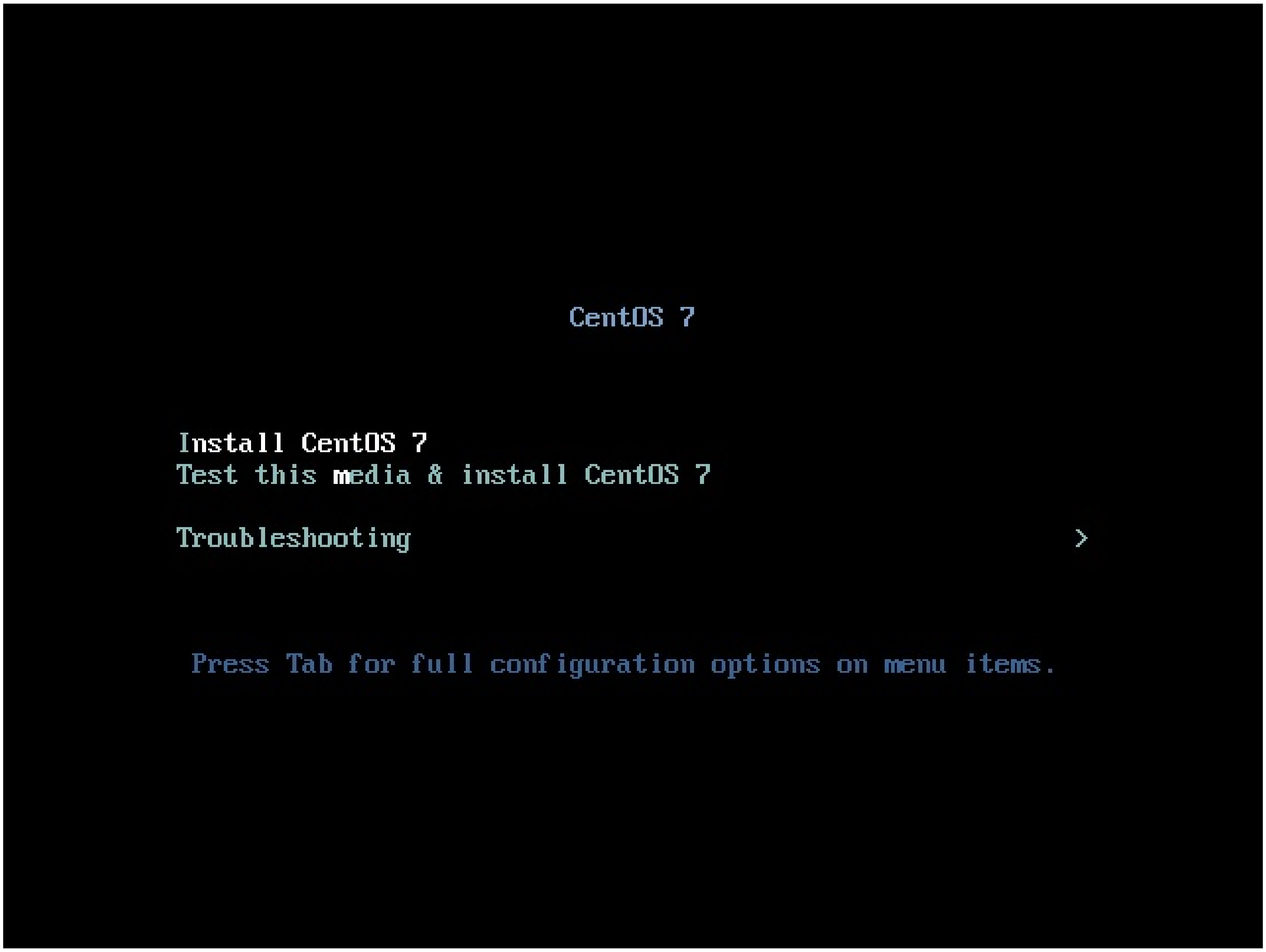
Installing BIND 9 DNS Server on CentOS 7

This guide assumes the use of BIND v9.10.4-P2 (the most current version at the time of writing) and CentOS 7 minimal install. Any other versions of software or distributions may have different dependencies, options, or commands.

Install CentOS 7

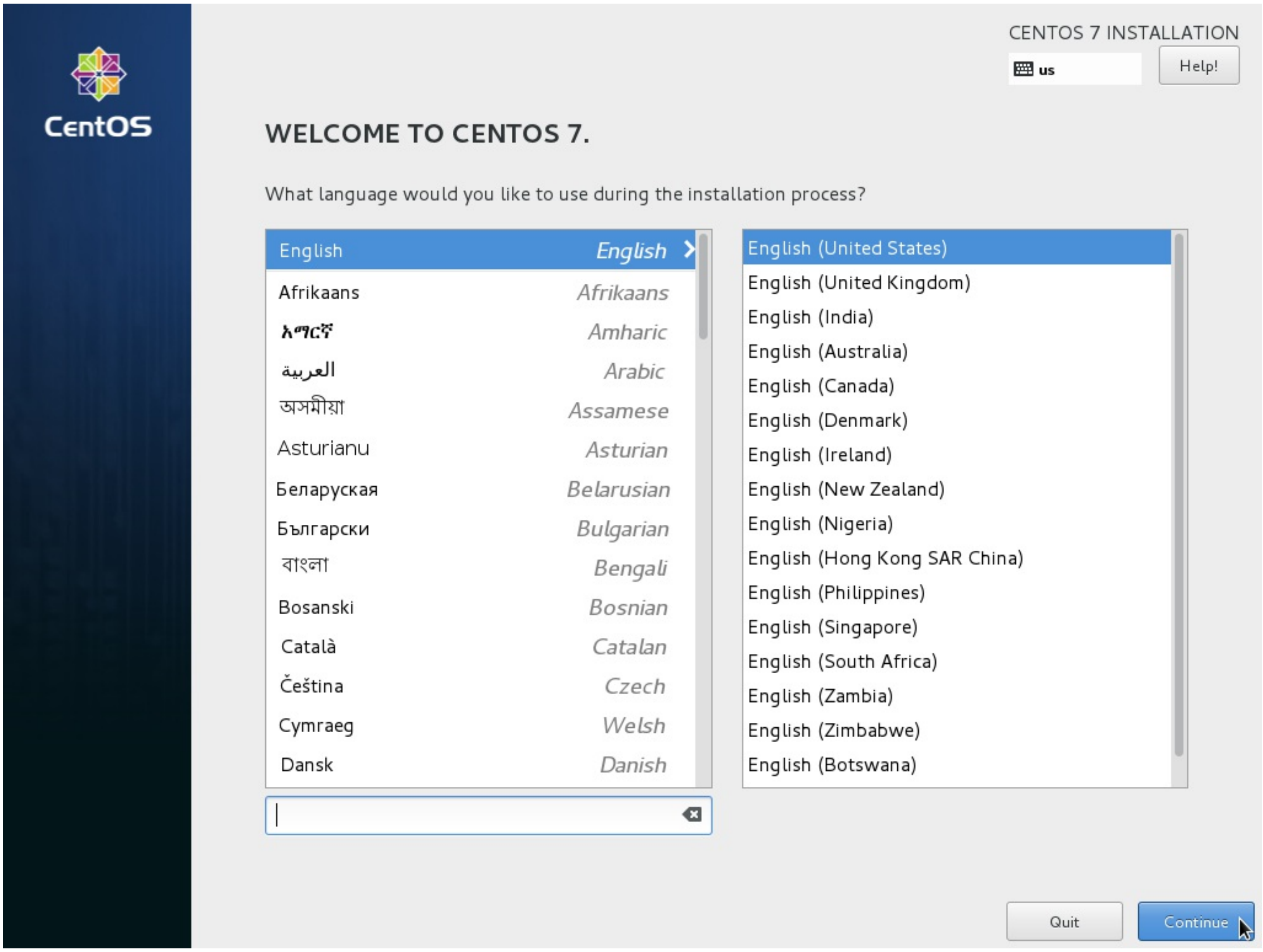
1. Start the machine with a CentOS install DVD inserted. Select the CD drive as the boot device if necessary.

2. When the CentOS install DVD boots, select "Install CentOS 7" from the menu using the arrow keys and hit the Enter key.



Press Tab for full configuration options on menu items.

3. After the installer loads, make sure that "English (United States)" is selected as the language and click the Continue button.



