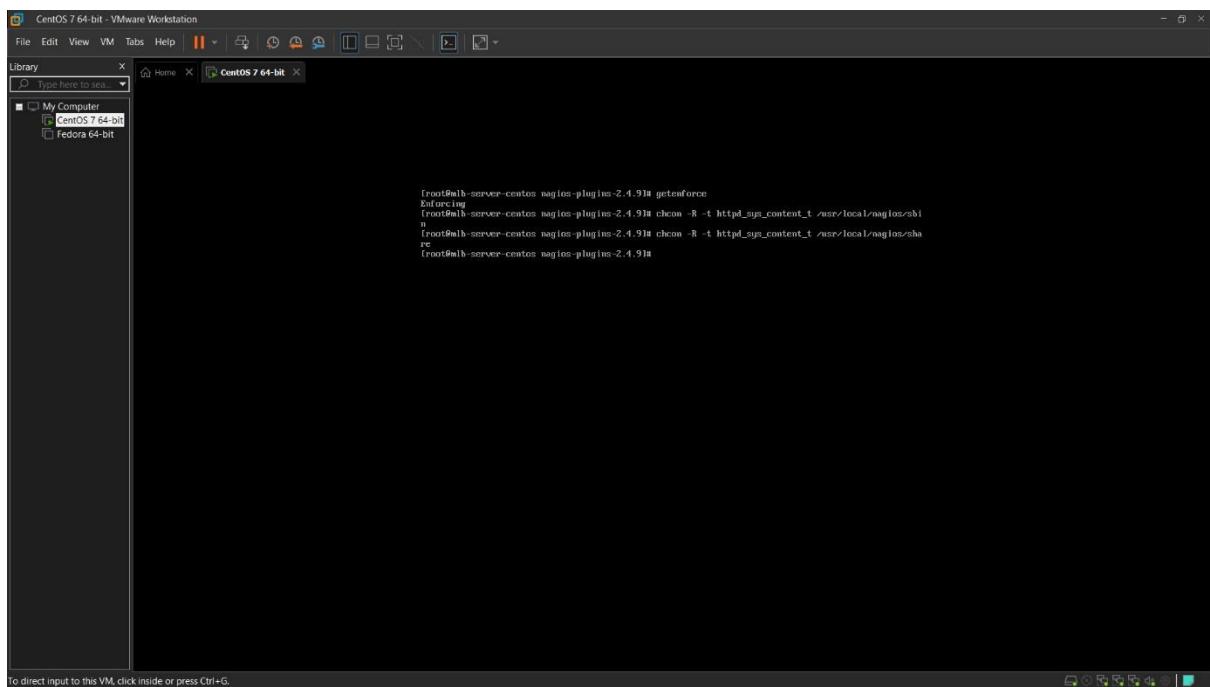
Things look okay - No serious problems were detected during the pre-flight check
(root@nlb-server-centos nagios-plugins-2.4.9]# )
```

Figure 1.1.44: Configuration verified



```
[root@mlb-server-centos nagios-plugins-2.4.9]# systemctl restart nagios
```

Figure 1.1.45: Restart Nagios daemon



```
[root@mlb-server-centos nagios-plugins-2.4.9]# getenforce  
Enforcing  
[root@mlb-server-centos nagios-plugins-2.4.9]# chcon -R -t httpd_sys_content_t /usr/local/nagios/cgi  
n  
[root@mlb-server-centos nagios-plugins-2.4.9]# chcon -R -t httpd_sys_content_t /usr/local/nagios/sha  
re  
[root@mlb-server-centos nagios-plugins-2.4.9]#
```

Figure 1.1.46: Disable Security-Enhanced Linux (SELinux)

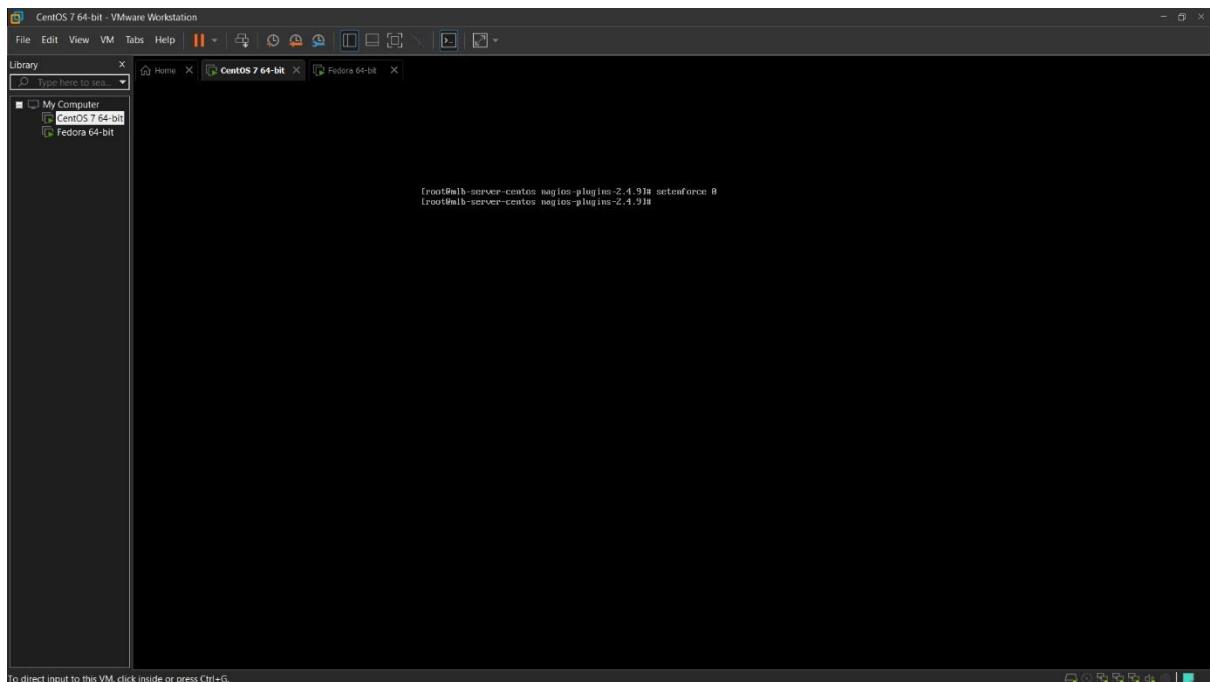


Figure 1.1.47: SELinux disabled

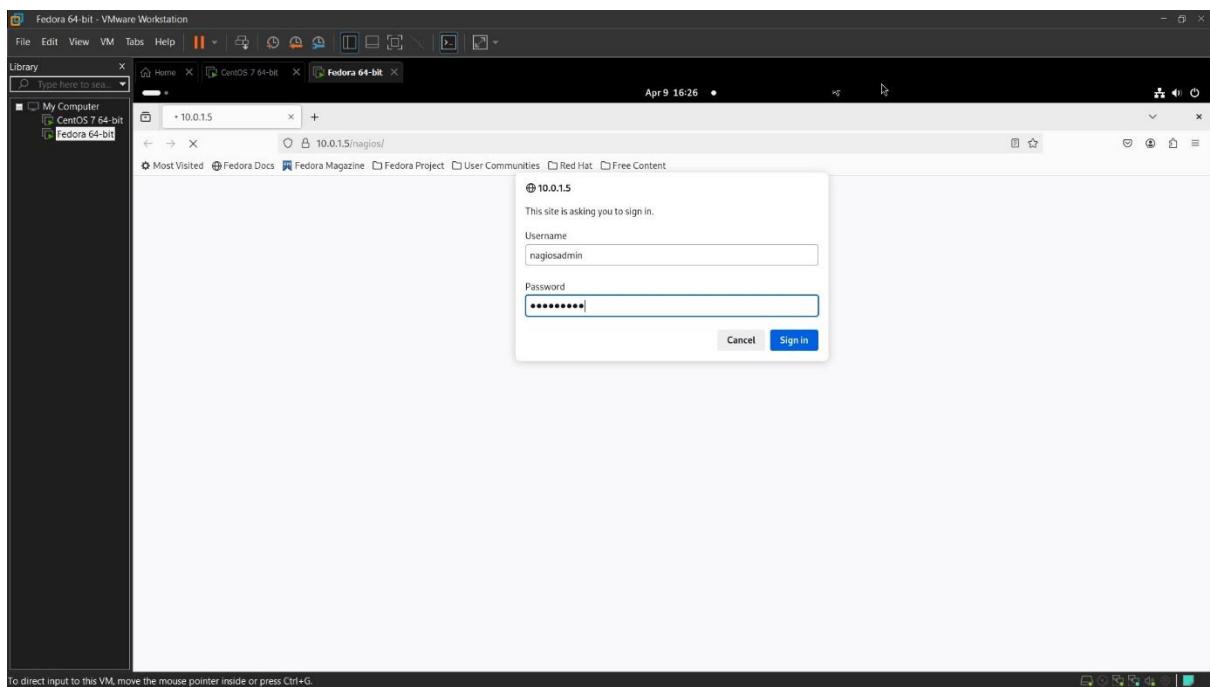


Figure 1.1.48: Sign in as Nagios admin

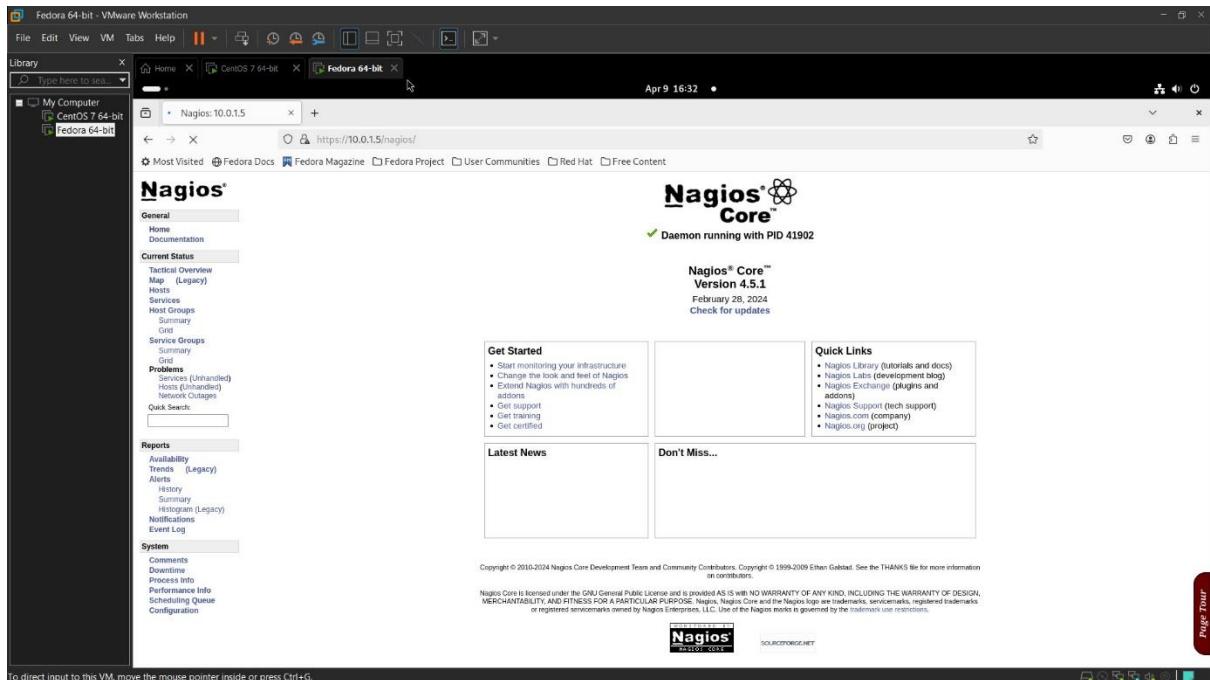


Figure 1.1.49: Nagios Core homepage

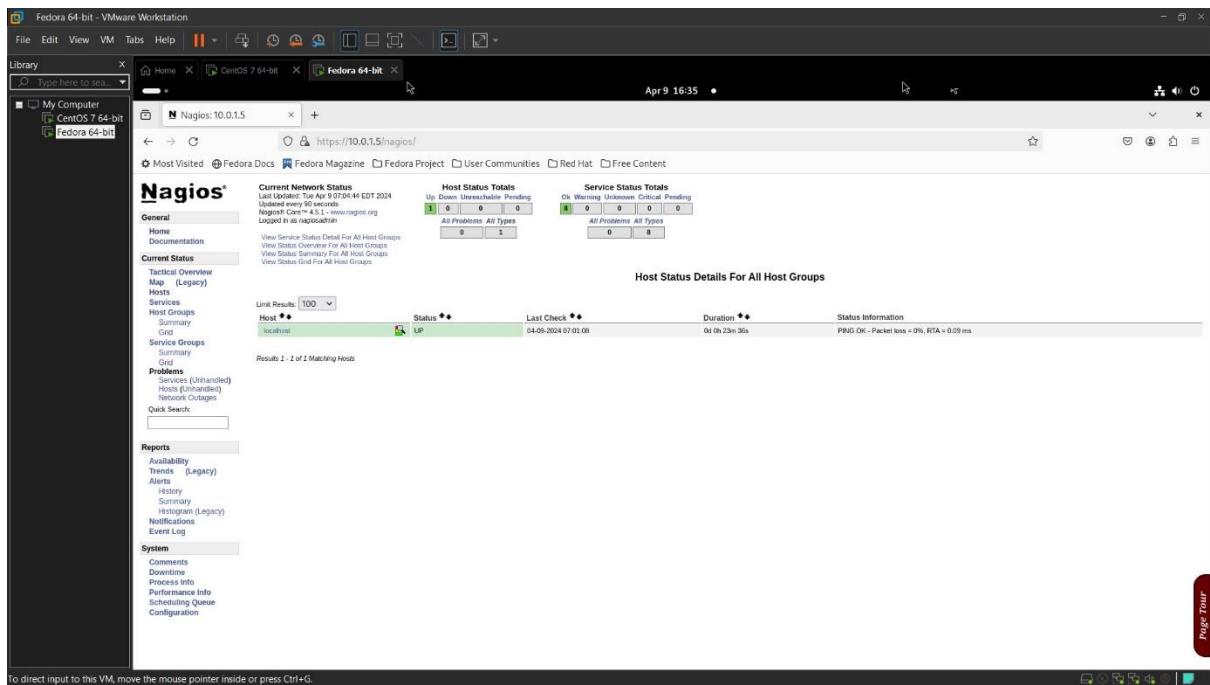


Figure 1.1.50: Host status details for Nagios server

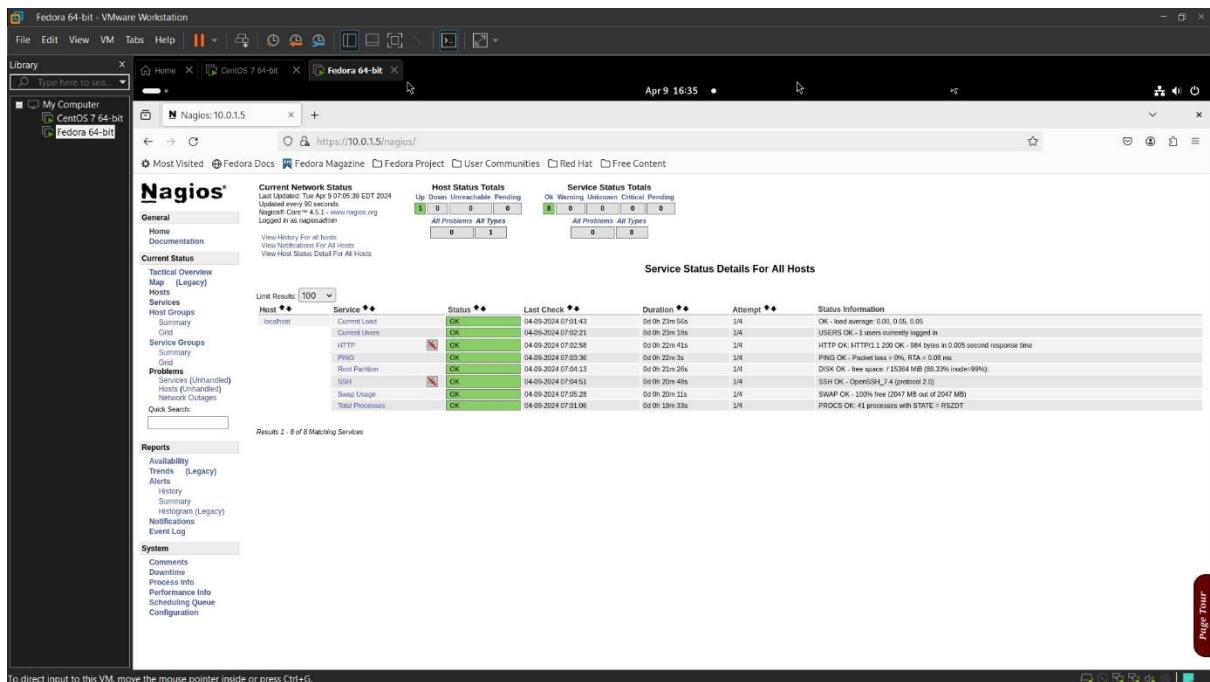


Figure 1.1.51: Service status details for Nagios server

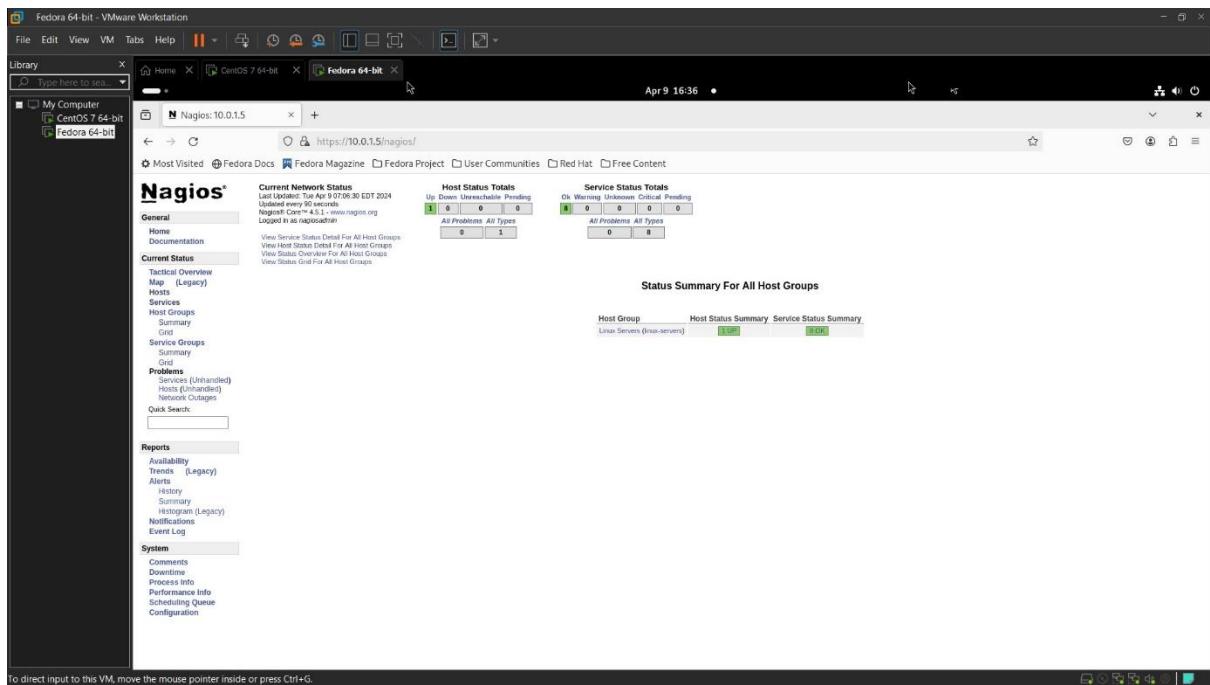


Figure 1.1.52: Status summary for Nagios server host group

1.2 Configuring Nagios Server for Monitoring Fedora Client^[2]

```
Fedora 64-bit - VMware Workstation
File Edit View VM Tabs Help || Library Type here to search
[ Home ] [ CentOS 7.64-bit ] [ Fedora 64-bit ]
[root@mlb-client-fedor ~]# yum install openssl openssl-devel
Last metadata expiration check: 8:06:59 ago on wed 18 Apr 2024 12:25:12 PM +0530.
Dependencies resolved.
=====
Transaction Summary
=====
Install  2 Packages

Total download size: 3.6 M
Installed size: 5.8 M
Is this ok [y/N]: y
Downloaded Packages:
(1/2): openssl-3.1.1-4.fc39.x86_64.rpm           257 kB/s | 1.0 MB  00:04
(2/2): openssl-devel-3.1.1-4.fc39.x86_64.rpm      451 kB/s | 2.6 MB  00:05

Total
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing : 
  Installing  : openssl-devel-3.1.1-4.fc39.x86_64          1/1
  Installing  : openssl-3.1.1-4.fc39.x86_64             1/2
  Running script: openssl-3.1.1-4.fc39.x86_64          2/2
  Verifying   : openssl-3.1.1-4.fc39.x86_64             2/2
  Verifying   : openssl-devel-3.1.1-4.fc39.x86_64        2/2

Installed:
  openssl-1:3.1.1-4.fc39.x86_64
  openssl-devel-1:3.1.1-4.fc39.x86_64

Complete!
[root@mlb-client-fedor ~]#
```

Figure 1.2.1: Install packages for cryptography and secure communication

```
Fedora 64-bit - VMware Workstation
File Edit View VM Tab Help ||| Library

Fedora 64-bit x CentOS 7.6-64bit x Fedora 64-bit x
Type here to search 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
HTTP/2.0 302 Found https://github.com/NagiosEnterprises/nrpe/releases/download/nrpe-4.1.0/nrpe-4.1.0.tar.gz
Content-Type: application/x-tar+gzip
Content-Length: 563KB
Date: Mon, 16 Apr 2024 12:33:45 GMT
Server: GitHub
X-GitHub-Request-Id: 102f5e4a-102f-4130-8f4e-13e6-4e48-939d-2923-0427f8c7x-Amz-Algorithm=AWS4-HMAC-SHA256X-Amz-Credential=AKIAVCDYL5AS3PQK4ZAN2F20240410T073948Zx-Amz-Signature=1d3dc4dd612x&ca2aa092dc5c121846dd0485a4d3a2031712c3c2918x-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=16119653&response-content-disposition=attachment;filename=nrpe-4.1.0.tar.gz&response-content-type=application/octet-stream [following]
--2024-04-16 12:33:45 -- https://objects.githubusercontent.com/github-production-release-asset-26058/16119653/1595281c-13e6-4e48-939d-2923-0427f8c7x-Amz-Algorithm=AWS4-HMAC-SHA256X-Amz-Credential=AKIAVCDYL5AS3PQK4ZAN2F20240410T073948Zx-Amz-Signature=1d3dc4dd612x&ca2aa092dc5c121846dd0485a4d3a2031712c3c2918x-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=16119653&response-content-disposition=attachment;filename=nrpe-4.1.0.tar.gz&response-content-type=application/octet-stream
Saving to: 'nrpe-4.1.0.tar.gz'

nrpe-4.1.0.tar.gz      100%===== 515.85K 563KB/s   in 0.9s

2024-04-16 12:33:45 (563 KB/s) - 'nrpe-4.1.0.tar.gz' saved [526228/528228]

