



Internet Systems Consortium

The UNIX Command Line

Basics for BIND, ISC DHCP and Kea Administrators

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Rationale

 **Lesley Carhart** @hacks4pancakes · 9h

You know what really pickles my beets? When infosec people reply to a tweet about something in security being overly complex for end users with something like:

"Oh, but it's no problem. They should just:

- > Complex technical install
- > Workaround from Github
- > 14-step process.."

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 **Zeke Cao** @Zeke_Cao · 9h

Replying to @hacks4pancakes

How to draw a horse:

Step one: draw an oval.
Step two: draw the rest of the horse.

I think most people forgot where they came from and don't want to spend the time helping others climb up the same ladder they once had to build steps to. It's across all industries unfortunately

5 9 71



Caveat Utilitor

- The commands provided here are "generic UNIX"
 - "Generic UNIX" does not mean "exactly the same across all platforms"
 - Specifically, options are often different between versions - read the **man** pages!
- The sample output in this presentation is based on a mixture of CentOS and Raspbian



Caveat Utilitor

- All of the commands used in this slide deck can be used to assist in the debugging of ANY service running on a UNIX host.
- Where samples use "**named**", you may use "**kea**" or "**dhcpcd**" instead
- Similarly "**kea**" can be replaced by whatever you are poking at



When all else fails...

- Manual pages are your friend
 - "RTFM"
 - Read The Friendly Manual (Page)
- Command(s):
 - **man**



man (1)

MAN (1)

Manual pager utils

MAN (1)

NAME

man - an interface to the on-line reference manuals

SYNOPSIS

```
man [-C file] [-d] [-D] [--warnings[=warnings]] [-R encoding] [-L locale] [-m system[,...]] [-M path] [-S list] [-e extension] [-i|-I] [--regex|--wildcard] [--names-only] [-a] [-u] [--no-subpages] [-P pager] [-r prompt] [-7] [-E encoding] [--no-hyphenation] [--no-justification] [-p string] [-t] [-T[device]] [-H[browser]] [-X[dpi]] [-Z] [[section] page[.section] ...] ...
```

```
man -k [apropos options] regexp ...
```

```
man -K [-w|-W] [-S list] [-i|-I] [--regex] [section] term ...
```

```
man -f [whatis options] page ...
```

```
man -l [-C file] [-d] [-D] [--warnings[=warnings]] [-R encoding] [-L locale] [-P pager] [-r prompt] [-7] [-E encoding] [-p string] [-t]
```

[.....]



man (1)

- Sections in the manual:

```
1  Executable programs or shell commands
2  System calls (functions provided by the kernel)
3  Library calls (functions within program libraries)
4  Special files (usually found in /dev)
5  File formats and conventions eg /etc/passwd
6  Games
7  Miscellaneous (including macro packages and conventions), e.g.
   man(7), groff(7)
8  System administration commands (usually only for root)
```




Where is it?

- Wandering our way around the filesystem
- Command(s):
 - **locate**
 - and a side helping of **grep** and **more/less**
 - **find**
 - **which**



locate (1)

- **locate**
 - Locates files quickly based on a database that is rebuilt "off-hours"
 - May be out-of-date, but is much faster and less resource intensive than **find**.
 - **locate** may not be installed by default
 - look for the **mlocate** package



grep (1)

- **grep**
 - **Global regular expression print**
 - finds a pattern in files and displays the lines containing the pattern
 - can also negate the search
 - prints lines that do NOT contain the pattern



`more (1) / less (1)`

- `more / less`
 - Pages the output of a command so that the output can be digested by a human
 - Can read from standard input
 - Often used at the end of a series of commands



locate (1)

```
[aclegg@centos ~]$ locate kea | more
/home/aclegg/kea-1.5.0
/home/aclegg/kea-1.6.0-beta2
/home/aclegg/kea-1.5.0/AUTHORS
/home/aclegg/kea-1.5.0/COPYING
/home/aclegg/kea-1.5.0/ChangeLog
/home/aclegg/kea-1.5.0/INSTALL
/home/aclegg/kea-1.5.0/Makefile
/home/aclegg/kea-1.5.0/Makefile.am
/home/aclegg/kea-1.5.0/Makefile.in
/home/aclegg/kea-1.5.0/README
/home/aclegg/kea-1.5.0/aclocal.m4
[...]
^C
[aclegg@centos ~]$ locate kea | grep -v aclegg | more
/usr/local/bin/kea-msg-compiler
/usr/local/etc/kea
/usr/local/etc/kea/kea-ctrl-agent.conf
/usr/local/etc/kea/kea-dhcp-ddns.conf
/usr/local/etc/kea/kea-dhcp4.conf
/usr/local/etc/kea/kea-dhcp6.conf
/usr/local/etc/kea/kea-netconf.conf
/usr/local/etc/kea/keactrl.conf
/usr/local/etc/kea/keactrl.conf.bak
```



