



University Of Sargodha

Assignment: Apache http Server
System and Network Administration

Submitted By:

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NOTABLE CHANGES IN THE APACHE HTTP SERVER

```
centos@localhost:~  
[centos@localhost ~]$ apachectl configtest  
AH00558: httpd: Could not reliably determine the server's fully qualified domain  
name, using localhost.localdomain. Set the 'ServerName' directive globally to s  
uppress this message  
Syntax OK  
[centos@localhost ~]$
```

THE APACHE CONFIGURATION FILES

```
centos@localhost:~  
uppress this message  
Syntax OK  
[centos@localhost ~]$ cat /etc/httpd/conf/httpd.conf  
#  
# This is the main Apache HTTP server configuration file. It contains the  
# configuration directives that give the server its instructions.  
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.  
# In particular, see  
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>  
# for a discussion of each configuration directive.  
#  
# See the httpd.conf(5) man page for more information on this configuration,  
# and httpd.service(8) on using and configuring the httpd service.  
#  
# Do NOT simply read the instructions in here without understanding  
# what they do. They're here only as hints or reminders. If you are unsure  
# consult the online docs. You have been warned.  
#  
# Configuration and logfile names: If the filenames you specify for many  
# of the server's control files begin with "/" (or "drive:/" for Win32), the  
# server will use that explicit path. If the filenames do *not* begin  
# with "/", the value of ServerRoot is prepended -- so 'log/access_log'  
# with ServerRoot set to '/www' will be interpreted by the  
# server as '/www/log/access_log', where as '/log/access_log' will be
```

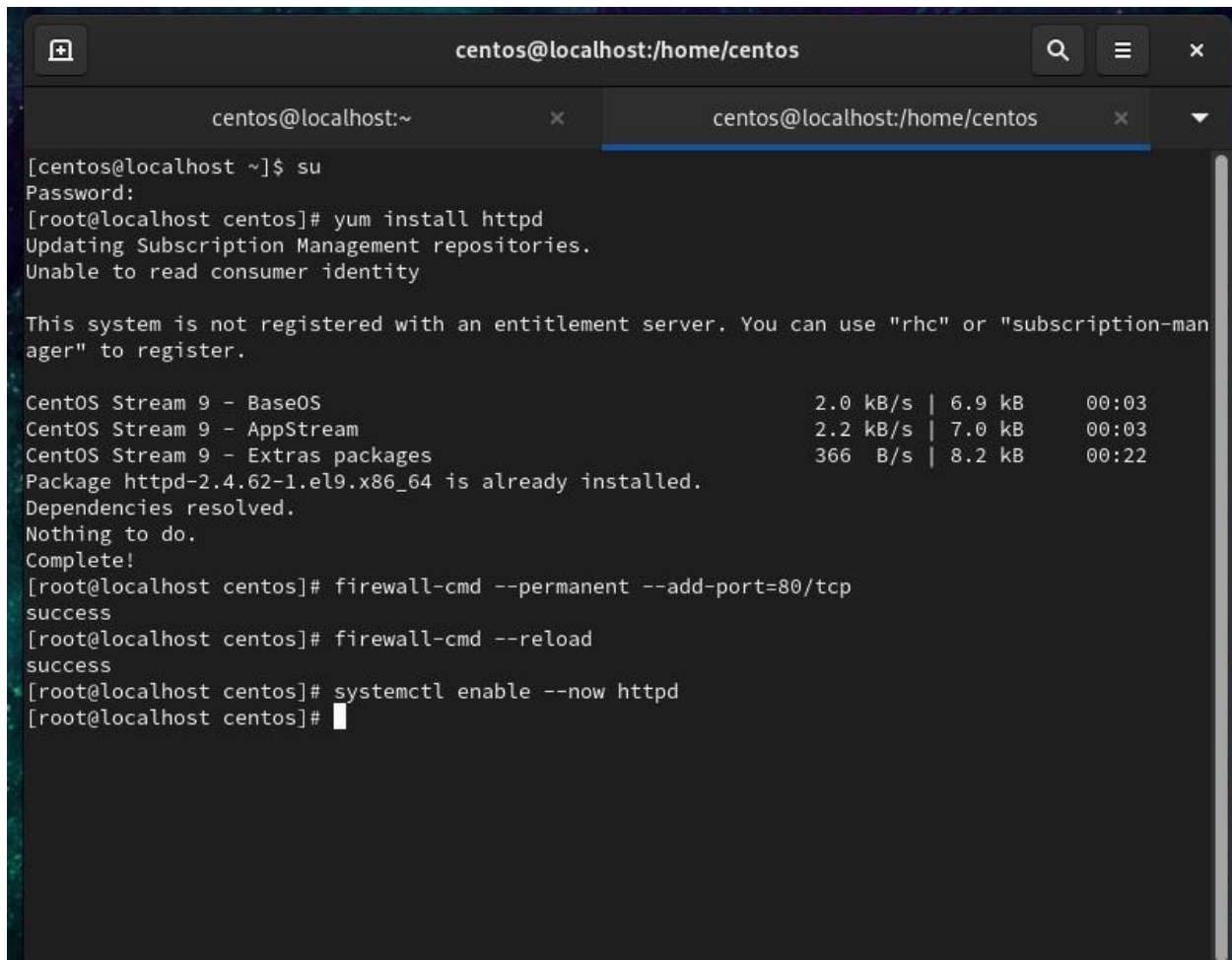
```
centos@localhost:~  
#ErrorDocument 404 "/cgi-bin/missing_handler.pl"  
#ErrorDocument 402 http://www.example.com/subscription_info.html  
#  
#  
# EnableMMAP and EnableSendfile: On systems that support it,  
# memory-mapping or the sendfile syscall may be used to deliver  
# files. This usually improves server performance, but must  
# be turned off when serving from networked-mounted  
# filesystems or if support for these functions is otherwise  
# broken on your system.  
# Defaults if commented: EnableMMAP On, EnableSendfile Off  
#  
#EnableMMAP off  
EnableSendfile on  
  
# Supplemental configuration  
#  
# Load config files in the "/etc/httpd/conf.d" directory, if any.  
IncludeOptional conf.d/*.conf  
[centos@localhost ~]$  
[centos@localhost ~]$ cat /etc/httpd/conf.d/  
cat: /etc/httpd/conf.d/: Is a directory  
[centos@localhost ~]$
```

```
centos@localhost:~  
#  
#  
# EnableMMAP and EnableSendfile: On systems that support it,  
# memory-mapping or the sendfile syscall may be used to deliver  
# files. This usually improves server performance, but must  
# be turned off when serving from networked-mounted  
# filesystems or if support for these functions is otherwise  
# broken on your system.  
# Defaults if commented: EnableMMAP On, EnableSendfile Off  
#  
#EnableMMAP off  
EnableSendfile on  
  
# Supplemental configuration  
#  
# Load config files in the "/etc/httpd/conf.d" directory, if any.  
IncludeOptional conf.d/*.conf  
[centos@localhost ~]$  
[centos@localhost ~]$ cat /etc/httpd/conf.d/  
cat: /etc/httpd/conf.d/: Is a directory  
[centos@localhost ~]$ cat /etc/httpd/conf.modules.d/  
cat: /etc/httpd/conf.modules.d/: Is a directory  
[centos@localhost ~]$
```

```
centos@localhost:~ — systemctl status httpd
centos@localhost:~ x centos@localhost:~ — systemctl status httpd x
• httpd.service - The Apache HTTP Server
  Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
  Active: active (running) since Fri 2024-11-29 08:56:32 PKT; 34s ago
  Docs: man:httpd.service(8)
  Main PID: 3687 (httpd)
  Status: "Total requests: 0; Idle/Busy workers 100/0; Requests/sec: 0; Bytes served/sec: 0"
  Tasks: 177 (limit: 10948)
  Memory: 33.6M
  CPU: 933ms
  CGroup: /system.slice/httpd.service
          └─3687 /usr/sbin/httpd -DFOREGROUND
            └─3693 /usr/sbin/httpd -DFOREGROUND
              └─3697 /usr/sbin/httpd -DFOREGROUND
                └─3698 /usr/sbin/httpd -DFOREGROUND
                  └─3701 /usr/sbin/httpd -DFOREGROUND

lines 1-15/15 (END)
```

SETTING UP A SINGLE-INSTANCE APACHE HTTP SERVER



```
centos@localhost:/home/centos

centos@localhost:~
centos@localhost:/home/centos

[centos@localhost ~]$ su
Password:
[root@localhost centos]# yum install httpd
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-man
ager" to register.

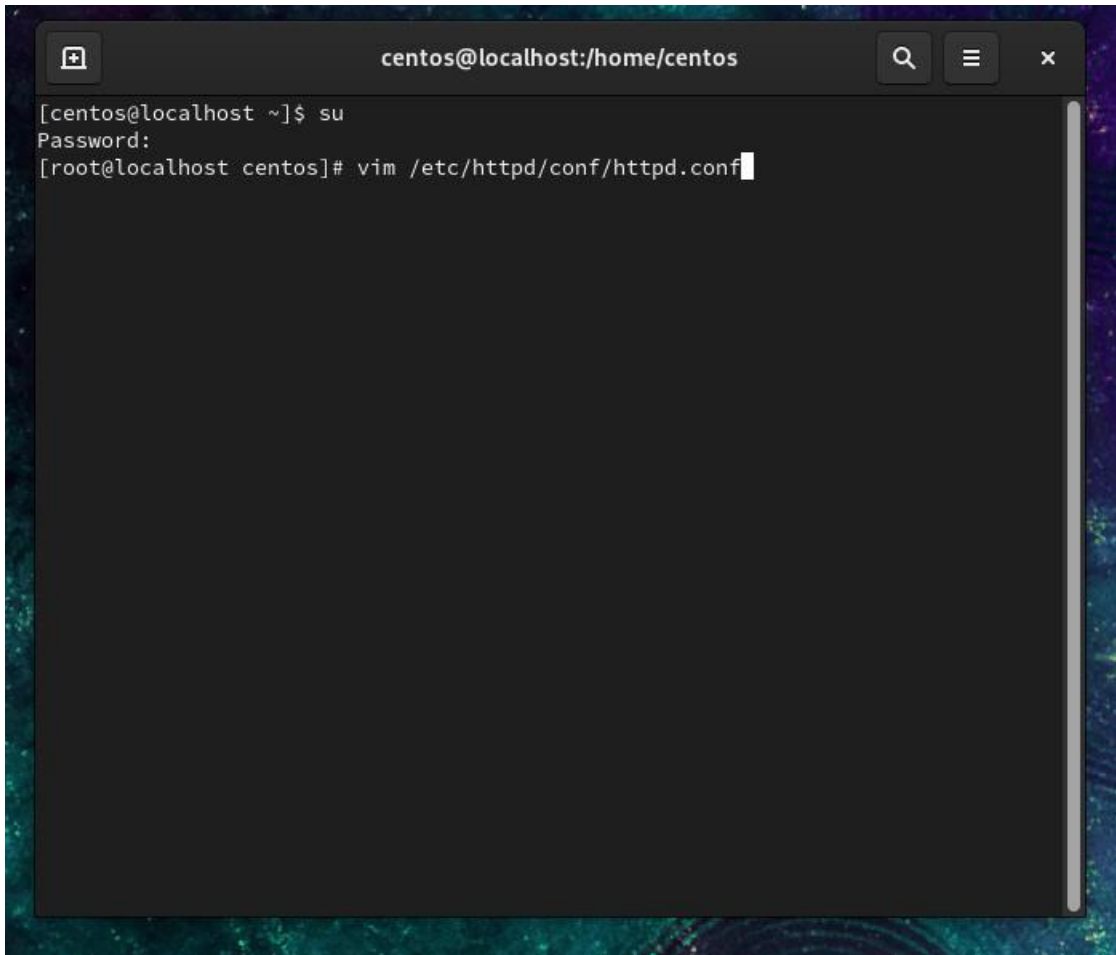
CentOS Stream 9 - BaseOS                2.0 kB/s | 6.9 kB    00:03
CentOS Stream 9 - AppStream              2.2 kB/s | 7.0 kB    00:03
CentOS Stream 9 - Extras packages        366 B/s | 8.2 kB    00:22
Package httpd-2.4.62-1.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@localhost centos]# firewall-cmd --permanent --add-port=80/tcp
success
[root@localhost centos]# firewall-cmd --reload
success
[root@localhost centos]# systemctl enable --now httpd
[root@localhost centos]#
```

```
centos@localhost:/home/centos

# 1) plain text 2) local redirects 3) external redirects
#
# Some examples:
#ErrorDocument 500 "The server made a boo boo."
#ErrorDocument 404 /missing.html
#ErrorDocument 404 "/cgi-bin/missing_handler.pl"
#ErrorDocument 402 http://www.example.com/subscription_info.html
#
#
# EnableMMAP and EnableSendfile: On systems that support it,
# memory-mapping or the sendfile syscall may be used to deliver
# files. This usually improves server performance, but must
# be turned off when serving from networked-mounted
# filesystems or if support for these functions is otherwise
# broken on your system.
# Defaults if commented: EnableMMAP On, EnableSendfile Off
#
#EnableMMAP off
EnableSendfile on

# Supplemental configuration
#
# Load config files in the "/etc/httpd/conf.d" directory, if any.
IncludeOptional conf.d/*.conf
[centos@localhost ~]$
[centos@localhost ~]$ cat /etc/httpd/conf.d/
cat: /etc/httpd/conf.d/: Is a directory
[centos@localhost ~]$ cat /etc/httpd/conf.modules.d/
cat: /etc/httpd/conf.modules.d/: Is a directory
[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf
```