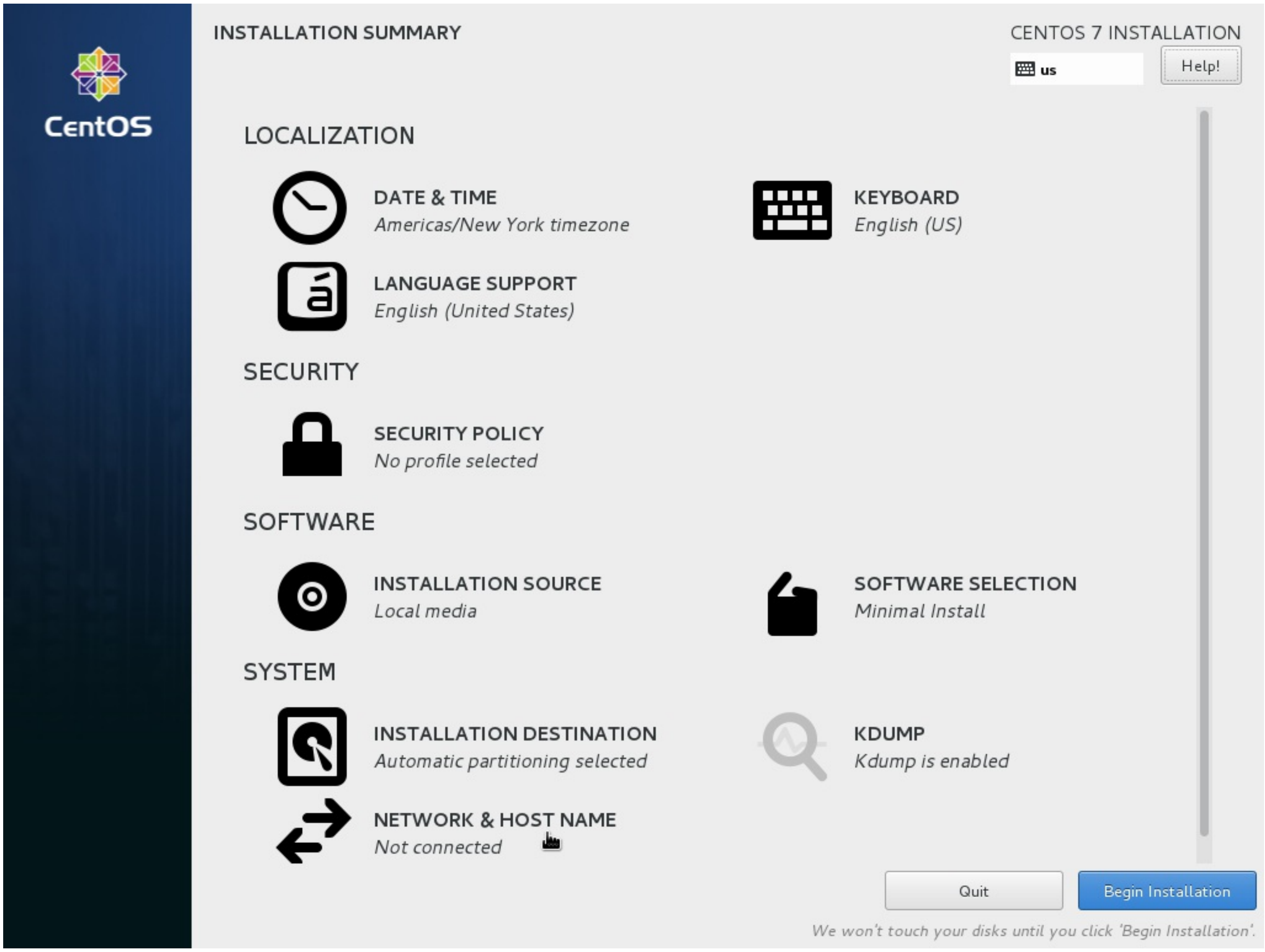
WELCOME TO CENTOS 7.

What language would you like to use during the installation process?

English	English
Afrikaans	Afrikaans
አማርኛ	Amharic
العربية	Arabic
অসমীয়া	Assamese
Asturianu	Asturian
Беларуская	Belarusian
Български	Bulgarian
বাংলা	Bengali
Bosanski	Bosnian
Català	Catalan
Čeština	Czech
Cymraeg	Welsh
Dansk	Danish

- English (United States)
- English (United Kingdom)
- English (India)
- English (Australia)
- English (Canada)
- English (Denmark)
- English (Ireland)
- English (New Zealand)
- English (Nigeria)
- English (Hong Kong SAR China)
- English (Philippines)
- English (Singapore)
- English (South Africa)
- English (Zambia)
- English (Zimbabwe)
- English (Botswana)

4. On the main install screen, click "Network & Host Name"



INSTALLATION SUMMARY

CENTOS 7 INSTALLATION

LOCALIZATION

DATE & TIME
Americas/New York timezone

KEYBOARD
English (US)

LANGUAGE SUPPORT
English (United States)

SECURITY

SECURITY POLICY
No profile selected

SOFTWARE

INSTALLATION SOURCE
Local media

SOFTWARE SELECTION
Minimal Install

SYSTEM

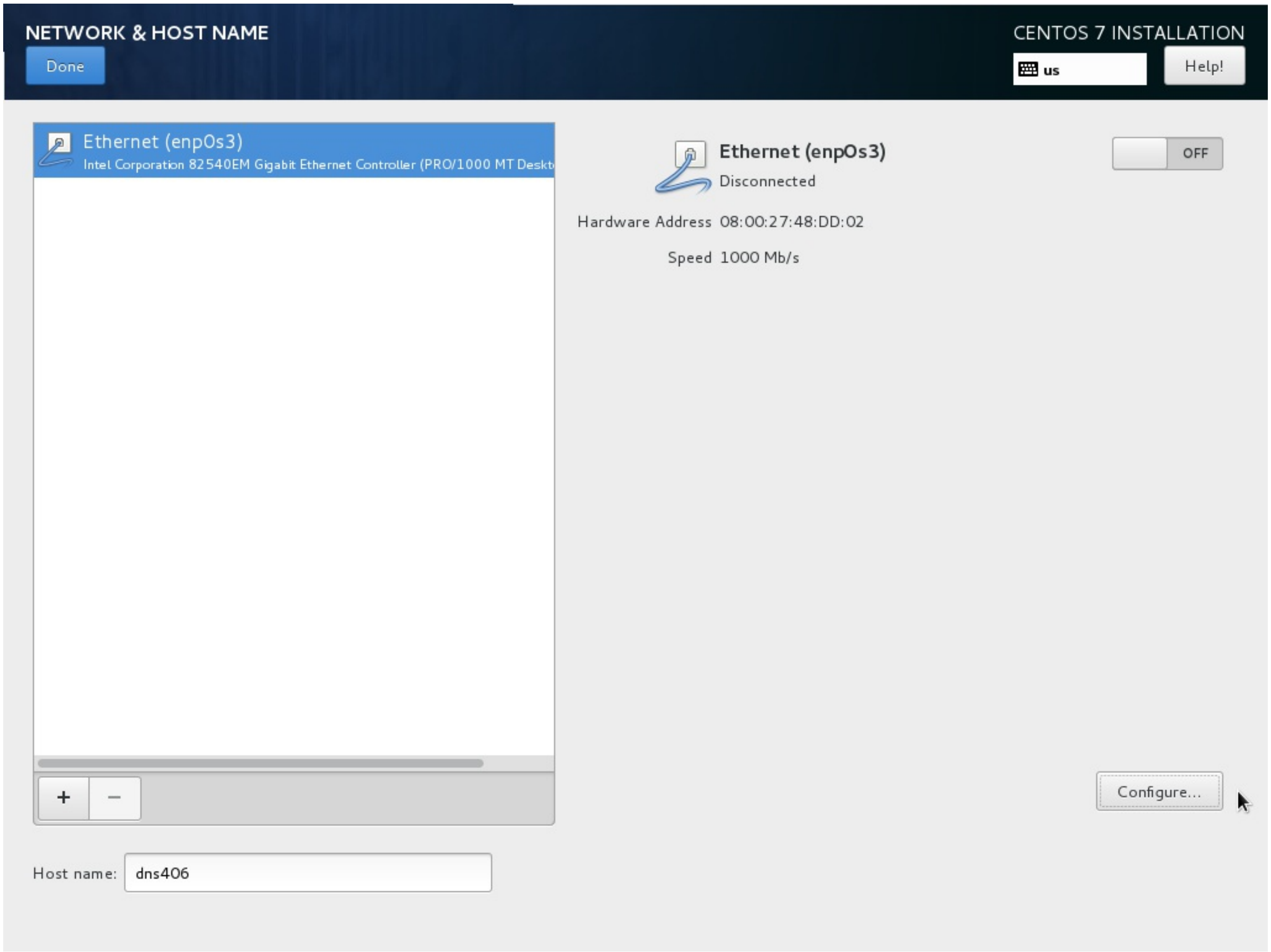
INSTALLATION DESTINATION
Automatic partitioning selected

KDUMP
Kdump is enabled

NETWORK & HOST NAME
Not connected

We won't touch your disks until you click 'Begin Installation'.

5. Enter the desired hostname in the "Host name" box. If the computer should use DHCP instead of a static IP, skip the next step. If a static IP is needed, click the "Configure" button.