`find(1)`

- `find`
 - Locates files in the filesystem
 - Starts searching from a given location and proceeds downwards
 - Does not rely on a database that may be out-of-date
 - More resource intense than "locate"



find(1)

```
[aclegg@centos ~]$ pwd
/home/aclegg
[aclegg@centos ~]$ find . -name '*conf'
./kea-1.5.0/doc/examples/https/shell/kea-stunnel.conf
./kea-1.5.0/doc/examples/https/nginx/kea-nginx.conf
./kea-1.5.0/doc/examples/https/httpd2/kea-httpd2.conf
./kea-1.5.0/doc/examples/netconf
./kea-1.5.0/src/bin/keactrl/keactrl.conf
./kea-1.5.0/src/bin/netconf
./ccache/ccache.conf
./kea-1.6.0-beta2/doc/examples/https/httpd2/kea-httpd2.conf
./kea-1.6.0-beta2/doc/examples/https/shell/kea-stunnel.conf
./kea-1.6.0-beta2/doc/examples/https/nginx/kea-nginx.conf
./kea-1.6.0-beta2/doc/examples/netconf
./kea-1.6.0-beta2/src/bin/keactrl/keactrl.conf
./kea-1.6.0-beta2/src/bin/keactrl/kea-dhcp4.conf
./kea-1.6.0-beta2/src/bin/keactrl/kea-dhcp6.conf
./kea-1.6.0-beta2/src/bin/keactrl/kea-dhcp-ddns.conf
./kea-1.6.0-beta2/src/bin/keactrl/kea-ctrl-agent.conf
./kea-1.6.0-beta2/src/bin/netconf
[aclegg@centos ~]$
```



which (1)

- **which**
 - When you execute a command, which one runs?

```
[aclegg@centos ~]$ locate bin/passwd
/usr/bin/passwd
/usr/local/bin/passwd
[aclegg@centos ~]$ which passwd
/usr/bin/passwd
[aclegg@centos ~]$ which passwd
/usr/bin/which: no passwd in (/usr/lib64/ccache:/usr/local/bin:/usr/bin:/usr/
local/sbin:/usr/sbin:/home/aclegg/.local/bin:/home/aclegg/bin)
[aclegg@centos ~]$
```




What is it doing?

- How can we figure out the status of processes running on our server?
- Command(s):
 - `ps`
 - `top`
 - `glances`



ps (1)

- ps
 - Display process status including process-id, runtime and more.

```
[root@centos kea]# ps -ef | grep kea
root      2184  2174  0 11:22 pts/0    00:00:00 /usr/local/sbin/kea-ctrl-agent -c
kea-ctrl-agent.conf
root      2185  2174  0 11:23 pts/0    00:00:00 /usr/local/sbin/kea-dhcp4 -c ke-
dhcp4.conf
root      2186  2174  0 11:23 pts/0    00:00:00 /usr/local/sbin/kea-dhcp6 -c ke-
dhcp6.conf
root      2237  2174  0 11:24 pts/0    00:00:00 grep --color=auto kea
[root@centos kea]#
```



top (1)

- Shows the processes that are using the most resources on your system
- Also displays system status
 - cpu % in use, memory in use, swap in use
- curses based - updates on an ascii display