CONFIGURING APACHE NAME-BASED VIRTUAL HOSTS

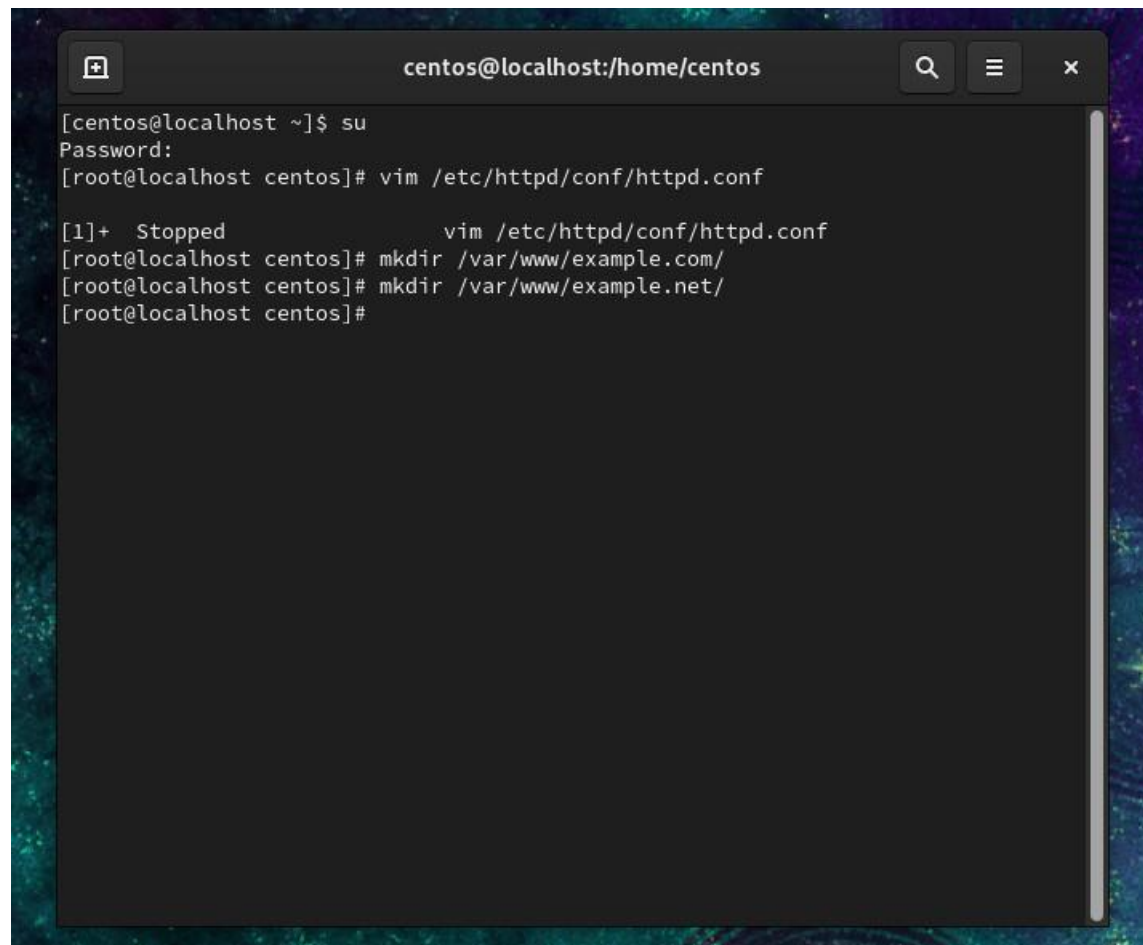
A terminal window with a dark background and a colorful, abstract pattern on the left side. The window title bar shows 'centos@localhost:/home/centos'. The terminal content shows a user switching to root and opening the Apache configuration file in vim.

```
[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf
```

```
centos@localhost:/home/centos — vim /etc/httpd/conf/httpd.c...
<VirtualHost *:80>
DocumentRoot "/var/www/example.com/"
ServerName example.com
CustomLog /var/log/httpd/example.com_access.log combined
ErrorLog /var/log/httpd/example.com_error.log
</VirtualHost>#
# This is the main Apache HTTP server configuration file. It contains the
# configuration directives that give the server its instructions.
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>
# for a discussion of each configuration directive.
#
# See the httpd.conf(5) man page for more information on this configuration,
# and httpd.service(8) on using and configuring the httpd service.
#
# Do NOT simply read the instructions in here without understanding
# what they do. They're here only as hints or reminders. If you are unsure
# consult the online docs. You have been warned.
#
# Configuration and logfile names: If the filenames you specify for many
# of the server's control files begin with "/" (or "drive:/" for Win32), the
# server will use that explicit path. If the filenames do *not* begin
# with "/", the value of ServerRoot is prepended -- so 'log/access_log'
# with ServerRoot set to '/www' will be interpreted by the
# server as '/www/log/access_log', where as '/log/access_log' will be
# interpreted as '/log/access_log'.
#
-- INSERT --
6,15 Top
```

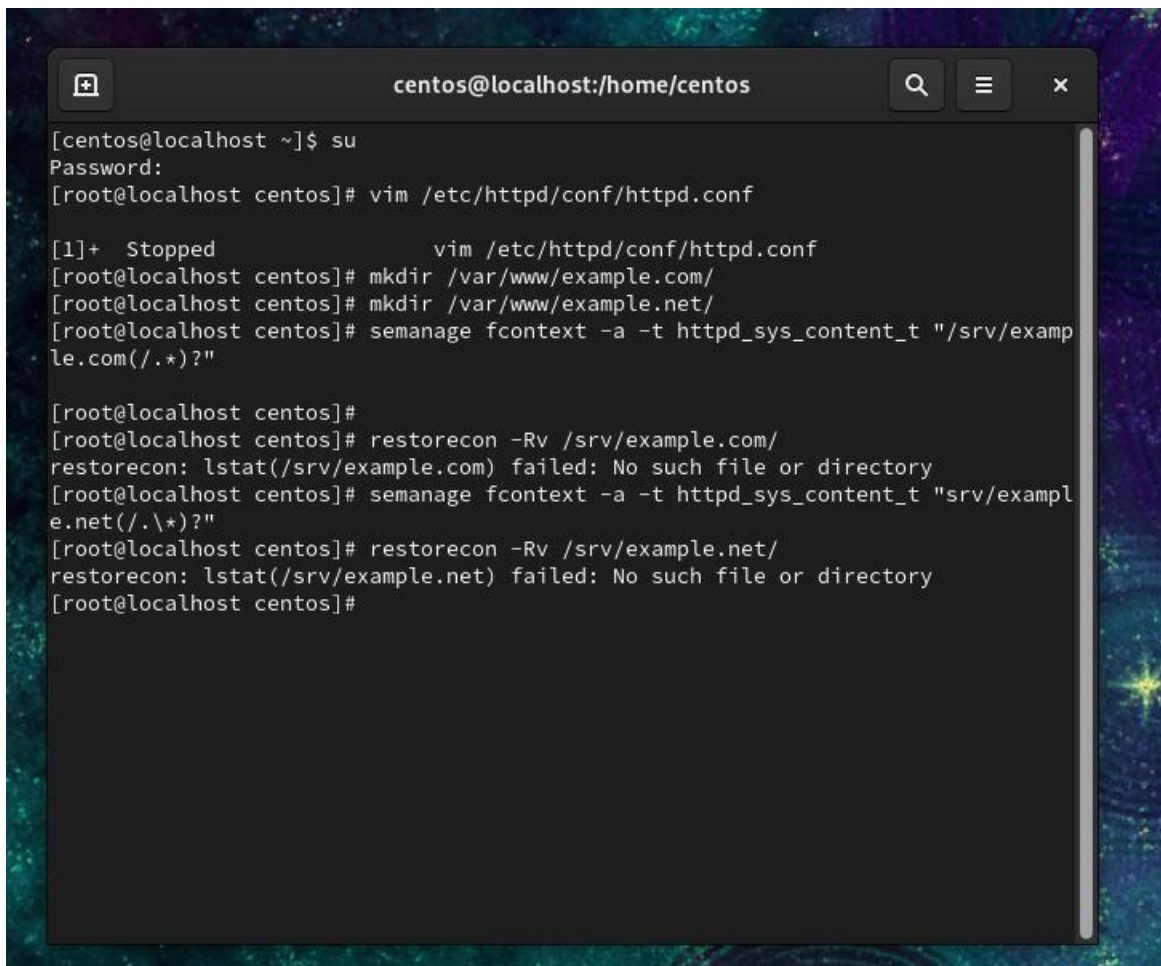


```
centos@localhost:/home/centos — vim /etc/httpd/conf/httpd.c...
<VirtualHost *:80>
DocumentRoot "/var/www/example.com/"
ServerName example.com
CustomLog /var/log/httpd/example.com_access.log combined
ErrorLog /var/log/httpd/example.com_error.log
</VirtualHost>
<VirtualHost *:80>
DocumentRoot "/var/www/example.net/"
ServerName example.net
CustomLog /var/log/httpd/example.net_access.log combined
ErrorLog /var/log/httpd/example.net_error.log
</VirtualHost>
#
# This is the main Apache HTTP server configuration file. It contains the
# configuration directives that give the server its instructions.
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>
# for a discussion of each configuration directive.
#
# See the httpd.conf(5) man page for more information on this configuration,
# and httpd.service(8) on using and configuring the httpd service.
#
# Do NOT simply read the instructions in here without understanding
# what they do. They're here only as hints or reminders. If you are unsure
# consult the online docs. You have been warned.
#
# Configuration and logfile names: If the filenames you specify for many
# of the server's control files begin with "/" (or "drive:/" for Win32), the
"/etc/httpd/conf/httpd.conf" 370L, 12399B written 13,1 Top
```



```
centos@localhost:/home/centos
[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf

[1]+  Stopped                  vim /etc/httpd/conf/httpd.conf
[root@localhost centos]# mkdir /var/www/example.com/
[root@localhost centos]# mkdir /var/www/example.net/
[root@localhost centos]#
```