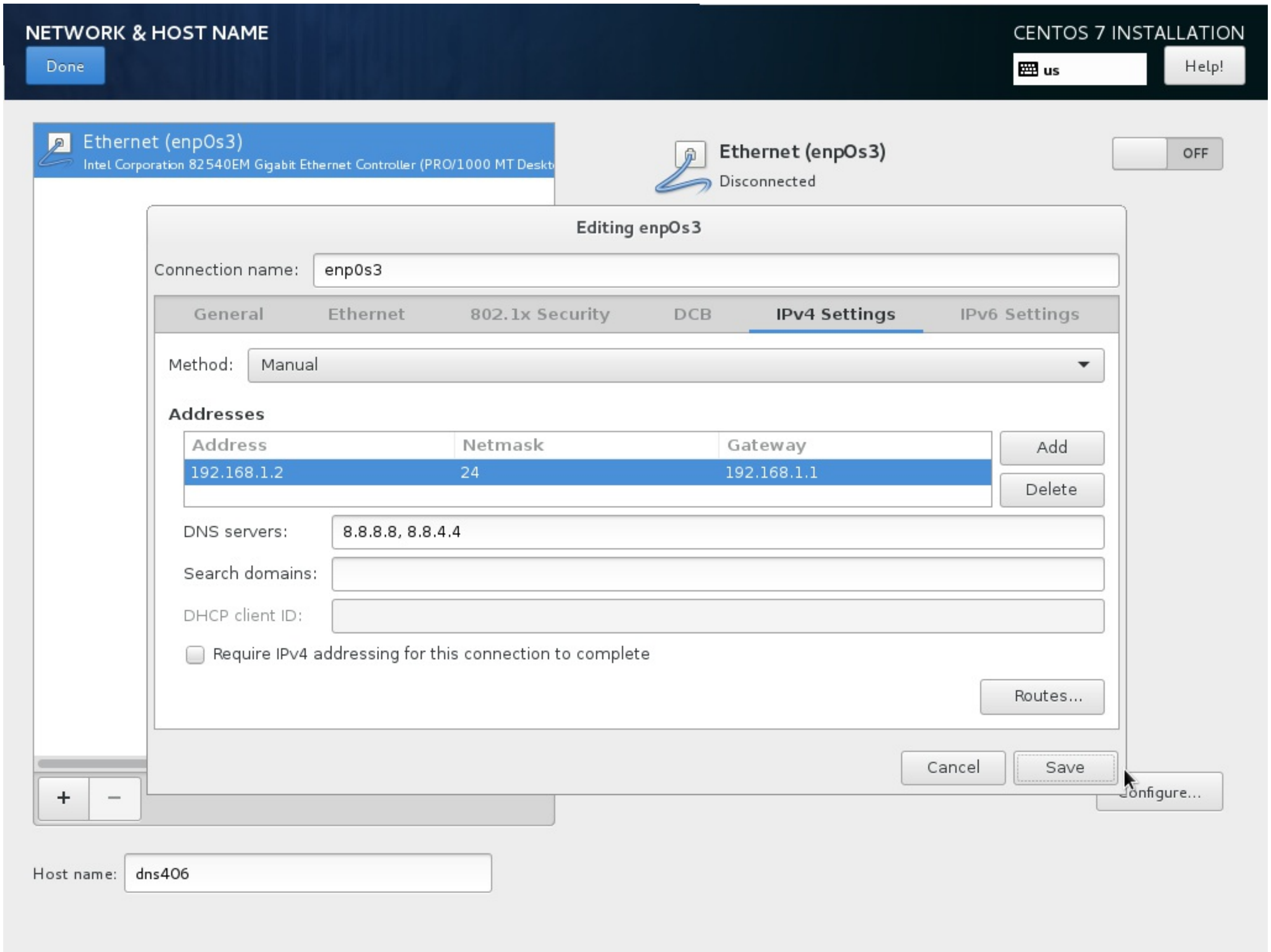


Hardware Address 08:00:27:48:DD:02

Speed 1000 Mb/s

Host name: dns406

6. To configure the static IP, select the "IPv4 Settings" tab, select "Manual" from the drop-down menu, and click the Add button. Enter the desired IP address, netmask (or CIDR mask), and gateway. List the DNS servers to use in the "DNS Servers" box, each one separated by commas. Click the Save button.



NETWORK & HOST NAME

CENTOS 7 INSTALLATION

Ethernet (enp0s3)
Intel Corporation 82540EM Gigabit Ethernet Controller (PRO/1000 MT Deskt

Ethernet (enp0s3)
Disconnected

Editing enp0s3

Connection name: enp0s3

Method: Manual

Addresses

Address	Netmask	Gateway
192.168.1.2	24	192.168.1.1

DNS servers: 8.8.8.8, 8.8.4.4

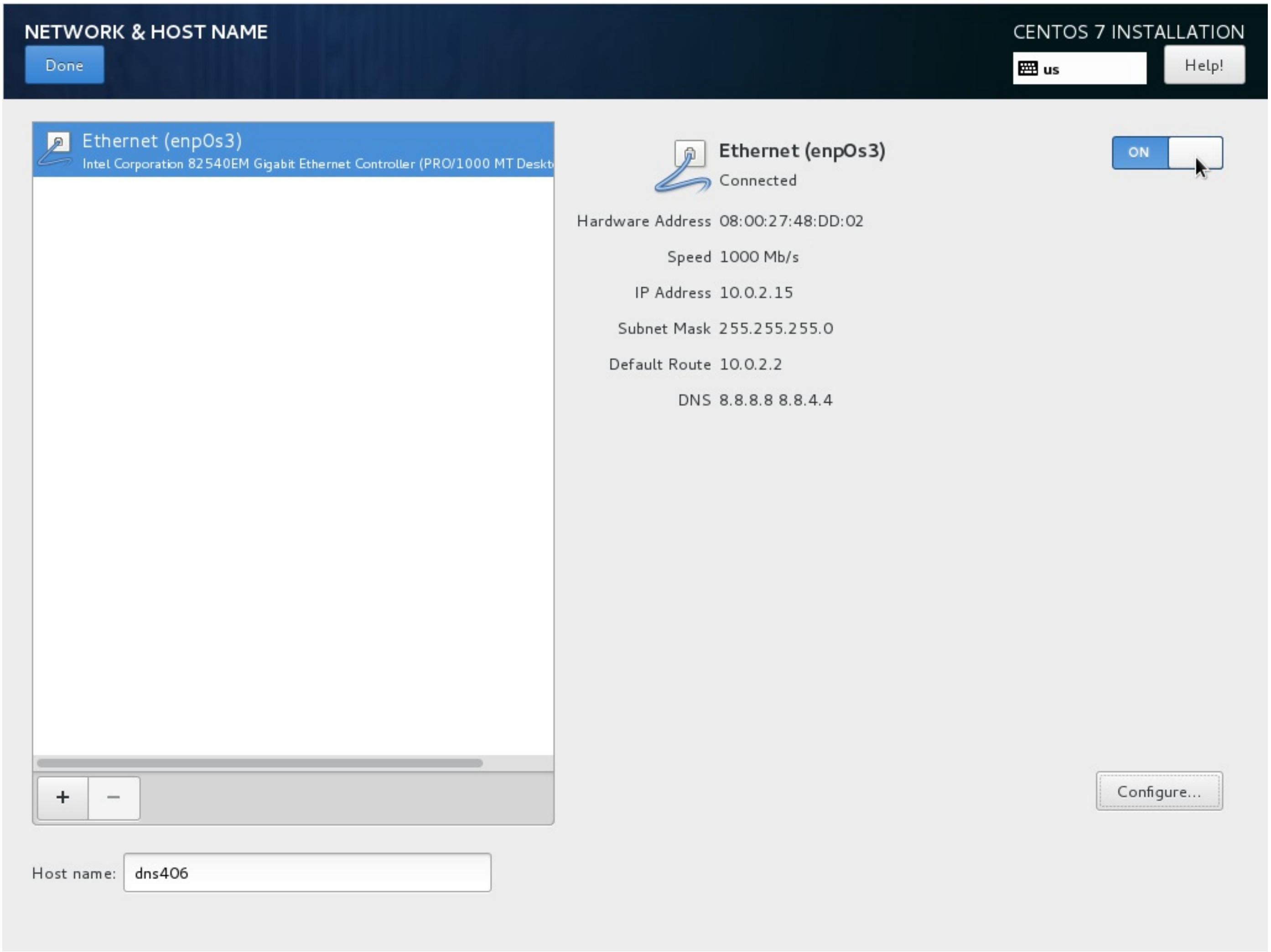
Search domains:

DHCP client ID:

□ Require IPv4 addressing for this connection to complete

Host name: dns406

7. Click the On/Off toggle to turn the network interface on. If no static IP was entered, DHCP will be used. Click the Done button.



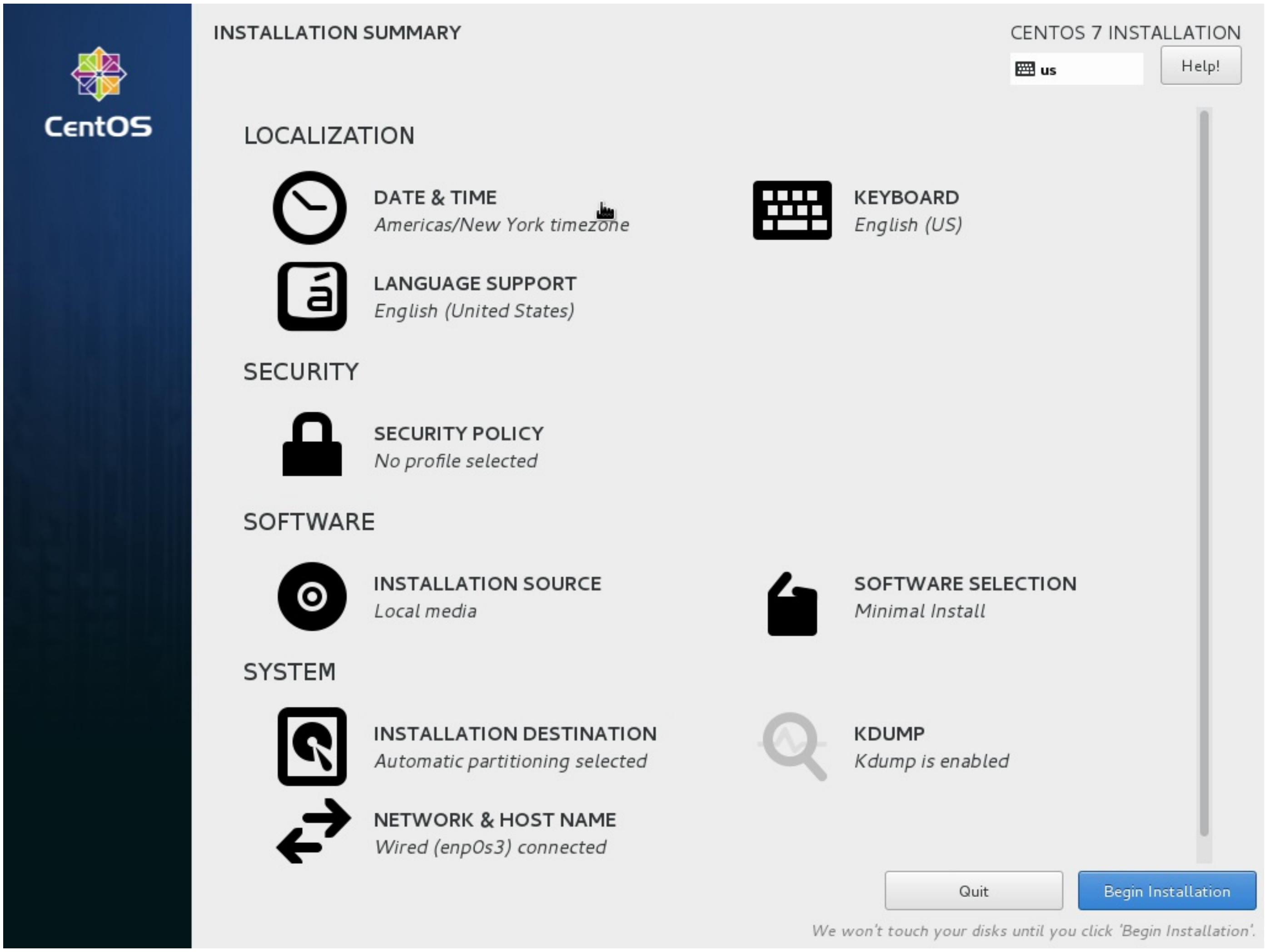
Ethernet (enp0s3)
Intel Corporation 82540EM Gigabit Ethernet Controller (PRO/1000 MT Deskt