top (1)

```
top - 11:10:19 up 56 min, 2 users, load average: 0.00, 0.01, 0.05
Tasks: 95 total, 1 running, 94 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 6.2 sy, 0.0 ni, 93.8 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem : 1014956 total, 442204 free, 140648 used, 432104 buff/cache
KiB Swap: 839676 total, 839676 free, 0 used. 686676 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1	root	20	0	128004	6516	4120	S	0.0	0.6	0:02.25	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.82	ksoftirqd/0
5	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kworker/0:0H
6	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kworker/u2:0
7	root	rt	0	0	0	0	S	0.0	0.0	0:00.00	migration/0
8	root	20	0	0	0	0	S	0.0	0.0	0:00.00	rcu_bh
9	root	20	0	0	0	0	S	0.0	0.0	0:01.12	rcu_sched
10	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	lru-add-dra+
11	root	rt	0	0	0	0	S	0.0	0.0	0:00.03	watchdog/0
13	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
14	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	netns
15	root	20	0	0	0	0	S	0.0	0.0	0:00.00	khungtaskd
16	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	writeback
17	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	kintegrityd
18	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	bioaset
19	root	0	-20	0	0	0	S	0.0	0.0	0:00.00	bioaset



glances (1)

- `top` on steroids
- In addition to `top` information, `glances` provides:
 - Network utilization
 - Disk I/O
 - Disk capacity
- Written in Python, much "heavier" than `top`



glances (1)

```
centos.boat Uptime: 1:10:00

CPU [ 2.6%] CPU 2.6% MEM 23.0% SWAP 0.0% LOAD 1-core
MEM [ 23.0%] user: 1.6% total: 991M total: 820M 1 min: 0.00
SWAP [ 0.0%] system: 1.3% used: 228M used: 0 5 min: 0.01
idle: 97.1% free: 763M free: 820M 15 min: 0.05

NETWORK Rx/s Tx/s TASKS 102 (119 thr), 2 run, 100 slp, 0 oth
enp0s3 744b 728b
lo 0b 0b
CPU% MEM% PID USER NI S Command
2.9 1.5 2187 root 0 R glances /bin/glanc
DISK I/O R/s W/s 0.0 0.9 2186 root 0 S kea-dhcp6 -c kea-d
dm-0 0 0 0.0 0.6 2184 root 0 S kea-ctrl-agent -c
dm-1 0 0 0.0 0.0 45 root -20 S kpsmoused
sda1 0 0 0.0 1.7 1114 root 0 S tuned -Es /usr/sbi
sda2 0 0 0.0 0.2 2043 aclegg 0 S bash
sr0 0 0 0.0 0.0 410 root -20 S xfs-reclaim/dm-
0.0 0.0 405 root -20 S xfs_mru_cache
FILE SYS Used Total 0.0 0.6 1394 root 0 S sshd aclegg [priv]
/ 5.28G 6.19G 0.0 0.3 1398 aclegg 0 S sshd aclegg@pts/0,
/boot 162M 1014M 0.0 0.0 3 root 0 S ksoftirqd/0

2019-09-24 11:23:56 No warning or critical alert detected
```



Who is it doing it to?

- Figure out what our server(s) are doing to the network
 - `netstat`
 - `ifconfig`
 - `ip`



netstat (1)

- **netstat** provides the ability to see:
 - network connections
 - network routing tables
 - listening processes
- **netstat** may not be installed by default



netstat (1)

```
aclegg@boat-gw:~ $ sudo netstat -ltnp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp      0      0 127.0.0.1:5353          0.0.0.0:*                 LISTEN     1447/named
tcp      0      0 127.0.0.2:5353          0.0.0.0:*                 LISTEN     1447/named
tcp      0      0 0.0.0.0:8080            0.0.0.0:*                 LISTEN     9030/monitorix-http
tcp      0      0 0.0.0.0:80              0.0.0.0:*                 LISTEN     791/lighttpd
tcp      0      0 44.127.8.1:53           0.0.0.0:*                 LISTEN     11302/doh-client
tcp      0      0 127.0.0.1:53            0.0.0.0:*                 LISTEN     1447/named
tcp      0      0 127.0.0.2:53            0.0.0.0:*                 LISTEN     1447/named
tcp      0      0 127.0.0.1:8053          0.0.0.0:*                 LISTEN     1447/named
tcp      0      0 0.0.0.0:22              0.0.0.0:*                 LISTEN     551/sshd
tcp      0      0 127.0.0.1:631           0.0.0.0:*                 LISTEN     12338/cupsd
tcp      0      0 127.0.0.1:953           0.0.0.0:*                 LISTEN     1447/named
tcp      0      0 0.0.0.0:61209           0.0.0.0:*                 LISTEN     471/python3
tcp      0      0 127.0.0.1:25            0.0.0.0:*                 LISTEN     841/exim4
tcp      0      0 127.0.0.1:5380          0.0.0.0:*                 LISTEN     11302/doh-client
tcp      0      0 44.127.8.1:5380         0.0.0.0:*                 LISTEN     11302/doh-client
tcp6     0      0 :::80                   :::*                     LISTEN     791/lighttpd
tcp6     0      0 :::22                   :::*                     LISTEN     551/sshd
tcp6     0      0 :::1:631                 :::*                     LISTEN     12338/cupsd
tcp6     0      0 :::1:25                  :::*                     LISTEN     841/exim4
tcp6     0      0 :::1:5380                :::*                     LISTEN     11302/doh-client
aclegg@boat-gw:~ $
```



netstat (1)