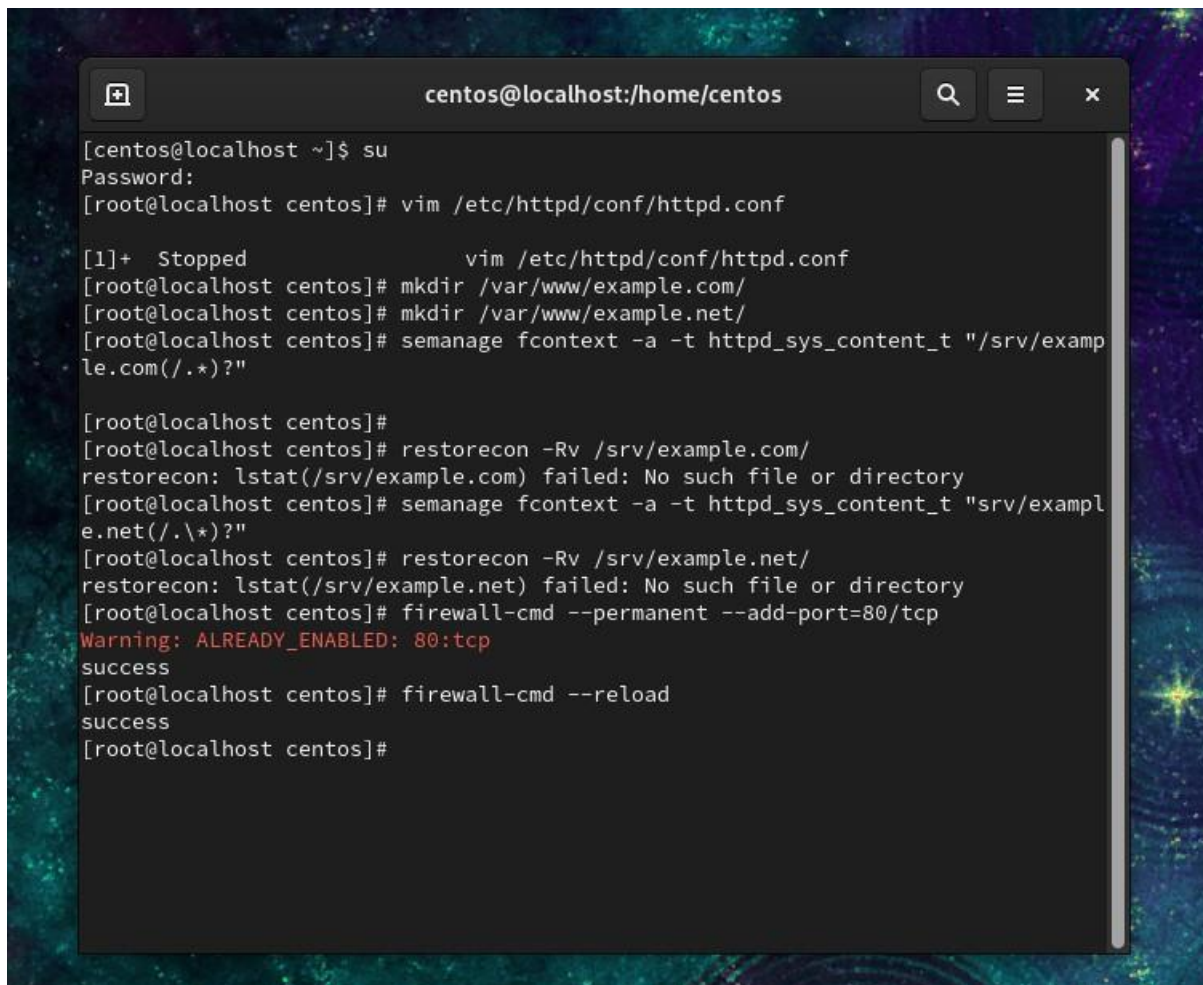
```
centos@localhost:/home/centos

[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf

[1]+  Stopped                  vim /etc/httpd/conf/httpd.conf
[root@localhost centos]# mkdir /var/www/example.com/
[root@localhost centos]# mkdir /var/www/example.net/
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "/srv/example.com(/.*)?"

[root@localhost centos]#
[root@localhost centos]# restorecon -Rv /srv/example.com/
restorecon: lstat(/srv/example.com) failed: No such file or directory
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "srv/example.net(/.*)?"

[root@localhost centos]# restorecon -Rv /srv/example.net/
restorecon: lstat(/srv/example.net) failed: No such file or directory
[root@localhost centos]#
```



A terminal window titled 'centos@localhost:/home/centos' with search, menu, and close buttons. The terminal shows a user switching to root and configuring the firewall. The steps include editing httpd.conf, creating directories for example.com and example.net, setting SELinux contexts, and adding ports 80 and 443 to the firewall. The firewall is then reloaded successfully.

```
centos@localhost:/home/centos

[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf

[1]+  Stopped                  vim /etc/httpd/conf/httpd.conf
[root@localhost centos]# mkdir /var/www/example.com/
[root@localhost centos]# mkdir /var/www/example.net/
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "/srv/example.com(/.*)?"

[root@localhost centos]#
[root@localhost centos]# restorecon -Rv /srv/example.com/
restorecon: lstat(/srv/example.com) failed: No such file or directory
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "srv/example.net(/.*)?"
[root@localhost centos]# restorecon -Rv /srv/example.net/
restorecon: lstat(/srv/example.net) failed: No such file or directory
[root@localhost centos]# firewall-cmd --permanent --add-port=80/tcp
Warning: ALREADY_ENABLED: 80:tcp
success
[root@localhost centos]# firewall-cmd --reload
success
[root@localhost centos]#
```

```
centos@localhost:/home/centos

[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf

[1]+  Stopped                  vim /etc/httpd/conf/httpd.conf
[root@localhost centos]# mkdir /var/www/example.com/
[root@localhost centos]# mkdir /var/www/example.net/
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "/srv/example.com(/.*)?"

[root@localhost centos]#
[root@localhost centos]# restorecon -Rv /srv/example.com/
restorecon: lstat(/srv/example.com) failed: No such file or directory
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "srv/example.net(/.*)?"
[root@localhost centos]# restorecon -Rv /srv/example.net/
restorecon: lstat(/srv/example.net) failed: No such file or directory
[root@localhost centos]# firewall-cmd --permanent --add-port=80/tcp
Warning: ALREADY_ENABLED: 80:tcp
success
[root@localhost centos]# firewall-cmd --reload
success
[root@localhost centos]# systemctl enable --now httpd
[root@localhost centos]#
```

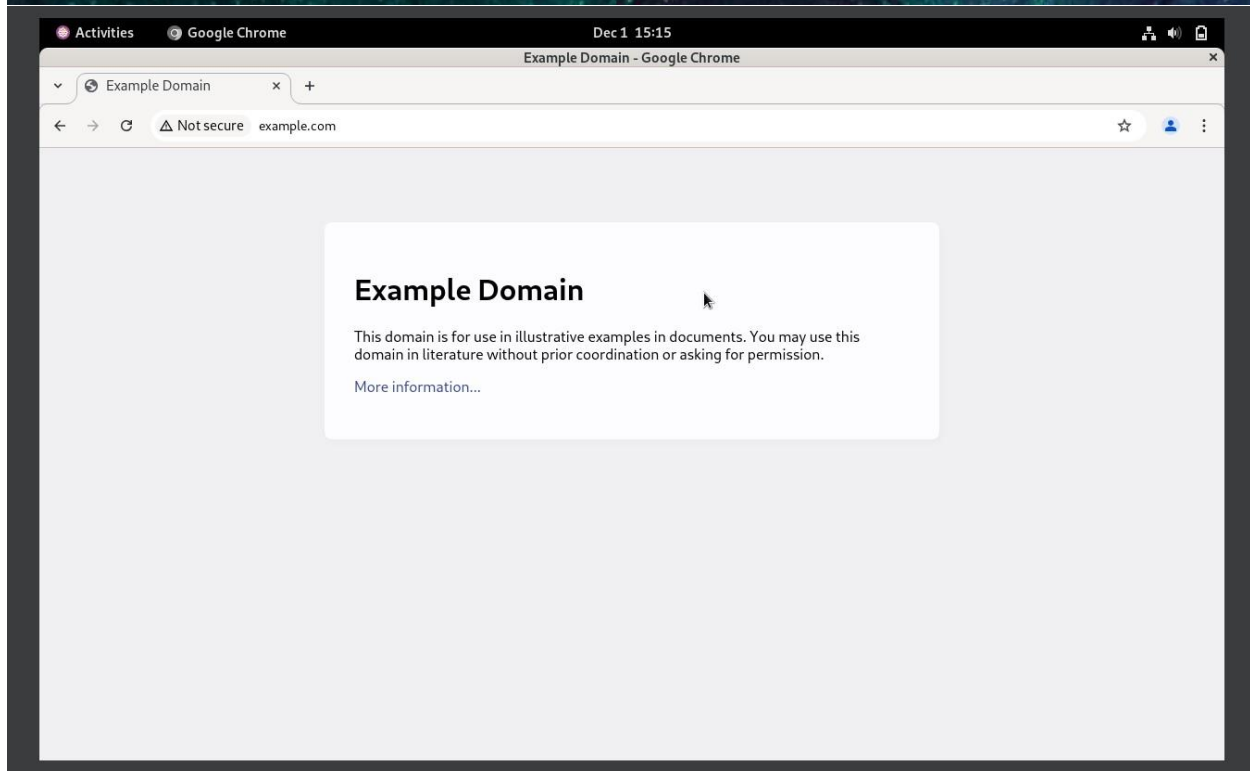


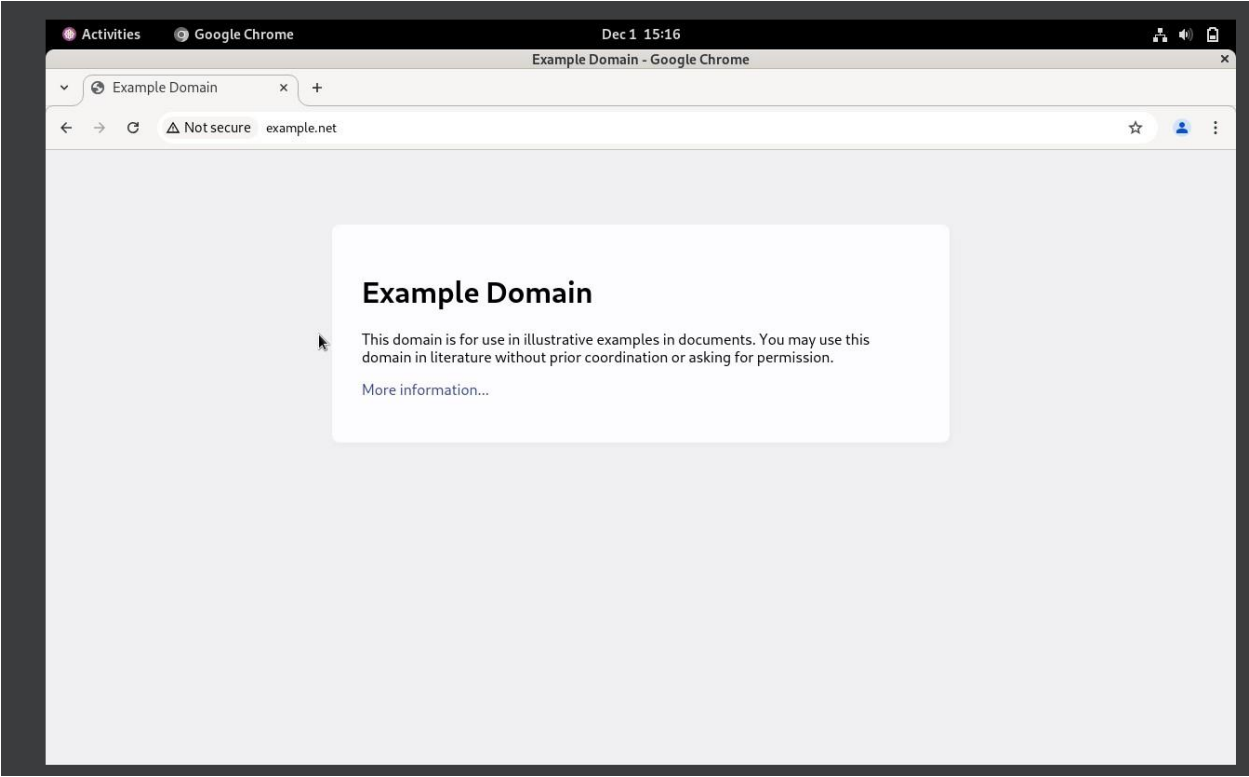
```
centos@localhost:/home/centos

[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf

[1]+  Stopped                  vim /etc/httpd/conf/httpd.conf
[root@localhost centos]# mkdir /var/www/example.com/
[root@localhost centos]# mkdir /var/www/example.net/
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "/srv/example.com(/.*)?"

[root@localhost centos]#
[root@localhost centos]# restorecon -Rv /srv/example.com/
restorecon: lstat(/srv/example.com) failed: No such file or directory
[root@localhost centos]# semanage fcontext -a -t httpd_sys_content_t "srv/example.net(/.*)?"
[root@localhost centos]# restorecon -Rv /srv/example.net/
restorecon: lstat(/srv/example.net) failed: No such file or directory
[root@localhost centos]# firewall-cmd --permanent --add-port=80/tcp
Warning: ALREADY_ENABLED: 80:tcp
success
[root@localhost centos]# firewall-cmd --reload
[root@localhost centos]# echo "vHost example.com" > /var/www/example.com/index.html
[root@localhost centos]# echo "vHost example.net" > /var/www/example.net/index.html
[root@localhost centos]#
```