Ethernet (enp0s3)
Connected

Hardware Address 08:00:27:48:DD:02
Speed 1000 Mb/s
IP Address 10.0.2.15
Subnet Mask 255.255.255.0
Default Route 10.0.2.2
DNS 8.8.8.8 8.8.4.4

Host name: dns406

8. Back on the main install screen, click "Date & Time".



INSTALLATION SUMMARY

CENTOS 7 INSTALLATION

LOCALIZATION

DATE & TIME
Americas/New York timezone

KEYBOARD
English (US)

LANGUAGE SUPPORT
English (United States)

SECURITY

SECURITY POLICY
No profile selected

SOFTWARE

INSTALLATION SOURCE
Local media

SOFTWARE SELECTION
Minimal Install

SYSTEM

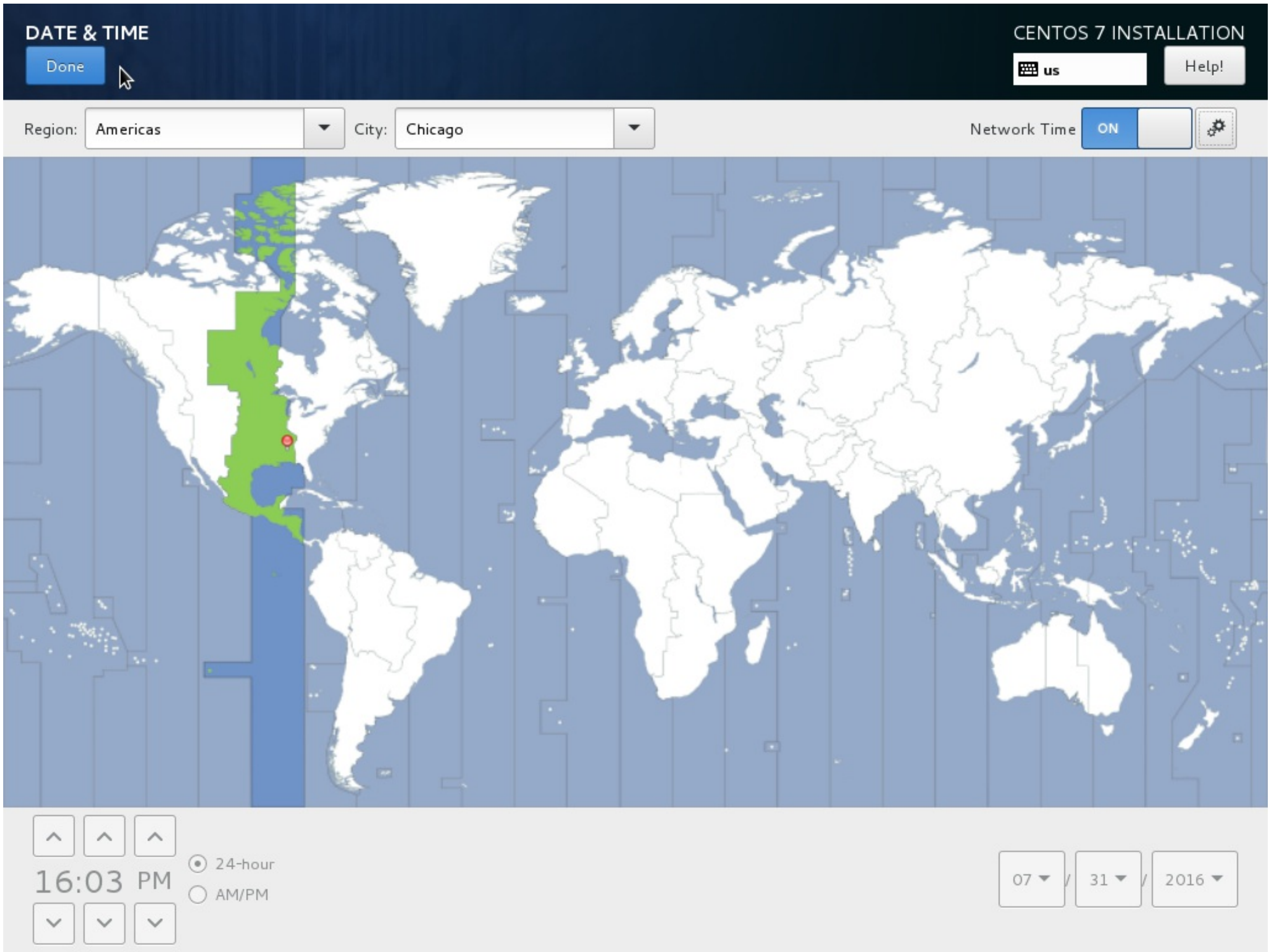
INSTALLATION DESTINATION
Automatic partitioning selected

KDUMP
Kdump is enabled

NETWORK & HOST NAME
Wired (enp0s3) connected

We won't touch your disks until you click 'Begin Installation'.

9. Select the appropriate time zone. For US Central time, select "Americas/Chicago". Make sure the the "Network Time" in the upper right is set to "On". Click the Done button.



DATE & TIME

CENTOS 7 INSTALLATION

Region: Americas

City: Chicago

Network Time: ON

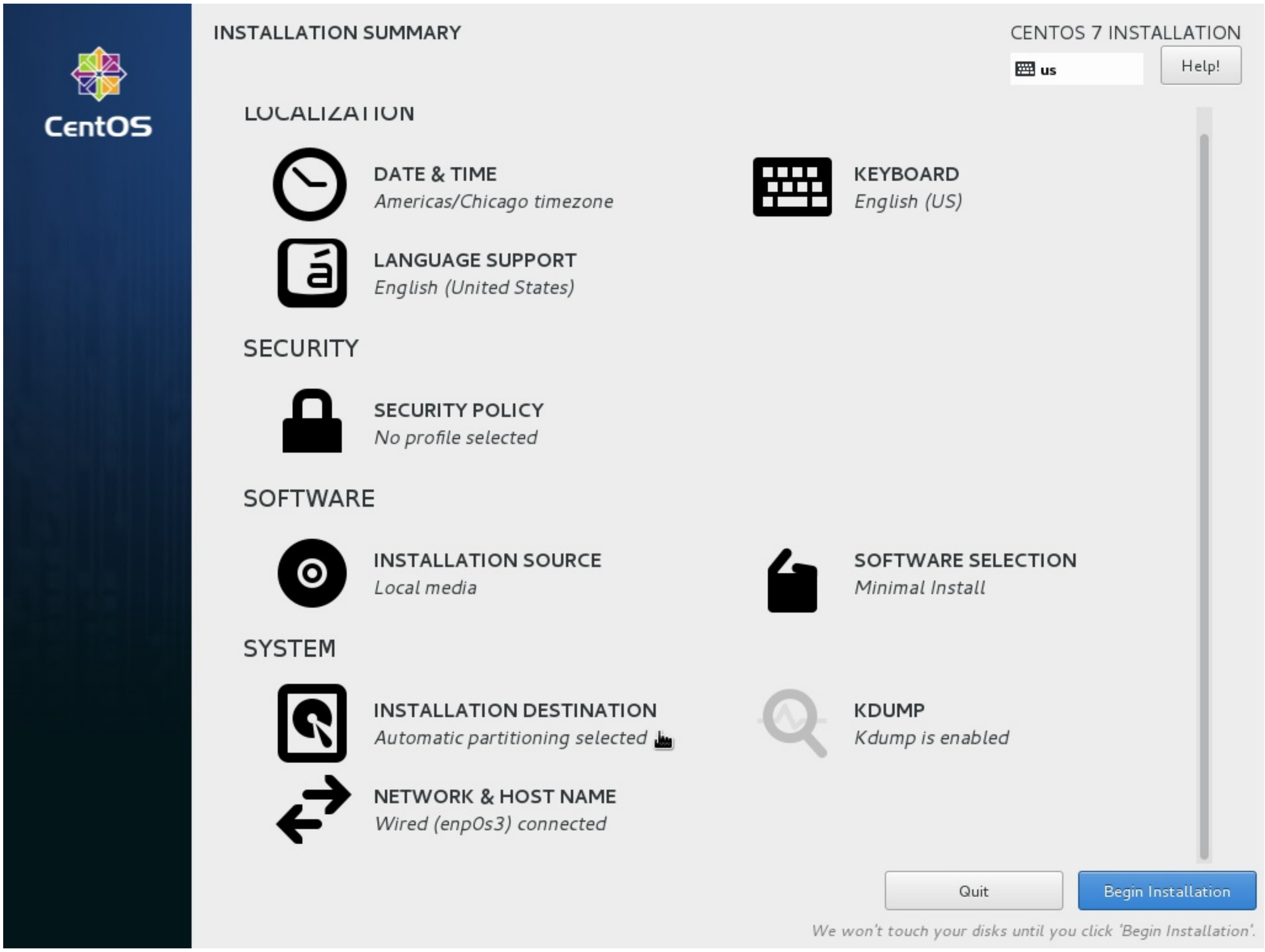
16:03 PM

● 24-hour

○ AM/PM

07 / 31 / 2016

10. Back on the main install screen, click "Installation Destination".



INSTALLATION SUMMARY

CENTOS 7 INSTALLATION

LOCALIZATION

DATE & TIME
Americas/Chicago timezone

KEYBOARD
English (US)

LANGUAGE SUPPORT
English (United States)