root@elb-client-fedora:~
```

Figure 1.2.2: Download Nagios Remote Plugin Executor (NRPE) 4.1.0

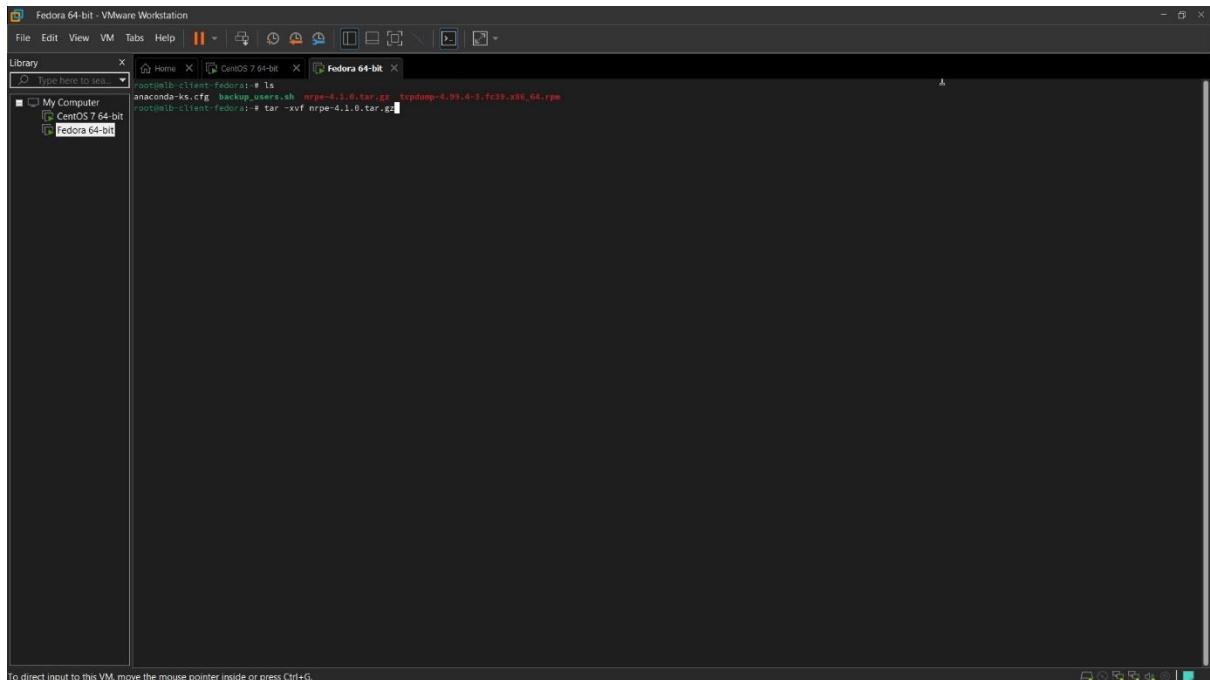


Figure 1.2.3: Extract NRPE 4.1.0 file

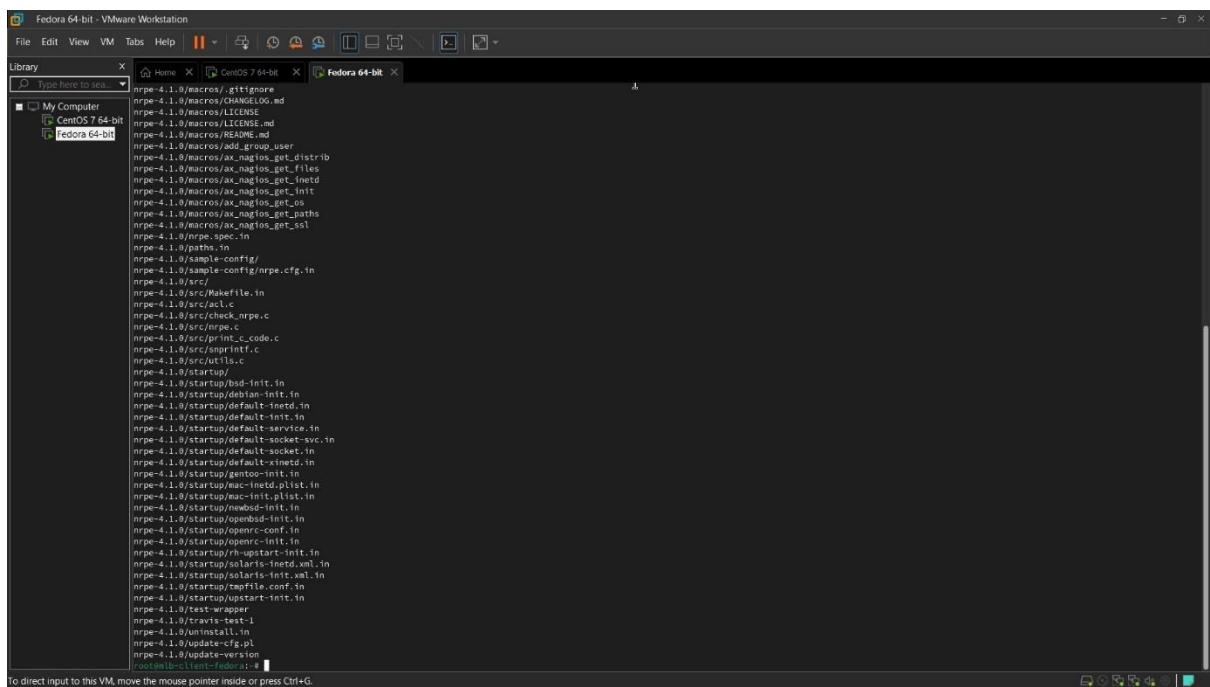


Figure 1.2.4: NRPE 4.1.0 file extracted

The screenshot shows a terminal window titled "Fedora 64-bit" running on a Fedora 64-bit VM in VMware Workstation. The terminal displays the output of the command "ls" in the directory "/root@mlb-client-fedora:~/nrpe-4.1.0". The listed files include: anaconda-ks.cfg, backup_update.sh, COPYING-4.1.0, nrpe-4.1.0.tar.gz, tcpdump-4.99.4-3.fc39.x86_64.rpm, aclocal.m4, CHANGETLOG.md, configure.ac, CONTRIBUTING.md, include, LICENSE.md, Makefile.in, paths.in, README.SSL.md, SECURITY.md, startup, THANKS, uninstall.in, update-version, build-aux, configure, contrib, docs, LEGAL, Macros, nrpe.spec.in, README.ed, sample-config, src, test-wrapper, travis-test-1, update-cfg.pl, and root@mlb-client-fedora:~/nrpe-4.1.0\$.

Figure 1.2.5: Contents of ‘nrpe-4.1.0’ folder

The screenshot shows a terminal window titled "Fedora 64-bit" running on a Fedora 64-bit VM in VMware Workstation. The terminal displays the command "root@mlb-client-fedora:~# yum groupinstall "Development Tools"|" being typed by the user.

Figure 1.2.6: Install "Development Tools" group

Figure 1.2.7: "Development Tools" group installed

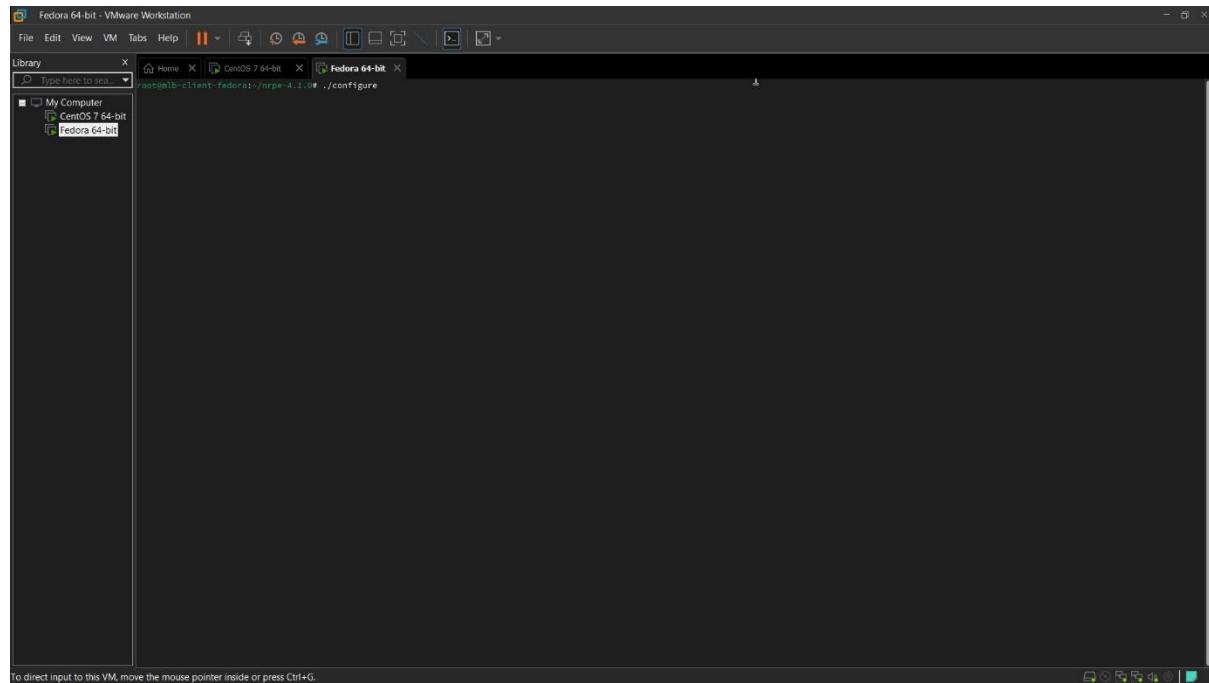


Figure 1.2.8: Check system for required software to build NRPE 4.1.0

Figure 1.2.9: Configuration summary for NRPE 4.1.0

Fedora 64-bit - VMware Workstation

File Edit View VM Tab Help | || | | | | | | | | | |

Library Type here to search

My Computer CentOS 7 64-bit Fedora 64-bit

cd /src/; make
make[1]: Entering directory '/root/nrpe-4.1.0/src'
gcc -g -O2 -DNMVE_CONFIG_H -I ../../include -I ./ -I ./include -o nrpe ./nrpe.c ./utils.c ./acl.c -lssl -lcrypto
gcc -g -O2 -DNMVE_CONFIG_H -I ../../include -I ./ -I ./include -o check_nrpe ./check_nrpe.c ./utils.c -lssl -lcrypto
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@mlb-client-fedora:~/nrpe-4.1.0#

Figure 1.2.10: Compile NRPE source code

Fedora 64-bit - VMware Workstation

File Edit View VM Tabs Help

Library Type here to search

My Computer

CentOS 7 64-bit

Fedora 64-bit

```
root@mlb-client-fedoras: /nprc 4.1.0# useradd nagios
root@mlb-client-fedoras: /nprc 4.1.0# # make install
cd ./src; ./make install
make[1]: Entering directory '/root/nprc-4.1.0/src'
make[2]: Entering directory '/root/nprc-4.1.0/src'
make[2]: Entering directory '/root/nprc-4.1.0/src'
/usr/bin/install -c -m 755 -d /usr/local/nagios/bin
/usr/bin/install -c -m 775 ..uninstall /usr/local/nagios/bin/nprc-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_nprc /usr/local/nagios/libexec
make[2]: Leaving directory '/root/nprc-4.1.0/src'
make install-daemon
make[2]: Entering directory '/root/nprc-4.1.0/src'
/usr/bin/install -c -m 755 -d /usr/local/nagios/bin
/usr/bin/install -c -m 775 ..uninstall /usr/local/nagios/bin/nprc-uninstall
/usr/bin/install -c -m 755 nprc /usr/local/nagios/bin
/usr/bin/install -c -m 775 -o nagios -g nagios -d /usr/local/nagios/bin
/usr/bin/install -c -m 775 -d /usr/lib/tmpfiles.d
/usr/bin/install -c -m 644 /etc/init.d/nprc /usr/lib/tmpfiles.d/nprc.conf
make[2]: Entering directory '/root/nprc-4.1.0/src'
make[1]: Leaving directory '/root/nprc-4.1.0/src'
root@mlb-client-fedoras: /nprc 4.1.0#
```

Figure 1.2.11: Add user and place compiled files into default system path

Figure 1.2.12: Enable repository for a service that listens for incoming requests over the network and launches the appropriate service for that request

```
Fedora 64-bit - VMware Workstation
File Edit View VM Tabs Help ||| 🔍
Library Type here to search
Home CentOS 7.6.1804 x Fedora 64-bit
CentOS-7-Server-x86_64-1804.iso
CentOS 7.6.1804
Fedora 64-bit
Dependencies resolved.
Package           Architecture      Version            Repository          Size
=====
Installing:
  xinetd           x86_64          2:2.3.15-34.fc39
                                         copr:copr.fedorainfracloud.org:brandfb:xinetd
Transaction summary
=====
Install 1 Package

Total download size: 125 k
Installed size is 44 k
Is this ok [y/N]: y
Downloading Packages:
xinetd-2.3.15-34.fc39.x86_64.rpm
Total
Copr rep for xinetd owned by brandfb
Importing GPG key 0x3C0E6E3:
  Userid : "brandfb@xinetd@copr.fedorahosted.org"
  Fingerprint: 9E5E C109 8A72 921C D347 78CA 4273 887C 25C9 E6E3
  From   : https://download.copr.fedorainfracloud.org/results/brandfb/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 scriptlets: xinetd-2:2.3.15-34.fc39.x86_64
Created symlink /etc/systemctl/system/multi-user.target.wants/xinetd.service → /usr/lib/systemd/system/xinetd.service.

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

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

Complete!
root@mlb-client-fedora:~#
```

Figure 1.2.13: Install xinetd

Fedora 64-bit - VMware Workstation

File Edit View VM Tab Help

Library Type here to search

My Computer CentOS 7 64-bit Fedora 64-bit

Home CentOS 7 64-bit Fedora 64-bit

```
[root@mlb-client-fedora:~/nrpe-4.1.0]# cd sample-config/
[root@mlb-client-fedora:~/nrpe-4.1.0/sample-config]# ls
nrpe.cfg  nrpe.cfg.in
[root@mlb-client-fedora:~/nrpe-4.1.0/sample-config]#
```

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

Figure 1.2.14: Contents of ‘sample-config’ folder

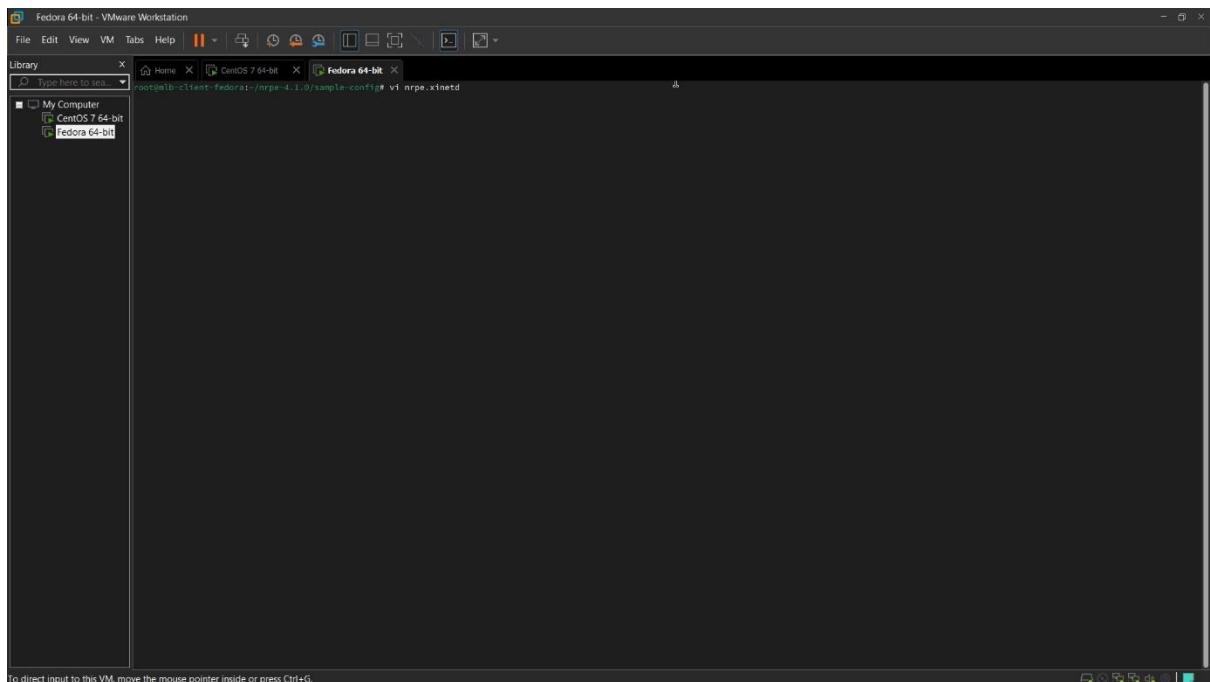


Figure 1.2.15: Create ‘nrpe.xinetd’ file

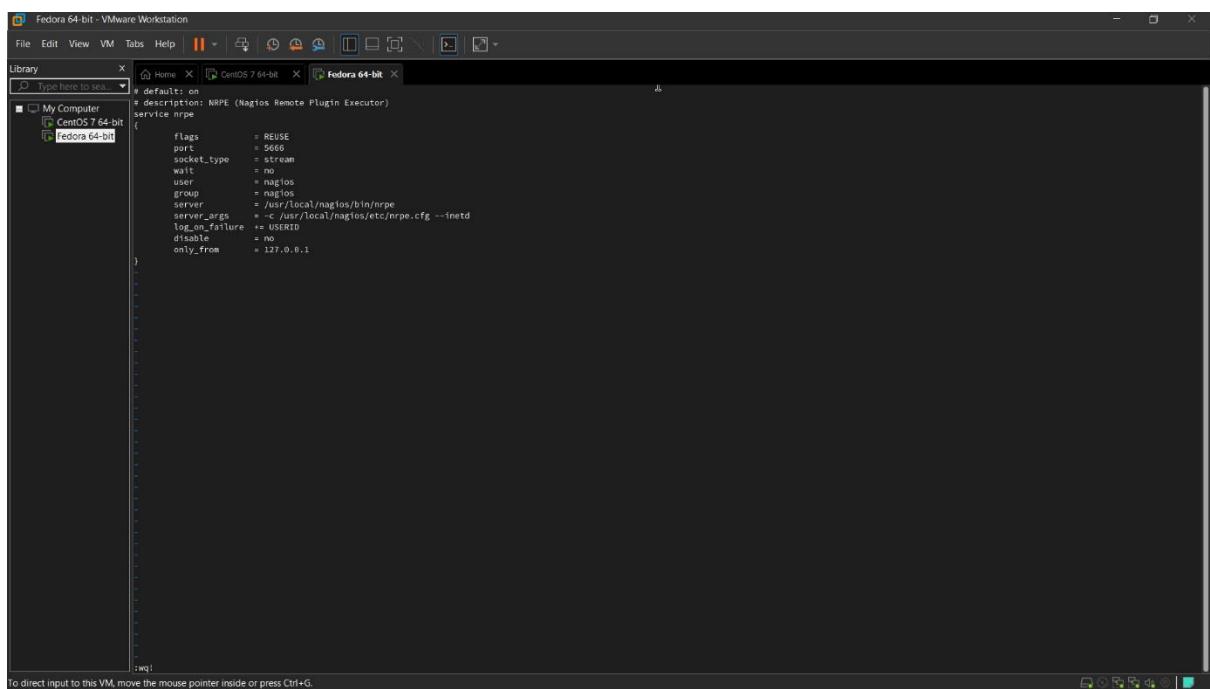
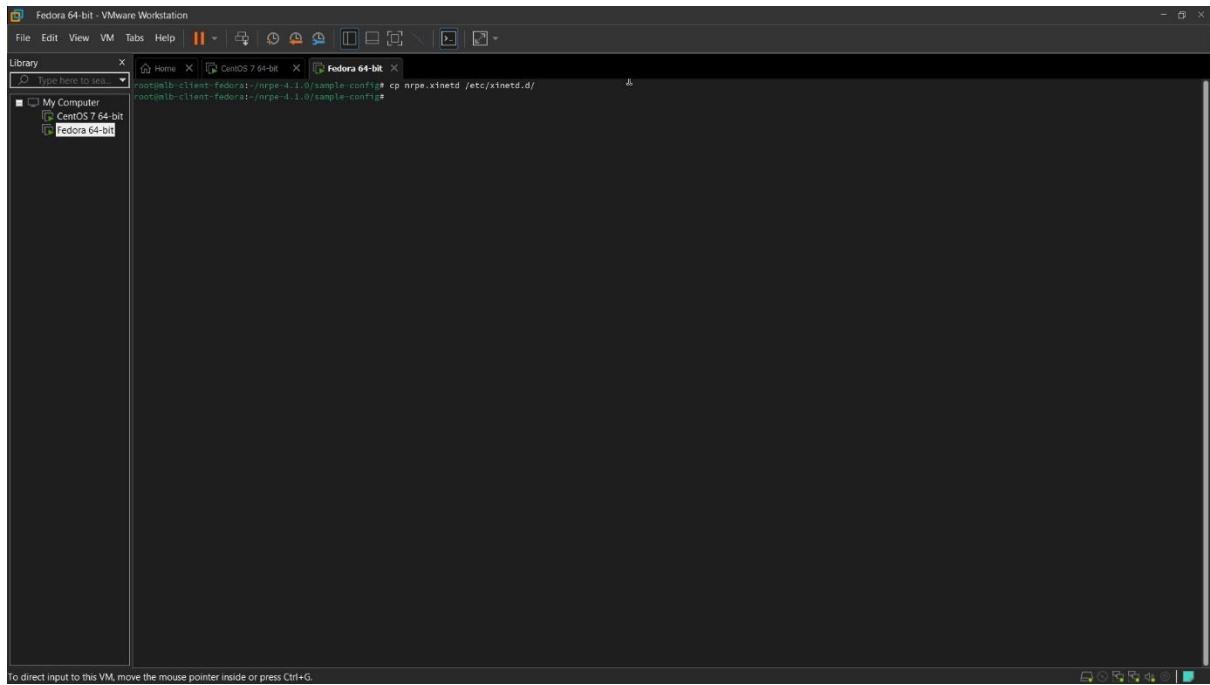


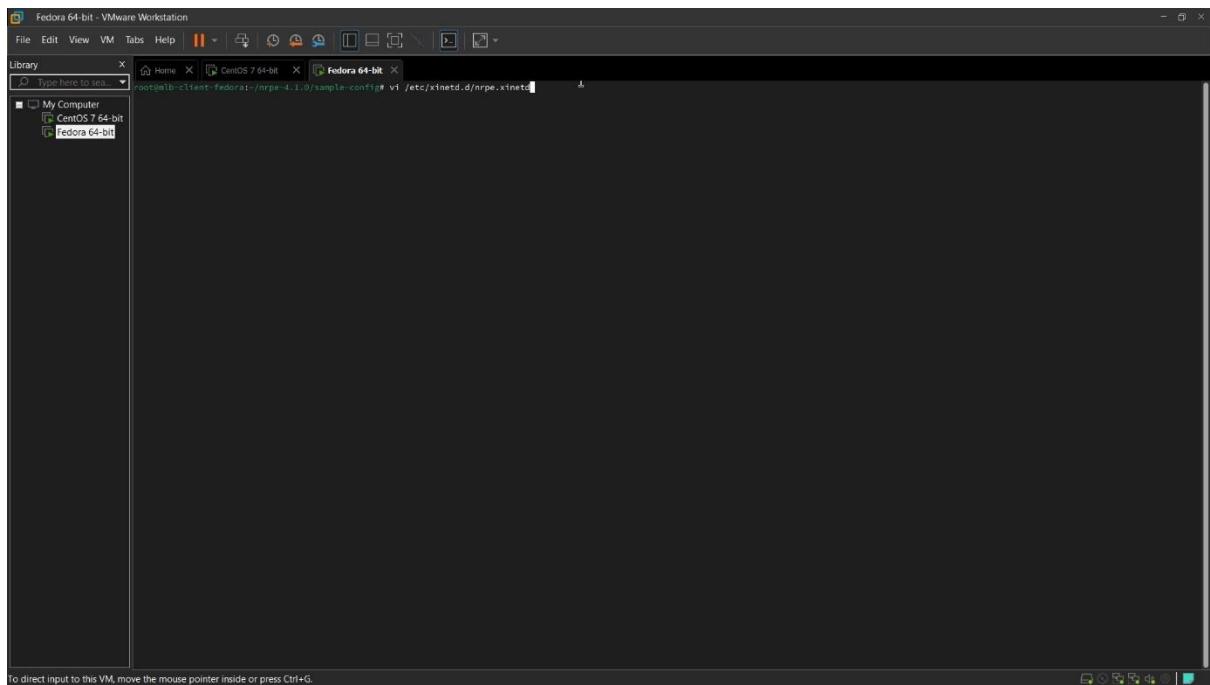
Figure 1.2.16: ‘nrpe.xinetd’ file created



The screenshot shows a VMware Workstation window titled "Fedora 64-bit - VMware Workstation". Inside, there are two tabs: "Home" and "Fedora 64-bit". The "Fedora 64-bit" tab is active and displays a terminal session. The command entered is:

```
root@lb-client-fedora:~/nrgpe-4.1.0/sample-config# cp nrpe.xinetd /etc/xinetd.d/
```

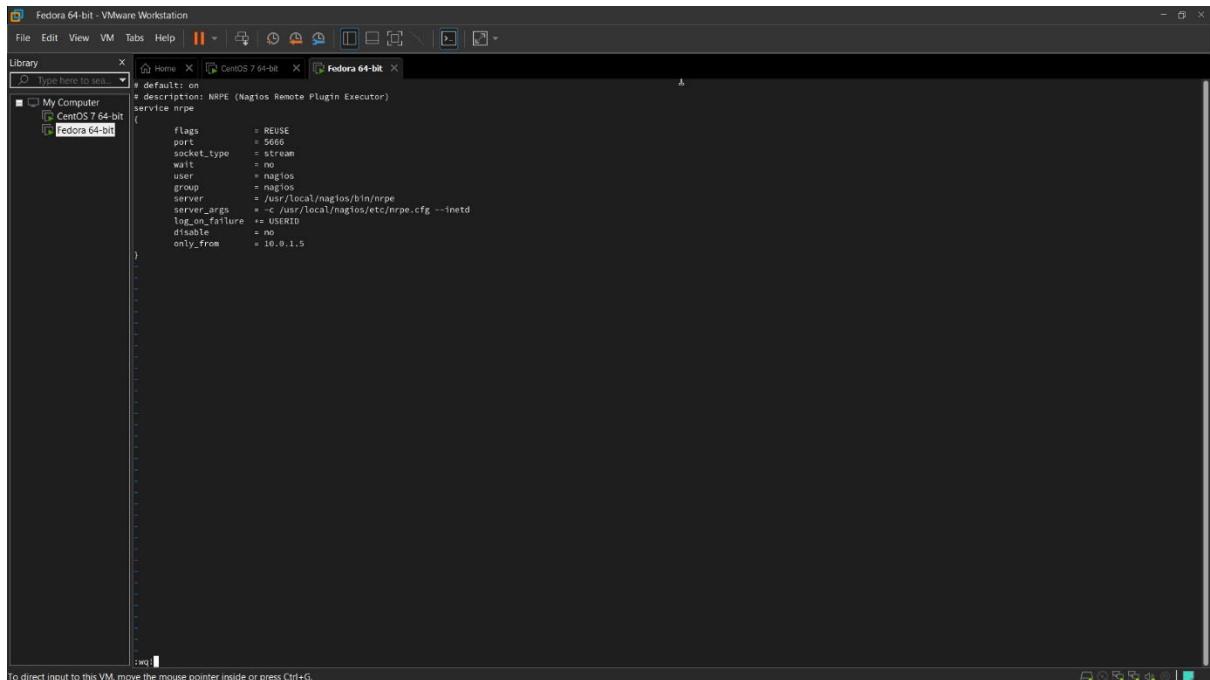
Figure 1.2.17: Copy file into directory containing xinetd configuration files



The screenshot shows a VMware Workstation window titled "Fedora 64-bit - VMware Workstation". Inside, there are two tabs: "Home" and "Fedora 64-bit". The "Fedora 64-bit" tab is active and displays a terminal session. The command entered is:

```
root@lb-client-fedora:~/nrgpe-4.1.0/sample-config# vi /etc/xinetd.d/nrpe.xinetd
```

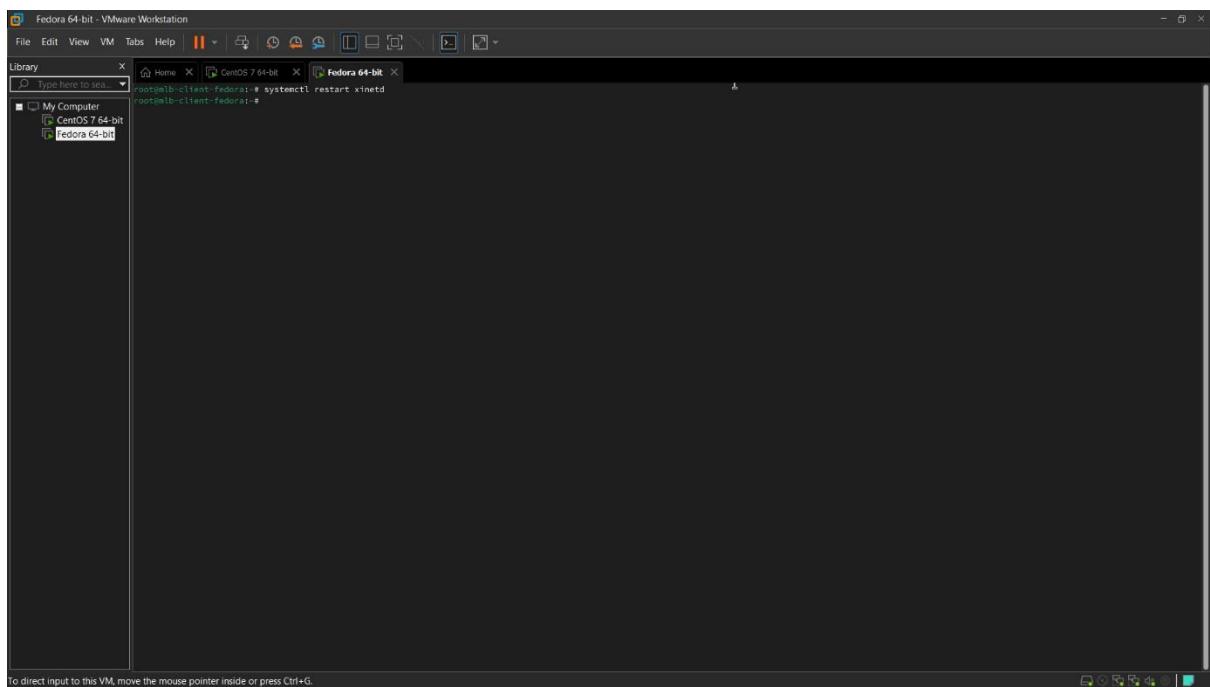
Figure 1.2.18: Edit the xinetd configuration file for NRPE service on port 5666



The screenshot shows a terminal window titled "Fedora 64-bit" running on a Fedora 64-bit VM in VMware Workstation. The terminal displays the contents of the NRPE xinetd configuration file, which includes settings for port 5666, user nagios, group nagios, and server /usr/local/nagios/bin/nrpe. The configuration file also specifies command-line arguments and log-on failure handling.