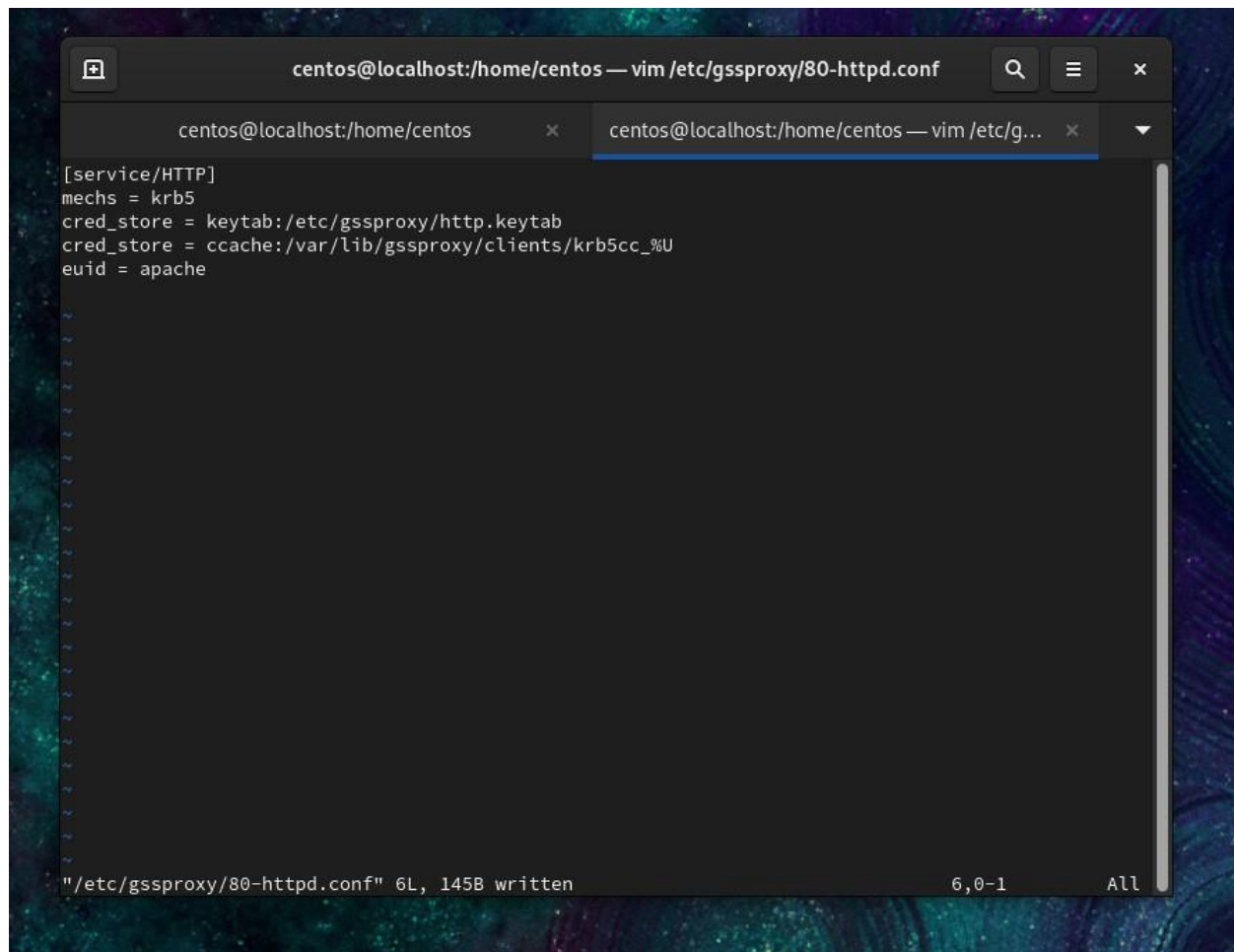
CONFIGURING KERBEROS AUTHENTICATION FOR THE APACHE HTTP WEB SERVER

```
centos@localhost:/home/centos

python3-yubico-1.3.3-7.el9.noarch      Pure-python library for interacting with Yubikeys
rpcbind-1.2.6-7.el9.x86_64           Universal Addresses to RPC Program Number Mapper
sssd-dbus-2.9.5-5.el9.x86_64         The D-Bus responder of the SSSD
sssd-idp-2.9.5-5.el9.x86_64          Kerberos plugins and OIDC helper for external identity providers.
sssd-nfs-idmap-2.9.5-5.el9.x86_64    SSSD plug-in for NFSv4 rpc.idmapd
sssd-passkey-2.9.5-5.el9.x86_64      SSSD helpers and plugins needed for authentication with passkey token
sssd-tools-2.9.5-5.el9.x86_64        Userspace tools for use with the SSSD
Proceed with changes? [N/y] y

* Waiting in queue...
* Waiting for authentication...
* Waiting in queue...
* Downloading packages...
* Requesting data...
* Testing changes...
* Installing packages...
Usage: ipa-getkeytab [-qvPWr?] [-q|--quiet] [-v|--verbose] [-s|--server=Server Name]
      [-p|--principal=Kerberos Service Principal Name] [-k|--keytab=Keytab File Name]
      [-e|--encetypes=Comma separated encryption types list] [--permitted-encetypes]
      [-P|--password] [-D|--binddn=DN to bind as if not using kerberos]
      [-w|--bindpw=password to use if not using kerberos] [-W] [--cacert=IPA CA certificate]
      [-H|--ldapuri=url] [-Y|--mech=GSSAPI|EXTERNAL] [-r|--retrieve] [--help] [--usage]

[root@localhost centos]# ^[[200~ipa-getkeytab -s $(awk '/^server =/ {print $3}' /etc/ipa/default.conf)-k /etc/gssproxy/http.keytab -p HTTP/$(hostname -f)~
awk: fatal: cannot open file '/etc/ipa/default.conf' for reading: No such file or directory
bash: ipa-getkeytab: command not found...
ipa-getkeytab -s $(awk '/^server =/ {print $3}' /etc/ipa/default.conf)-k /etc/gssproxy/http.keytab -p HTTP/$(hostname -f)~[root@localhost centos]# R
```

```
centos@localhost:/home/centos — vim /etc/gssproxy/80-httpd.conf
centos@localhost:/home/centos  centos@localhost:/home/centos — vim /etc/g...
[service/HTTP]
mechs = krb5
cred_store = keytab:/etc/gssproxy/http.keytab
cred_store = ccache:/var/lib/gssproxy/clients/krb5cc_%U
euid = apache

"/etc/gssproxy/80-httpd.conf" 6L, 145B written 6,0-1 All
```

```
centos@localhost:/home/centos

sssd-tools-2.9.5-5.el9.x86_64 Userspace tools for use with the SSSD
Proceed with changes? [N/y] y

* Waiting in queue...
* Waiting for authentication...
* Waiting in queue...
* Downloading packages...
* Requesting data...
* Testing changes...
* Installing packages...
Usage: ipa-getkeytab [-qvPWr?] [-q|--quiet] [-v|--verbose] [-s|--server=Server Name]
      [-p|--principal=Kerberos Service Principal Name] [-k|--keytab=Keytab File Name]
      [-e|--encetypes=Comma separated encryption types list] [--permitted-encetypes]
      [-P|--password] [-D|--binddn=DN to bind as if not using kerberos]
      [-w|--bindpw=password to use if not using kerberos] [-W] [--cacert=IPA CA certificate]
      [-H|--ldapuri=url] [-Y|--mech=GSSAPI|EXTERNAL] [-r|--retrieve] [-?|--help] [--usage]

[root@localhost centos]# ^[[200~ipa-getkeytab -s $(awk '/^server =/ {print $3}' /etc/ipa/default.conf)-k /etc/gssproxy/http.keytab -p HTTP/$(hostname -f)~
awk: fatal: cannot open file `/etc/ipa/default.conf' for reading: No such file or directory
bash: ipa-getkeytab: command not found...
ipa-getkeytab -s $(awk '/^server =/ {print $3}' /etc/ipa/default.conf)-k /etc/gssproxy/http.keytab
-p HTTP/$(hostname -f)~[root@localhost centos]# vim /etc/gssproxy/80-httpd.conf

[1]+  Stopped                  vim /etc/gssproxy/80-httpd.conf
[root@localhost centos]# systemctl restart gssproxy.service
[root@localhost centos]# systemctl enable gssproxy.service
Created symlink /etc/systemd/system/multi-user.target.wants/gssproxy.service → /usr/lib/systemd/system/gssproxy.service.
[root@localhost centos]#
```

[illegible]

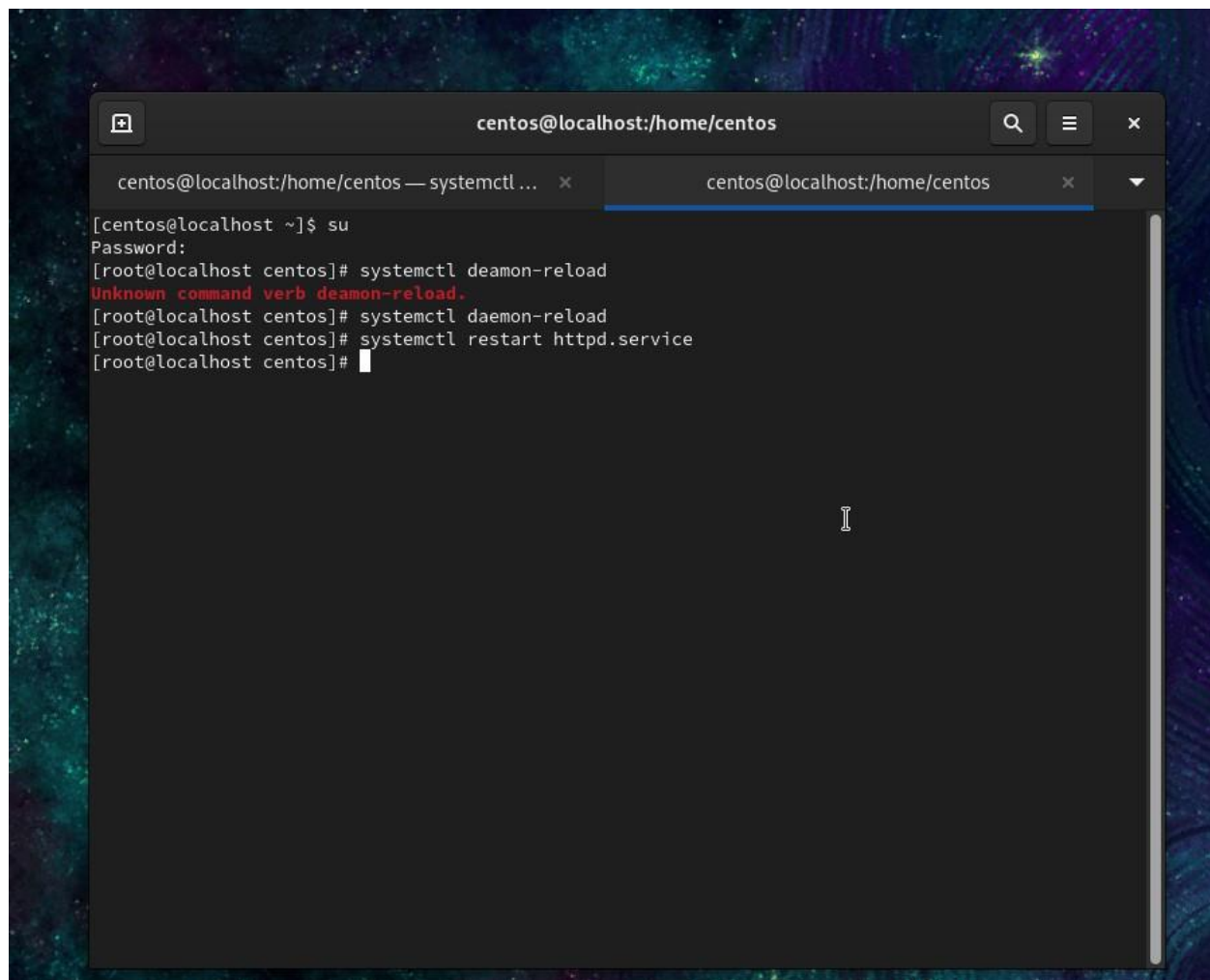
5,11	All
------	-----

```
centos@localhost:/home/centos — systemctl edit httpd.service
GNU nano 5.6.1 /etc/systemd/system/httpd.service.d/.#override.conf61ced170ede5188 Modified
[Service]
Environment=GSS_USE_PROXY=1
^O
^E
### Editing /etc/systemd/system/httpd.service.d/override.conf
### Anything between here and the comment below will become the new contents of the file

### Lines below this comment will be discarded

### /usr/lib/systemd/system/httpd.service
# # See httpd.service(8) for more information on using the httpd service.
#
# # Modifying this file in-place is not recommended, because changes
# # will be overwritten during package upgrades. To customize the
# # behaviour, run "systemctl edit httpd" to create an override unit.
#
# # For example, to pass additional options (such as -D definitions) to
# # the httpd binary at startup, create an override unit (as is done by
# # systemctl edit) and enter the following:
#
# #     [Service]
# #     Environment=OPTIONS=-DMY_DEFINE
#
# [Unit]
# Description=The Apache HTTP Server
# Wants=httpd-init.service
# After=network.target remote-fs.target nss-lookup.target httpd-init.service

^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste       ^J Justify    ^_ Go To Line
```



A terminal window titled "centos@localhost:/home/centos" with a search icon, menu icon, and close button. The terminal shows a user switching to root via 'su', then attempting to reload systemd daemon with 'systemctl daemon-reload', which fails with the error "Unknown command verb daemon-reload.". The user then successfully restarts the httpd service with 'systemctl restart httpd.service'.

```
[centos@localhost ~]$ su
Password:
[root@localhost centos]# systemctl daemon-reload
Unknown command verb daemon-reload.
[root@localhost centos]# systemctl daemon-reload
[root@localhost centos]# systemctl restart httpd.service
[root@localhost centos]#
```

Adding TLS encryption to an Apache HTTP Server

```
centos@localhost:/home/centos — /usr/bin/python3.9 /usr/bin/yum install mod_ssl
```

centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x

Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manager" to register.