SECURITY

SECURITY POLICY
No profile selected

SOFTWARE

INSTALLATION SOURCE
Local media

SOFTWARE SELECTION
Minimal Install

SYSTEM

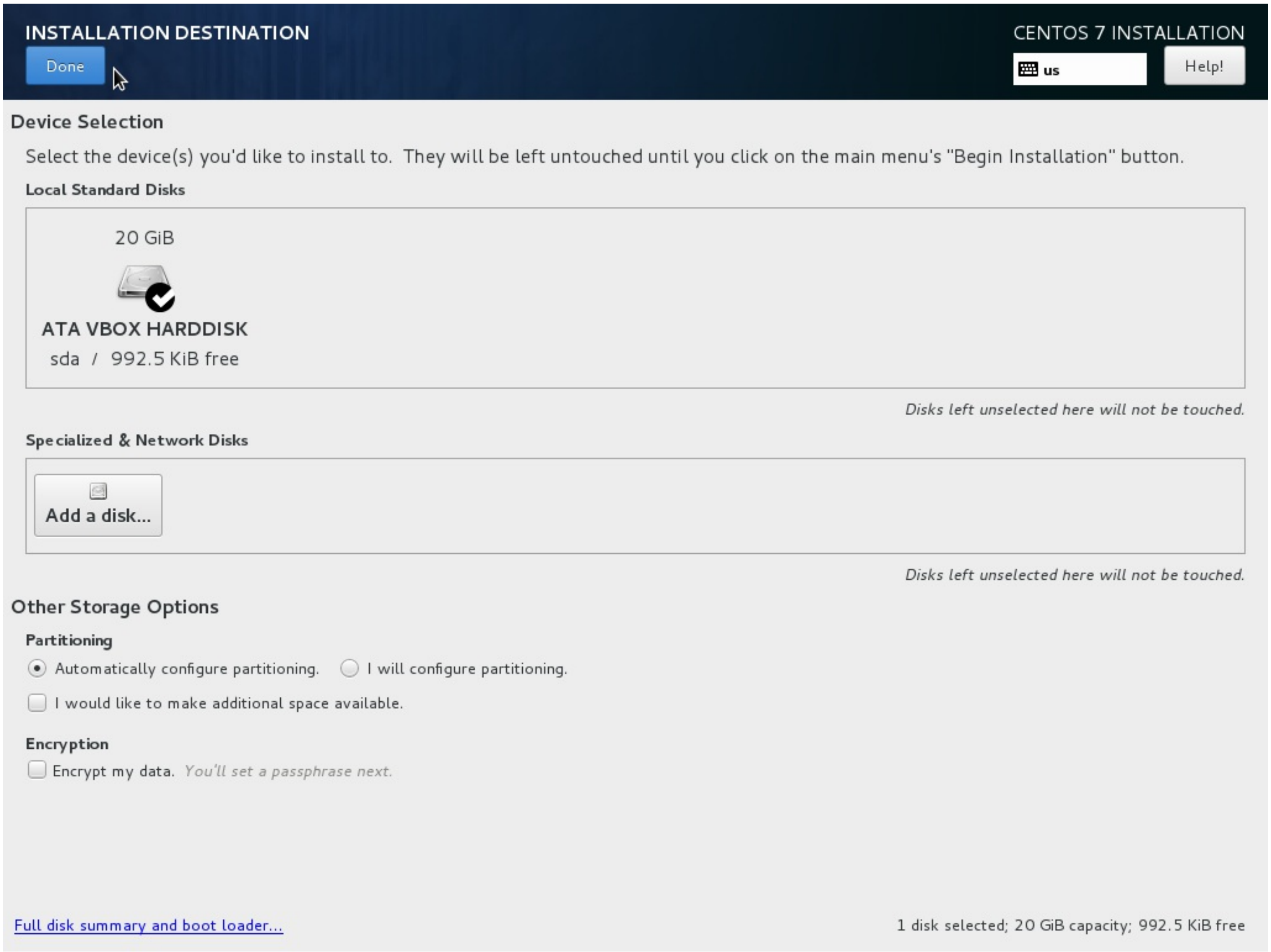
INSTALLATION DESTINATION
Automatic partitioning selected

KDUMP
Kdump is enabled

NETWORK & HOST NAME
Wired (enp0s3) connected

We won't touch your disks until you click 'Begin Installation'.

11. Make sure that "Automatically configure partitioning" is selected. Click the Done button.



INSTALLATION DESTINATION

Device Selection

Select the device(s) you'd like to install to. They will be left untouched until you click on the main menu's "Begin Installation" button.

Local Standard Disks

20 GiB

ATA VBOX HARDDISK

sda / 992.5 KiB free

Disks left unselected here will not be touched.

Specialized & Network Disks

Disks left unselected here will not be touched.

Other Storage Options

Partitioning

● Automatically configure partitioning. ○ I will configure partitioning.

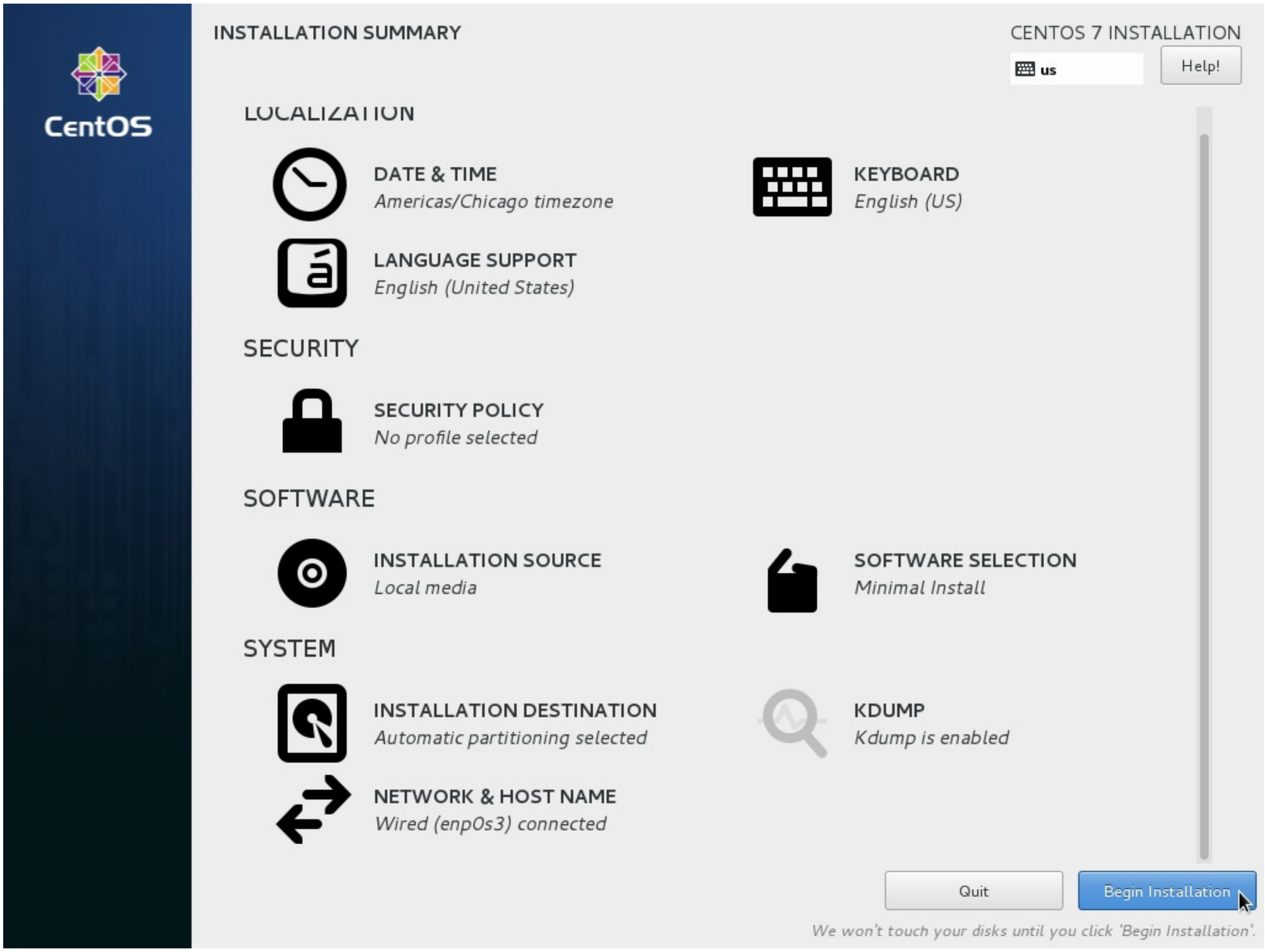
□ I would like to make additional space available.

Encryption

□ Encrypt my data. *You'll set a passphrase next.*

1 disk selected; 20 GiB capacity; 992.5 KiB free

12. Back on the main install screen, click the Begin Installation button.



INSTALLATION SUMMARY

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SOFTWARE SELECTION
Minimal Install

SYSTEM

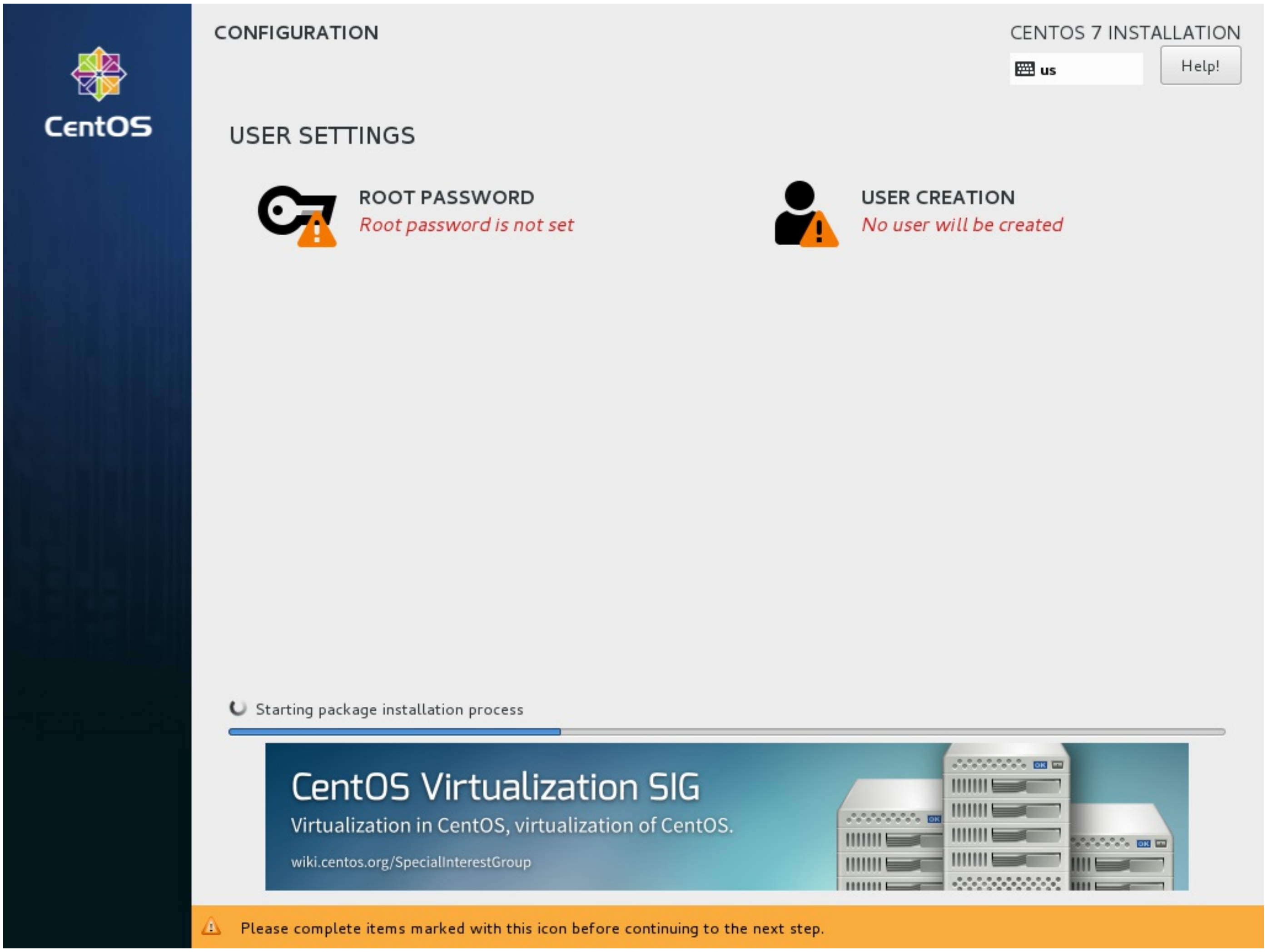
INSTALLATION DESTINATION
Automatic partitioning selected