```
# 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        =
    only_from     = 10.0.1.5
}
```

Figure 1.2.19: NRPE xinetd configuration file edited



The screenshot shows a terminal window titled "Fedora 64-bit" running on a Fedora 64-bit VM in VMware Workstation. The terminal shows the command "systemctl restart xinetd" being run by a root user on a system labeled "mlb-client-federal".

```
root@mlb-client-federal:~# systemctl restart xinetd
root@mlb-client-federal:~#
```

Figure 1.2.20: Restart xinetd service

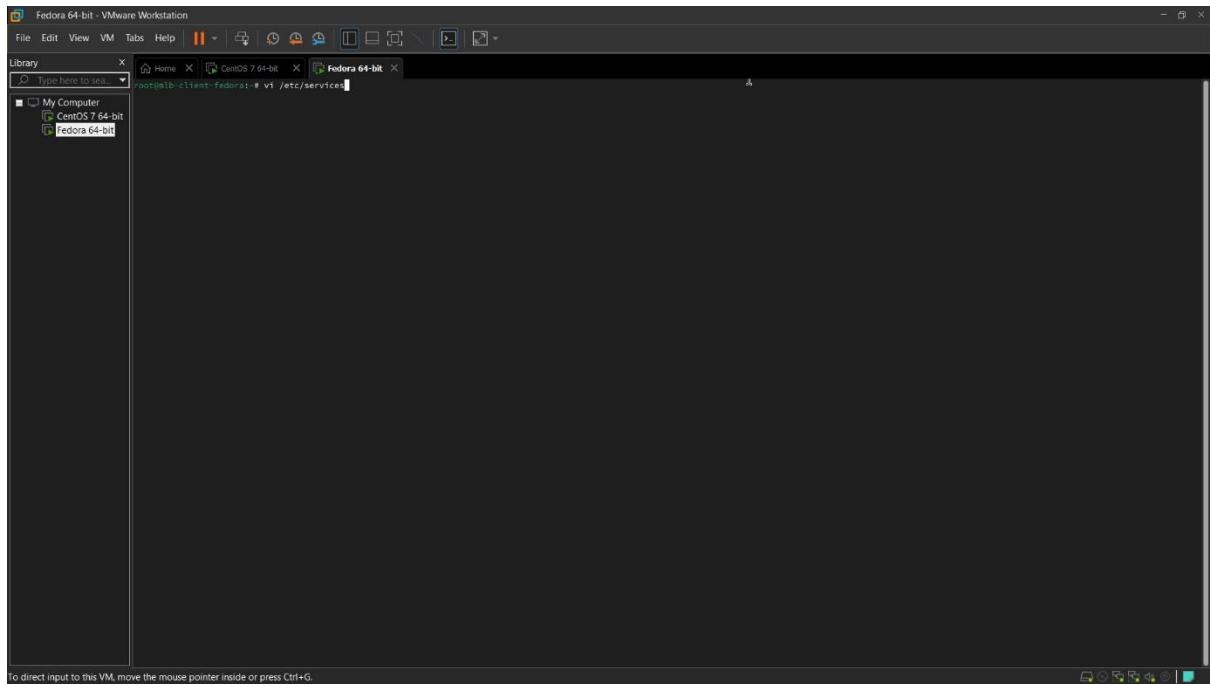


Figure 1.2.21: Check the configuration file that maps port numbers to named services

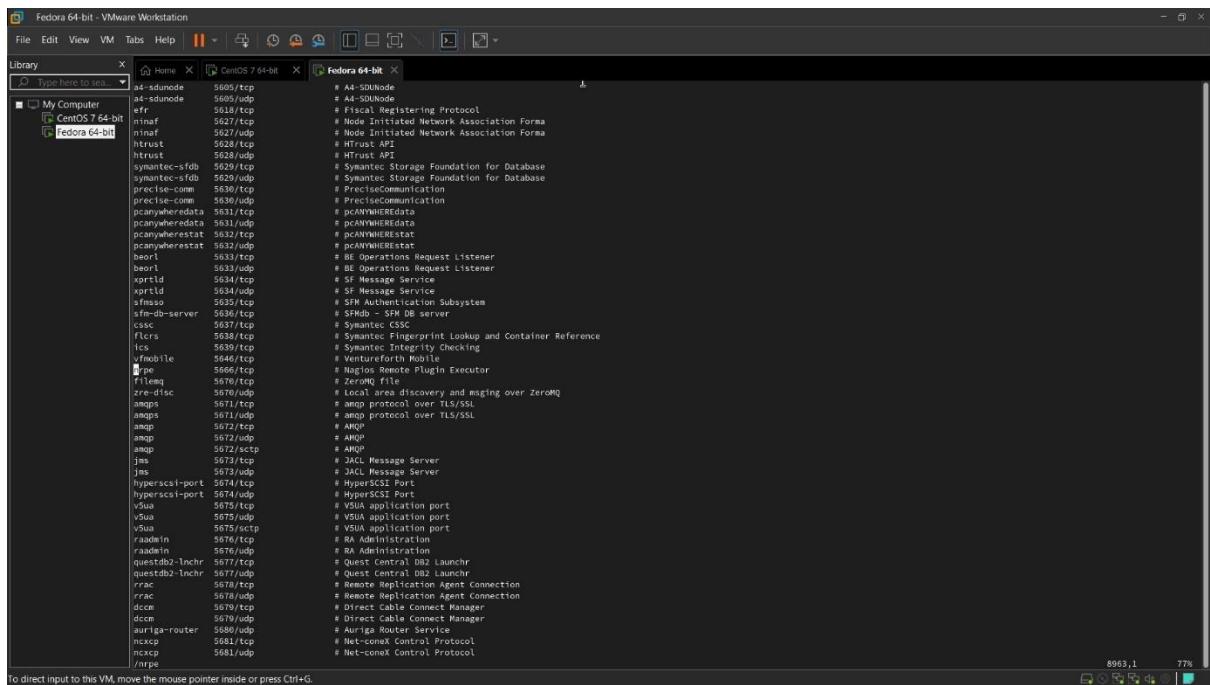


Figure 1.2.22: NRPE entry is present

The screenshot shows a terminal window titled "Fedora 64-bit - VMware Workstation". The terminal is displaying the contents of a file named "nrpe.cfg". The file contains configuration settings for the NRPE (Nagios Remote Plugin Executor) service. Key settings include:

```
# Default: on
# description: NRPE (Nagios Remote Plugin Executor)
service nrpe
{
    flags          = REUSE
    port           = 5665
    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 += useNMD
    disable        = no
    only_from     = 127.0.0.1
}
```

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

Figure 1.2.23: Check the path to be created for NRPE configuration file

The screenshot shows a terminal window titled "Fedora 64-bit - VMware Workstation". The terminal is displaying the command "mkdir /usr/local/nagios/etc/" being run by a root user. The command is completed successfully.

```
root@mlb-client-fedorat:~# mkdir /usr/local/nagios/etc/
root@mlb-client-fedorat:~#
```

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

Figure 1.2.24: Path for NRPE configuration file created

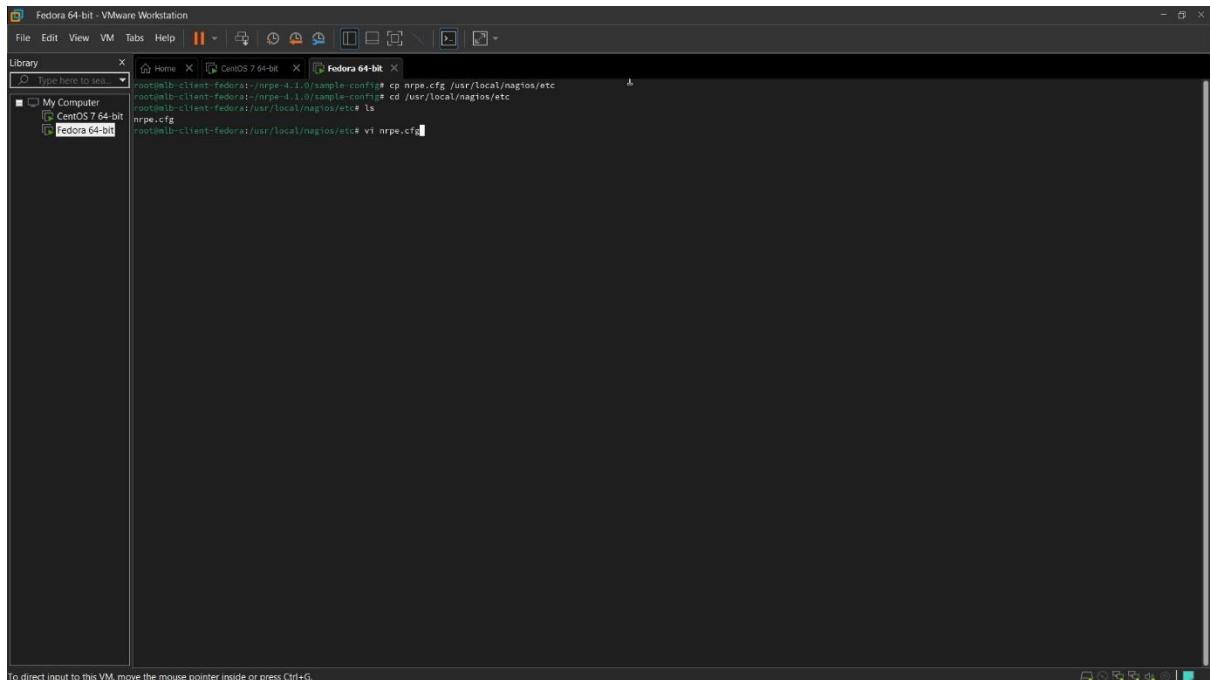


Figure 1.2.25: Copy NRPE configuration file to the path and edit the file

```
# 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.
#
# NOTE: This option is ignored if NRPE is running under either inetd or xinetd
nrpe_group=nagios

# ALLOWED HOST ADDRESSES
# This is an optional comma-delimited list of IP address or hostnames
# that are allowed to talk to the NRPE daemon. Network addresses with a bit mask
# (i.e. 192.168.1.0/24) are also supported. Hostname wildcards are not currently
# supported.
#
# Note: The daemon only does rudimentary checking of the client's IP
# address. I would highly recommend adding entries in your /etc/hosts.allow
# file to allow only the specified host to connect to the port
# you are running this daemon on.
#
# NOTE: This option is ignored if NRPE is running under either inetd or xinetd
allowed_hosts=127.0.0.1,10.0.1.5
```

Figure 1.2.26: Change server address and allowed hosts in the file

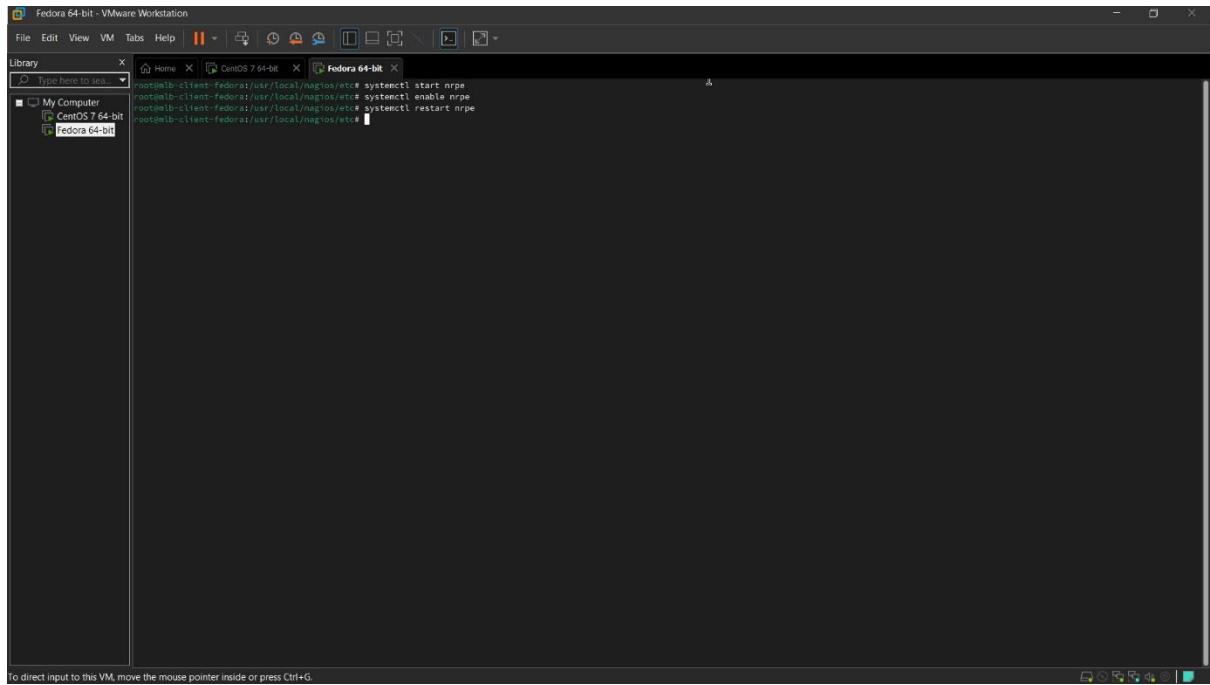


Figure 1.2.27: Start and enable NRPE

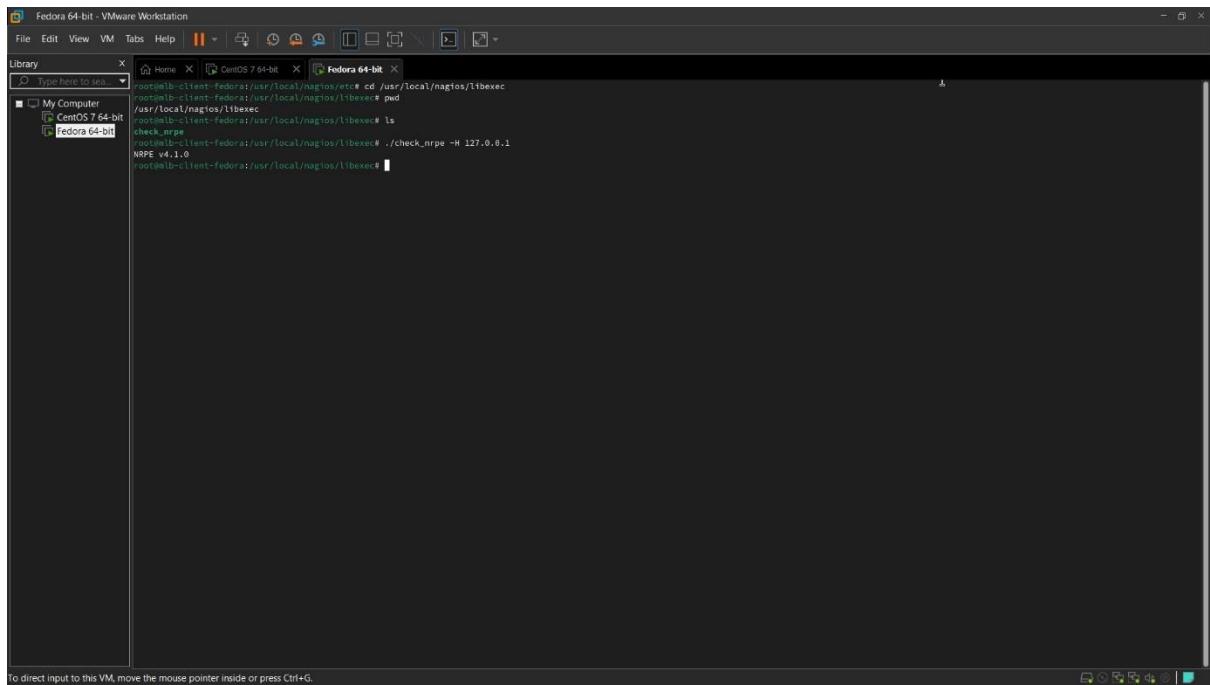


Figure 1.2.28: Test NRPE plugin

Figure 1.2.29: Install Linux firewall

The screenshot shows a VMware Workstation interface with a single running VM titled "Fedora 64-bit". The VM's desktop environment is visible, featuring a dark theme with white text. In the foreground, a terminal window is open, displaying a command-line session. The user has navigated to the directory "/etc/sysconfig/" and is listing files. The terminal output is as follows:

```
root@mlb-client-fedora: ~ cd /etc/sysconfig
root@mlb-client-fedora: /etc/sysconfig # ll
total 12
drwxr-xr-x 2 root root 4096 Dec 10 11:45 .
drwxr-xr-x 1 root root 4096 Dec 10 11:45 ..
-rw-r--r-- 1 root root  128 Dec 10 11:45 anaconda
-rw-r--r-- 1 root root  128 Dec 10 11:45 console
-rw-r--r-- 1 root root  128 Dec 10 11:45 firewalld
-rw-r--r-- 1 root root  128 Dec 10 11:45 htcacheclean
-rw-r--r-- 1 root root  128 Dec 10 11:45 ip6tables-config
-rw-r--r-- 1 root root  128 Dec 10 11:45 iptables-config
-rw-r--r-- 1 root root  128 Dec 10 11:45 kdump
-rw-r--r-- 1 root root  128 Dec 10 11:45 livesys
-rw-r--r-- 1 root root  128 Dec 10 11:45 modules
-rw-r--r-- 1 root root  128 Dec 10 11:45 network-scripts
-rw-r--r-- 1 root root  128 Dec 10 11:45 nrope
-rw-r--r-- 1 root root  128 Dec 10 11:45 raid-check
-rw-r--r-- 1 root root  128 Dec 10 11:45 run-parts
-rw-r--r-- 1 root root  128 Dec 10 11:45 saslauthd
-rw-r--r-- 1 root root  128 Dec 10 11:45 sshd
-rw-r--r-- 1 root root  128 Dec 10 11:45 unbound
-rw-r--r-- 1 root root  128 Dec 10 11:45 zfs-fuse
-rw-r--r-- 1 root root  128 Dec 10 11:45
root@mlb-client-fedora: /etc/sysconfig # vi iptables
```

Figure 1.2.30: Contents of '/etc/sysconfig' folder

Figure 1.2.31: Edit iptables configuration file to add TCP port 5666 and port 80

```
Fedora 64-bit - VMware Workstation
File Edit View VM Tab Help || | Library
Type here to search
Home CentOS 7.6.18 x Fedora 64-bit x
$ sudo systemctl restart iptables
$ sudo systemctl status iptables
● iptables.service - IPv4 Firewall with iptables
   Loaded: loaded /usr/lib/systemd/system/iptables.service; disabled; preset: disabled
   Drop-In: /usr/lib/systemd/system/iptables.d
             └─ 10-persistent-net.rules
     Active: active (running) since Wed 2024-04-10 14:40:14 +0530; 3s ago
       Process: 28485 ExecStart=/usr/libexec/iptables/iptables.init start (code=exited, status=0/SUCCESS)
      Main PID: 28485 (code=exited, status=0/SUCCESS)
         CPU: 22ms
Apr 10 14:40:14 mlb-client-fedora.cs.lk systemd[1]: Starting IPv4 Firewall with iptables...
Apr 10 14:40:14 mlb-client-fedora.cs.lk iptables.init[28485]: iptables: Applying firewall rules: [ OK ]
Apr 10 14:40:14 mlb-client-fedora.cs.lk systemd[1]: Finished iptables.service - IPv4 Firewall with iptables.
root@mlb-client-fedora:/etc/sysconfig|
```

Figure 1.2.32: Restart the firewall

Fedora 64-bit - VMware Workstation

File Edit View VM Tabs Help

Library Type here to see... ▾

Fedora 64-bit CentOS 7.6.4-bit Fedora 64-bit

```
[root@lib-client fedora:/etc/sysconfig]# iptables --list
Chain INPUT (policy ACCEPT)
  target     prot opt source               destination
  ACCEPT    tcp  --  anywhere             anywhere             tcp dpt:http
  ACCEPT    all  --  anywhere             anywhere            state RELATED,ESTABLISHED
  ACCEPT    icmp --  anywhere            anywhere
  ACCEPT    all  --  anywhere             anywhere
  ACCEPT    tcp  --  anywhere             anywhere           state NEW tcp dpt:sshd
  ACCEPT    tcp  --  anywhere             anywhere           state NEW tcp dpt:nrpe
  REJECT   all  --  anywhere             anywhere           reject-with icmp-host-prohibited

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@lib-client fedora:/etc/sysconfig]#
```

Figure 1.2.33: List of iptables entries

CentOS 7 64-bit - VMware Workstation

File Edit View VM Tabs Help | || | | | | | | | | | | | | | | | | | |

Library Type here to search

My Computer

CentOS 7 64-bit

Fedora 64-bit

[root@mlb-server-centos ~]# cd /usr/local/magics/etc
[root@mlb-server-centos etc]# ls
cgi.cfg cgi.cfg* httppasswd.users magics.cfg magics.cfg* objects resource.cfg resource.cfg*
[root@mlb-server-centos etc]#

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.2.34: Contents of directory containing Nagios server configuration file

Figure 1.2.35: Content of ‘nagios.cfg’ file

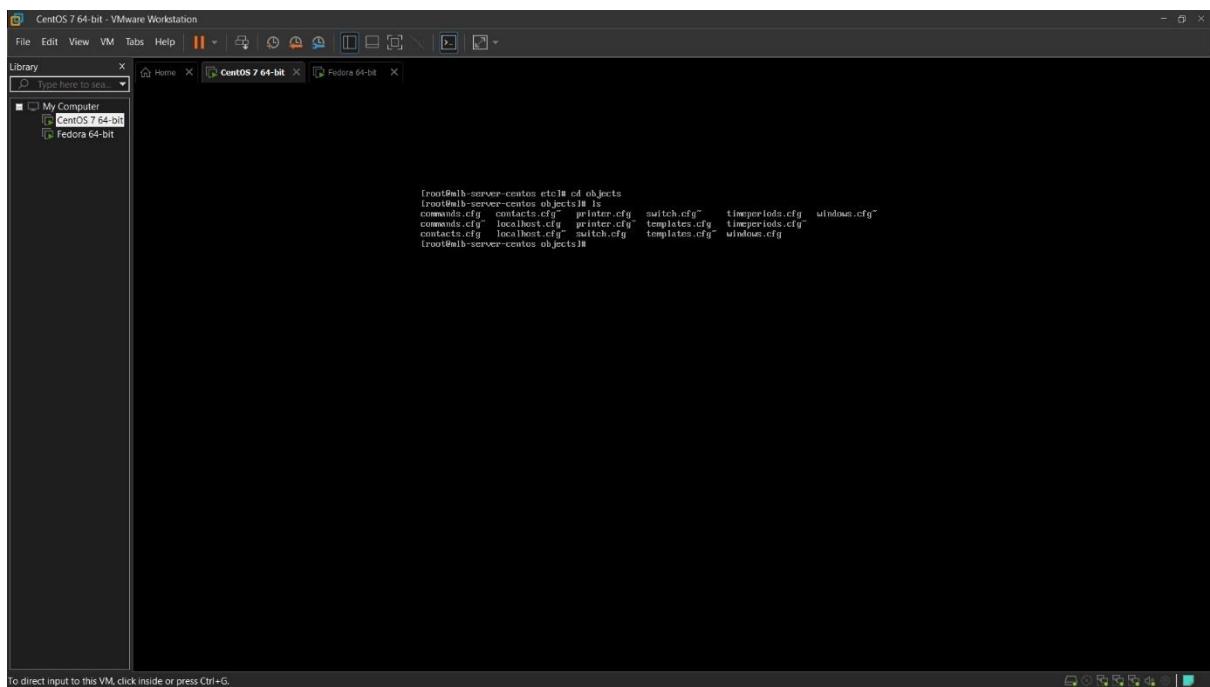


Figure 1.2.36: Contents of ‘objects’ folder

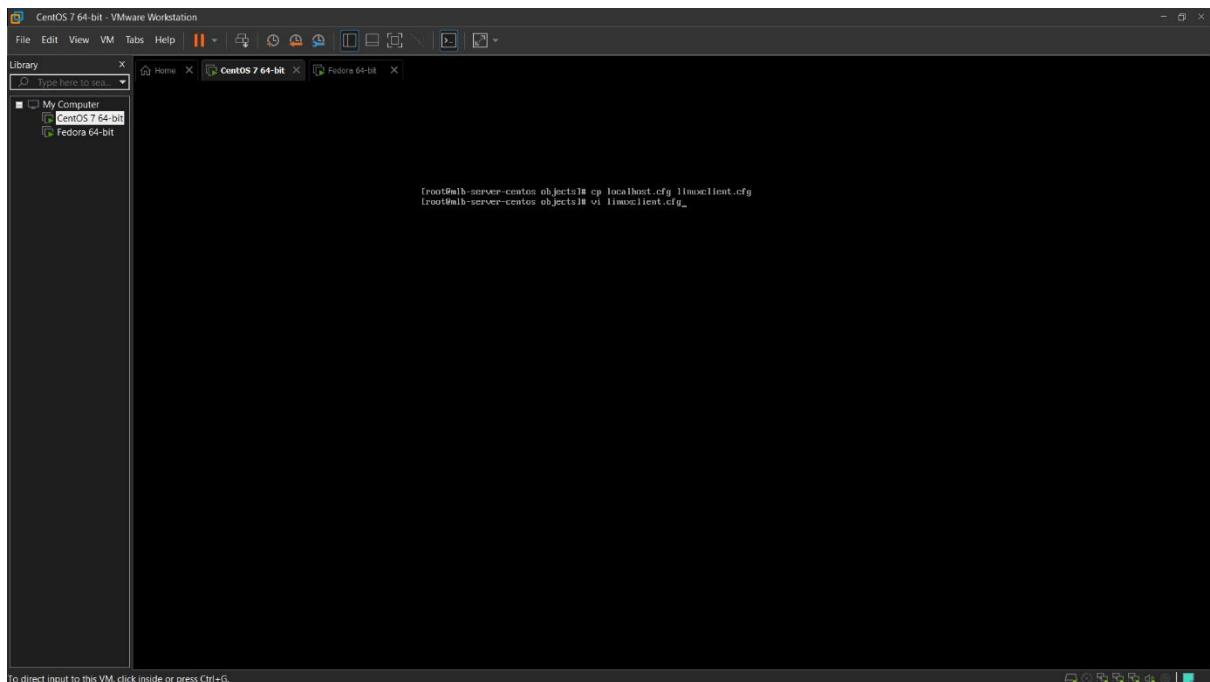


Figure 1.2.37: Copy and edit Linux template for Nagios client

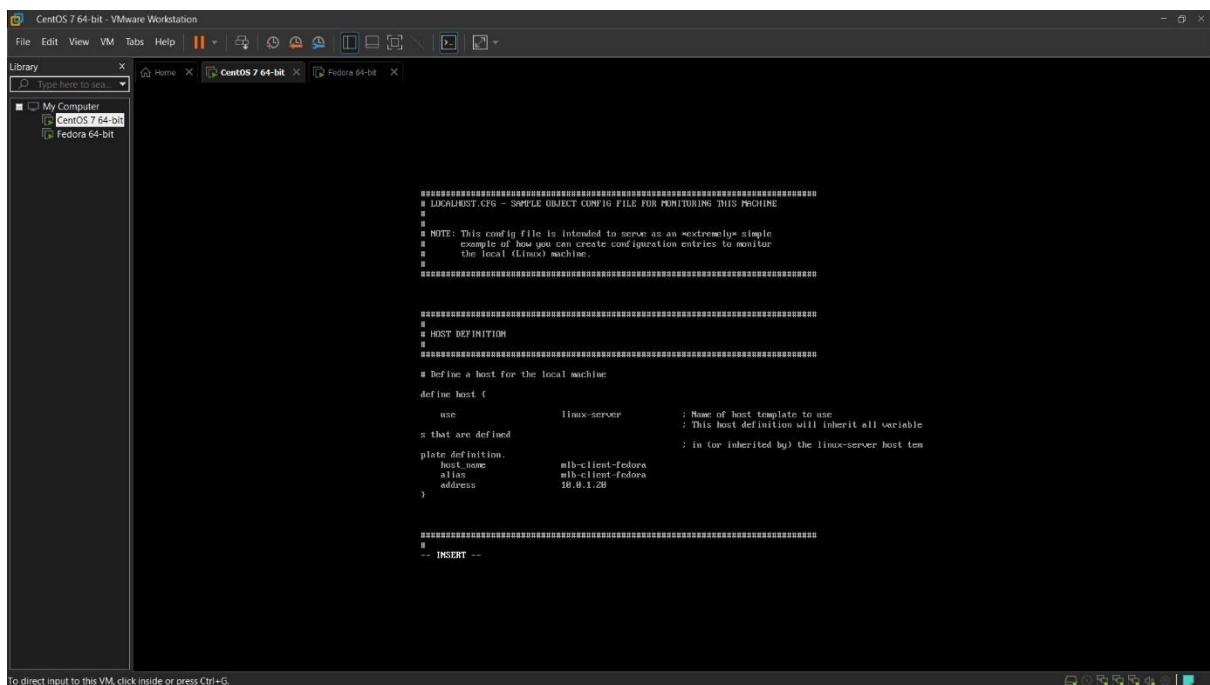


Figure 1.2.38: Modify the host definition