CentOS Stream 9 - BaseOS	2.9 kB/s	6.9 kB	00:02
CentOS Stream 9 - AppStream	6.1 kB/s	7.0 kB	00:01
CentOS Stream 9 - Extras packages	1.3 kB/s	8.6 kB	00:06
google-chrome	626 B/s	1.3 kB	00:02
google-chrome	547 B/s	4.4 kB	00:08

Dependencies resolved.

Package	Architecture	Version	Repository	Size
Installing:				
mod_ssl	x86_64	1:2.4.62-1.el9	appstream	110 k

Transaction Summary

Install 1 Package

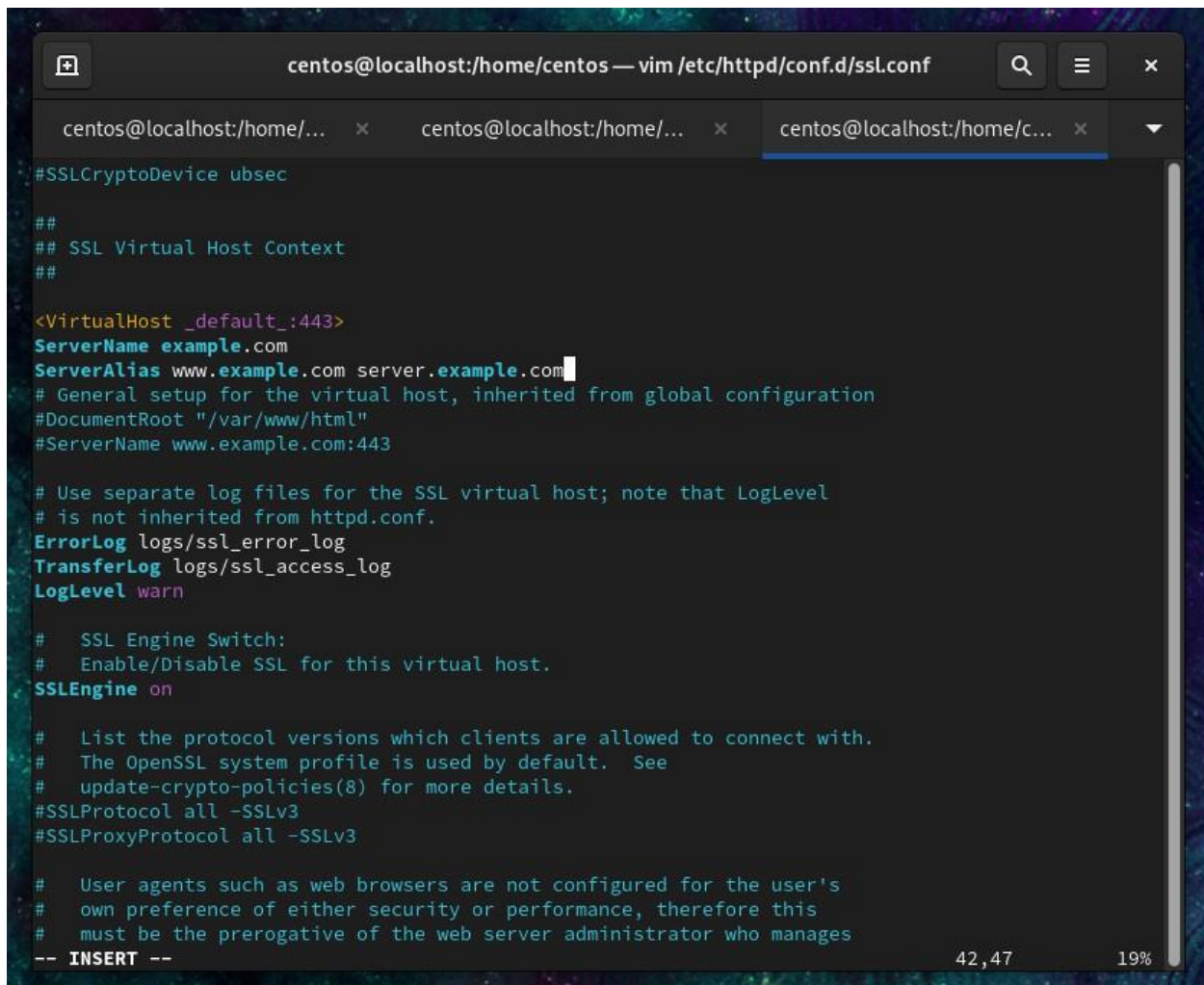
Total download size: 110 k
Installed size: 272 k
Is this ok [y/N]: y
Downloading Packages:

mod_ssl-2.4.62-1.el9.x86_64.rpm	11 kB/s	110 kB	00:09
---------------------------------	---------	--------	-------

Total

	6.6 kB/s	110 kB	00:16
--	----------	--------	-------

Running transaction check
Transaction check succeeded.
Running transaction test



```
centos@localhost:/home/centos — vim /etc/httpd/conf.d/ssl.conf
centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x
#SSLCryptoDevice ubsec
##
## SSL Virtual Host Context
##
<VirtualHost _default_:443>
ServerName example.com
ServerAlias www.example.com server.example.com
# General setup for the virtual host, inherited from global configuration
#DocumentRoot "/var/www/html"
#ServerName www.example.com:443

# Use separate log files for the SSL virtual host; note that LogLevel
# is not inherited from httpd.conf.
ErrorLog logs/ssl_error_log
TransferLog logs/ssl_access_log
LogLevel warn

# SSL Engine Switch:
# Enable/Disable SSL for this virtual host.
SSLEngine on

# List the protocol versions which clients are allowed to connect with.
# The OpenSSL system profile is used by default. See
# update-crypto-policies(8) for more details.
#SSLProtocol all -SSLv3
#SSLProxyProtocol all -SSLv3

# User agents such as web browsers are not configured for the user's
# own preference of either security or performance, therefore this
# must be the prerogative of the web server administrator who manages
-- INSERT --
42,47 19%
```

```
centos@localhost:/home/centos — vim /etc/httpd/conf.d/ssl.conf
centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x
#SSLCryptoDevice ubsec
##
## SSL Virtual Host Context
##
<VirtualHost _default_:443>
ServerName example.com
ServerAlias www.example.com server.example.com
# General setup for the virtual host, inherited from global configuration
#DocumentRoot "/var/www/html"
#ServerName www.example.com:443

# Use separate log files for the SSL virtual host; note that LogLevel
# is not inherited from httpd.conf.
ErrorLog logs/ssl_error_log
TransferLog logs/ssl_access_log
LogLevel warn

# SSL Engine Switch:
# Enable/Disable SSL for this virtual host.
SSLEngine on

# List the protocol versions which clients are allowed to connect with.
# The OpenSSL system profile is used by default. See
# update-crypto-policies(8) for more details.
#SSLProtocol all -SSLv3
#SSLProxyProtocol all -SSLv3

# User agents such as web browsers are not configured for the user's
# own preference of either security or performance, therefore this
# must be the prerogative of the web server administrator who manages
:w
```



```
centos@localhost:/home/centos

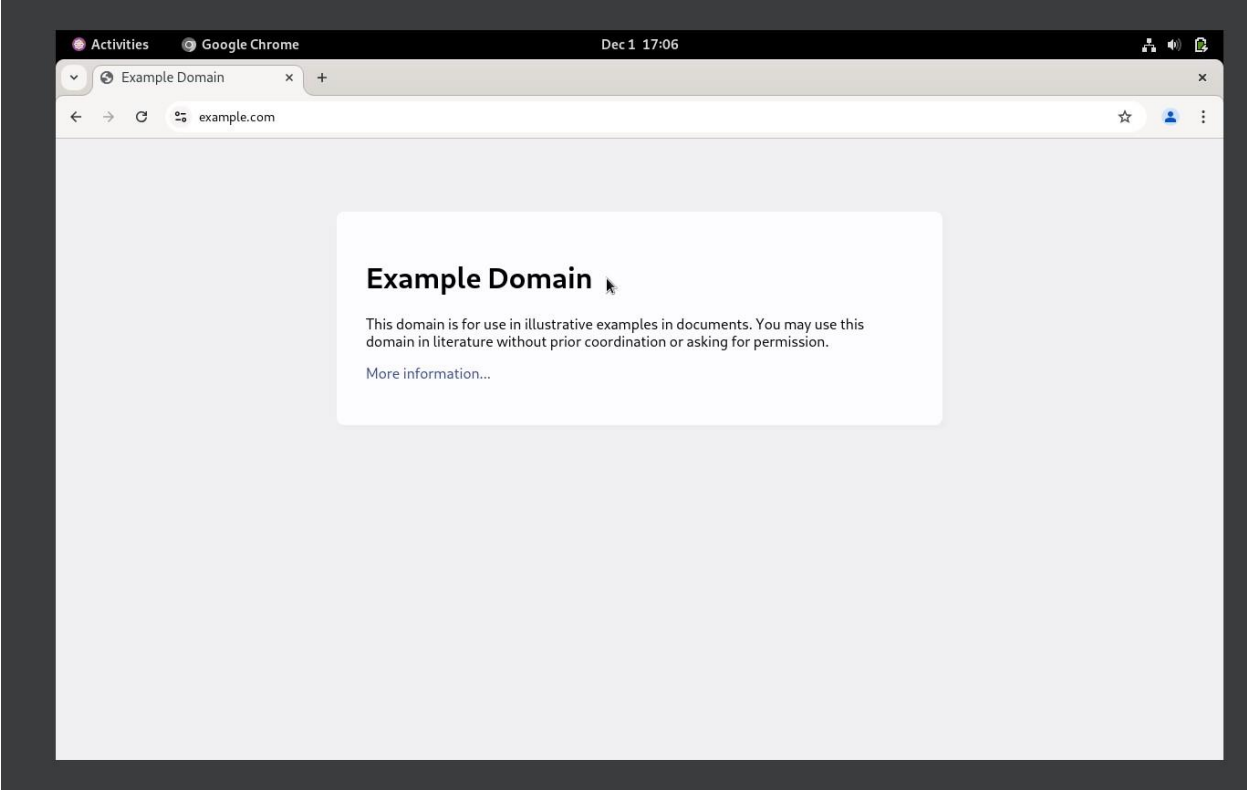
centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x

Running transaction
  Preparing      :                                1/1
  Installing     : mod_ssl-1:2.4.62-1.el9.x86_64  1/1
  Running scriptlet: mod_ssl-1:2.4.62-1.el9.x86_64  1/1
  Verifying      : mod_ssl-1:2.4.62-1.el9.x86_64  1/1
Installed products updated.

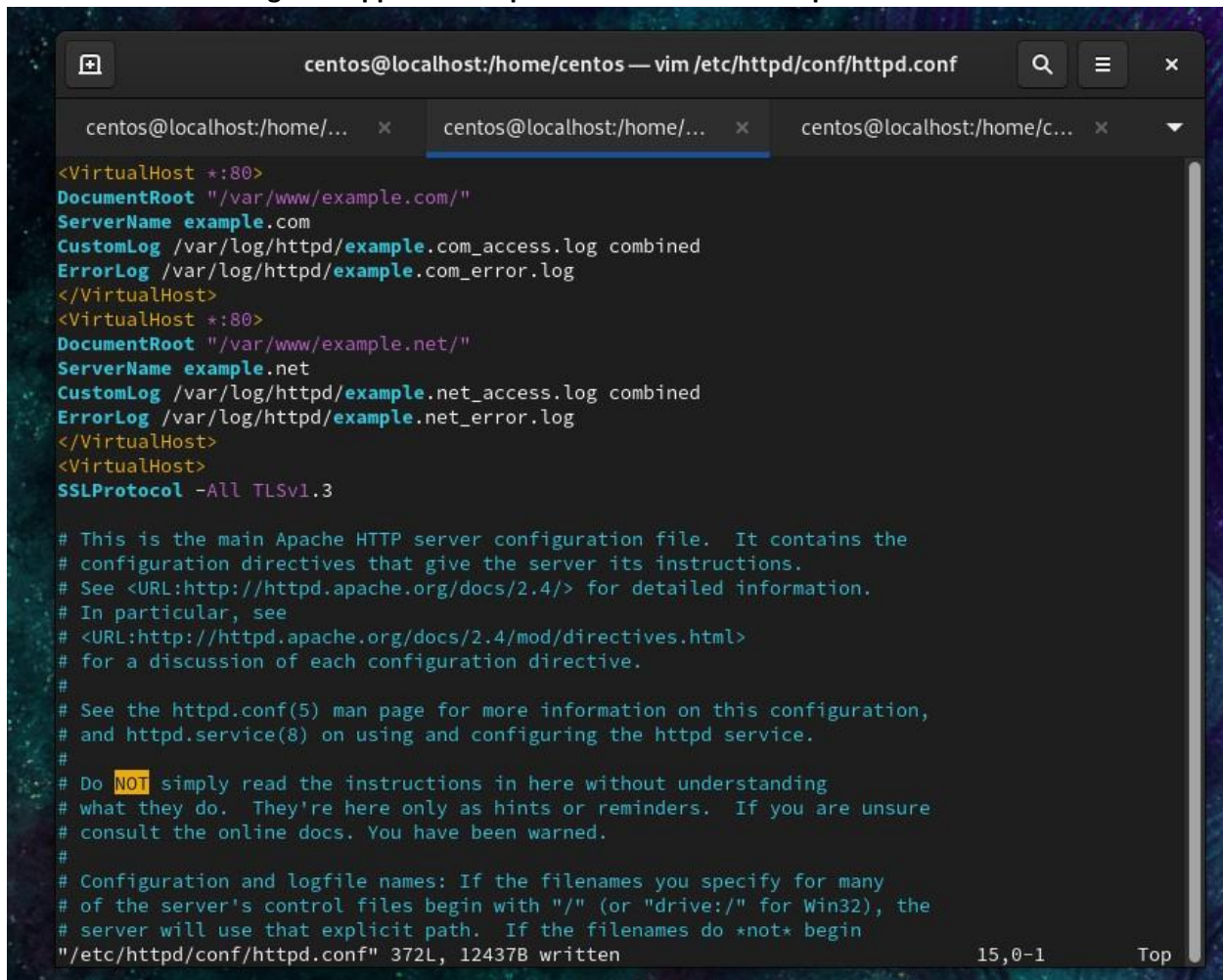
Installed:
  mod_ssl-1:2.4.62-1.el9.x86_64

Complete!
[root@localhost centos]# vim /etc/httpd/conf.d/ssl.conf

[1]+  Stopped                  vim /etc/httpd/conf.d/ssl.conf
[root@localhost centos]# SSLCertificateKeyFile "/etc/pki/tls/private/example.com.key"
bash: SSLCertificateKeyFile: command not found...
[root@localhost centos]# SSLCertificateFile "/etc/pki/tls/certs/example.com.crt"
bash: SSLCertificateFile: command not found...
[root@localhost centos]# SSLCACertificateFile "/etc/pki/tls/certs/ca.crt"
bash: SSLCACertificateFile: command not found...
[root@localhost centos]# chown root:root /etc/pki/tls/private/example.com.key
chown: cannot access '/etc/pki/tls/private/example.com.key': No such file or directory
[root@localhost centos]# chmod 600 /etc/pki/tls/private/example.com.key
chmod: cannot access '/etc/pki/tls/private/example.com.key': No such file or directory
[root@localhost centos]# firewall-cmd --permanent --add-port=443/tcp
usage: 'firewall-cmd --help' for usage information or see firewall-cmd(1) man page
firewall-cmd: error: unrecognized arguments: --add-port=443/tcp
[root@localhost centos]# firewall-cmd --permanent --add-port=443/tcp
success
[root@localhost centos]# firewall-cmd --reload
success
[root@localhost centos]# systemctl restart httpd
[root@localhost centos]#
```