KDUMP
Kdump is enabled

NETWORK & HOST NAME
Wired (enp0s3) connected

We won't touch your disks until you click 'Begin Installation'.

13. While the operating system is being installed, click "Root Password".



CONFIGURATION

CENTOS 7 INSTALLATION

USER SETTINGS

ROOT PASSWORD
Root password is not set

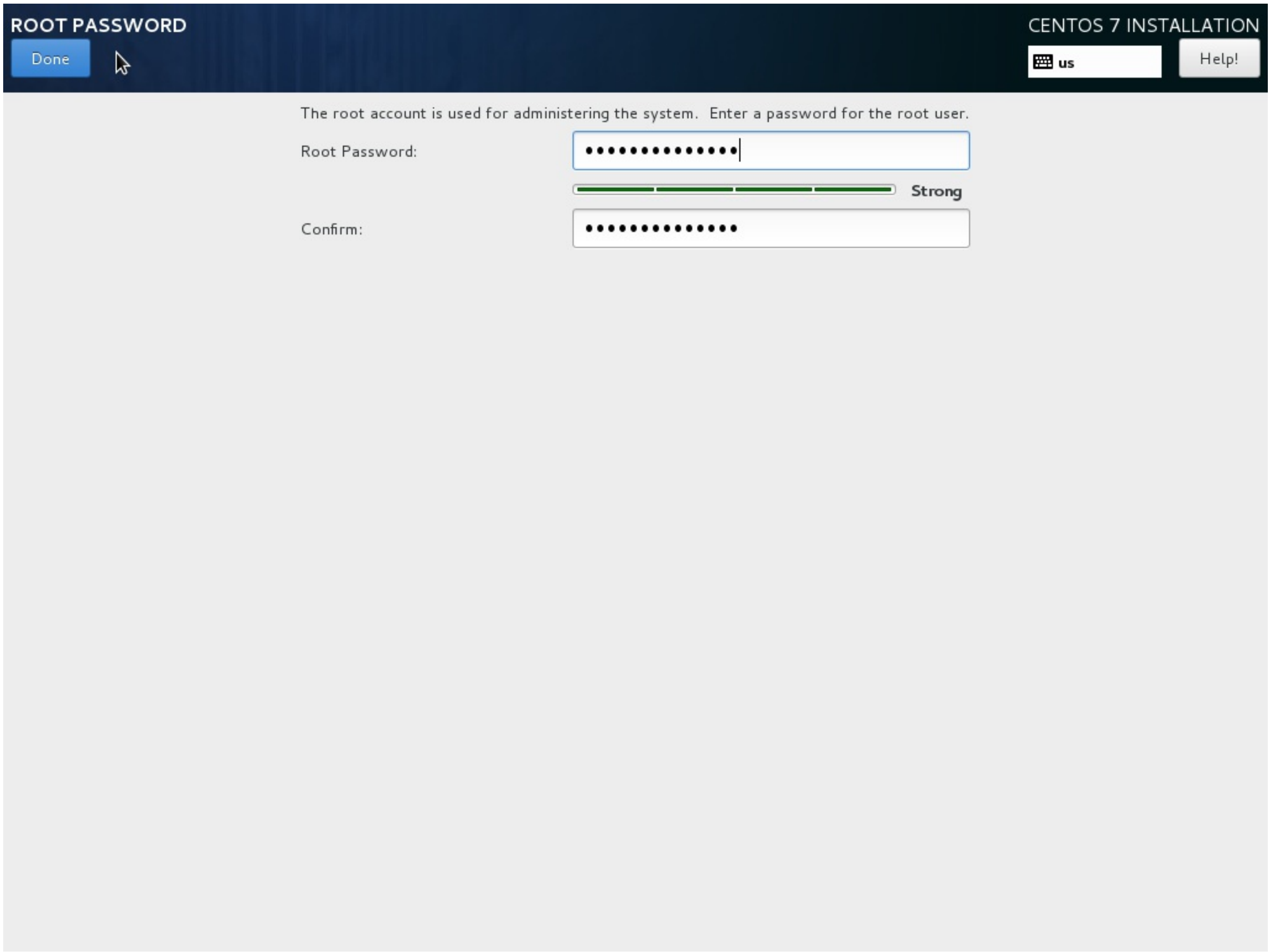
USER CREATION
No user will be created

Starting package installation process

CentOS Virtualization SIG
Virtualization in CentOS, virtualization of CentOS.
wiki.centos.org/SpecialInterestGroup

⚠ Please complete items marked with this icon before continuing to the next step.

14. Enter the desired root user password in both boxes. Click the Done button.



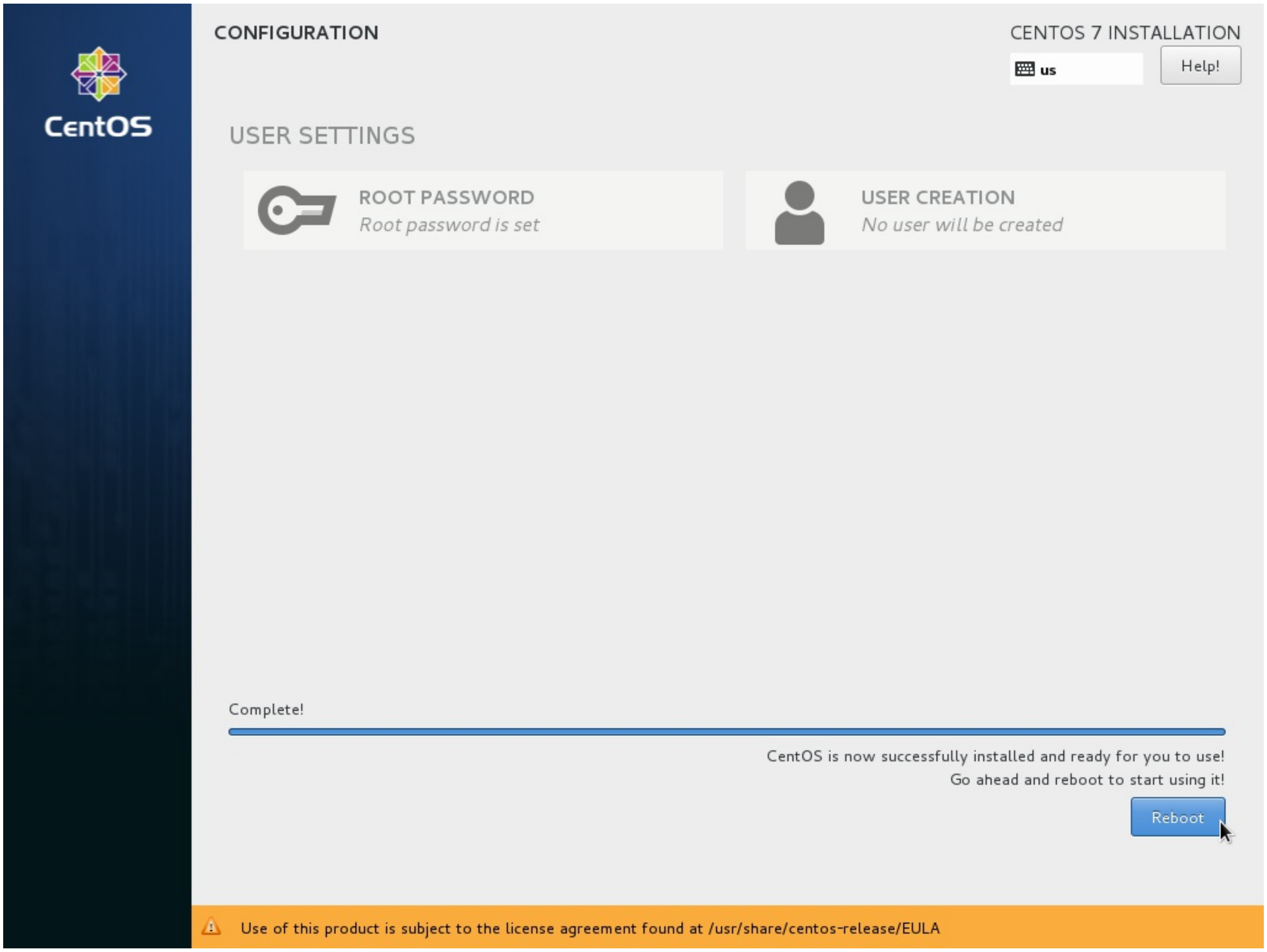
The root account is used for administering the system. Enter a password for the root user.