```

#####
# 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          : Hostname or IP address of the service
    service_description PING             : Description of the service
    check_command     check_ping!100.0,28:1500.0,600
}
-- INSERT --

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.2.39: Comment the 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          : Hostname or IP address of the service
    service_description PING             : Description of the service
    check_command     check_ping!100.0,28:1500.0,600
}

# 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          : Hostname or IP address of the service
    service_description Root Partition   : Description of the service
    check_command     check_local_free!20:10:100
}

# Define a service to check the number of currently logged in
# users on the local machine. Warning if > 20 users, critical if
# if > 50 users
:1:$ s/localhost/mh-client-fedora/g_

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.2.40: Modify hostname for service definitions

```
CentOS 7 64-bit - VMware Workstation
File Edit View VM Tabs Help || Library CentOS 7 64-bit Fedora 64-bit
Type here to search
My Computer
CentOS 7 64-bit
Fedora 64-bit

define service {
    use           local-service      : Name of service template to use
    host_name    nmb-client-fedora
    service_description  Ssh Usage
    check_command  check_local_smapf2kffr2
}

# Define a service to check SSH on the local machine.
# Disable notifications for this service by default, as not all users may have SSH enabled.

define service {
    use           local-service      : Name of service template to use
    host_name    nmb-client-fedora
    service_description  SSH
    check_command  check_ssh
    notifications_enabled  0
}

# Define a service to check HTTP on the local machine.
# Disable notifications for this service by default, as not all users may have HTTP enabled.

define service {
    use           local-service      : Name of service template to use
    host_name    nmb-client-fedora
    service_description  HTTP
    check_command  check_http
    notifications_enabled  0
}
9 substitutions on 9 times
```

Figure 1.2.41: Hostname for service definitions modified

```
CentOS 7.6 64-bit - VMware Workstation
File Edit View VM Tabs Help || Library Home CentOS 7 64-bit Fedora 64-bit

Library Type here to search
My Computer
CentOS 7 64-bit
Fedora 64-bit

root@nmb-server-centos:~# ls
commands.cfg*  localhost.cfg*  printer.cfg*  switch.cfg*  templates.cfg*  windows.cfg*
commands.cfg*  linuxclient.cfg*  printer.cfg*  switch.cfg*  templates.cfg*  windows.cfg*
contacts.cfg*  localhost.cfg*  printer.cfg*  templates.cfg*  timeperiods.cfg*
[root@nmb-server-centos objects]# ls -l
total 0
root@nmb-server-centos objects:~# ls
rw-rw-r--. 1 nagios nagios 6757 Apr 9 05:58 commands.cfg*
rw-rw-r--. 1 nagios nagios 6757 Apr 9 05:58 commands.cfg*
rw-rw-r--. 1 nagios nagios 1083 Apr 9 05:59 contacts.cfg*
rw-rw-r--. 1 root root 4971 Apr 10 05:25 linuxclient.cfg
rw-rw-r--. 1 nagios nagios 4777 Apr 9 05:58 localhost.cfg
rw-rw-r--. 1 nagios nagios 3681 Apr 9 05:58 printer.cfg*
rw-rw-r--. 1 nagios nagios 3681 Apr 9 05:58 printer.cfg*
rw-rw-r--. 1 nagios nagios 3404 Apr 9 05:58 switch.cfg*
rw-rw-r--. 1 nagios nagios 12533 Apr 9 05:29 templates.cfg*
rw-rw-r--. 1 nagios nagios 12533 Apr 9 05:58 templates.cfg*
rw-rw-r--. 1 nagios nagios 3412 Apr 9 05:58 windows.cfg*
rw-rw-r--. 1 nagios nagios 3512 Apr 9 05:58 timeperiods.cfg*
rw-rw-r--. 1 nagios nagios 4974 Apr 9 05:29 windows.cfg*
rw-rw-r--. 1 nagios nagios 4974 Apr 9 05:58 windows.cfg*
[root@nmb-server-centos objects]#
```

Figure 1.2.42: Ownership of files in ‘objects’ folder

```
[root@mlb-server-centos objects]# ls -l nagios/nagios/linosclient.cfg
total 12
-rw-r--r-- 1 nagios nagios 6757 apr 9 06:29 commands.cfg
-rw-r--r-- 1 nagios nagios 6757 apr 9 06:29 contacts.cfg
-rw-r--r-- 1 nagios nagios 1277 apr 9 06:29 hosts.cfg
-rw-r--r-- 1 nagios nagios 3801 apr 9 06:29 loghost.cfg
-rw-r--r-- 1 nagios nagios 4974 apr 10 06:29 linosclient.cfg
-rw-r--r-- 1 nagios nagios 4777 apr 9 06:29 localhost.cfg
-rw-r--r-- 1 nagios nagios 4777 apr 9 06:29 localhost.cfg~
-rw-r--r-- 1 nagios nagios 3801 apr 9 06:29 loghost.cfg
-rw-r--r-- 1 nagios nagios 3801 apr 9 06:29 printer.cfg
-rw-r--r-- 1 nagios nagios 3484 apr 9 06:29 switch.cfg
-rw-r--r-- 1 nagios nagios 12533 apr 9 06:29 templates.cfg
-rw-r--r-- 1 nagios nagios 12533 apr 9 06:29 templates.cfg~
-rw-r--r-- 1 nagios nagios 3512 apr 9 06:29 timperiods.cfg
-rw-r--r-- 1 nagios nagios 3512 apr 9 06:29 timperiods.cfg~
-rw-r--r-- 1 nagios nagios 4974 apr 9 06:29 windows.cfg
-rw-r--r-- 1 nagios nagios 4874 apr 9 06:29 windows.cfg~
```

Figure 1.2.43: Change ownership of Nagios client configuration file

```
[root@mlb-server-centos objects]# cd ..
[root@mlb-server-centos etc]# vi nagios.cfg
```

Figure 1.2.44: Add Nagios client to ‘nagios.cfg’ file

```

#####
# 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=/usr/local/nagios/var/nagios.log

# OBJECT CONFIGURATION FILES
# These are the object configuration files in which you define hosts,
# host groups, contacts, contact groups, services, etc.
# You can either have one big file with lots of entries, or many 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/contactgroups.cfg
cfg_file=/usr/local/nagios/etc/objects/hostgroups.cfg
cfg_file=/usr/local/nagios/etc/objects/hosts.cfg
cfg_file=/usr/local/nagios/etc/objects/services.cfg

# Definitions for monitoring the local (Linux) host
cfg_file=/usr/local/nagios/etc/objects/localhost.cfg
"nagios.cfg" 139L, 4599C

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.2.45: Nagios client added

Service Status Details For All Hosts						
Host	Service	Status	Last Check	Duration	Attempt	Status Information
mbs-client-fedora	Current Load	OK	04-10-2024 07:26:09	0d 0h 46m 46s	1/4	OK - load average: 0.00, 0.01, 0.05
	Current Users	OK	04-10-2024 07:26:41	0d 0h 46m 8s	1/4	USERS OK - 1 users currently logged in
	HTTP	CRITICAL	04-10-2024 07:27:24	0d 0h 46m 31s	1/4	HTTP OK: HTTP/1.1 200 OK, 484 bytes in 0.001 second response time
	PING	OK	04-10-2024 07:26:38	0d 0h 46m 34s	1/4	PING OK: 100% packet loss, 0ms
	Root Partition	OK	04-10-2024 07:26:39	0d 0h 46m 35s	1/4	DISK OK: free space: 15380 MB (88.30% used--99%)
	SSH	CRITICAL	04-10-2024 07:26:17	0d 0h 43m 38s	1/4	SSH OK - OpenSSH_7.4 protocol 2.0
	Swap Usage	OK	04-10-2024 07:25:54	0d 0h 43m 1s	1/4	SWAP OK - 100% free (2047 MB out of 2047 MB)
	Total Processes	OK	04-10-2024 07:25:32	0d 0h 42m 57s	1/4	PROCS OK: 41 processes with STATE = R/SZDOT
	Current Load	OK	04-10-2024 07:26:41	0d 0h 33m 48s	1/4	OK - load average: 0.02, 0.01, 0.05
	Current Users	OK	04-10-2024 07:26:19	0d 0h 33m 10s	1/4	USERS OK - 1 users currently logged in
CentOS 7 64-bit	HTTP	WARNING	04-10-2024 07:26:13	0d 0h 8m 26s	4/4	HTTP OK: HTTP/1.1 200 OK, 403 bytes in 0.015 second response time
	PING	OK	04-10-2024 07:26:36	0d 0h 7m 56s	1/4	PING OK: 100% packet loss, 0ms
	Root Partition	OK	04-10-2024 07:27:11	0d 0h 7m 39s	1/4	DISK OK: free space: 15380 MB (88.30% used--99%)
	SSH	CRITICAL	04-10-2024 07:26:49	0d 0h 17m 40s	1/4	SSH OK - OpenSSH_7.4 protocol 2.0
	Swap Usage	OK	04-10-2024 07:23:26	0d 1h 30m 3s	1/4	SWAP OK - 100% free (2047 MB out of 2047 MB)
	Total Processes	OK	04-10-2024 07:24:04	0d 1h 29m 25s	1/4	PROCS OK: 43 processes with STATE = R/SZDOT

Results 1 - 16 of 16 Matching Services

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

Figure 1.2.46: Service status details for Nagios server and client

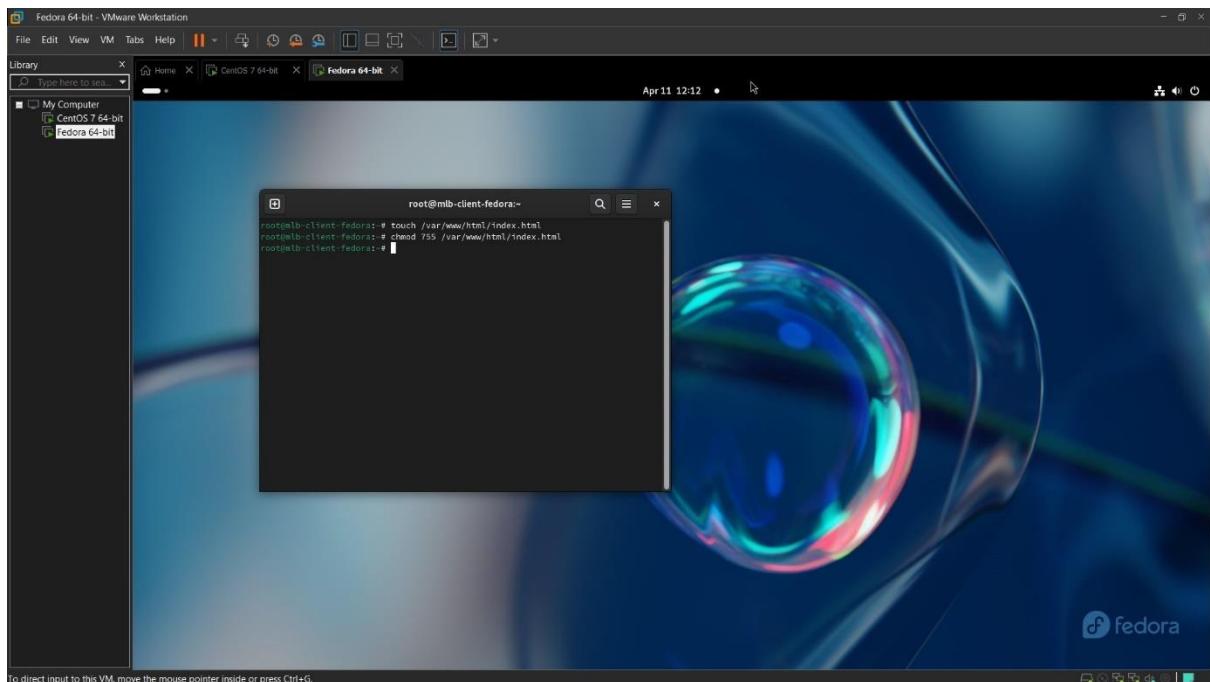
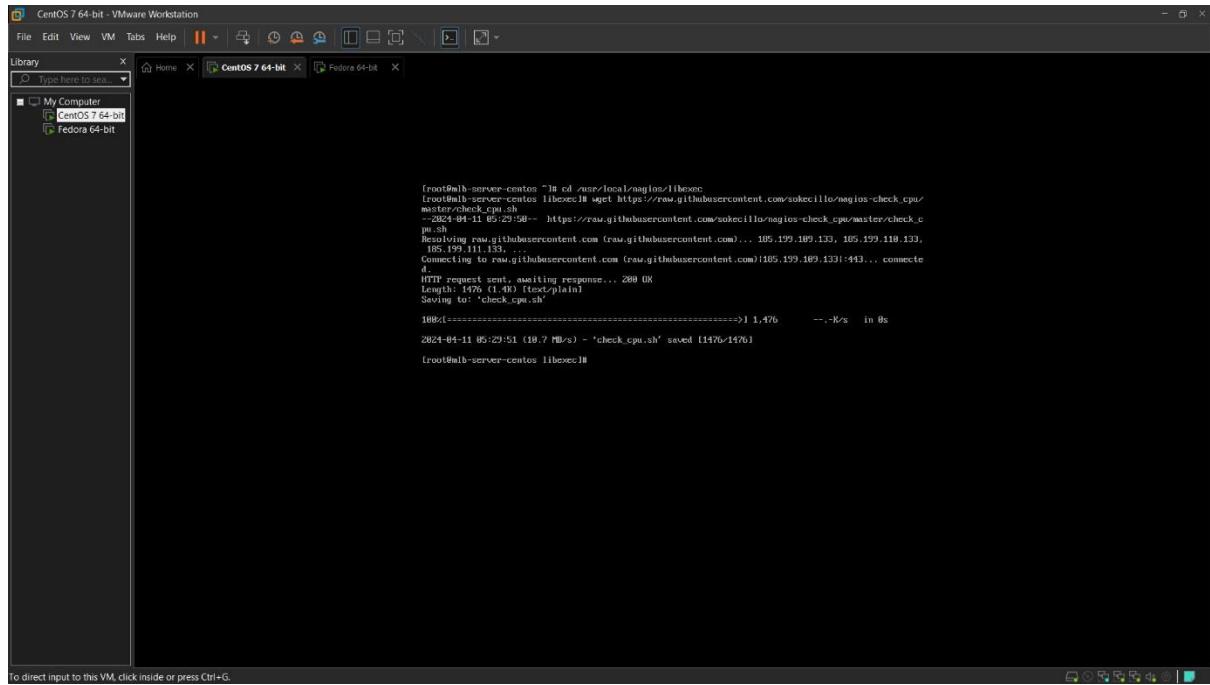


Figure 1.2.47: Create index.html file for Nagios client

1.3 Implementing System Checks on Fedora Client^[3]



The screenshot shows a terminal window in a VMware Workstation interface. The terminal title is 'CentOS 7 64-bit'. The command entered is:

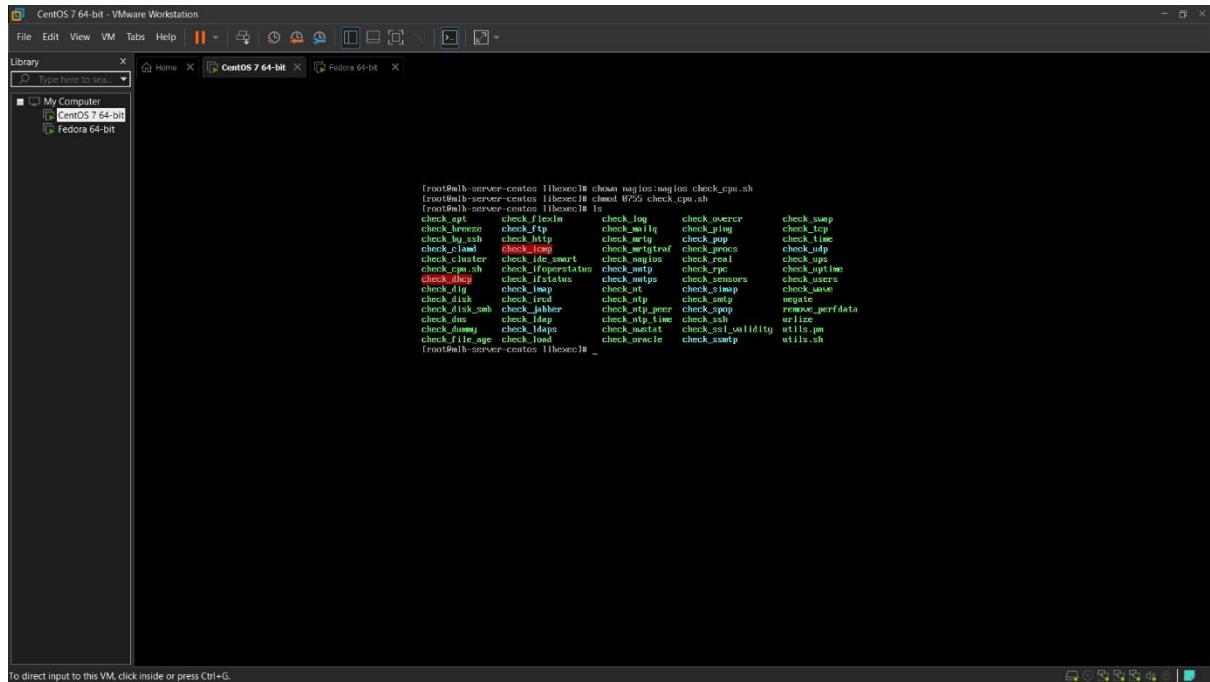
```
root@mlb-server-centos:~# cd /usr/local/nagios/libexec  
root@mlb-server-centos: libexec# wget https://raw.githubusercontent.com/sokecillo/nagios-check_cputime/master/check_cputime.sh
```

The output shows the download progress:

```
--2024-04-11 05:29:58-- https://raw.githubusercontent.com/sokecillo/nagios-check_cputime/master/check_cputime.sh  
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 105.199.109.133, 105.199.111.133, ...  
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|105.199.109.133|:443... connected  
HTTP request sent, awaiting response... 200 OK  
Length: 1476 (1.4K) [text/plain]  
Saving to: 'check_cputime.sh'  
  
100%[=====] 1,476 --.-K/s in 0s  
2024-04-11 05:29:51 (18.7 MB/s) - "check_cputime.sh" saved [1476/1476]  
[root@mlb-server-centos: libexec]#
```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.3.1: Download plugin to check for CPU usage



The screenshot shows a terminal window in a VMware Workstation interface. The terminal title is 'CentOS 7 64-bit'. The command entered is:

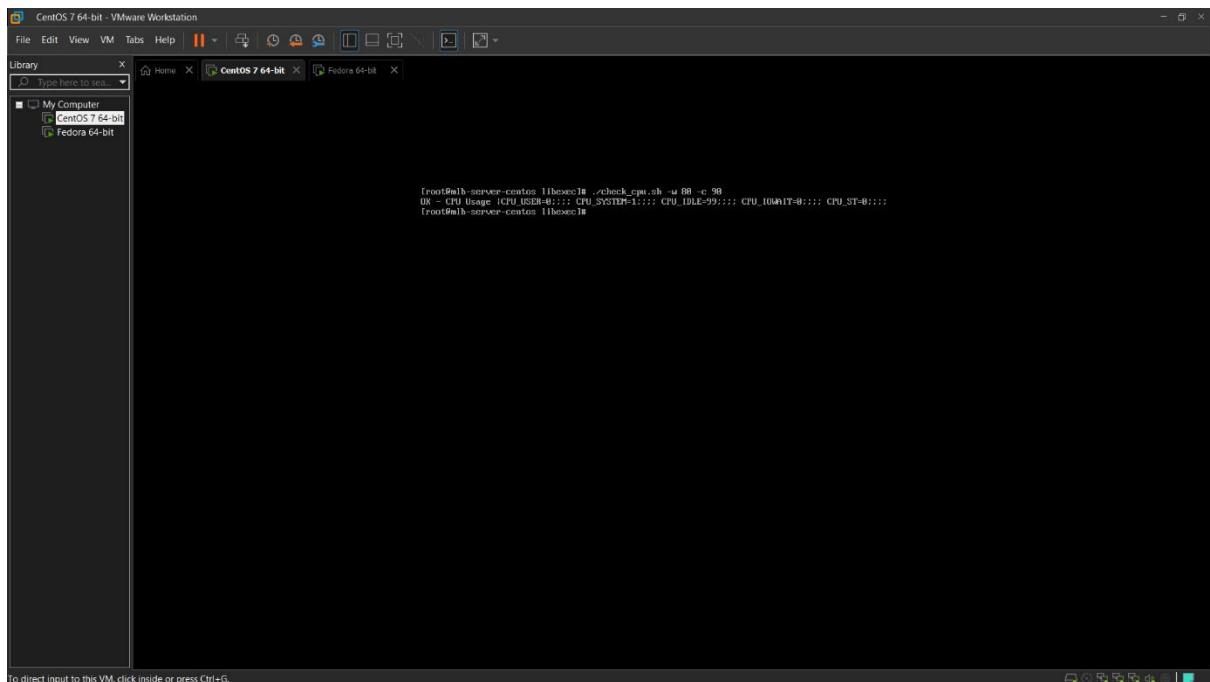
```
root@mlb-server-centos: libexec# ls
```

The output lists various Nagios monitoring scripts:

```
check_arpwatch  check_ifstatus  check_ipping  check_ntp  check_ntp_perfdelta  
check_breeze  check_ifdown  check_ntp_peer  check_ntp_time  utilize  
check_by_ssh  check_http  check_ntp_mon  check_ntp_time  utilite  
check_cputime  check_ifdown  check_ntp_mon  check_ntp_time  utilite  
check_distro  check_ifdown  check_ntp_mon  check_ntp_time  utilite  
check_disk  check_ifdown  check_ntp_mon  check_ntp_time  utilite  
check_disk_snmp  check_jabber  check_ntp_mon  check_ntp_time  utilite  
check_dns  check_ifdown  check_ntp_mon  check_ntp_time  utilite  
check_file_size  check_load  check_ntp_mon  check_ntp_time  utilite  
check_file_age  check_load  check_ntp_mon  check_ntp_time  utilite  
[root@mlb-server-centos: libexec]#
```

To direct input to this VM, click inside or press Ctrl+G.

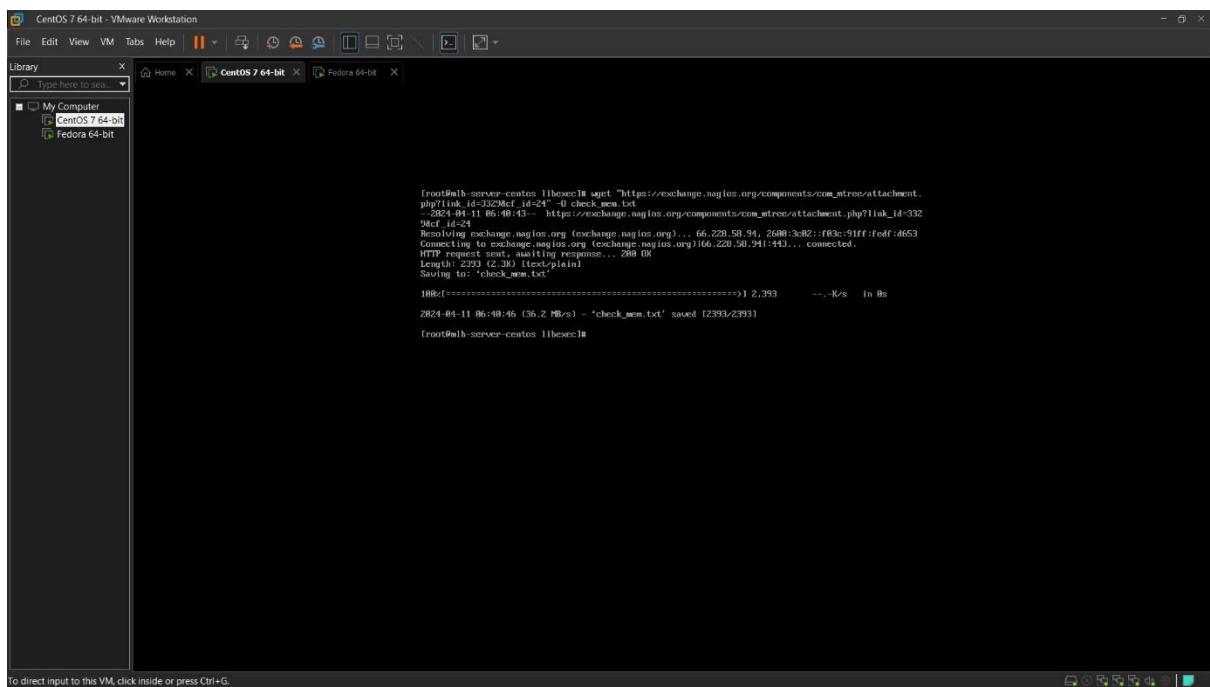
Figure 1.3.2: Set ownership and permissions for plugin



The screenshot shows a CentOS 7 64-bit VM running in VMware Workstation. The terminal window displays the output of the command `/check_cpu.sh -u 80 -c 90`. The output shows CPU usage statistics: CPU USER=0::: CPU SYSTEM=1::: CPU_IDLE=99::: CPU_WAIT=0::: CPU_ST=0:::.