```
aclegg@boat-gw:~ $ netstat -r
Kernel IP routing table
Destination      Gateway          Genmask         Flags   MSS Window  irtt Iface
default          192.168.42.129  0.0.0.0         UG      0 0        0 usb0
44.127.8.0       0.0.0.0         255.255.255.0   U       0 0        0 eth0
loopback         0.0.0.0         255.0.0.0       U       0 0        0 lo
192.168.42.0     0.0.0.0         255.255.255.0   U       0 0        0 usb0
aclegg@boat-gw:~ $ netstat --stat
Ip:
  Forwarding: 1
  53006814 total packets received
  33 with invalid headers
  39764006 forwarded
  0 incoming packets discarded
  13233796 incoming packets delivered
  49374809 requests sent out
  28 outgoing packets dropped
  998 dropped because of missing route
Icmp:
  104908 ICMP messages received
  5 input ICMP message failed
  ICMP input histogram:
    destination unreachable: 6805
    echo requests: 58885
    echo replies: 39218
  99483 ICMP messages sent
  0 ICMP messages failed
[...]
```



ifconfig (1)

- **ifconfig** is the old-school way to look at network interface configuration.
 - IP addresses - v4 and v6
 - hardware (MAC) address
 - RX and TX packet & error counts
- **ifconfig** may not be installed by default :-)



ifconfig (1)

```
aclegg@boat-gw:~ $ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 44.127.8.1 netmask 255.255.255.0 broadcast 44.127.8.255
    inet6 fe80::6d16:9f2c:94f0:409c prefixlen 64 scopeid 0x20<link>
    ether b8:27:eb:9a:12:ba txqueuelen 1000 (Ethernet)
    RX packets 16437278 bytes 3951033721 (3.6 GiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 25434570 bytes 1302683865 (1.2 GiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.2 netmask 255.255.255.255
    inet6 fe80::e6d4:151e:e9c9:c73 prefixlen 64 scopeid 0x20<link>
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 808411 bytes 3360886230 (3.1 GiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 808411 bytes 3360886230 (3.1 GiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

usb0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.42.233 netmask 255.255.255.0 broadcast 192.168.42.255
    ether ee:fd:7b:2a:cf:32 txqueuelen 1000 (Ethernet)
    RX packets 36252783 bytes 43901141421 (40.8 GiB)
```



ip (1)

- **ip** is the new way to look at network interface configuration, routing tables, arp tables and tunnels.
 - IP addresses - v4 and v6
 - hardware (MAC) address
 - routing tables
 - arp tables



ip (1)

```
aclegg@boat-gw:~ $ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.2/32 scope host lo
        valid_lft forever preferred_lft forever
    inet 127.0.0.3/32 scope host lo
        valid_lft forever preferred_lft forever
    inet 127.0.0.1/8 brd 127.255.255.255 scope global noprefixroute lo
        valid_lft forever preferred_lft forever
    inet6 fe80::e6d4:151e:e9c9:c73/64 scope link
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group
default qlen 1000
    link/ether b8:27:eb:9a:12:ba brd ff:ff:ff:ff:ff:ff
    inet 44.127.8.1/24 brd 44.127.8.255 scope global noprefixroute eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::6d16:9f2c:94f0:409c/64 scope link
        valid_lft forever preferred_lft forever
3: wlan0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast state DOWN
group default qlen 1000
    link/ether b8:27:eb:cf:47:ef brd ff:ff:ff:ff:ff:ff
```



ip (1)