Root Password: ••••••••••••••

Strong

Confirm: ••••••••••••••

15. After the install has finished, click the Reboot button.



ROOT PASSWORD
Root password is set

USER CREATION
No user will be created

Complete!

CentOS is now successfully installed and ready for you to use!
Go ahead and reboot to start using it!

⚠ Use of this product is subject to the license agreement found at /usr/share/centos-release/EULA

16. Make sure to remove the install disk from the CD drive

Prerequisites

Note that some of these dependencies are for the BIND application and others are useful utilities to aid in setup and not strictly dependencies.

1. Once the system has restarted to the login prompt, login with the username `root` and the password that was set during the install.
2. Install dependencies.

```
yum install screen vim bind-utils wget openssl-devel gcc automake net-tools
checkpolicy policycoreutils-python perl-Net-DNS-Nameserver perl-IO-Socket-INET6
```

3. Update the system

```
yum update
```

4. After the system is updated, reboot the system.

```
reboot
```

5. When the system has finished restarting, log back in as the `root` user.
6. Create the `named` user that BIND will run as. This is important to ensure that BIND does not run with `root` privileges.

```
useradd -r -M -d /var/named/chroot -s /sbin/nologin named
```

7. Allow DNS queries through the host firewall.

```
firewall-cmd --permanent --add-service=dns
firewall-cmd --reload
```

8. Create the file for an SELinux policy. Press the 'i' key to enter insert mode.

```
vim -c 'set paste' /tmp/named-custom.te
```

9. Copy and paste the following into the file. Return to normal mode by pressing Esc. Save and close the

file by typing `:x`.

```
module named-custom 1.0;
require {
     type sysctl_net_t;
     type named_t;
     class dir search;
     class file { read getattr open };
}
#============= named_t ==============
allow named_t sysctl_net_t:dir search;
allow named_t sysctl_net_t:file { read getattr open };
```

10. Build and load the policy into SELinux.

```
checkmodule -M -m -o /tmp/named-custom.mod /tmp/named-custom.te && semodule_package -
o /tmp/named-custom.pp -m /tmp/named-custom.mod && semodule -i /tmp/named-custom.pp
```

11. Add a non-root user, set the password, and allow the user to run commands via `sudo`. Replace **username** with the desired username.

```
useradd username
passwd username
echo "username ALL=(ALL) ALL" >> /etc/sudoers
```

12. Log into the non-root user account. Replace **username** with the chosen username. Enter the previously set password when prompted. After logging in, change into the non-root user's home directory.

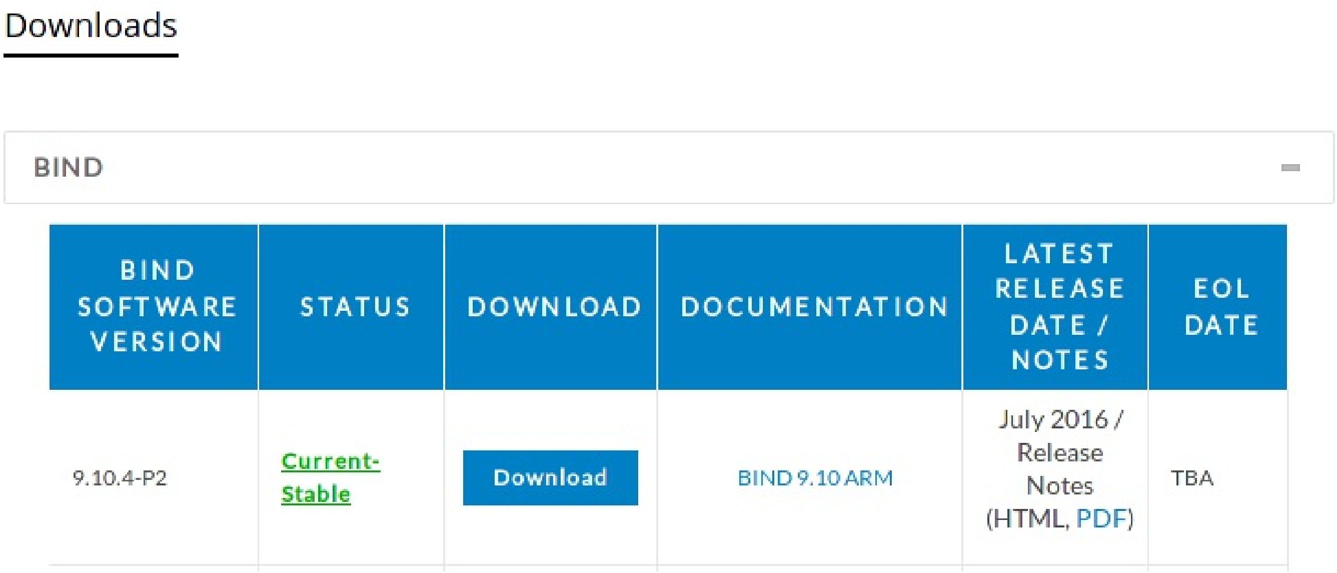
```
su username -
cd
```

Install BIND

All remaining steps should be done with the non-root user account. See Prerequisites section for logging into the non-root account.

Download and Verify

1. Go to the Internet Systems Consortium website in the downloads section: https://www.isc.org/downloads/. Click on the 'BIND' option under 'Downloads' to expand the available downloads. Click on the Download button for the 'Current-Stable' release.

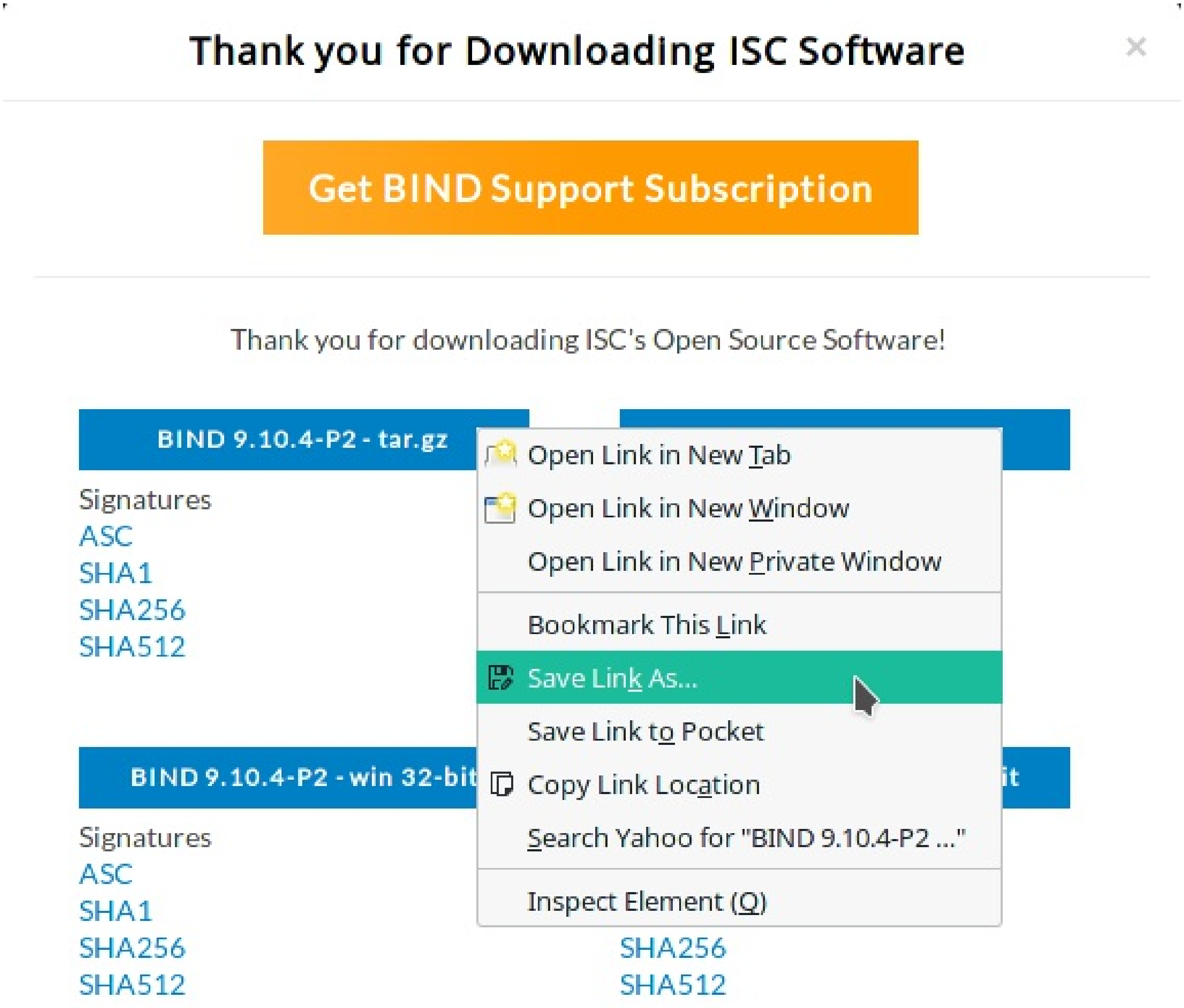


Downloads

BIND

BIND SOFTWARE VERSION	STATUS	DOWNLOAD	DOCUMENTATION	LATEST RELEASE DATE / NOTES	EOL DATE
9.10.4-P2	Current-Stable	Download	BIND 9.10 ARM	July 2016 / Release Notes (HTML, PDF)	TBA

2. In the popup box, right click on the `tar.gz` download box and click 'Save Link As' to copy the file URL to the clipboard.



Thank you for Downloading ISC Software

Thank you for downloading ISC's Open Source Software!

3. On the command line of the CentOS 7 server, use `wget` to download the file. Paste the file URL previously copied where **file-url** is in the command below.

```
wget file-url -O bind.tar.gz
```

4. In the same popup box where the `tar.gz` file URL was copied on the ISC website, also copy the URL of the 'SHA512' file listed under the `tar.gz` box.