Setting the supported TLS protocol versions on an Apache HTTP Server



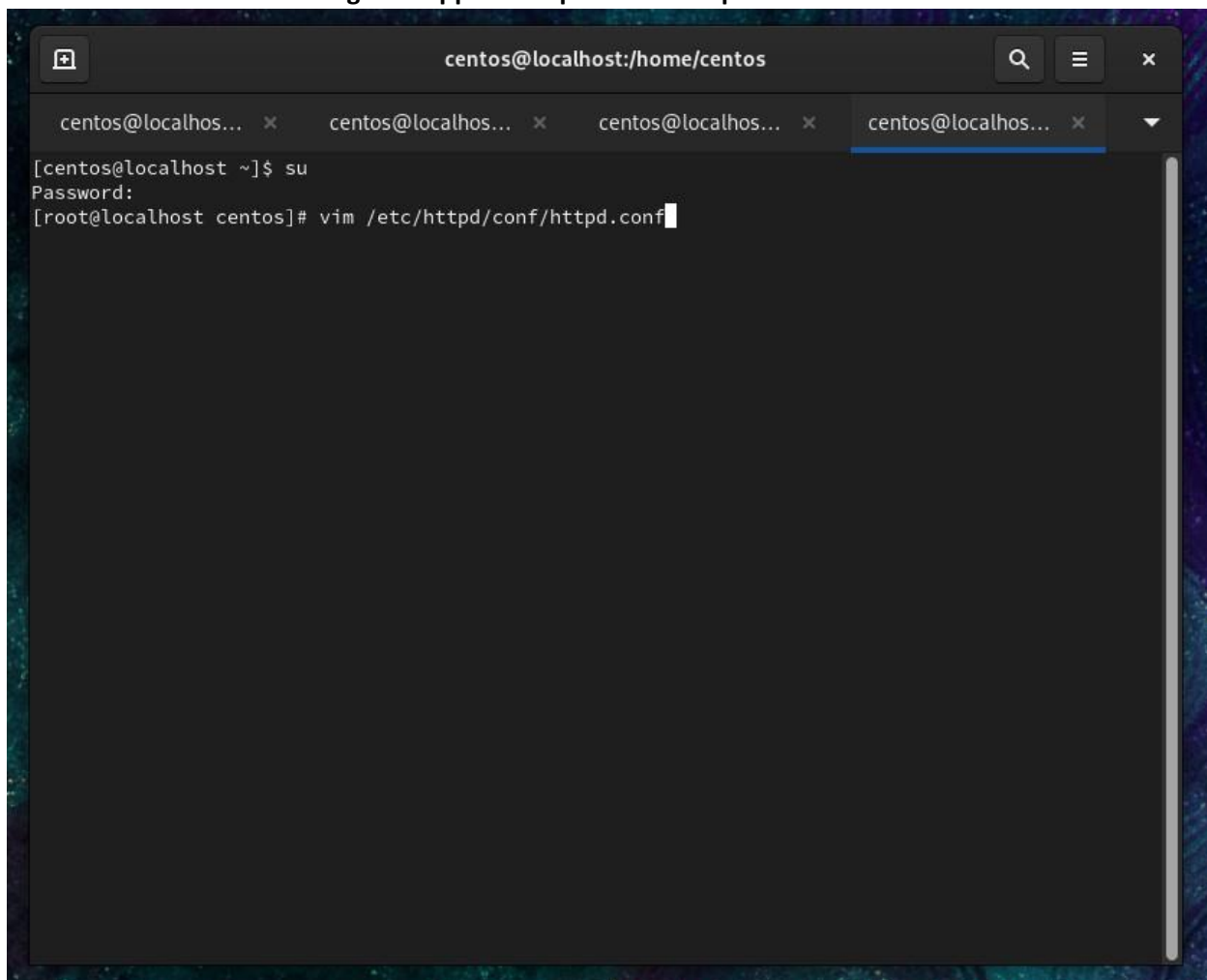
```
centos@localhost:/home/centos — vim /etc/httpd/conf/httpd.conf
centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x
<VirtualHost *:80>
DocumentRoot "/var/www/example.com/"
ServerName example.com
CustomLog /var/log/httpd/example.com_access.log combined
ErrorLog /var/log/httpd/example.com_error.log
</VirtualHost>
<VirtualHost *:80>
DocumentRoot "/var/www/example.net/"
ServerName example.net
CustomLog /var/log/httpd/example.net_access.log combined
ErrorLog /var/log/httpd/example.net_error.log
</VirtualHost>
<VirtualHost>
SSLProtocol -All TLSv1.3

# This is the main Apache HTTP server configuration file. It contains the
# configuration directives that give the server its instructions.
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>
# for a discussion of each configuration directive.
#
# See the httpd.conf(5) man page for more information on this configuration,
# and httpd.service(8) on using and configuring the httpd service.
#
# Do NOT simply read the instructions in here without understanding
# what they do. They're here only as hints or reminders. If you are unsure
# consult the online docs. You have been warned.
#
# Configuration and logfile names: If the filenames you specify for many
# of the server's control files begin with "/" (or "drive:/" for Win32), the
# server will use that explicit path. If the filenames do *not* begin
"/etc/httpd/conf/httpd.conf" 372L, 12437B written
15,0-1 Top
```

```
centos@localhost:/home/centos — openssl s_client -connect example.com:443 -tls1_3
centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x
[centos@localhost ~]$ su
Password:
[root@localhost centos]# openssl s_client -connect example.com:443 -tlsv1.3
s_client: Unknown option: -tlsv1.3
s_client: Use -help for summary.
[root@localhost centos]# openssl s_client -connect example.com:443 -tls1_3
s_client: Unknown option: -tls1_3
s_client: Use -help for summary.
[root@localhost centos]# openssl s_client -connect example.com:443 -tls1_3
Connecting to 93.184.215.14
CONNECTED(00000003)
depth=2 C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert Global Root G2
verify return:1
depth=1 C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
verify return:1
depth=0 C=US, ST=California, L=Los Angeles, O=Internet Corporation for Assigned Names and Numbers,
CN=www.example.org
verify return:1
---
Certificate chain
 0 s:C=US, ST=California, L=Los Angeles, O=Internet Corporation for Assigned Names and Numbers, CN
=www.example.org
  i:C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: Jan 30 00:00:00 2024 GMT; NotAfter: Mar 1 23:59:59 2025 GMT
 1 s:C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
  i:C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert Global Root G2
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: Mar 30 00:00:00 2021 GMT; NotAfter: Mar 29 23:59:59 2031 GMT
---
Server certificate
-----BEGIN CERTIFICATE-----
MIIHbjCCBlagAwIBAgIQB1vO8waJyK3fE+Ua9K/hhzANBgkqhkiG9w0BAQsFADBZ
```

```
centos@localhost:/home/centos — openssl s_client -connect example.com:443 -tls1_2
centos@localhost:/home/... x centos@localhost:/home/... x centos@localhost:/home/c... x
[root@localhost centos]#
[root@localhost centos]# openssl s_client -connect example.com:443 -tls1_2
Connecting to 93.184.215.14
CONNECTED(00000003)
depth=2 C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert Global Root G2
verify return:1
depth=1 C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
verify return:1
depth=0 C=US, ST=California, L=Los Angeles, O=Internet Corporation for Assigned Names and Numbers,
CN=www.example.org
verify return:1
---
Certificate chain
 0 s:C=US, ST=California, L=Los Angeles, O=Internet Corporation for Assigned Names and Numbers, CN=
www.example.org
  i:C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: Jan 30 00:00:00 2024 GMT; NotAfter: Mar 1 23:59:59 2025 GMT
 1 s:C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
  i:C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert Global Root G2
  a:PKEY: rsaEncryption, 2048 (bit); sigalg: RSA-SHA256
  v:NotBefore: Mar 30 00:00:00 2021 GMT; NotAfter: Mar 29 23:59:59 2031 GMT
---
Server certificate
-----BEGIN CERTIFICATE-----
MIIHbjCCBlagAwIBAgIQB1v08waJyK3fE+Ua9K/hhzANBgkqhkiG9w0BAQsFADBZ
MQswCQYDVQQGEwJVUzEVMBMGA1UEChMMRGlnaUNlcnQgSW5jMTMwMQYDVQQDEypE
aWdpQ2VydCBHbG9iYWwRZzIyYVJlbnRlbnQgYXNjaW50MTU5WjCBLjEELMAkGA1UEBhMCVVMxEzARBGNV
BAGTCkNhbgGlm3JuaWExFDASBgNVBACTC0xvcyBBbmdlbGVzZmUIwQAYDVQQKDDlj
bnRlcm5ldmkgQ29ycG9yYXRpb27CoGZvczKgQXNzaWduZWTCOE5hbWVzwqBhbmTC
oE51bWJlcnMxGDAwBgNVBAMTD3d3dy5leGFtcGxlLm9yZzCCASIwDQYJKoZIhvcN
AQEBBQADggEPADCCAQoCggEBAlaFD7s0+cpf2fXgCjIsM9mqDgcpqC8IrXi9wga/
```


Setting the supported ciphers on an Apache HTTP Server



A terminal window with a dark background and a space-themed border. The window title is "centos@localhost:/home/centos". It contains four tabs, all labeled "centos@localhost...". The active tab shows the following commands and output:

```
[centos@localhost ~]$ su
Password:
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf
```