```
[root@mlb-server-centos ~]# /check_cpu.sh -u 80 -c 90
CPU - CPU Usage [CPU_USER=0::: CPU_SYSTEM=1::: CPU_IDLE=99::: CPU_WAIT=0::: CPU_ST=0:::]
```

Figure 1.3.3: Execute CPU usage plugin



The screenshot shows a CentOS 7 64-bit VM running in VMware Workstation. The terminal window displays the output of the command `curl -O "https://exchange.mageia.org/components/com_mtreo/attachment.php?id=332&file_id=24" > check_mem.txt`. The output shows the download of a file from exchange.mageia.org, saving it as `check_mem.txt`.

```
[root@mlb-server-centos ~]# curl -O "https://exchange.mageia.org/components/com_mtreo/attachment.php?id=332&file_id=24" > check_mem.txt
  % Total    Elapsed   Downloaded   Speed     Estimated Left
  0     0:00:00      0.00K  0.00B/s      0.00B/s
  100  0:00:00      2.393K  36.2 MB/s      0.00B/s
[root@mlb-server-centos ~]#
```

Figure 1.3.4: Download plugin to check for memory usage

CentOS 7 64-bit - VMware Workstation

File Edit View VM Tabs Help || ○ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞ ⊞

Library Type here to search

My Computer

CentOS 7 64-bit

Fedora 64-bit

```
[root@mlb-server-centos libexec]# chsh nagios:nagios check_nw.txt
[root@mlb-server-centos libexec]# chmod 0755 check_nw.txt
[root@mlb-server-centos libexec]# ls
check_apt  check_ftp  check_nw.txt  check_pop  check_udp
check_breeze  check_http  check_ntp  check_procs  check_uptime
check_cron  check_ntpaf  check_ntptraf  check_sensors  check_wave
check_email  check_ncp  check_nagios  check_rpc  check_users
check_filestatus  check_ncpt  check_ntp  check_sensors  check_wave
check_finger.sh  check_nntp  check_ntpt  check_snmp  netperf
check_gd  check_imap  check_at  check_ntp  receive_perfdata
check_idn  check_ircd  check_ntp  check_spop  utilize
check_ipsec  check_imq  check_ntp_peer  check_sstat  utilis.jm
check_ipmi  check_imq  check_ntp_time  check_sstat1  utilis.jh
check_dns  check_imq  check_ntt  check_ntt  utilis.jh
check_dmar  check_imq  check_ntt  check_ntt  utilis.jh
check_load  check_imq  check_ntt  check_ntt  utilis.jh
check_swap  check_imq  check_ntt  check_ntt  utilis.jh
check_flexis  check_ntt  check_ntt  check_ntt  utilis.jh
[root@mlb-server-centos libexec]# -
```

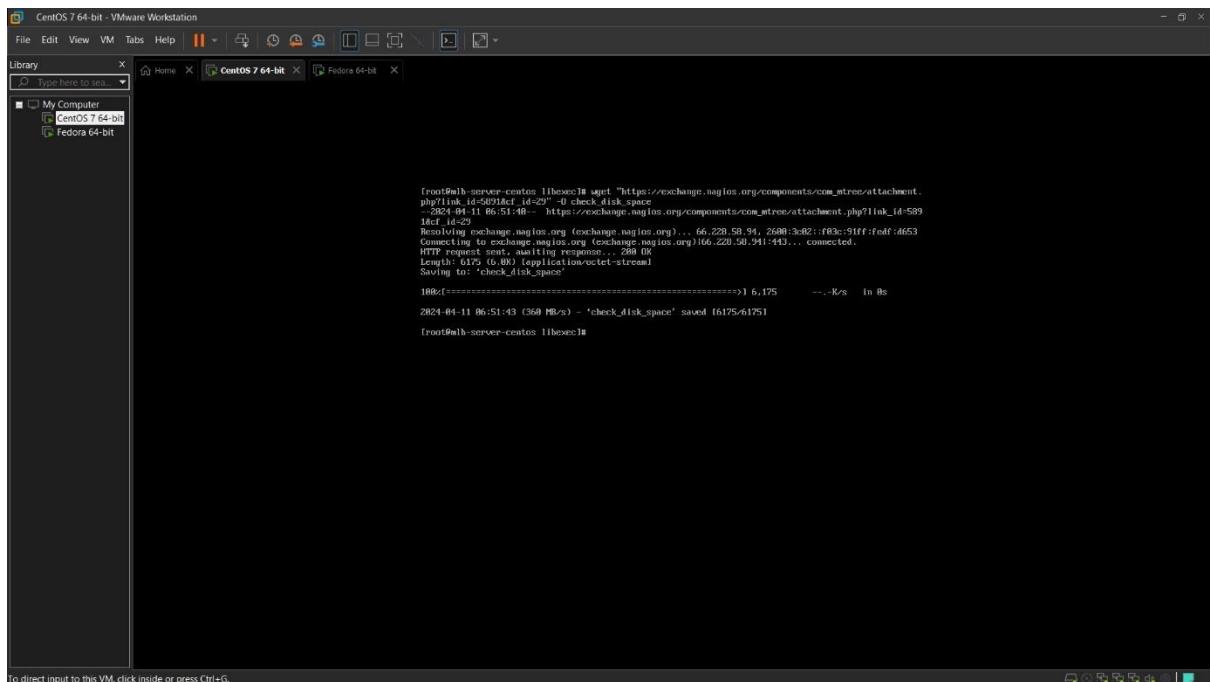
Figure 1.3.5: Set ownership and permissions for plugin

The screenshot shows a VMware Workstation interface with a single running virtual machine titled "CentOS 7 64-bit". The VM window has a dark theme. At the top, there's a menu bar with "File", "Edit", "View", "VM", "Tabs", and "Help". Below the menu is a toolbar with icons for copy, paste, cut, undo, redo, zoom, and other functions. A "Library" sidebar on the left lists "My Computer" with entries for "CentOS 7 64-bit" and "Fedora 64-bit". The main area of the VM window is a terminal window with the following text:

```
[root@mlb-server-centos libexec]# ./check_mem.txt -u 10 -c 5
0K - 3443 MB (91%) Free Memory
[root@mlb-server-centos libexec]#
```

At the bottom of the screen, there's a status bar with the message "To direct input to this VM, click inside or press Ctrl+G." and a set of small control icons.

Figure 1.3.6: Execute memory usage plugin



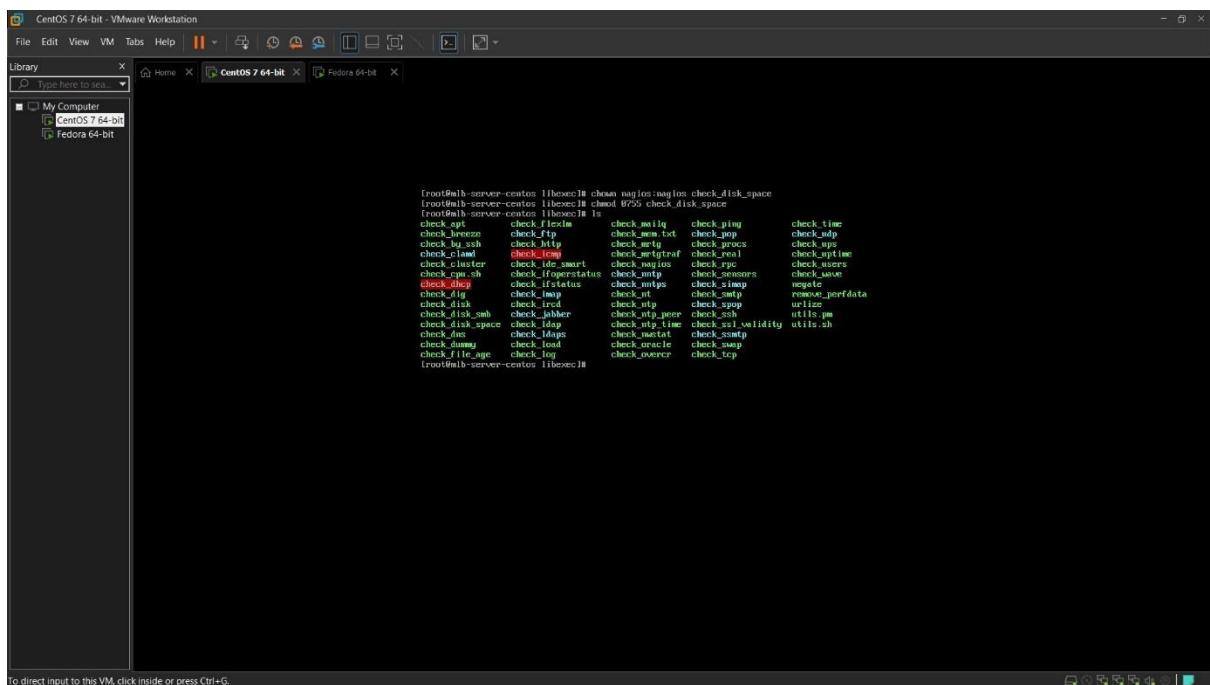
```
root@mlb-server-centos:~# wget "https://exchange.nagios.org/components/cm_ntree/attachment.php?link_id=5091&id=29" -O check_disk_space
--2024-04-11 06:51:40-- https://exchange.nagios.org/components/cm_ntree/attachment.php?link_id=5091&id=29
Resolving exchange.nagios.org (exchange.nagios.org)... 66.228.58.94, 2600:3c82:103c:91ff:fe0f:4653
Connecting to exchange.nagios.org (exchange.nagios.org) 66.228.58.94:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 6175 (6.0K) [application/x-msdownload]
Saving to: 'check_disk_space'

100%[=====] 1,612      --.-K/s   in 0s

2024-04-11 06:51:43 (360 MB/s) - 'check_disk_space' saved [6175/6175]

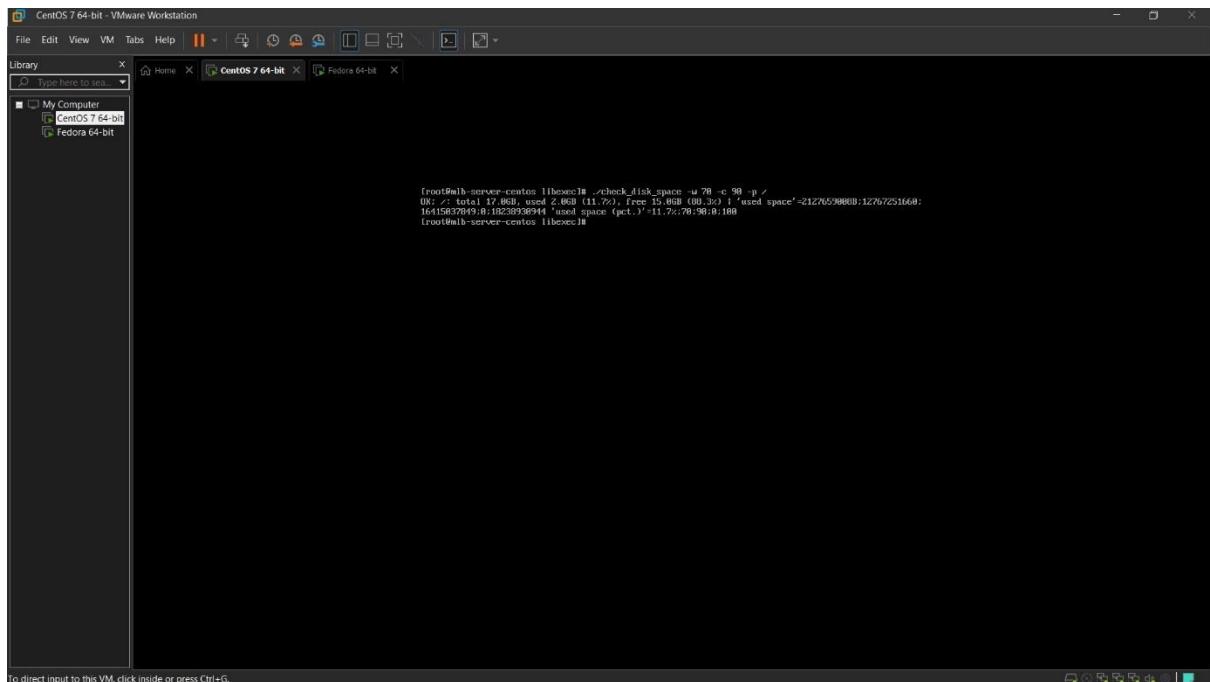
root@mlb-server-centos:~#
```

Figure 1.3.7: Download plugin to check for disk space



```
root@mlb-server-centos:~# chown nagios:nagios check_disk_space
root@mlb-server-centos:~# chmod 755 check_disk_space
root@mlb-server-centos:~# ls
check_apt      check_flexis    check_nt      check_ping      check_time
check_bzsize    check_ftp       check_ntxt     check_pop      check_ntp
check_cron     check_http      check_nxlog    check_realm    check_ntp
check_curl     check_icmp      check_ntp6     check_real    check_uptime
check_cluster  check_ids_smart check_ntp6c    check_reachable check_users
check_dhcp     check_ifstatus  check_ntp6c   check_rfc2616  check_wmi
check_dig      check_imap      check_ntp6c   check_sensors  check_wmi
check_distro   check_irssi     check_ntp6c   check_smtp     check_wmi
check_dstat    check_lspsvc    check_ntp6c   check_snmp     remove_perfdata
check_dstat_sob check_lspsvc    check_ntp6c   check_spop     utilize
check_dstat_sob check_lspsvc    check_ntp6c   check_ntp      utilize
check_disk_space check_idmap    check_ntp6c   check_ntp_time  check_ntp_validity
check_dstat_sob check_lspsvc    check_ntp6c   check_ntp_time  utilize
check_dstat_sob check_lspsvc    check_ntp6c   check_ntp_time  utilize
check_file_md5 check_lspsvc    check_ntp6c   check_ntp_time  utilize
check_file_md5 check_lspsvc    check_ntp6c   check_ntp_time  utilize
check_file_size check_lspsvc    check_ntp6c   check_ntp_time  utilize
root@mlb-server-centos:~#
```

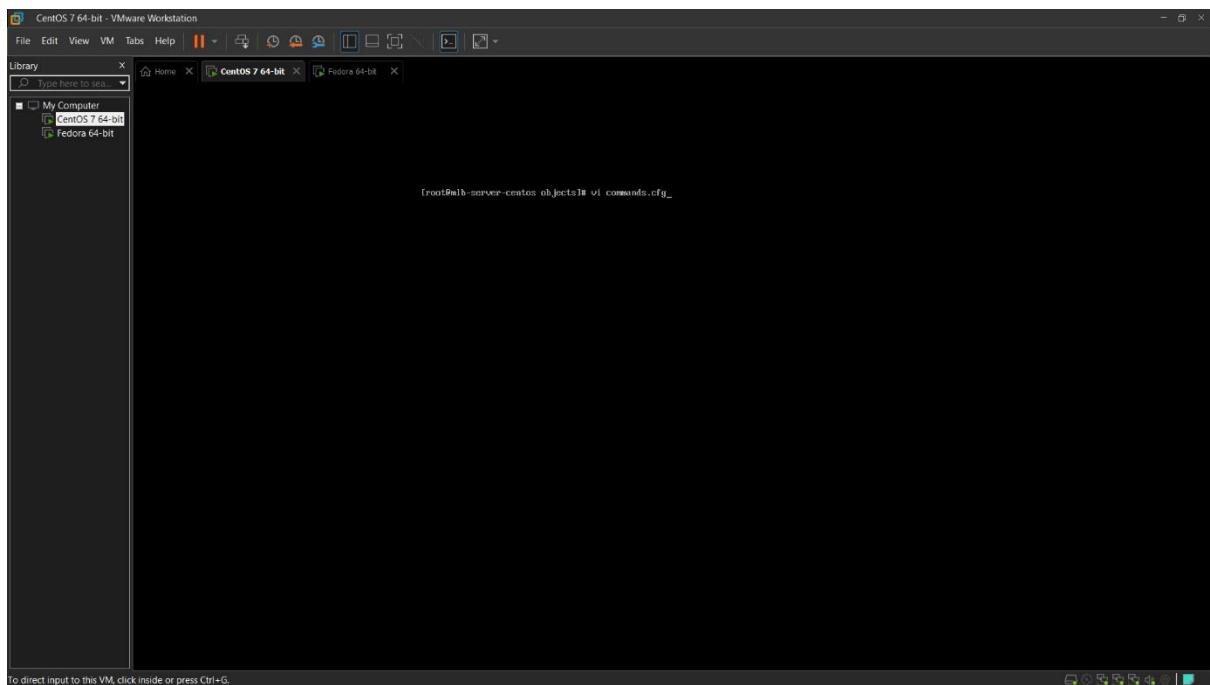
Figure 1.3.8: Set ownership and permissions for plugin



The screenshot shows a CentOS 7 64-bit VM running in VMware Workstation. The terminal window displays the output of the command `/check_disk_space -u 70 -c 90 -p /`. The output shows disk usage statistics for the root partition:

```
[root@mlb-server-centos libexec]# /check_disk_space -u 70 -c 90 -p /
OK: / total 17.06G, used 2.06G (11.7%), free 15.06G (88.3%) | used space'=21276598808:12767251668:
16@15G@3769:8:102393930944 used space (pct.)'=11.7%:70:90:0:100
[root@mlb-server-centos libexec]#
```

Figure 1.3.9: Execute disk space plugin



The screenshot shows a CentOS 7 64-bit VM running in VMware Workstation. The terminal window shows the command `vi commands.cfg` being run in the root directory.

```
[root@mlb-server-centos objects]# vi commands.cfg
```

Figure 1.3.10: Define new commands

```

command_name  check_swap
command_line  $USER1$>check_swap -H $HOSTADDRESS$ $ARG1$

define command {
    command_name  check_http
    command_line  $USER1$>check_http -I $HOSTADDRESS$ $ARG1$}

define command {
    command_name  check_ssh
    command_line  $USER1$>check_ssh $ARG1$ $HOSTADDRESS$}

define command {
    command_name  check_dhcp
    command_line  $USER1$>check_dhcp $ARG1$}

define command {
    command_name  check_ping
    command_line  $USER1$>check_ping -H $HOSTADDRESS$ -w $ARG1$ -c $ARG2$ -p 5}

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.3.11: HTTP, SSH, and Network Connectivity commands present

```

define command {
    command_name  check_disk
    command_line  $USER1$>check_disk -w $ARG1$ -c $ARG2$ -p $ARG3$}

define command {
    command_name  check_load
    command_line  $USER1$>check_load -w $ARG1$ -c $ARG2$}

define command {
    command_name  check_procs
    command_line  $USER1$>check_procs -w $ARG1$ -c $ARG2$ -s $ARG3$}

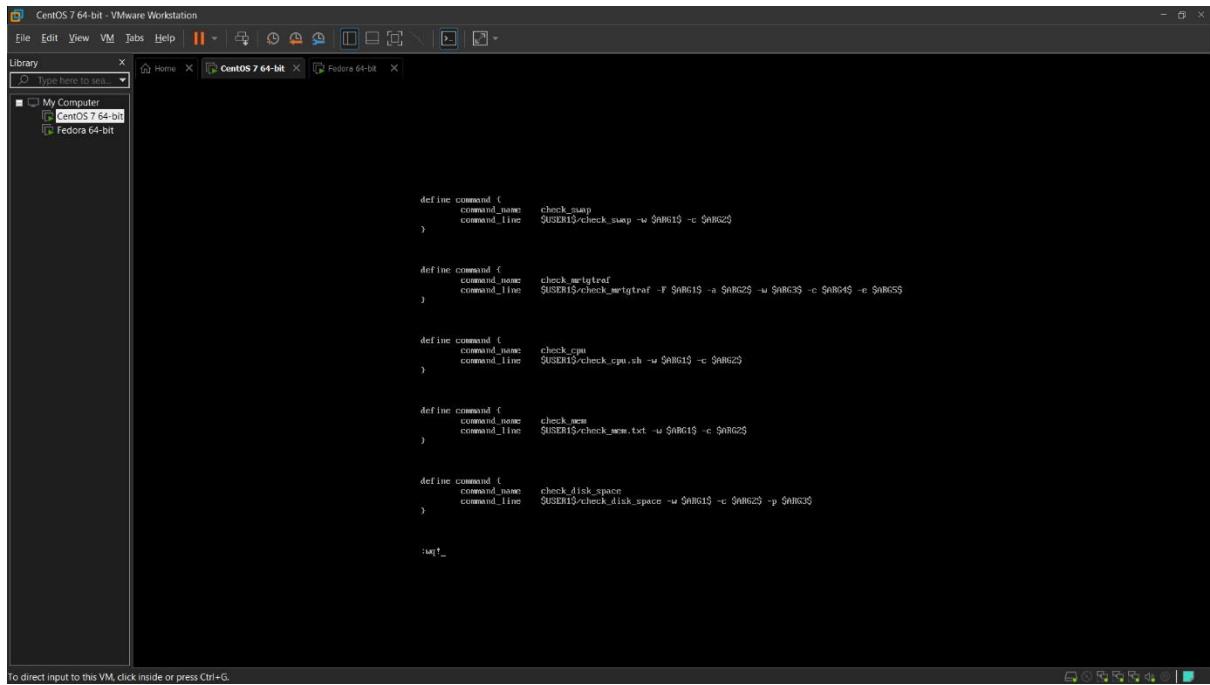
define command {
    command_name  check_users
    command_line  $USER1$>check_users -w $ARG1$ -c $ARG2$}

define command {
    command_name  check_swap
    command_line  $USER1$>check_swap -w $ARG1$ -c $ARG2$}

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.3.12: New commands defined for Nagios client



```
define command {
    command_name  check_swap
    command_line  $USER1$check_swap -w $ARG1$ -c $ARG2$
}

define command {
    command_name  check_mrtgtraf
    command_line  $USER1$check_mrtgtraf -F $ARG1$ -a $ARG3$ -w $ARG4$ -c $ARG5$ -e $ARG6$ 
}

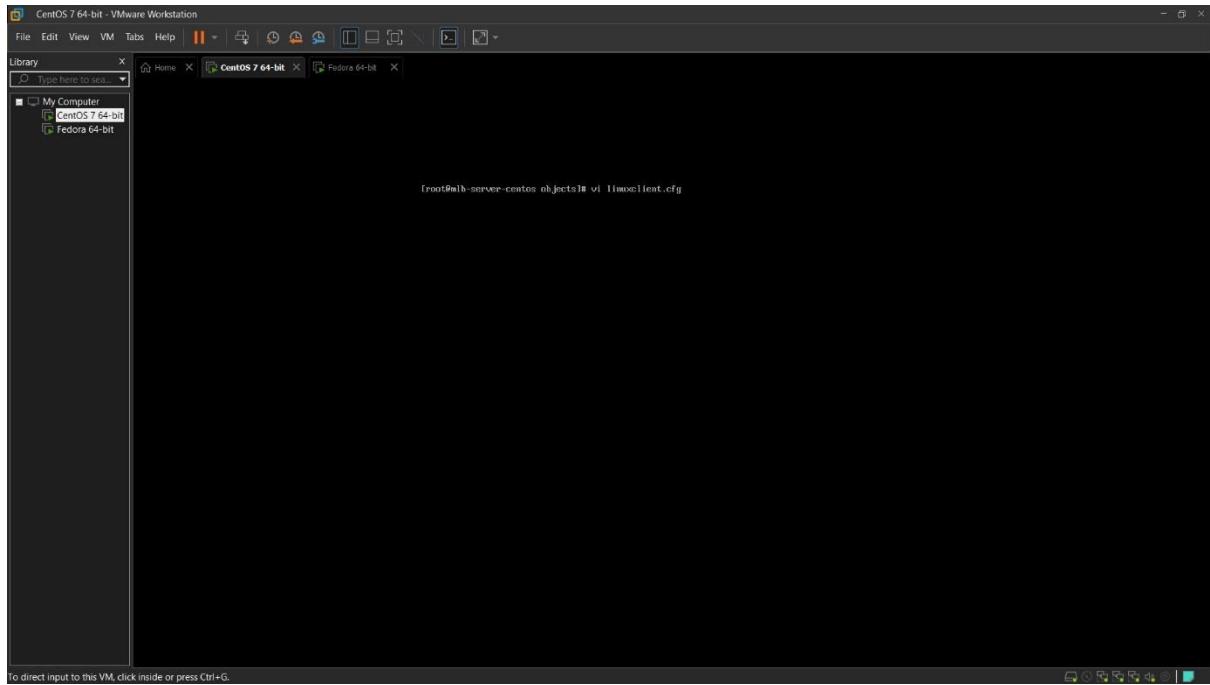
define command {
    command_name  check_cpu
    command_line  $USER1$check_cpu.sh -w $ARG1$ -c $ARG2$ 
}

define command {
    command_name  check_mem
    command_line  $USER1$check_mem -w $ARG1$ -c $ARG2$ 
}

define command {
    command_name  check_disk_space
    command_line  $USER1$check_disk_space -w $ARG1$ -c $ARG2$ -p $ARG3$ 
}