5. On the command line of the CentOS 7 server, use `wget` to download the 'SHA512' file. Paste the file URL previously copied where **file-url** is in the command below.

```
wget file-url -O bind.sha512.asc
```

6. Import the ISC GPG key to verify the downloaded file.

```
gpg --keyserver pgp.mit.edu --search-keys codesign@isc.org
```

Select the current signing key (the one that is not expired) by typing the number and hitting Enter.

```
gpg: directory `/home/username/.gnupg' created
gpg: new configuration file `/home/username/.gnupg/gpg.conf' created
gpg: WARNING: options in `/home/username/.gnupg/gpg.conf' are not yet active during
this run
gpg: keyring `/home/username/.gnupg/secring.gpg' created
gpg: keyring `/home/username/.gnupg/pubring.gpg' created
gpg: searching for "codesign@isc.org" from hkp server pgp.mit.edu
(1)     Internet Systems Consortium, Inc. (Signing key, 2015-2016) <codesign@i
          2048 bit RSA key 911A4C02, created: 2014-12-02, expires: 2017-01-31
(2)     Internet Systems Consortium, Inc. (Signing key, 2013) <codesign@isc.or
          2048 bit RSA key 189CDBC5, created: 2013-01-31, expires: 2015-01-31
(expired)
(3)     Internet Systems Consortium, Inc. (Signing key, 2012) (http://www.isc.
          2048 bit RSA key C96B350A, created: 2011-10-27, expires: 2013-02-01
(expired)
Keys 1-3 of 3 for "codesign@isc.org".  Enter number(s), N)ext, or Q)uit > 1
gpg: requesting key 911A4C02 from hkp server pgp.mit.edu
gpg: /home/username/.gnupg/trustdb.gpg: trustdb created
gpg: key 911A4C02: public key "Internet Systems Consortium, Inc. (Signing key, 2015-
2016) <codesign@isc.org>" imported
gpg: no ultimately trusted keys found
gpg: Total number processed: 1
gpg:               imported: 1  (RSA: 1)
```

7. Verify the downloaded BIND software with the downloaded `SHA512` hash.

```
gpg --verify bind.sha512.asc bind.tar.gz
```

If the output shows `Good signature`, then the download is verified. Ignore the warning message about the key not being certified with a trusted signature.

```
gpg: Signature made Mon 18 Jul 2016 05:59:45 PM CDT using RSA key ID 911A4C02
gpg: checking the trustdb
gpg: no ultimately trusted keys found
```

```
gpg: Good signature from "Internet Systems Consortium, Inc. (Signing key, 2015-2016)
<codesign@isc.org>"
gpg: WARNING: This key is not certified with a trusted signature!
gpg:          There is no indication that the signature belongs to the owner.
Primary key fingerprint: ADBE 9446 286C 7949 05F1  E075 6FA6 EBC9 911A 4C02
```

Compile

1. Make a new empty directory to extract the BIND source code.

```
mkdir bind
```

2. Untar the downloaded BIND source code.

```
tar -xvf bind.tar.gz -C bind --strip 1
```

3. Change into the new directory.

```
cd bind
```

4. Run the script to configure the compilation options.

```
./configure --prefix=/usr --sysconfdir=/etc --enable-threads --enable-static --
localstatedir=/var
```

5. Compile BIND.

```
make
```

Test

1. Enable the test environment.

```
sudo bin/tests/system/ifconfig.sh up
```

2. Check the built software, saving the output to a log file.

```
make check | tee check.log
```

Note: This checking process will take a very long time, usually more than 15 minutes.
Note: It is helpful to save the output to a log file because it is extremely long and it may be necessary to search through it to find any problems with the checks.

3. **None of the tests should have the result `FAIL`.** Any results that have `SKIPPED` or `UNTESTED` are fine.

```
I:System test result summary:
I:      69 PASS
I:       7 SKIPPED
I:       2 UNTESTED
```

4. If any tests have the result `FAIL`, clean the current build and start from the beginning of the Compile section. Otherwise, skip this step and continue.

```
make clean
```

5. Disable the test environment.

```
sudo bin/tests/system/ifconfig.sh down
```

Install

1. Install BIND.

```
sudo make install
```

2. Create the necessary directories for the BIND chroot environment.

```
sudo mkdir -p /var/named/chroot/dev /var/named/chroot/etc /var/named/chroot/proc
/var/named/chroot/usr /var/named/chroot/var/named/data
/var/named/chroot/var/run/named /var/named/chroot/run/named
/var/named/chroot/var/named/slaves
```

3. Create a new file for the chroot setup script. Press the 'i' key to enter insert mode.

```
sudo vim -c "set paste" /usr/libexec/setup-named-chroot.sh
```

4. Copy the following code and paste it into the file. Return to normal mode by pressing Esc. Save and close the file by typing `:x`.

```
#!/bin/bash
usage() {
  echo
  echo 'This script setups chroot environment for BIND'
  echo 'Usage: setup-named-chroot.sh ROOTDIR [on|off]'
}
if ! [ "$#" -eq 2 ]; then
  echo 'Wrong number of arguments'
  usage
  exit 1
fi
ROOTDIR="$1"
# Exit if ROOTDIR doesn't exist
if ! [ -d "$ROOTDIR" ]; then
  echo "Root directory $ROOTDIR doesn't exist"
  usage
  exit 1
fi
mount_chroot_conf() {
if [ -s /etc/localtime ]; then
        cp -fp /etc/localtime ${ROOTDIR}/etc/localtime
fi;
if [ ! -d ${ROOTDIR}/proc ]; then
        mkdir -p ${ROOTDIR}/proc
fi
if ! egrep -q '^/proc[[:space:]]+'${ROOTDIR}'/proc' /proc/mounts; then
        mount --bind -n /proc ${ROOTDIR}/proc >/dev/null 2>&1
fi
}
umount_chroot_conf() {
  if [ -n "$ROOTDIR" ]; then
        umount ${ROOTDIR}/proc
  fi
}
case "$2" in
  on)
    mount_chroot_conf
    ;;
  off)
    umount_chroot_conf
    ;;
  *)
    echo 'Second argument has to be "on" or "off"'
    usage
    exit 1
esac
```

5. Create the pseudo-devices for the chroot environment.

```
sudo mknod /var/named/chroot/dev/null c 1 3
sudo mknod /var/named/chroot/dev/random c 1 8
```

6. Set the appropriate file and directory permissions.

```
sudo chmod 740 /usr/libexec/setup-named-chroot.sh
sudo chown -R root.named /var/named/chroot/etc /var/named/chroot/var/run/named
/var/named/chroot/var/run
sudo chown -R named.named /var/named/chroot/var/named
sudo restorecon -R /var/named/chroot/*
sudo setsebool -P named_write_master_zones on
```

7. Create a file for the systemd startup of the chroot environment. Press the 'i' key to enter insert mode.

```
sudo vim -c "set paste" /usr/lib/systemd/system/named-chroot-setup.service
```

8. Copy and paste the following into the file. Return to normal mode by pressing Esc. Save and close the file by typing `:x`.

```
[Unit]
Description=Set-up/destroy chroot environment for named (DNS)
BindsTo=named.service
[Service]
Type=oneshot
RemainAfterExit=yes
```

```
ExecStart=/usr/libexec/setup-named-chroot.sh /var/named/chroot on
ExecStop=/usr/libexec/setup-named-chroot.sh /var/named/chroot off
```

9. Create a file for the systemd startup of BIND. Press the 'i' key to enter insert mode.

```
sudo vim -c "set paste" /usr/lib/systemd/system/named.service
```

10. Copy and paste the following into the file. Return to normal mode by pressing Esc. Save and close the file by typing `:x`.

```
[Unit]
Description=Berkeley Internet Name Domain (DNS)
Wants=nss-lookup.target
Requires=named-chroot-setup.service
Before=nss-lookup.target
After=network.target
After=named-chroot-setup.service
[Service]
Type=forking
EnvironmentFile=-/etc/sysconfig/named
Environment=KRB5_KTNAME=/etc/named.keytab
ExecStartPre=/usr/sbin/named-checkconf -t /var/named/chroot -z /etc/named.conf
ExecStart=/usr/sbin/named -u named -t /var/named/chroot $OPTIONS
ExecReload=/bin/sh -c '/usr/sbin/rndc reload > /dev/null 2>&1 || /bin/kill -HUP
$MAINPID'
ExecStop=/bin/sh -c '/usr/sbin/rndc stop > /dev/null 2>&1 || /bin/kill -TERM
$MAINPID'
PrivateTmp=false
[Install]
WantedBy=multi-user.target
```

11. Restart the systemd daemon to load the new startup files.

```
sudo systemctl daemon-reload
```

Configure BIND

This will enable a basic config of the BIND DNS server. No zones or custom settings will be configured beyond the basic necessary ones. For additional configuration and best security practices, see later sections.

1. Create the new config file. Press the 'i' key to enter insert mode.

```
sudo vim -c 'set paste' /var/named/chroot/etc/named.conf
```

2. Copy and paste the following into the file. Return to normal mode by pressing Esc. Save and close the file by typing `:x`.

```
options {
      directory "/var/named";
      pid-file "/var/run/named/named.pid";
      statistics-file "/var/run/named/named.stats";
};
zone "." {
      type hint;
      file "root.hints";
};
zone "0.0.127.in-addr.arpa" {
      type master;
      file "0.0.127.in-addr.arpa";
};
logging {
      category default { default_syslog; default_debug; };
      category unmatched { null; };
      channel default_syslog { syslog daemon; severity info; };
      channel default_debug { file "named.run"; severity dynamic; };
      channel default_stderr { stderr; severity info; };
      channel null { null; };
};
```

3. Create the `rndc` configuration.

```
sudo su -c 'rndc-confgen -r /dev/urandom -b 512 > /var/named/chroot/etc/rndc.conf'
```

4. Add the necessary configuration to the `named.conf` for `rndc`.

```
sed '/conf/d;/^#/!d;s:^# ::' /var/named/chroot/etc/rndc.conf | sudo tee -a
/var/named/chroot/etc/named.conf >/dev/null
```

8. Start the BIND service.

```
sudo systemctl start named
```

9. Enable BIND to run on startup.

```
sudo systemctl enable named
```