The terminal is currently in the vim editor, editing the file /etc/httpd/conf/httpd.conf. The cursor is at the end of the command line.

```
centos@localhost:/home/centos — vim /etc/httpd/conf/httpd.conf

<VirtualHost *:80>
DocumentRoot "/var/www/example.com/"
ServerName example.com
CustomLog /var/log/httpd/example.com_access.log combined
ErrorLog /var/log/httpd/example.com_error.log
</VirtualHost>
<VirtualHost *:80>
DocumentRoot "/var/www/example.net/"
ServerName example.net
CustomLog /var/log/httpd/example.net_access.log combined
ErrorLog /var/log/httpd/example.net_error.log
</VirtualHost>
<VirtualHost>
SSLProtocol -All TLSv1.3
SSLCipherSuite "EECDH+AESGCM:EDH+AESGCM:AES256+EECDH:AES256+EDH:!SHA1:!SHA256"
</VirtualHost>
# This is the main Apache HTTP server configuration file. It contains the
# configuration directives that give the server its instructions.
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>
# for a discussion of each configuration directive.
#
# See the httpd.conf(5) man page for more information on this configuration,
# and httpd.service(8) on using and configuring the httpd service.
#
# Do NOT simply read the instructions in here without understanding
# what they do. They're here only as hints or reminders. If you are unsure
# consult the online docs. You have been warned.
#
# Configuration and logfile names: If the filenames you specify for many
# of the server's control files begin with "/" (or "drive:/" for Win32), the
"/etc/httpd/conf/httpd.conf" 373L, 12530B written
```

15,78

Top

```
centos@localhost:/home/centos

centos@localhos... x centos@localhos... x centos@localhos... x centos@localhos... x
[root@localhost centos]# yum install nmap
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manag
er" to register.

Last metadata expiration check: 1:06:18 ago on Sun 01 Dec 2024 04:58:42 PM PKT.
Dependencies resolved.
=====
Package                Architecture      Version           Repository        Size
=====
Installing:
nmap                   x86_64            3:7.92-3.el9      appstream          5.6 M
Transaction Summary
=====
Install 1 Package

Total download size: 5.6 M
Installed size: 24 M
Is this ok [y/N]: y
Downloading Packages:
nmap-7.92-3.el9.x86_64.rpm                                35 kB/s | 5.6 MB    02:46
-----
Total                                                    34 kB/s | 5.6 MB    02:47
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/1
  Installing    : nmap-3:7.92-3.el9.x86_64        1/1
```



```
centos@localhost:/home/centos

centos@localhos... x centos@localhos... x centos@localhos... x centos@localhos... x

Total download size: 5.6 M
Installed size: 24 M
Is this ok [y/N]: y
Downloading Packages:
nmap-7.92-3.el9.x86_64.rpm                                35 kB/s | 5.6 MB    02:46
-----
Total                                                    34 kB/s | 5.6 MB    02:47
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/1
  Installing    : nmap-3:7.92-3.el9.x86_64        1/1
  Running scriptlet: nmap-3:7.92-3.el9.x86_64        1/1
  Verifying     : nmap-3:7.92-3.el9.x86_64        1/1
Installed products updated.

Installed:
nmap-3:7.92-3.el9.x86_64

Complete!
[root@localhost centos]# nmap --script ssl-enum-ciphers -p 443 example.com
Starting Nmap 7.92 ( https://nmap.org ) at 2024-12-01 18:21 PKT
Nmap scan report for example.com (93.184.215.14)
Host is up (0.0014s latency).
Other addresses for example.com (not scanned): 2606:2800:21f:cb07:6820:80da:af6b:8b2c

PORT      STATE      SERVICE
443/tcp   filtered  https

Nmap done: 1 IP address (1 host up) scanned in 2.86 seconds
[root@localhost centos]#
```

```
centos@localhost:/home/centos

centos@localhos... x centos@localhos... x centos@localhos... x centos@localhos... x
Total download size: 5.6 M
Installed size: 24 M
Is this ok [y/N]: y
Downloading Packages:
nmap-7.92-3.el9.x86_64.rpm 35 kB/s | 5.6 MB 02:46
-----
Total 34 kB/s | 5.6 MB 02:47
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/1
  Installing     : nmap-3:7.92-3.el9.x86_64      1/1
  Running scriptlet: nmap-3:7.92-3.el9.x86_64      1/1
  Verifying      : nmap-3:7.92-3.el9.x86_64      1/1
Installed products updated.

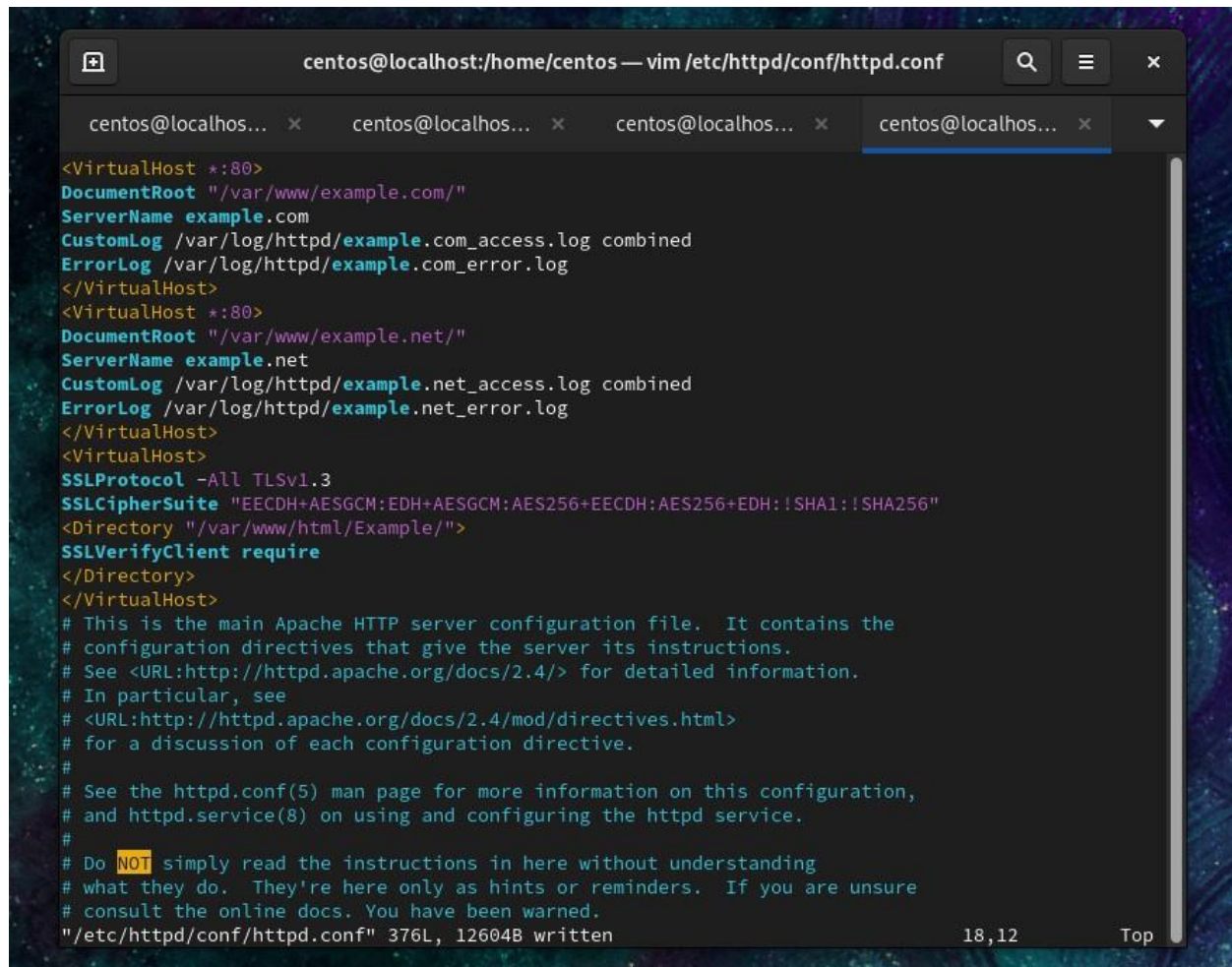
Installed:
nmap-3:7.92-3.el9.x86_64

Complete!
[root@localhost centos]# nmap --script ssl-enum-ciphers -p 443 example.com
Starting Nmap 7.92 ( https://nmap.org ) at 2024-12-01 18:21 PKT
Nmap scan report for example.com (93.184.215.14)
Host is up (0.0014s latency).
Other addresses for example.com (not scanned): 2606:2800:21f:cb07:6820:80da:af6b:8b2c

PORT      STATE      SERVICE
443/tcp   filtered  https

Nmap done: 1 IP address (1 host up) scanned in 2.86 seconds
[root@localhost centos]# vim /etc/httpd/conf/httpd.conf
```

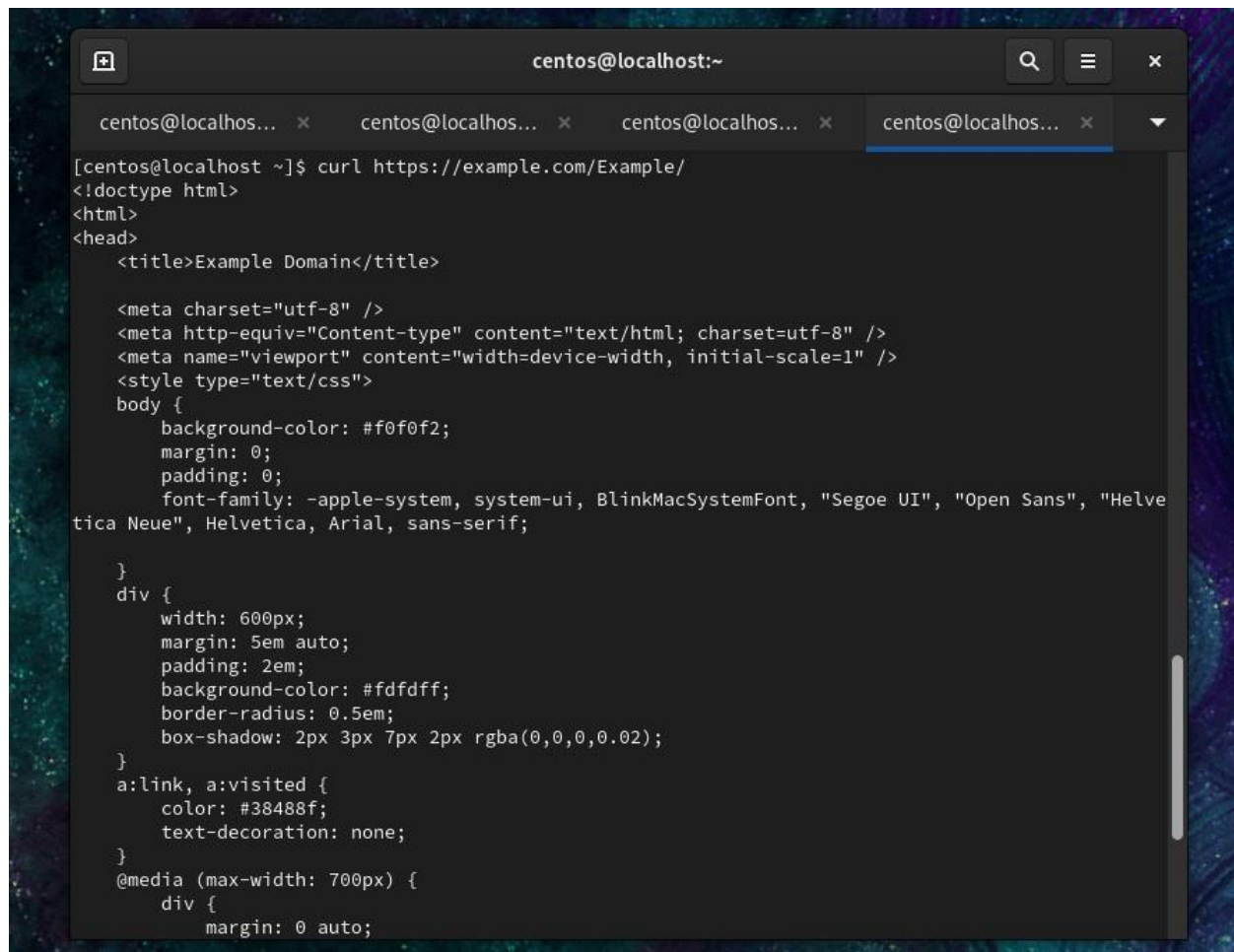
CONFIGURING TLS CLIENT CERTIFICATE AUTHENTICATION