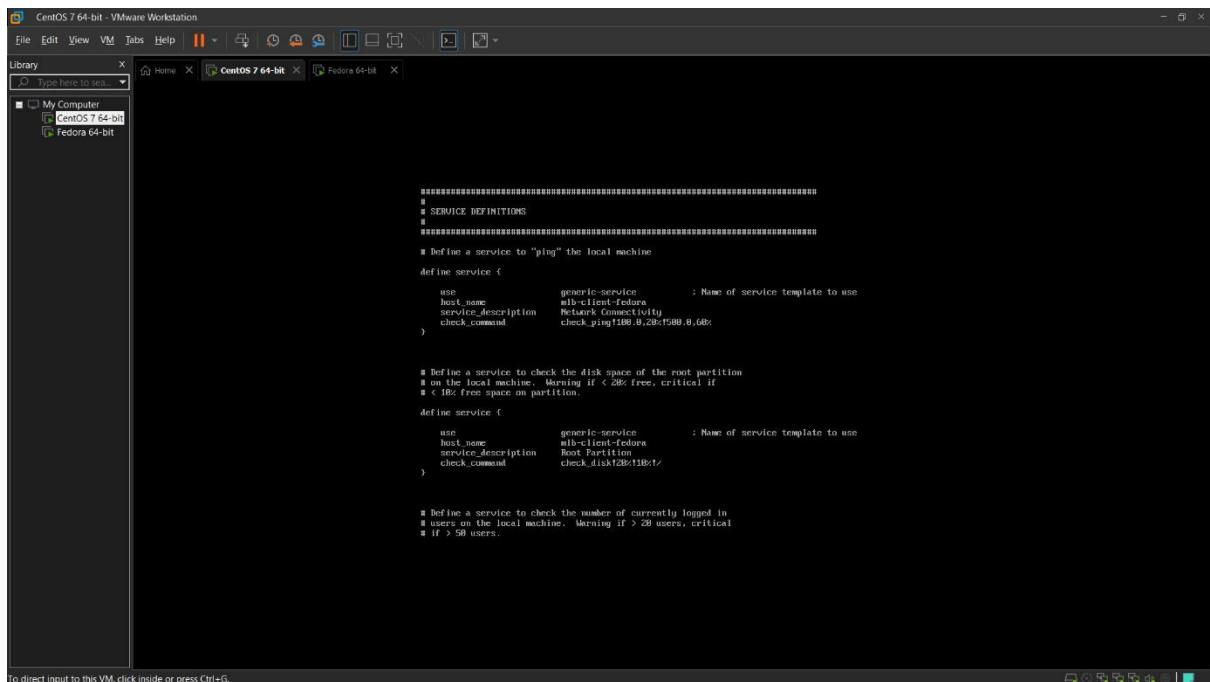
:wg?_
```

Figure 1.3.13: New commands defined for Nagios client



```
(root@mlb-server-centos objects)#[ vi linuxclient.cfg
```

Figure 1.3.14: Define new services



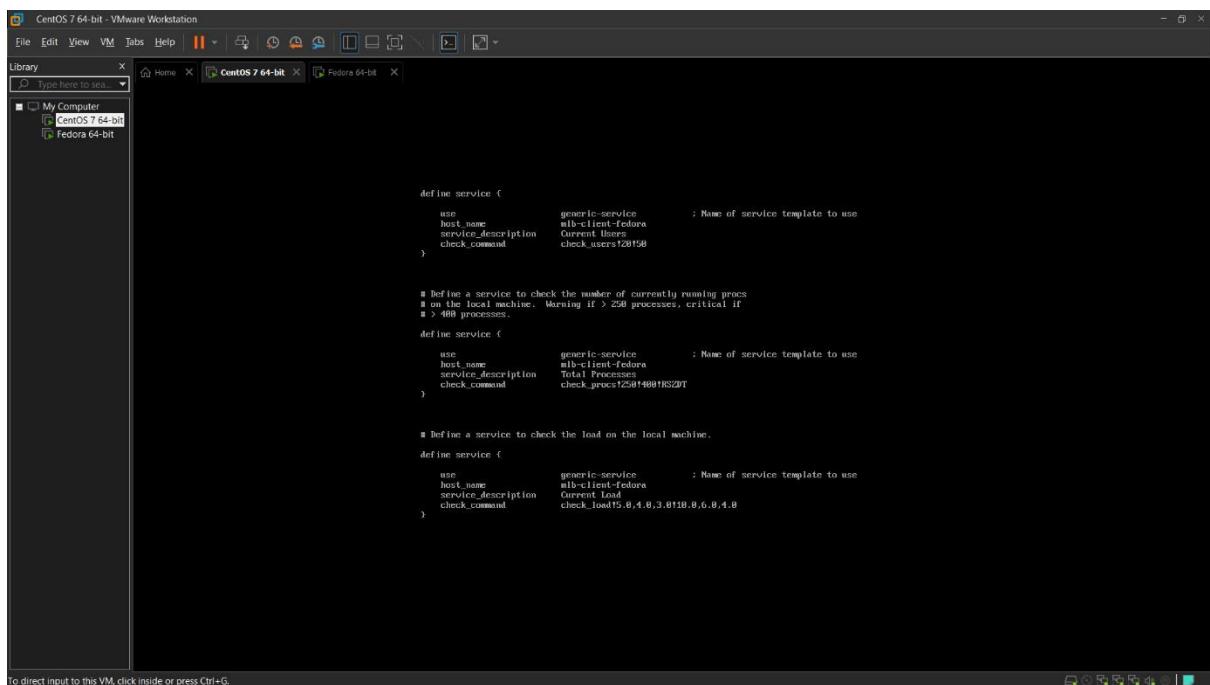
```
#####
# SERVICE DEFINITIONS
#####

# Define a service to "ping" the local machine
define service {
    use generic-service : Name of service template to use
    host_name mib-client-fedora
    service_description Network Connectivity
    check_command check_ping!100.0,20!1500.0,600
}

# 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 generic-service : Name of service template to use
    host_name mib-client-fedora
    service_description Root Partition
    check_command check_disk!20!10!1/
}

# Define a service to check the number of currently logged in
# users on the local machine. Warning if > 20 users, critical if
# if > 50 users.
define service {
    use generic-service : Name of service template to use
    host_name mib-client-fedora
    service_description Current Users
    check_command check_users!20!50
}
```

Figure 1.3.15: New services defined for Nagios client



```
define service {
    use generic-service : Name of service template to use
    host_name mib-client-fedora
    service_description Current Users
    check_command check_users!20!50
}

# Define a service to check the number of currently running procs
# on the local machine. Warning if > 250 processes, critical if
# > 400 processes.
define service {
    use generic-service : Name of service template to use
    host_name mib-client-fedora
    service_description Total Processes
    check_command check_procs!250!400!RS!20T
}

# Define a service to check the load on the local machine.
define service {
    use generic-service : Name of service template to use
    host_name mib-client-fedora
    service_description Current Load
    check_command check_load!5.0!4.0!3.0!10.0!6.0!4.0
}
```

Figure 1.3.16: New services defined for Nagios client

```

define service {
    use generic-service
    host_name mlb-client-fedor
    service_description Swap Usage
    check_command check_swap[2&gt;10]
}

# Define a service to check SSH on the local machine.
# Disable notifications for this service by default, as not all users may have SSH enabled.
define service {
    use generic-service
    host_name mlb-client-fedor
    service_description SSH
    check_command check_ssh
    notifications_enabled 0
}

# Define a service to check HTTP on the local machine.
# Disable notifications for this service by default, as not all users may have HTTP enabled.
define service {
    use generic-service
    host_name mlb-client-fedor
    service_description HTTP
    check_command check_http
    notifications_enabled 0
}

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.3.17: New services defined for Nagios client

```

use generic-service
host_name mlb-client-fedor
service_description CPU Usage
check_command check_load[0.05]
notifications_enabled 0

define service {
    use generic-service
    host_name mlb-client-fedor
    service_description Memory Usage
    check_command check_mem[800000]
    notifications_enabled 0
}

define service {
    use generic-service
    host_name mlb-client-fedor
    service_description Disk Space
    check_command check_disk_space[70%]
    notifications_enabled 0
}

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 1.3.18: New services defined for Nagios client

CentOS 7 64-bit - VMware Workstation

File Edit View VM Tabs Help || Library Home CentOS 7 64-bit

```
[root@mlb-server-centos ~]# systemctl restart nagios
[root@mlb-server-centos ~]# systemctl status nagios
● nagios.service - Nagios Core 4.5.1
   Loaded: loaded (/usr/lib/systemd/system/nagios.service; enabled; vendor preset: disabled)
   Active: active (running) since Thu 2024-01-11 19:25:21 EET 9s ago
     Main PID: 1774 execStopPost /bin/zsh -c /usr/local/nagios/var/run/nagios.cmd (code=exited, status=0/SUCCESS)
    Process: 1774 ExecStopPost /bin/zsh -c /usr/local/nagios/var/run/nagios.cmd (code=exited, status=0/SUCCESS)
   Processes: 1776 ExecStopPost /bin/zsh -c /usr/local/nagios/var/run/nagios.cmd (code=exited, status=0/SUCCESS)
   Processes: 1779 ExecStart=/usr/local/nagios/bin/nagios -4 /usr/local/nagios/etc/nagios.cfg (code=exited, status=0/SUCCESS)
   Processes: 1777 ExecPref /usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg (code=exited, status=0/SUCCESS)
   Main PID: 1762 (nagios)
      Groups: system, nagi...service
        Tasks: 1783 /usr/local/nagios/bin/nagios -w /usr/local/nagios/var/run/nagios.qh
        Tasks: 1784 /usr/local/nagios/bin/nagios -w /usr/local/nagios/var/run/nagios.qh
        Tasks: 1785 /usr/local/nagios/bin/nagios -w /usr/local/nagios/var/run/nagios.qh
        Tasks: 1786 /usr/local/nagios/bin/nagios -w /usr/local/nagios/var/run/nagios.qh
        Tasks: 1787 /usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg

Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: gh: Socket '/usr/local/nagios/var/run/nagios...ed
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: gh: core query handler registered
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: gh: echo service query handler registered
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: gh: help service query handler registered
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: gh: process configuration file registered or
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: wproc: Registry request: name:Core_Wo...03
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: wproc: Registry request: name:Core_Wo...84
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: wproc: Registry request: name:Core_Wo...95
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: wproc: Registry request: name:Core_Wo...86
Apr 11 19:25:21 mlb-server-centos.cs alinit nagios[1762]: Successfully launched command file wo...87
Hint: Some lines were ellipsized, use -l to show in full.
[root@mlb-server-centos ~]#
```

Figure 1.3.19: Restart Nagios daemon

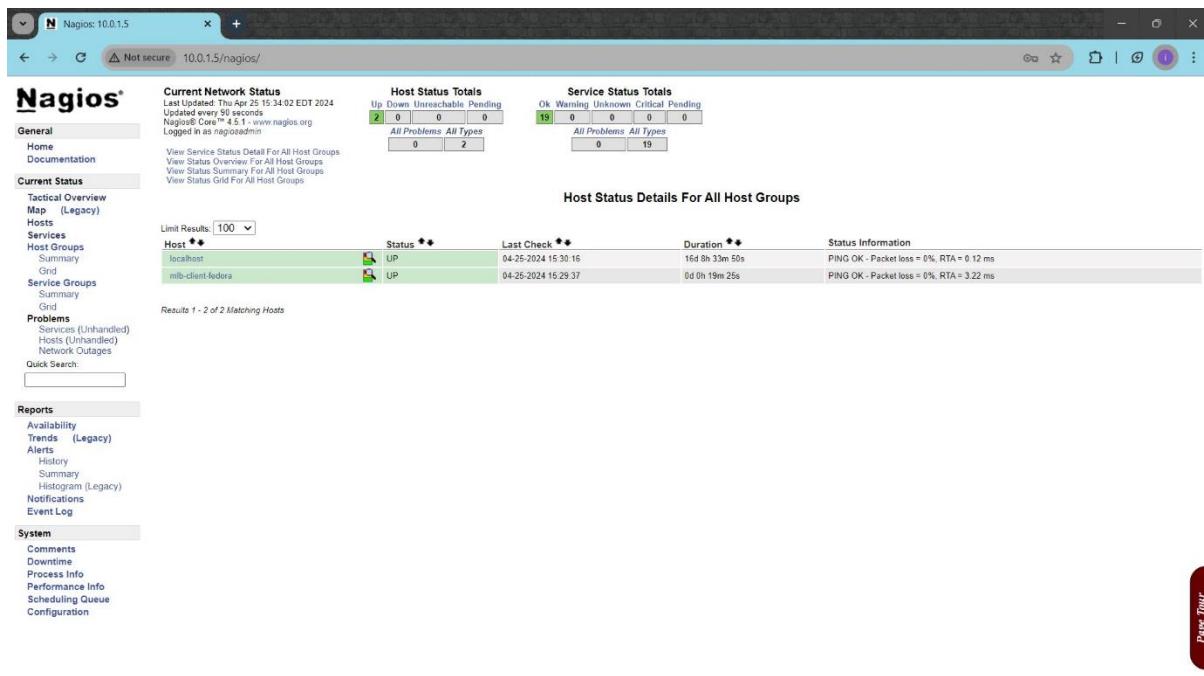


Figure 1.3.20: Host status details for Nagios server and client

The screenshot shows the Nagios web interface at 10.0.1.5/nagios/. The main header includes the Nagios logo, a 'Not secure' warning, and the URL. The left sidebar contains navigation links for General, Home, Documentation, Current Status (with a 'Tactical Overview Map (Legacy)' link), Services, Host Groups, Problems, Reports (with 'Availability Trends (Legacy)', 'Alerts', 'History', 'Summary', 'Histogram (Legacy)', 'Notifications', and 'Event Log' links), and System (with 'Comments', 'Downtime', 'Process Info', 'Performance Info', 'Scheduling Queue', and 'Configuration' links). The right sidebar has a 'Page Tour' button.

Current Network Status

Last Updated: Fri Apr 26 15:34:09 EDT 2024
Up: 2 Down: 0 Unreachable: 0 Pending: 0
All Problems: All Types
0 2

Service Status Totals

Ok: 19 Warning: 0 Unknown: 0 Critical: 0 Pending: 0
All Problems: All Types
0 19

Service Status Details For All Hosts

Host	Service	Status	Last Check	Duration	Attempt	Status Information
localhost	Current Load	OK	04-25-2024 15:30:23	16d 8h 33m 22s	1/4	OK - load average: 0.04, 0.12, 0.10
localhost	Current Users	OK	04-25-2024 15:30:55	16d 8h 32m 44s	1/4	USERS OK - 1 users currently logged in
HTTP	HTTP	OK	04-25-2024 15:11:26	16d 8h 32m 7s	1/4	HTTP OK: HTTP/1.1 200 OK - 984 bytes in 0.004 second response time
PING	PING	OK	04-25-2024 15:51:58	16d 8h 31m 29s	1/4	PING OK - Packet loss = 0%, RTA = 0.17 ms
Root Partition	SSH	OK	04-25-2024 15:32:29	16d 8h 30m 52s	1/4	DISK OK - free space / 15361 MB (88.31% inode=99%)
SSH	Swap Usage	OK	04-25-2024 15:33:01	16d 8h 30m 14s	1/4	SSH OK - OpenSSH_7_4 (protocol 2.0)
Swap Usage	Total Processes	OK	04-25-2024 15:33:33	16d 8h 29m 37s	1/4	SWAP OK - 100% free (2047 MB out of 2047 MB)
Total Processes	Total Processes	OK	04-25-2024 15:29:04	15d 12h 29m 33s	1/4	PROCS OK: 38 processes with STATE = R/SZDT
mb-client-fedora	CPU Usage	OK	04-25-2024 15:24:36	14d 8h 26m 3s	1/3	OK - CPU Usage
mb-client-fedora	Current Load	OK	04-25-2024 15:27:20	15d 9h 20m 24s	1/3	OK - load average: 0.07, 0.10, 0.08
mb-client-fedora	Current Users	OK	04-25-2024 15:25:39	15d 9h 19m 46s	1/3	USERS OK - 1 users currently logged in
mb-client-fedora	Disk Space	OK	04-25-2024 15:27:45	14d 4h 51m 56s	1/3	OK: / total 17.0GB used 2.0GB (11.7%), free 15.0GB (88.3%)
mb-client-fedora	HTTP	OK	04-25-2024 15:27:45	0d 0h 16m 24s	1/3	HTTP OK: HTTP/1.1 200 OK - 265 bytes in 0.034 second response time
mb-client-fedora	Memory Usage	OK	04-25-2024 15:27:14	14d 8h 27m 22s	1/3	OK - 3450 MB (91%) Free Memory
mb-client-fedora	Network Connectivity	OK	04-25-2024 15:27:45	0d 0h 16m 24s	1/3	PING OK - Packet loss = 0%, RTA = 0.19 ms
mb-client-fedora	Root Partition	OK	04-25-2024 15:33:19	14d 4h 51m 56s	1/3	DISK OK - free space / 15361 MB (88.31% inode=99%)
mb-client-fedora	SSH	OK	04-25-2024 15:32:00	0d 0h 12m 9s	1/3	SSH OK - OpenSSH_9_3 (protocol 2.0)
mb-client-fedora	Swap Usage	OK	04-25-2024 15:24:20	15d 9h 16m 39s	1/3	SWAP OK - 100% free (2047 MB out of 2047 MB)
mb-client-fedora	Total Processes	OK	04-25-2024 15:24:52	15d 9h 16m 1s	1/3	PROCS OK: 42 processes with STATE = R/SZDT

Results 1 - 19 of 19 Matching Services

Figure 1.3.21: Service status details for Nagios server and client

The screenshot shows the Nagios web interface at 10.0.1.5/nagios/. The layout is identical to Figure 1.3.21, with the Nagios logo, 'Not secure' warning, and URL in the header. The left sidebar and right sidebar are also present. The main content area shows the 'Status Summary For All Host Groups' section.

Host Status Totals

Up: 2 Down: 0 Unreachable: 0 Pending: 0
All Problems: All Types
0 2

Service Status Totals

Ok: 19 Warning: 0 Unknown: 0 Critical: 0 Pending: 0
All Problems: All Types
0 19

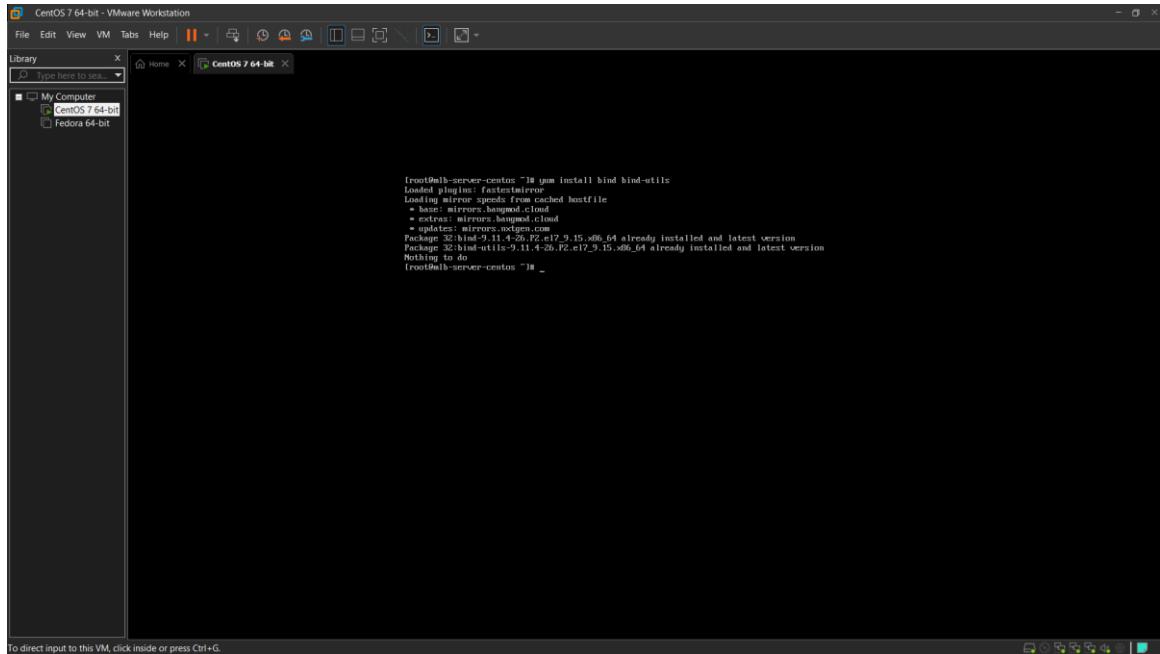
Status Summary For All Host Groups

Host Group	Host Status Summary	Service Status Summary
Linux Servers (linux-servers)	1 UP	0 OK

Figure 1.3.22: Status summary for all host groups

2 DNS Caching Setup with CentOS Server and Fedora Clients^[4]

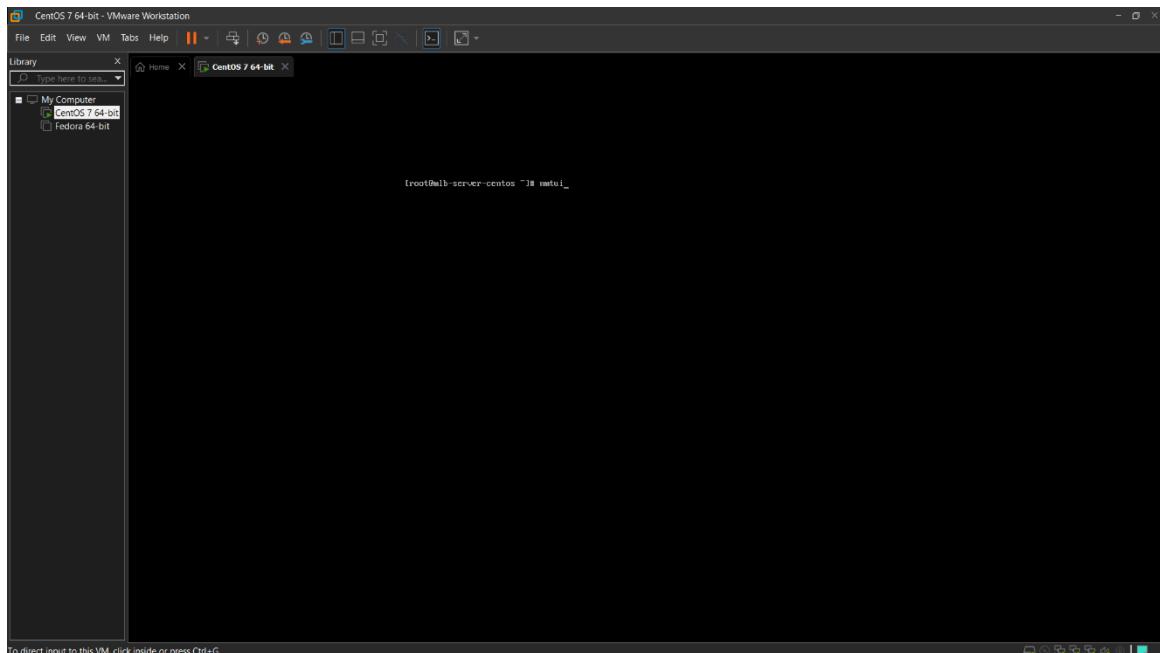
2.1 Configuring CentOS Server for DNS Caching



The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit VM running. The terminal window displays the following command and its output:

```
root@rhel-server-centos ~# yum install bind bind-utils
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
* rhel-server-centos.cloud
  extras: mirrors.bangmod.cloud
  updates: mirrors.singen.com
Package 32:bind-9.11.4-26.P2.el7_9_15.x86_64 already installed and latest version
Package 32:bind-utils-9.11.4-26.P2.el7_9_15.x86_64 already installed and latest version
Nothing to do
(root@rhel-server-centos ~# )
```

Figure 2.1.1: Install packages to provide named service and tools to manage it



The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit VM running. The terminal window displays the following command and its output:

```
[root@rhel-server-centos ~]# netcfg
```

Figure 2.1.2: Configure caching name server on this system

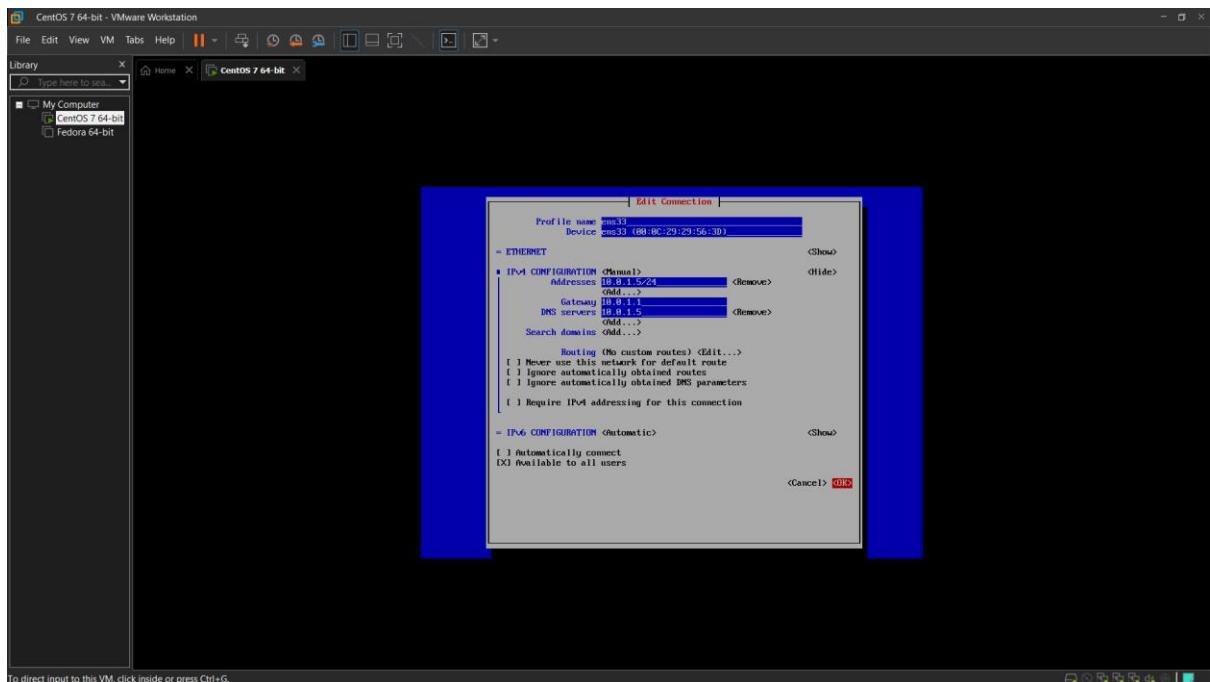


Figure 2.1.3: Caching name server configured

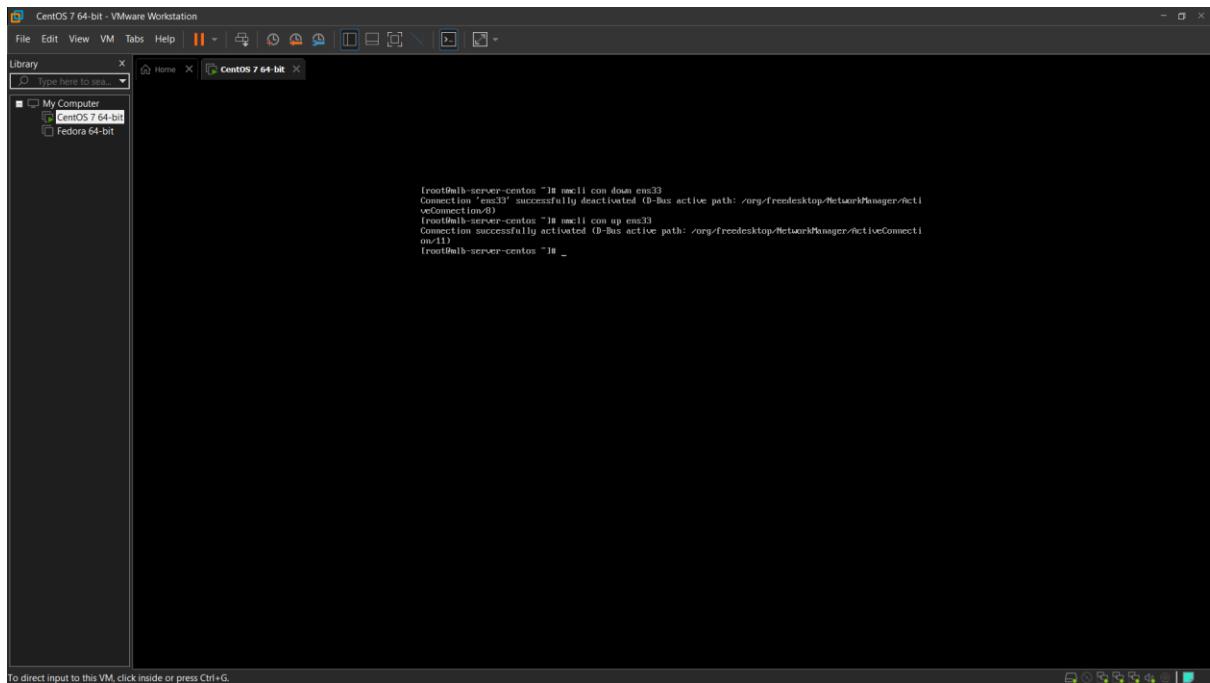


Figure 2.1.4: Restart the interface

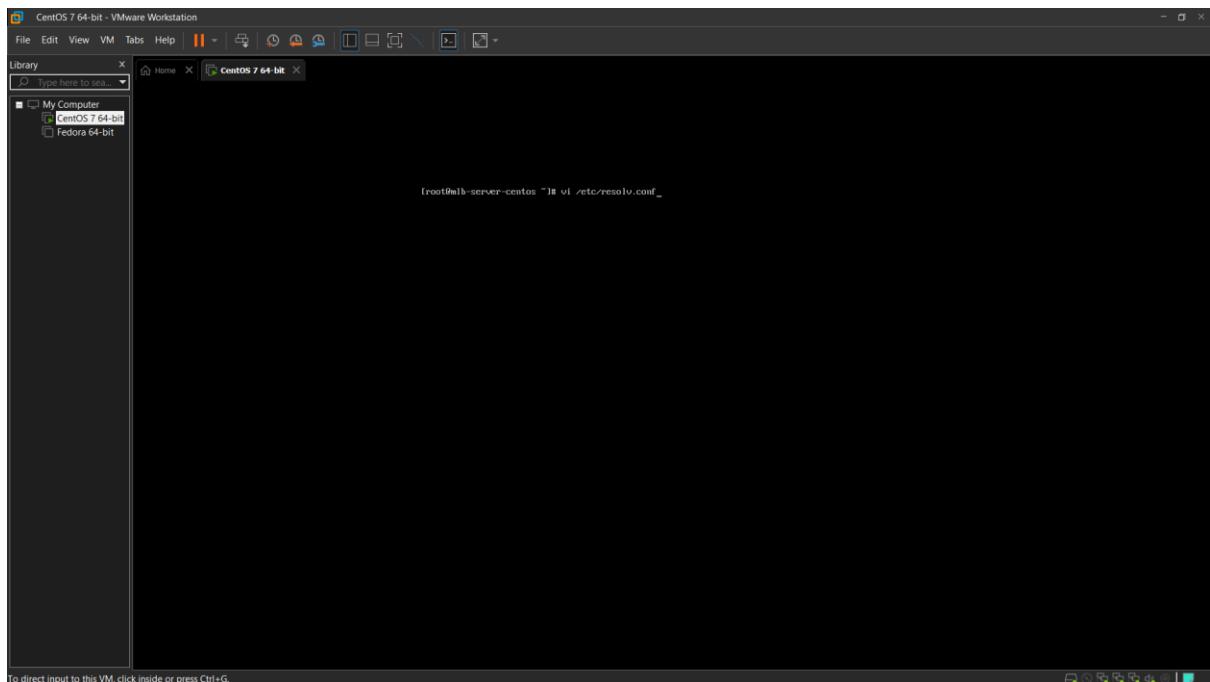


Figure 2.1.5: Edit the ‘/etc/resolv.conf’ file

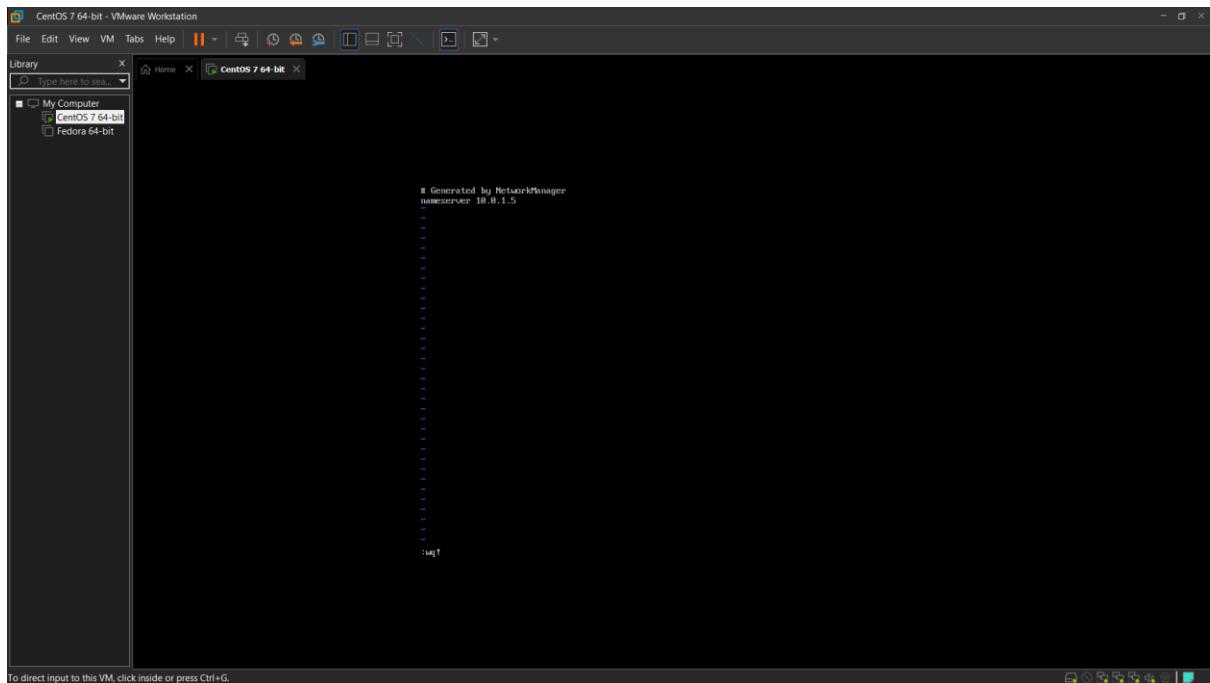


Figure 2.1.6: ‘/etc/resolv.conf’ file edited

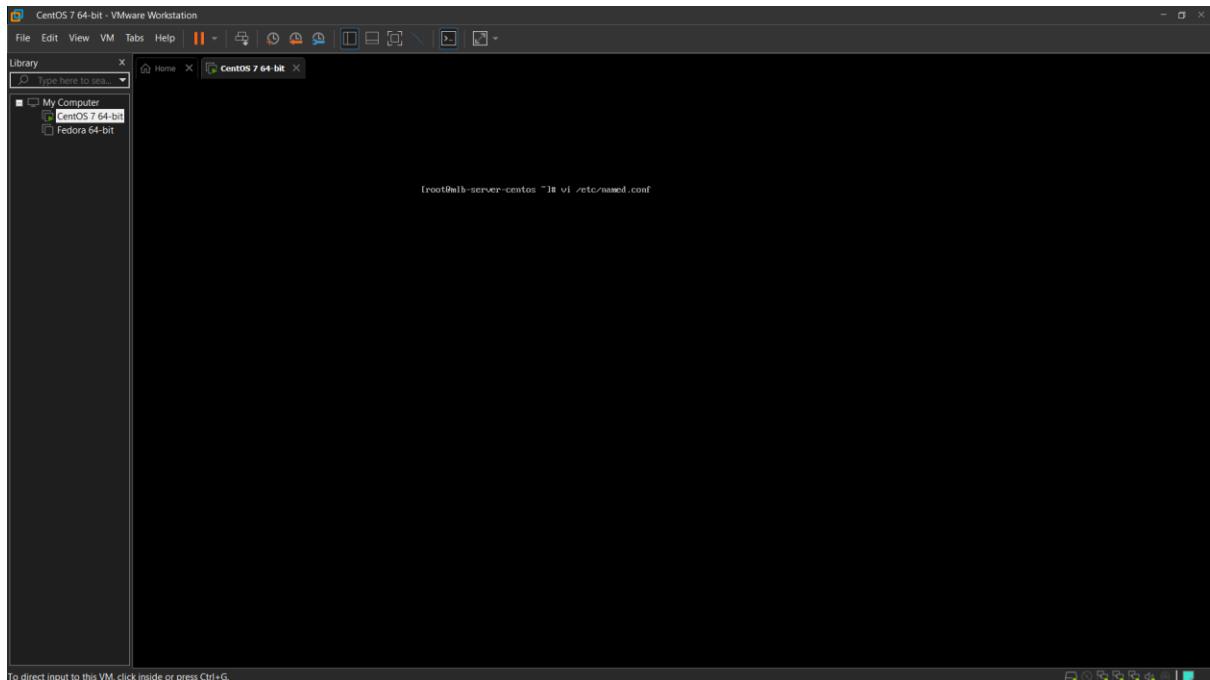


Figure 2.1.7: Edit DNS's main configuration file

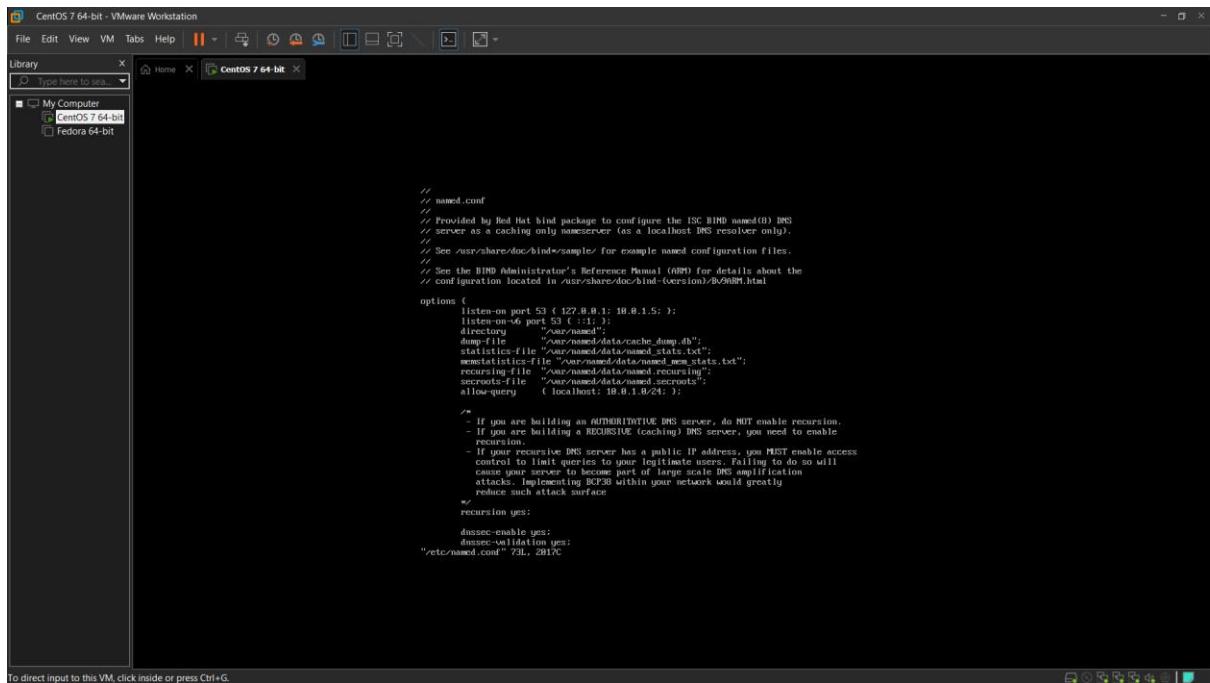


Figure 2.1.8: DNS's main configuration file edited

The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit VM running. The terminal window displays the command `systemctl restart named` being run as root. The terminal window has a dark background and white text. The VMware interface includes a toolbar at the top and a sidebar on the left.

```
[root@mlb-server-centos ~]# systemctl restart named
[root@mlb-server-centos ~]#
```

Figure 2.1.9: Restart the named service

The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit VM running. The terminal window displays the output of the `netstat -antp` command, listing active Internet connections. The output is in a table format with columns for Proto, Recv-Q, Local Address, Foreign Address, State, and Process name. The table lists various TCP and UDP ports, mostly in LISTEN state, associated with processes like named, sshd, and httpd. The terminal window has a dark background and white text. The VMware interface includes a toolbar at the top and a sidebar on the left.

Proto	Recv-Q	Local Address	Foreign Address	State	Process name
tcp	0	0.0.0.0:4369	0.0.0.0:*	LISTEN	2711/named
tcp	0	0.0.0.0:153	0.0.0.0:*	LISTEN	2711/named
tcp	0	0.0.0.0:22	0.0.0.0:*	LISTEN	1884:sshd
tcp	0	0.0.0.0:123	0.0.0.0:*	LISTEN	2711/named
tcp	0	0.0.0.0:125	0.0.0.0:*	LISTEN	1377/master
tcp	0	0.0.0.0:137	0.0.0.0:*	LISTEN	-
tcp	0	0.0.0.0:138	0.0.0.0:*	LISTEN	-
tcp	0	0.0.0.0:139	0.0.0.0:*	LISTEN	-
tcp	0	0.0.0.0:153	0.0.0.0:*	LISTEN	1377/master
tcp6	0	0:::80	0:::*	LISTEN	1261/httpd
tcp6	0	0:::153	0:::*	LISTEN	2711/named
tcp6	0	0:::21	0:::*	LISTEN	1884/ssh
tcp6	0	0:::22	0:::*	LISTEN	1377/master
tcp6	0	0:::1953	0:::*	LISTEN	2711/named
tcp6	0	0:::125	0:::*	LISTEN	1377/master
tcp6	0	0:::443	0:::*	LISTEN	1261/httpd

Figure 2.1.10: List all opened TCP ports

The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit VM running. The terminal window displays the output of the `netstat -anu` command, listing active Internet connections. The output is as follows:

```
[root@mlb-server-centos ~]# netstat -anu
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 0.0.0.1:53              0.0.0.0:*
                  LISTEN
tcp        0      0 127.0.0.1:53            0.0.0.0:*
                  LISTEN
tcp        0      0 0.0.0.0:22             0.0.0.0:*
                  LISTEN
tcp        0      0 0.0.0.0:1993            0.0.0.0:*
                  LISTEN
tcp        0      0 127.0.0.1:25            0.0.0.0:*
                  LISTEN
tcp6       0      0 ::1:80                 ::*:*
                  LISTEN
tcp6       0      0 ::1:53                 ::*:*
                  LISTEN
tcp6       0      0 ::1:1                 ::*:*
                  LISTEN
tcp6       0      0 ::1:22                 ::*:*
                  LISTEN
tcp6       0      0 ::1:1993               ::*:*
                  LISTEN
tcp6       0      0 ::1:323                ::*:*
                  LISTEN
tcp6       0      0 ::1:443                ::*:*
                  LISTEN
udp        0      0 0.0.0.1:53              0.0.0.0:*
                  LISTEN
udp        0      0 0.0.0.0:53              0.0.0.0:*
                  LISTEN
udp        0      0 0.0.0.0:67              0.0.0.0:*
                  LISTEN
udp        0      0 0.0.0.0:68              0.0.0.0:*
                  LISTEN
udp        0      0 127.0.0.1:323            0.0.0.0:*
                  LISTEN
udpg6      0      0 ::1:323               ::*:*
                  LISTEN
udpg6      0      0 ::1:1323               ::*:*
                  LISTEN
[root@mlb-server-centos ~]# _
```

Figure 2.1.11: List all opened ports

The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit VM running. The terminal window displays the output of the `dig google.com` command, which is used to query the DNS for the domain google.com. The output is as follows:

```
[root@mlb-server-centos ~]# dig google.com
```

Figure 2.1.12: Display answer from ‘google.com’

Figure 2.1.13: Display answer from ‘google.com’ again

Figure 2.1.14: Caching name server verified

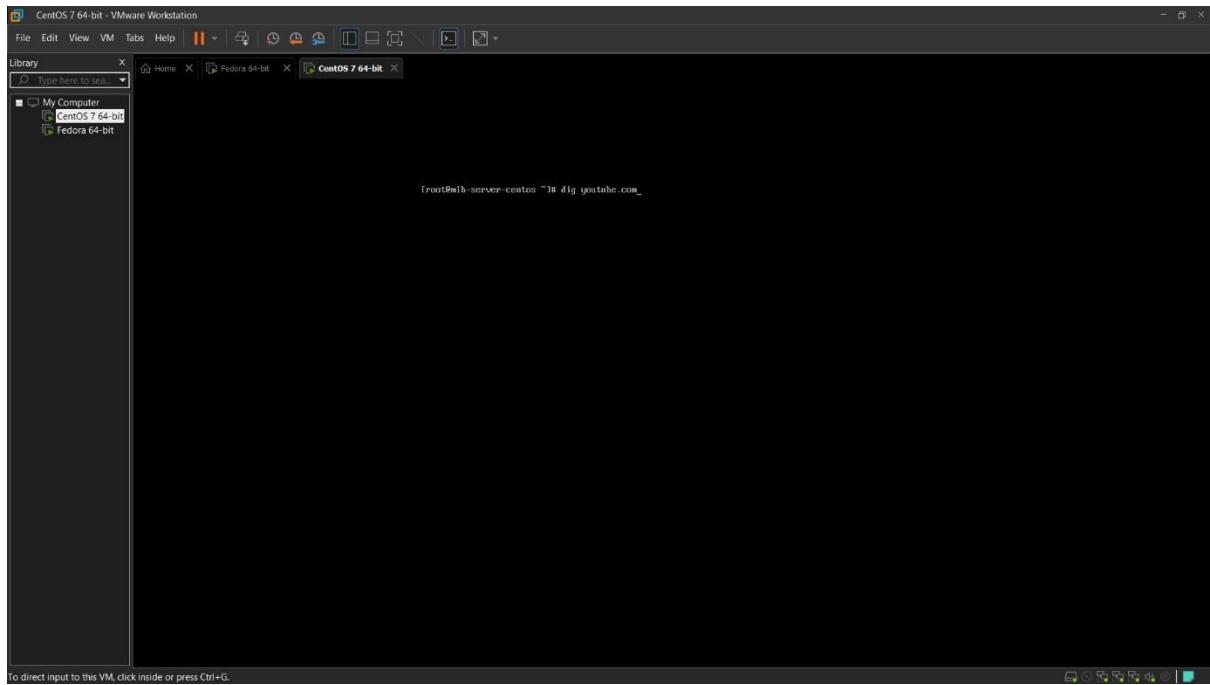


Figure 2.1.15: Display answer from ‘youtube.com’

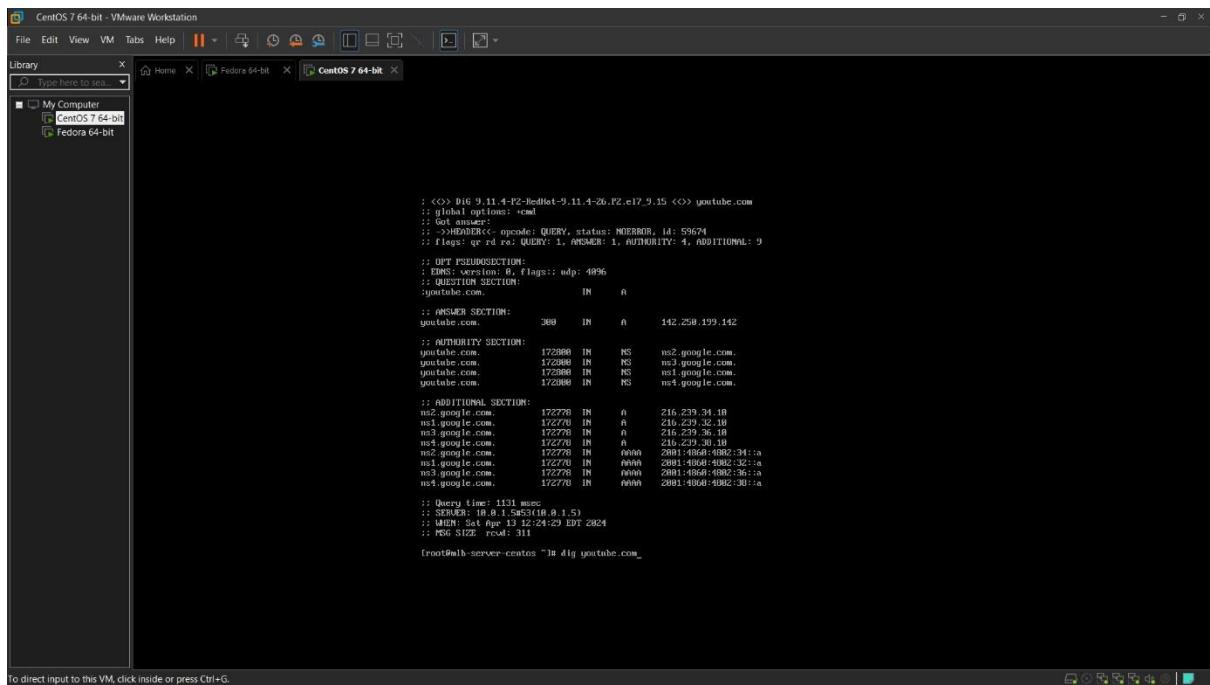


Figure 2.1.16: Display answer from ‘youtube.com’ again