```
aclegg@boat-gw:~ $ ip route
default via 192.168.42.129 dev usb0 proto dhcp src 192.168.42.233 metric 204
44.127.8.0/24 dev eth0 proto dhcp scope link src 44.127.8.1 metric 202
127.0.0.0/8 dev lo proto dhcp scope host src 127.0.0.1 metric 201
192.168.42.0/24 dev usb0 proto dhcp scope link src 192.168.42.233 metric 204
aclegg@boat-gw:~ $ ip neigh
44.127.8.78 dev eth0 lladdr 00:18:dd:01:58:a1 STALE
44.127.8.34 dev eth0 lladdr 10:98:c3:9c:93:c2 REACHABLE
44.127.8.74 dev eth0 lladdr 00:17:88:4e:ce:66 STALE
44.127.8.51 dev eth0 lladdr a8:20:66:4c:29:75 REACHABLE
44.127.8.70 dev eth0 lladdr d8:13:99:69:4b:79 STALE
192.168.42.129 dev usb0 lladdr fe:aa:f6:83:48:d2 REACHABLE
44.127.8.79 dev eth0 FAILED
44.127.8.52 dev eth0 lladdr a0:21:b7:ba:11:43 STALE
44.127.8.75 dev eth0 lladdr 74:bf:c0:6a:72:5e STALE
44.127.8.31 dev eth0 FAILED
44.127.8.67 dev eth0 FAILED
44.127.8.76 dev eth0 lladdr 00:18:dd:01:58:a1 STALE
44.127.8.32 dev eth0 lladdr 4c:17:44:2c:20:33 REACHABLE
169.254.82.233 dev eth0 lladdr c4:9d:ed:a3:ac:b6 STALE
44.127.8.41 dev eth0 lladdr 20:c9:d0:14:18:e4 STALE
44.127.8.77 dev eth0 lladdr 20:c9:d0:20:38:8b STALE
44.127.8.73 dev eth0 lladdr b8:27:eb:6c:31:84 DELAY
44.127.8.63 dev eth0 lladdr 08:00:27:05:c6:9f STALE
```



And then?

- **systemd**
 - A different mechanism for starting, stopping and monitoring processes that start "at boot"
 - Everything changes
 - Startup log files are swallowed
 - start/stop is controlled by **systemd**



systemd (1)

```
[root@centos aclegg]# systemctl enable named.service
Created symlink from /etc/systemd/system/multi-user.target.wants/named.service to /usr/lib/systemd/system/named.service.
[root@centos aclegg]# systemctl start named.service
[root@centos aclegg]# systemctl status named.service
● named.service - Berkeley Internet Name Domain (DNS)
   Loaded: loaded (/usr/lib/systemd/system/named.service; enabled; vendor preset: disabled)
   Active: active (running) since Tue 2019-09-24 20:17:40 EDT; 6s ago
     Process: 1454 ExecStart=/usr/sbin/named -u named -c ${NAMEDCONF} $OPTIONS (code=exited, status=0/SUCCESS)
     Process: 1452 ExecStartPre=/bin/bash -c if [ ! "$DISABLE_ZONE_CHECKING" == "yes" ]; then /usr/sbin/named-checkconf -z "$NAMEDCONF"; else echo "Checking of zone files is disabled"; fi (code=exited, status=0/SUCCESS)
    Main PID: 1456 (named)
      CGroup: /system.slice/named.service
             └─1456 /usr/sbin/named -u named -c /etc/named.conf

Sep 24 20:17:40 centos.boat named[1456]: network unreachable resolving './DNSKEY/IN': 2001:500:a8::e#53
Sep 24 20:17:40 centos.boat named[1456]: network unreachable resolving './NS/IN': 2001:500:a8::e#53
Sep 24 20:17:40 centos.boat named[1456]: network unreachable resolving './DNSKEY/IN': 2001:500:12::d0d#53
```

```
[root@centos aclegg]# cat /usr/lib/systemd/system/named.service
[Unit]
Description=Berkeley Internet Name Domain (DNS)
Wants=nss-lookup.target
Wants=named-setup-rndc.service
Before=nss-lookup.target
After=network.target
After=named-setup-rndc.service

[Service]
Type=forking
Environment=NAMEDCONF=/etc/named.conf
EnvironmentFile=-/etc/sysconfig/named
Environment=KRB5_KTNAME=/etc/named.keytab
PIDFile=/run/named/named.pid

ExecStartPre=/bin/bash -c 'if [ ! "$DISABLE_ZONE_CHECKING" == "yes" ]; then /usr/
sbin/named-checkconf -z "$NAMEDCONF"; else echo "Checking of zone files is
disabled"; fi'
ExecStart=/usr/sbin/named -u named -c ${NAMEDCONF} $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=true