The screenshot shows a terminal window with a dark background and a light blue border. The title bar of the terminal window reads "centos@localhost:/home/centos — vim /etc/httpd/conf/httpd.conf". The terminal content displays the configuration for two virtual hosts and the global SSL settings. The first virtual host is for "example.com" and the second is for "example.net". Both are configured to listen on port 80. The SSL settings are configured to use TLSv1.3 and a specific cipher suite. The "SSLVerifyClient" directive is set to "require" for the "example.net" virtual host. The terminal also shows the standard Apache configuration comments and a warning about not reading the instructions without understanding.

```
<VirtualHost *:80>
DocumentRoot "/var/www/example.com/"
ServerName example.com
CustomLog /var/log/httpd/example.com_access.log combined
ErrorLog /var/log/httpd/example.com_error.log
</VirtualHost>
<VirtualHost *:80>
DocumentRoot "/var/www/example.net/"
ServerName example.net
CustomLog /var/log/httpd/example.net_access.log combined
ErrorLog /var/log/httpd/example.net_error.log
</VirtualHost>
<VirtualHost>
SSLProtocol -All TLSv1.3
SSLCipherSuite "EECDH+AESGCM:EDH+AESGCM:AES256+EECDH:AES256+EDH:!SHA1:!SHA256"
<Directory "/var/www/html/Example/">
SSLVerifyClient require
</Directory>
</VirtualHost>
# This is the main Apache HTTP server configuration file. It contains the
# configuration directives that give the server its instructions.
# See <URL:http://httpd.apache.org/docs/2.4/> for detailed information.
# In particular, see
# <URL:http://httpd.apache.org/docs/2.4/mod/directives.html>
# for a discussion of each configuration directive.
#
# See the httpd.conf(5) man page for more information on this configuration,
# and httpd.service(8) on using and configuring the httpd service.
#
# Do NOT simply read the instructions in here without understanding
# what they do. They're here only as hints or reminders. If you are unsure
# consult the online docs. You have been warned.
"/etc/httpd/conf/httpd.conf" 376L, 12604B written
```

18,12 Top

A terminal window titled 'centos@localhost:~' with a search icon, menu icon, and close icon in the top right. The window has four tabs, all labeled 'centos@localhos...'. The terminal shows the command '[centos@localhost ~]\$ curl https://example.com/Example/' and its output, which is an HTML document. The HTML includes a title 'Example Domain', meta tags for charset, content-type, and viewport, and CSS styles for the body and a div. The body has a dark blue background and a white margin. The div has a light blue background, a border-radius, and a box-shadow. The link color is set to #38488f and text-decoration is none. A media query for max-width: 700px sets the div margin to 0 auto.

```
centos@localhost:~  
[centos@localhost ~]$ curl https://example.com/Example/  
<!doctype html>  
<html>  
<head>  
  <title>Example Domain</title>  
  
  <meta charset="utf-8" />  
  <meta http-equiv="Content-type" content="text/html; charset=utf-8" />  
  <meta name="viewport" content="width=device-width, initial-scale=1" />  
  <style type="text/css">  
    body {  
      background-color: #f0f0f2;  
      margin: 0;  
      padding: 0;  
      font-family: -apple-system, system-ui, BlinkMacSystemFont, "Segoe UI", "Open Sans", "Helvetica Neue", Helvetica, Arial, sans-serif;  
    }  
    div {  
      width: 600px;  
      margin: 5em auto;  
      padding: 2em;  
      background-color: #fdfdff;  
      border-radius: 0.5em;  
      box-shadow: 2px 3px 7px 2px rgba(0,0,0,0.02);  
    }  
    a:link, a:visited {  
      color: #38488f;  
      text-decoration: none;  
    }  
    @media (max-width: 700px) {  
      div {  
        margin: 0 auto;  

```

```
centos@localhost:~  
centos@localhos... x centos@localhos... x centos@localhos... x centos@localhos... x  
margin: 5em auto;  
padding: 2em;  
background-color: #fdfdff;  
border-radius: 0.5em;  
box-shadow: 2px 3px 7px 2px rgba(0,0,0,0.02);  
}  
a:link, a:visited {  
color: #38488f;  
text-decoration: none;  
}  
@media (max-width: 700px) {  
div {  
margin: 0 auto;  
width: auto;  
}  
}  
</style>  
</head>  
<body>  
<div>  
<h1>Example Domain</h1>  
<p>This domain is for use in illustrative examples in documents. You may use this  
domain in literature without prior coordination or asking for permission.</p>  
<p><a href="https://www.iana.org/domains/example">More information...</a></p>  
</div>  
</body>  
</html>  
[centos@localhost ~]$ curl --cacert ca.crt --key client.key --cert client.crt https://example.com/  
Example/  
curl: (58) could not load PEM client certificate, OpenSSL error error:80000002:system library::No  
such file or directory, (no key found, wrong pass phrase, or wrong file format?)  
[centos@localhost ~]$
```


SECURING WEB APPLICATIONS ON A WEB SERVER USING MODSECURITY

```
centos@localhost:~/centos
centos@localhost... x centos@localhost... x centos@localhost... x centos@localhost... x
[centos@localhost ~]$ su
Password:
[root@localhost centos]# yum install -y mod_security mod_security_crs httpd
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manag
er" to register.

Last metadata expiration check: 1:41:14 ago on Sun 01 Dec 2024 04:58:42 PM PKT.
Package httpd-2.4.62-1.el9.x86_64 is already installed.
Dependencies resolved.
=====
Package                Architecture    Version          Repository      Size
=====
Installing:
mod_security            x86_64         2.9.6-1.el9     appstream      276 k
mod_security_crs        noarch         3.3.5-1.el9     appstream      172 k
Transaction Summary
=====
Install 2 Packages

Total download size: 448 k
Installed size: 1.7 M
Downloading Packages:
(1/2): mod_security-2.9.6-1.el9.x86_64.rpm          59 kB/s | 276 kB    00:04
(2/2): mod_security_crs-3.3.5-1.el9.noarch.rpm      28 kB/s | 172 kB    00:06
-----
Total                                           39 kB/s | 448 kB    00:11
Running transaction check
Transaction check succeeded.
Running transaction test
```

```
centos@localhost:/home/centos — vim /etc/httpd/conf.d/mod_security.conf
centos@localhos... x centos@localhos... x centos@localhos... x centos@localhos... x
<IfModule mod_security2.c>
# Default recommended configuration
SecRuleEngine On
SecRequestBodyAccess On
SecRule ARGS:data"@contains evil" "deny,status:403,msg:'param data contains evil data',id:1
SecRule REQUEST_HEADERS:Content-Type "text/xml" \
    "id:'200000',phase:1,t:none,t:lowercase,pass,nolog,ctl:requestBodyProcessor=XML"
SecRequestBodyLimit 13107200
SecRequestBodyNoFilesLimit 131072
SecRequestBodyInMemoryLimit 131072
SecRequestBodyLimitAction Reject
SecRule REQBODY_ERROR "!@eq 0" \
    "id:'200001', phase:2,t:none,log,deny,status:400,msg:'Failed to parse request body.',logdata:'
%{reqbody_error_msg}',severity:2"
SecRule MULTIPART_STRICT_ERROR "!@eq 0" \
    "id:'200002',phase:2,t:none,log,deny,status:400,msg:'Multipart request body \
failed strict validation: \
PE %{REQBODY_PROCESSOR_ERROR}, \
BQ %{MULTIPART_BOUNDARY_QUOTED}, \
BW %{MULTIPART_BOUNDARY_WHITESPACE}, \
DB %{MULTIPART_DATA_BEFORE}, \
DA %{MULTIPART_DATA_AFTER}, \
HF %{MULTIPART_HEADER_FOLDING}, \
LF %{MULTIPART_LF_LINE}, \
SM %{MULTIPART_MISSING_SEMICOLON}, \
IQ %{MULTIPART_INVALID_QUOTING}, \
IP %{MULTIPART_INVALID_PART}, \
IH %{MULTIPART_INVALID_HEADER_FOLDING}, \
FL %{MULTIPART_FILE_LIMIT_EXCEEDED}"
SecRule MULTIPART_UNMATCHED_BOUNDARY "!@eq 0" \
    "id:'200003',phase:2,t:none,log,deny,status:400,msg:'Multipart request body \
failed strict validation: \
PE %{REQBODY_PROCESSOR_ERROR}, \
BQ %{MULTIPART_BOUNDARY_QUOTED}, \
BW %{MULTIPART_BOUNDARY_WHITESPACE}, \
DB %{MULTIPART_DATA_BEFORE}, \
DA %{MULTIPART_DATA_AFTER}, \
HF %{MULTIPART_HEADER_FOLDING}, \
LF %{MULTIPART_LF_LINE}, \
SM %{MULTIPART_MISSING_SEMICOLON}, \
IQ %{MULTIPART_INVALID_QUOTING}, \
IP %{MULTIPART_INVALID_PART}, \
IH %{MULTIPART_INVALID_HEADER_FOLDING}, \
FL %{MULTIPART_FILE_LIMIT_EXCEEDED}"
@@@
"/etc/httpd/conf.d/mod_security.conf" 57L, 2297B written
5,95 Top
```

```
centos@localhost:/home/centos

centos@localhos... x centos@localhos... x centos@localhos... x centos@localhos... x
Installing      : mod_security-2.9.6-1.el9.x86_64 1/2
Installing      : mod_security_crs-3.3.5-1.el9.noarch 2/2
Running scriptlet: mod_security_crs-3.3.5-1.el9.noarch 2/2
Verifying       : mod_security-2.9.6-1.el9.x86_64 1/2
Verifying       : mod_security_crs-3.3.5-1.el9.noarch 2/2
Installed products updated.

Installed:
  mod_security-2.9.6-1.el9.x86_64 mod_security_crs-3.3.5-1.el9.noarch

Complete!
[root@localhost centos]# ^C
[root@localhost centos]# systemctl restart httpd
Job for httpd.service failed because the control process exited with error code.
See "systemctl status httpd.service" and "journalctl -xeu httpd.service" for details.
[root@localhost centos]# httpd -M | grep security
AH00526: Syntax error on line 13 of /etc/httpd/conf/httpd.conf:
<VirtualHost> directive requires additional arguments
[root@localhost centos]# httpd -M | grep security security2_module(shared)
bash: syntax error near unexpected token `('
[root@localhost centos]# ls /etc/httpd/modsecurity.d/activated_rules/
ls: cannot access '/etc/httpd/modsecurity.d/activated_rules/': No such file or directory
[root@localhost centos]# vim /etc/httpd/conf.d/mod_security.conf

[1]+  Stopped                  vim /etc/httpd/conf.d/mod_security.conf
[root@localhost centos]# systemctl restart httpd
Job for httpd.service failed because the control process exited with error code.
See "systemctl status httpd.service" and "journalctl -xeu httpd.service" for details.
[root@localhost centos]# echo "mod_security test" > /var/www/html/test.html
[root@localhost centos]# systemctl restart httpd
Job for httpd.service failed because the control process exited with error code.
See "systemctl status httpd.service" and "journalctl -xeu httpd.service" for details.
[root@localhost centos]# S
```


INSTALLING THE APACHE HTTP SERVER MANUAL

```
centos@localhost:/home/centos

centos@localhost:... x centos@localhost:... x centos@localhost:... x centos@localhost:... x

[root@localhost centos]# yum install httpd-manual
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use "rhc" or "subscription-manager" to
register.

Last metadata expiration check: 1:56:19 ago on Sun 01 Dec 2024 04:58:42 PM PKT.
Dependencies resolved.
=====
Package                Architecture      Version           Repository        Size
=====
Installing:
httpd-manual            noarch            2.4.62-1.el9      appstream          2.3 M
Transaction Summary
=====
Install 1 Package

Total download size: 2.3 M
Installed size: 7.3 M
Is this ok [y/N]: y
Downloading Packages:
httpd-manual-2.4.62-1.el9.noarch.rpm                411 kB/s | 2.3 MB    00:05
-----
Total                                                273 kB/s | 2.3 MB    00:08
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/1
  Installing     : httpd-manual-2.4.62-1.el9.noarch 1/1
```

```
centos@localhost:/home/centos

centos@localhost:... x centos@localhost:... x centos@localhost:... x centos@localhost:... x

=====
Installing:
  httpd-manual          noarch          2.4.62-1.el9          appstream          2.3 M

Transaction Summary
=====
Install 1 Package

Total download size: 2.3 M
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Is this ok [y/N]: y
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httpd-manual-2.4.62-1.el9.noarch.rpm          411 kB/s | 2.3 MB    00:05
-----
Total                                          273 kB/s | 2.3 MB    00:08
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/1
  Installing     : httpd-manual-2.4.62-1.el9.noarch 1/1
  Verifying      : httpd-manual-2.4.62-1.el9.noarch 1/1
Installed products updated.

Installed:
  httpd-manual-2.4.62-1.el9.noarch

Complete!
[root@localhost centos]# systemctl restart httpd
Job for httpd.service failed because the control process exited with error code.
See "systemctl status httpd.service" and "journalctl -xeu httpd.service" for details.
[root@localhost centos]#
```