```

: <> B:ig 9.11.4-T2-Redhat-9.11.4-26.P2.e17.9.15 <> youtube.com
:: got answer
::=>HEADER<< opcode: QUERY, status: NOERROR, id: 28836
:: flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9
:: OPT PSEUDOSECTION:
:: EDNS: version: 0, flags: udg: 4996
:: QUESTION SECTION:
youtube.com.          IN      A
:: ANSWER SECTION:
youtube.com.          209    IN      A      142.29.199.142
:: AUTHORITY SECTION:
youtube.com.          172769  IN      NS      ns1.google.com.
youtube.com.          172769  IN      NS      ns2.google.com.
youtube.com.          172769  IN      NS      ns3.google.com.
youtube.com.          172769  IN      NS      ns4.google.com.
:: ADDITIONAL SECTION:
ns2.google.com.        172767  IN      A      216.239.34.18
ns1.google.com.        172767  IN      A      216.239.32.10
ns3.google.com.        172767  IN      A      216.239.36.18
ns4.google.com.        172767  IN      A      216.239.36.19
ns2.google.com.        172767  IN      A      208.140.64.248
ns1.google.com.        172767  IN      A      208.140.64.248
ns3.google.com.        172767  IN      A      208.140.64.248
ns4.google.com.        172767  IN      A      208.140.64.248
:: Query time: 0 msec
:: SERVER: 10.0.1.5#53(10.0.1.5)
:: WHEN: Sat Apr 13 02:24:48 EDT 2013
:: MSG SIZE rcvd: 311

```

To direct input to this VM, click inside or press Ctrl+G.

Figure 2.1.17: Caching name server verified

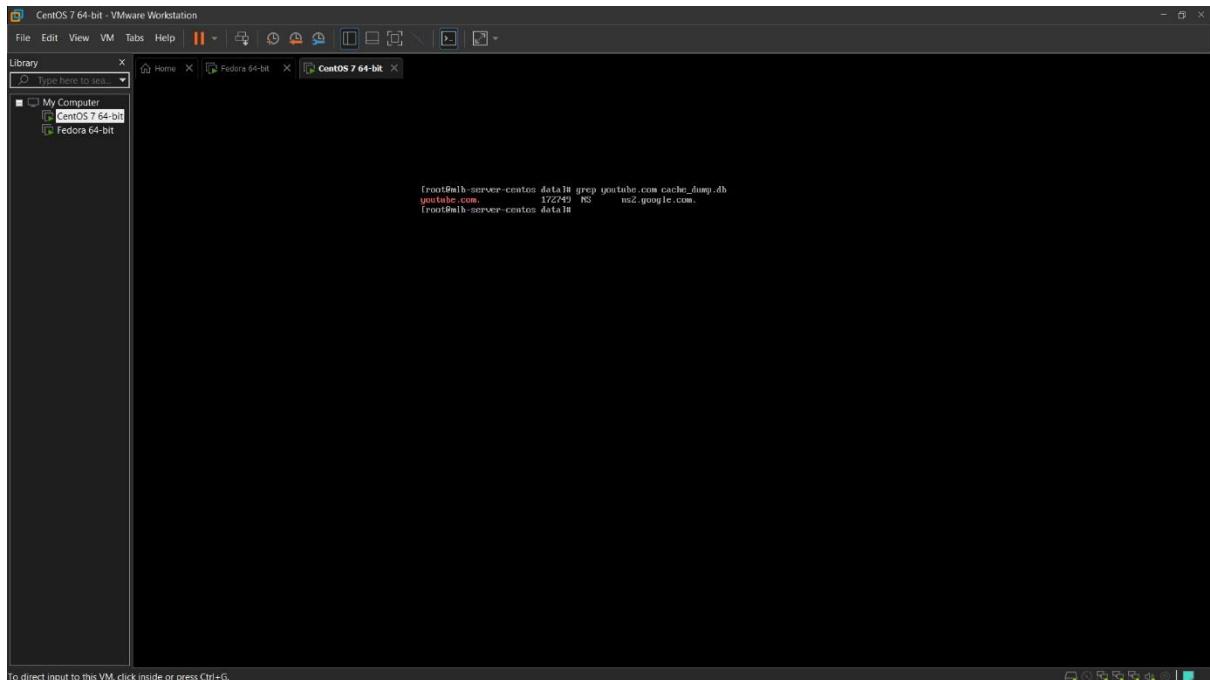
```

root@nmb-server-centos:~# rndc dumpdb -cache
root@nmb-server-centos:~# cd /var/named/data
root@nmb-server-centos:~/data# ls -la
total 1756
drwxr--r-- 2 named named   96 Apr 13 07:14 .
drwxr--r--T 8 root  root  12821 Apr 13 07:10 cache
-rw-r--r-- 1 named named 12821 Apr 13 07:10 cache_dump.db
-rw-r--r-- 1 named named 1467 Apr 13 07:10 named.run
-rw-r--r-- 1 named named 309602 Apr  6 03:38 named.run-28249496
-rw-r--r-- 1 named named 13414 Apr 13 07:10 named.run-28249493
root@nmb-server-centos:~/data# grep google.com cache_dump.db
google.com.          172129  NS      ns1.google.com.
172129  NS      ns2.google.com.
172129  NS      ns3.google.com.
172129  NS      ns4.google.com.
154   MX      10 mail.google.com.
3454   TXT    "v=spf1 include:spf.google.com ~all"
ns1.google.com.        172129  IN      A      216.239.32.10
ns2.google.com.        172129  IN      A      216.239.34.18
ns3.google.com.        172129  IN      A      216.239.36.18
ns4.google.com.        172129  IN      A      216.239.36.19

```

To direct input to this VM, click inside or press Ctrl+G.

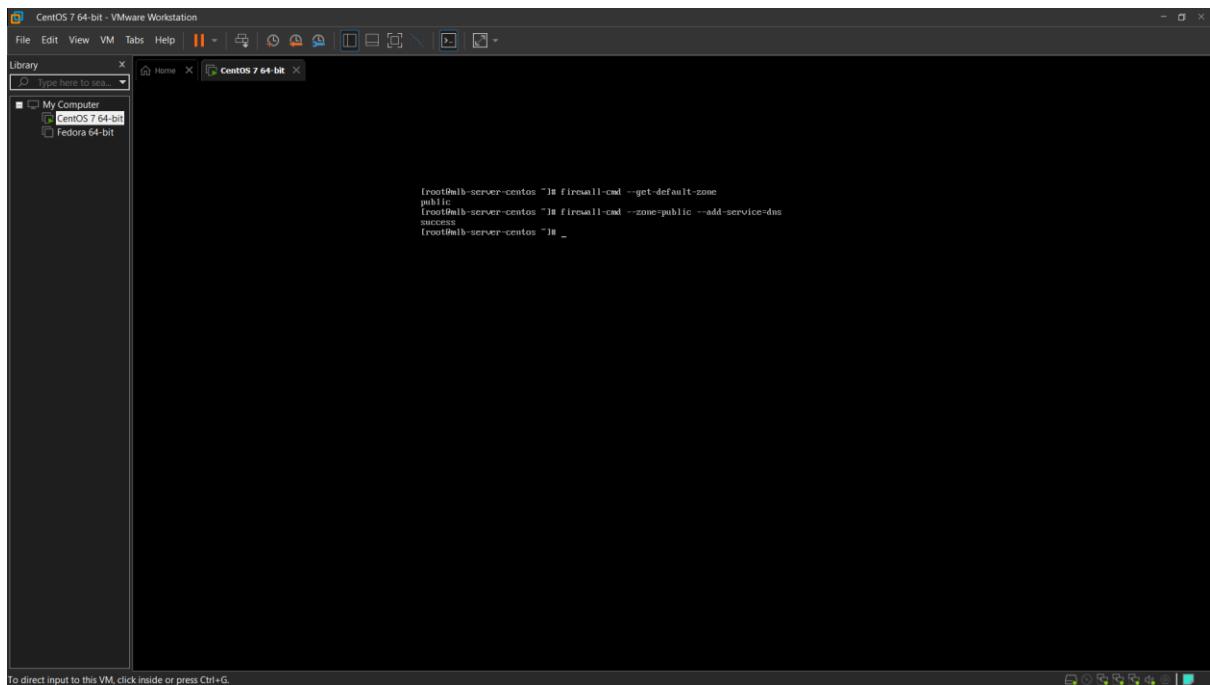
Figure 2.1.18: View cached data



The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit virtual machine running. The terminal window displays the output of the command 'grep youtube.com cache dump.db', which shows entries for 'youtube.com' and 'ns2.google.com'. The terminal window has tabs for 'Home', 'Fedora 64-bit', and 'CentOS 7 64-bit'. The VMware toolbar at the top includes icons for file operations, clipboard, and network.

```
root@mlb-server-centos ~# grep youtube.com cache dump.db
youtube.com.          172749  NS      ns2.google.com.
root@mlb-server-centos ~#
```

Figure 2.1.19: View cached data



The screenshot shows a VMware Workstation interface with a CentOS 7 64-bit virtual machine running. The terminal window displays the output of the command 'firewall-cmd --get-default-zone', showing 'public' as the default zone. It then shows the command 'firewall-cmd --zone=public --add-service=dns', which adds the DNS service to the public zone. The terminal window has tabs for 'Home', 'CentOS 7 64-bit', and 'Fedora 64-bit'. The VMware toolbar at the top includes icons for file operations, clipboard, and network.

```
root@mlb-server-centos ~# firewall-cmd --get-default-zone
public
[root@mlb-server-centos ~]# firewall-cmd --zone=public --add-service=dns
success
[root@mlb-server-centos ~]# _
```

Figure 2.1.20: Allow DNS traffic through firewall

2.2 Configuring Fedora Client to Utilize CentOS DNS Caching Server

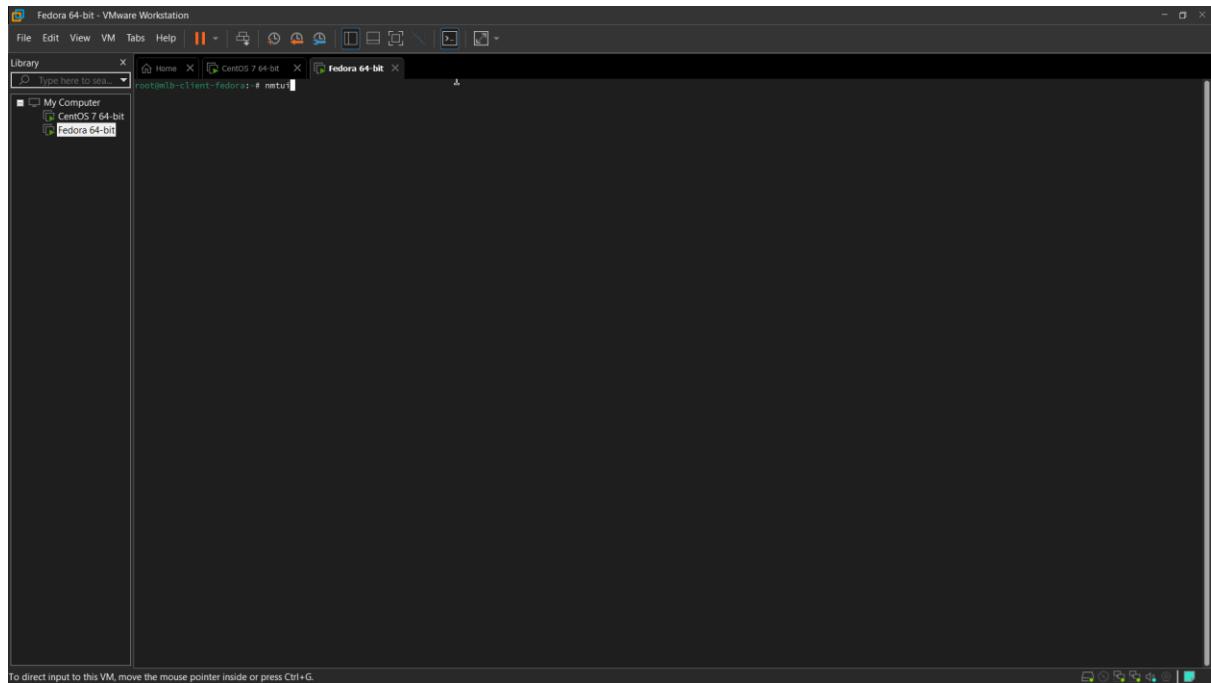


Figure 2.2.1: Configure client's DNS server IP address

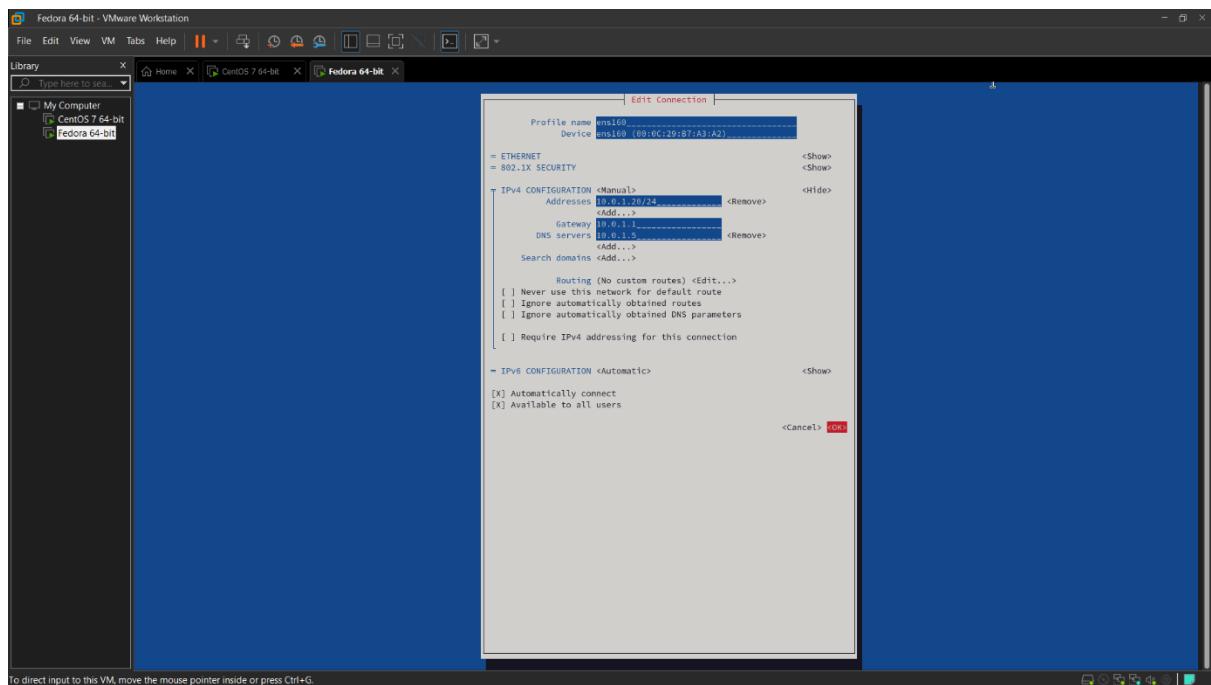


Figure 2.2.2: Client's DNS server IP address configured

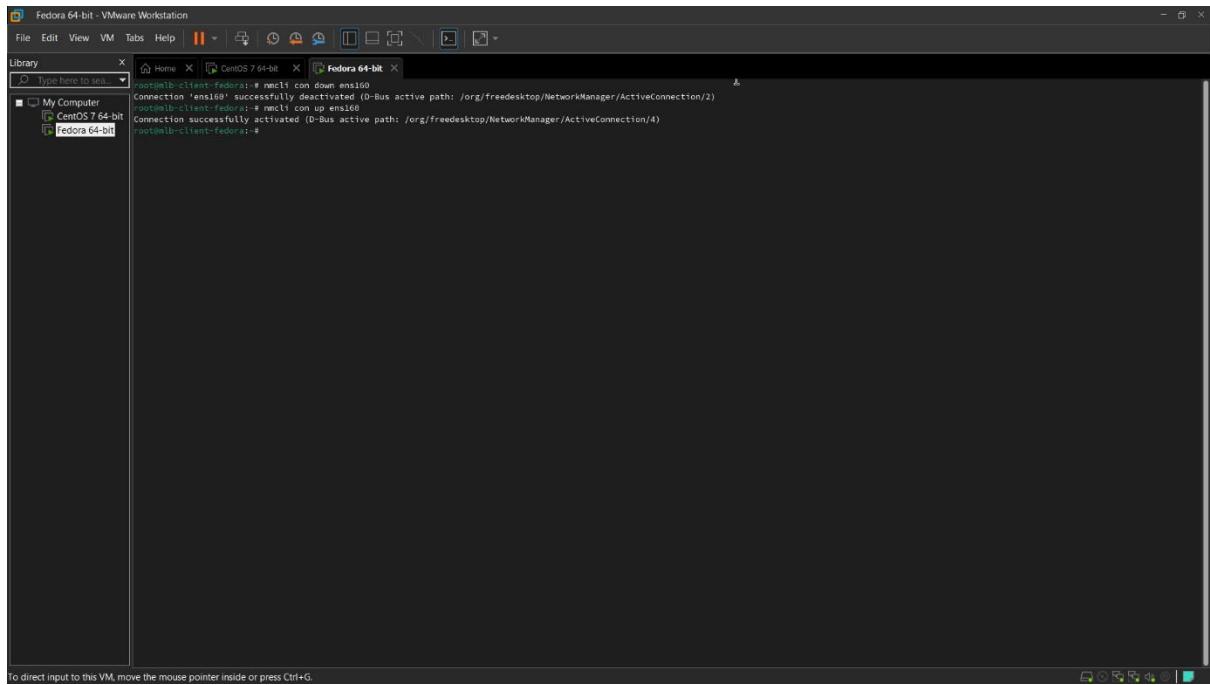


Figure 2.2.3: Restart the interface

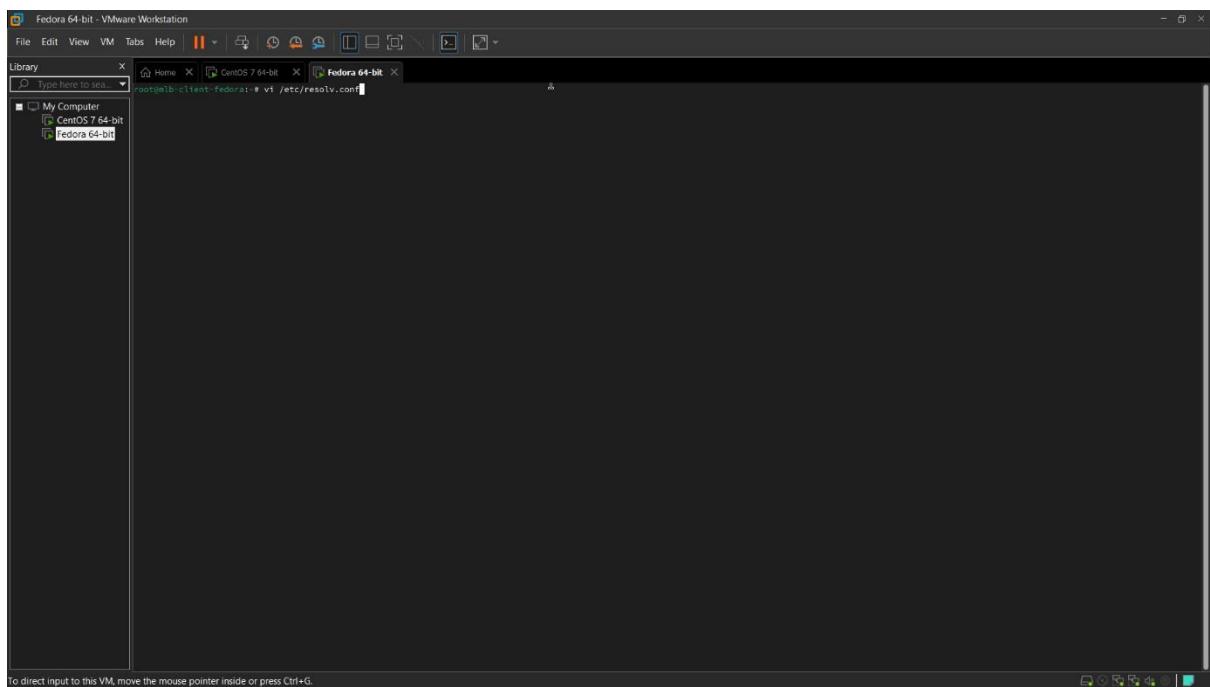


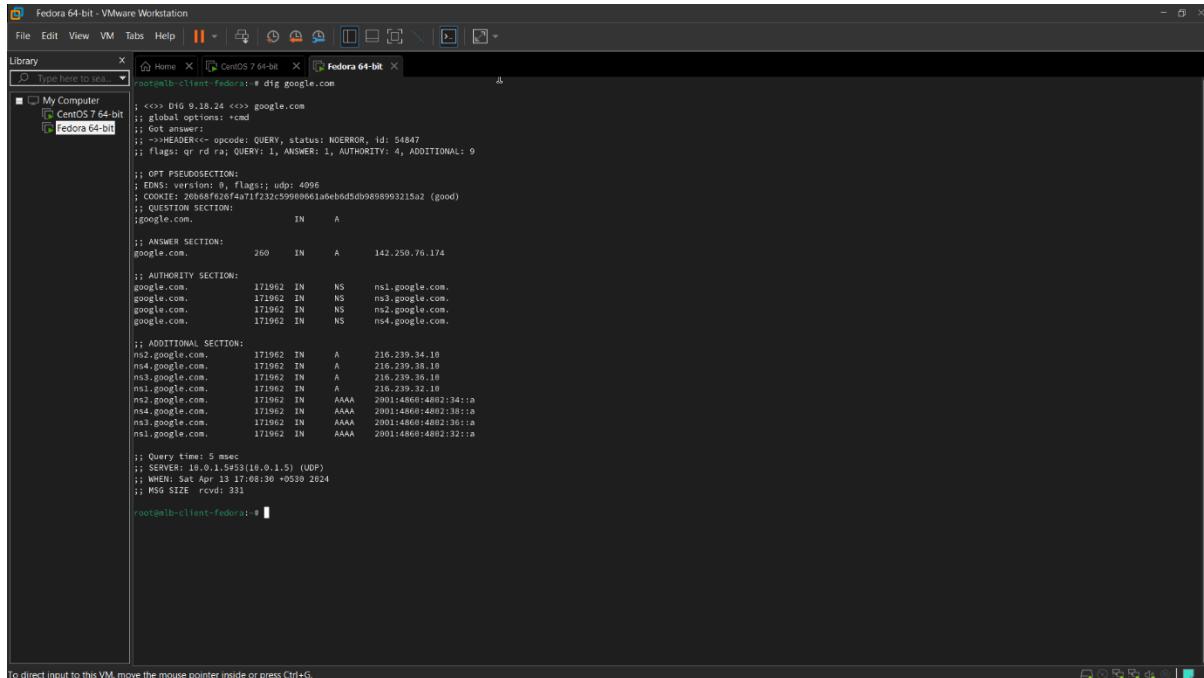
Figure 2.2.4: Edit the '/etc/resolv.conf' file

```
# 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 18.0.1.5
```

Figure 2.2.5: ‘/etc/resolv.conf’ file edited

2.3 Conducting DNS Resolution Tests on Fedora Client



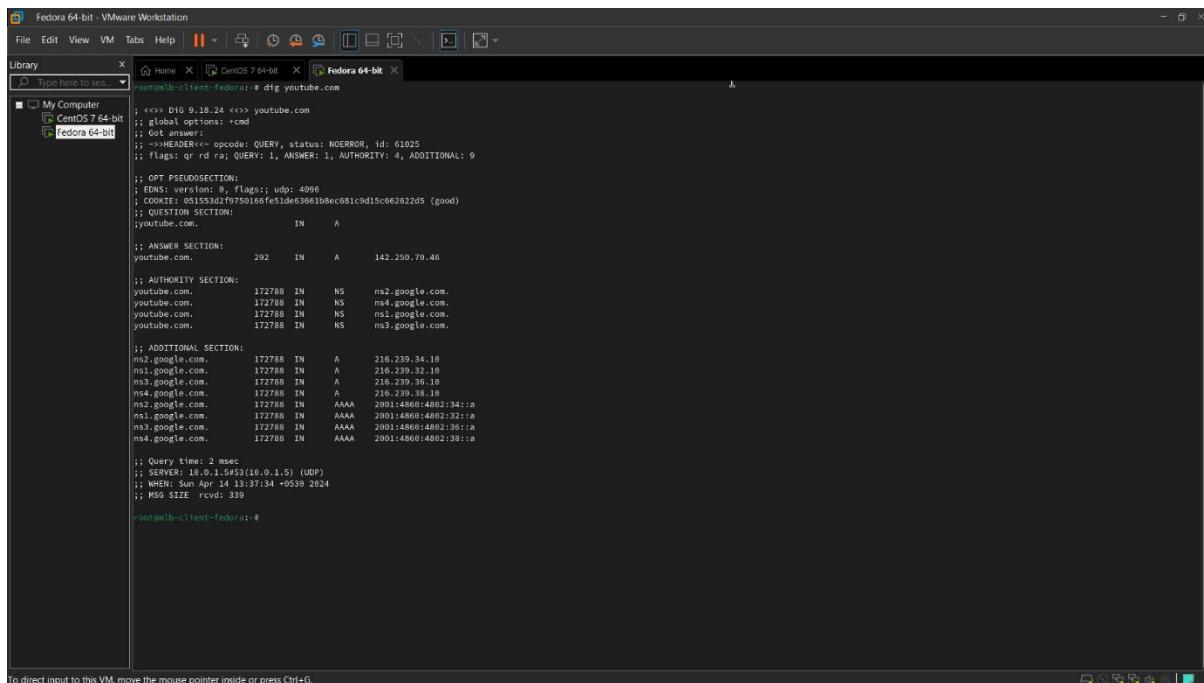
```

Fedora 64-bit - VMware Workstation
File Edit View VM Tabs Help ||| 
Library Type here to search
My Computer CentOS 7 64-bit Fedora 64-bit
root@lb-client-fedor...:~# dig google.com
; <>> DIG 9.18.24 <>> google.com
; global options: +cmd
; Got answer:
; ->>HEADER<> opcode: QUERY, status: NOERROR, id: 54847
; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9
; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: ; udp: 4096
; COOKIE: 2000bf526f4a71f232c5998061aebbd5d09898993215a2 (good)
; QUESTION SECTION:
;google.com.           IN      A
;ANSWER SECTION:
google.com.        260    IN      A      142.250.76.174
; AUTHORITY SECTION:
google.com.        171962  IN      NS      ns1.google.com.
google.com.        171962  IN      NS      ns3.google.com.
google.com.        171962  IN      NS      ns2.google.com.
google.com.        171962  IN      NS      ns4.google.com.
; ADDITIONAL SECTION:
ns2.google.com.    171962  IN      A       216.239.34.10
ns4.google.com.    171962  IN      A       216.239.38.10
ns3.google.com.    171962  IN      A       216.239.35.10
ns1.google.com.    171962  IN      A       216.239.32.10
ns2.google.com.    171962  IN      AAAA   2001:4661:4802::34::a
ns4.google.com.    171962  IN      AAAA   2001:4661:4802::30::a
ns3.google.com.    171962  IN      AAAA   2001:4661:4802::30::a
ns1.google.com.    171962  IN      AAAA   2001:4661:4802::32::a
; Query time: 5 msec
; SERVER: 10.0.1.53(10.0.1.5) (UDP)
; WHEN: Sat Apr 13 17:08:30 +0530 2024
; MSG SIZE rcvd: 331
root@lb-client-fedor...:#

```

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

Figure 2.3.1: Resolution test for ‘google.com’



```

Fedora 64-bit - VMware Workstation
File Edit View VM Tabs Help ||| 
Library Type here to search
My Computer CentOS 7 64-bit Fedora 64-bit
root@lb-client-fedor...:~# dig youtube.com
; <>> DIG 9.18.24 <>> youtube.com
; global options: +cmd
; Got answer:
; ->>HEADER<> opcode: QUERY, status: NOERROR, id: 61025
; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9
; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: ; udp: 4096
; COOKIE: 081553d4f9750165fe31de63661b8ec681c9d15c662822d5 (good)
; QUESTION SECTION:
;youtube.com.           IN      A
;ANSWER SECTION:
youtube.com.        292    IN      A      142.250.79.46
; AUTHORITY SECTION:
youtube.com.        172788  IN      NS      ns2.google.com.
youtube.com.        172788  IN      NS      ns4.google.com.
youtube.com.        172788  IN      NS      ns1.google.com.
youtube.com.        172788  IN      NS      ns3.google.com.
; ADDITIONAL SECTION:
ns2.google.com.    172788  IN      A       216.239.34.10
ns4.google.com.    172788  IN      A       216.239.36.10
ns3.google.com.    172788  IN      A       216.239.35.10
ns1.google.com.    172788  IN      A       216.239.38.10
ns2.google.com.    172788  IN      AAAA   2001:4661:4802::34::a
ns1.google.com.    172788  IN      AAAA   2001:4661:4802::32::a
ns3.google.com.    172788  IN      AAAA   2001:4661:4802::30::a
ns4.google.com.    172788  IN      AAAA   2001:4661:4802::38::a
; Query time: 2 msec
; SERVER: 10.0.1.53(10.0.1.5) (UDP)
; WHEN: Sun Apr 14 13:37:34 +0530 2024
; MSG SIZE rcvd: 339
root@lb-client-fedor...:#

```

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

Figure 2.3.2: Resolution test for ‘youtube.com’

References

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[2]

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