[Install]
WantedBy=multi-user.target
[root@centos aclegg]#
```



systemd (1)

```
[root@centos etc]# locate /named | grep named\$\n/etc/named\n/etc/logrotate.d/named\n/etc/rwtab.d/named\n/etc/sysconfig/named\n/home/aclegg/bind-9.15.4/bin/named\n/home/aclegg/bind-9.15.4/bin/named/named\n/home/aclegg/bind-9.15.4/bin/named/include/named\n/home/aclegg/bind-9.15.4/bin/named/unix/include/named\n/home/aclegg/bind-9.15.4/bin/named/win32/include/named\n/opt/BIND9/lib/named\n/opt/BIND9/sbin/named\n/usr/local/lib/named\n/usr/local/sbin/named\n/usr/sbin/named\n/usr/share/doc/bind-9.11.4/sample/var/named\n/var/named\n[root@centos etc]# which named\n/sbin/named\n[root@centos etc]#
```



systemd (1)

```
[root@centos etc]# named -V
BIND 9.11.4-P2-RedHat-9.11.4-9.P2.el7 (Extended Support Version) <id:7107deb>
running on Linux x86_64 3.10.0-957.27.2.el7.x86_64 #1 SMP Mon Jul 29 17:46:05 UTC
2019
built by make with '--build=x86_64-redhat-linux-gnu' '--host=x86_64-redhat-linux-
gnu' '--program-prefix=' '--disable-dependency-tracking' '--prefix=/usr' '--exec-
[...]
'build_alias=x86_64-redhat-linux-gnu' 'host_alias=x86_64-redhat-linux-gnu' 'CFLAGS=
-O2 -g -pipe -Wall -Wp,-D_FORTIFY_SOURCE=2 -fexceptions -fstack-protector-strong --
param=ssp-buffer-size=4 -grecord-gcc-switches -m64 -mtune=generic' 'LDFLAGS=-Wl,-
z,relro ' 'CPPFLAGS= -DDIG_SIGCHASE'
compiled by GCC 4.8.5 20150623 (Red Hat 4.8.5-39)
compiled with OpenSSL version: OpenSSL 1.0.2k 26 Jan 2017
linked to OpenSSL version: OpenSSL 1.0.2k-fips 26 Jan 2017
compiled with libxml2 version: 2.9.1
linked to libxml2 version: 20901
compiled with zlib version: 1.2.7
linked to zlib version: 1.2.7
threads support is enabled
[root@centos etc]#
```



systemd (1)

```
[root@centos etc]# /usr/local/sbin/named -V
BIND 9.15.4 (Development Release) <id:9e48935>
running on Linux x86_64 3.10.0-957.27.2.el7.x86_64 #1 SMP Mon Jul 29 17:46:05 UTC
2019
built by make with '--without-python' '--disable-linux-caps' '--sysconfdir=/etc/
namedb'
compiled by GCC 4.8.5 20150623 (Red Hat 4.8.5-36)
compiled with OpenSSL version: OpenSSL 1.0.2k 26 Jan 2017
linked to OpenSSL version: OpenSSL 1.0.2k-fips 26 Jan 2017
compiled with zlib version: 1.2.7
linked to zlib version: 1.2.7
threads support is enabled

default paths:
  named configuration: /etc/namedb/named.conf
  rndc configuration: /etc/namedb/rndc.conf
  DNSSEC root key: /etc/namedb/bind.keys
  nsupdate session key: /usr/local/var/run/named/session.key
  named PID file: /usr/local/var/run/named/named.pid
  named lock file: /usr/local/var/run/named/named.lock
[root@centos etc]#
```



systemd (1)

- While not the fault of **systemd**, using a packaged version of BIND (or Kea) and then installing your own version from source may lead to issues

```
[root@centos etc]# ps -ef | grep named
named      16502      1  0 19:29 ?          00:00:00 /usr/sbin/named -u named -c /etc/
named.conf
root       16599 16462    0 19:36 pts/2      00:00:00 /usr/local/sbin/named -g
root       16607 16462    0 19:37 pts/2      00:00:00 grep --color=auto named
[root@centos etc]#
```



ISC Daemon Specifics

- When looking for your configuration, read the configuration!
- Kea: look for: **kea-<daemon>.conf**

```
[aclegg@centos kea]$ ls
kea-ctrl-agent.conf  keactrl.conf.bak  kea-dhcp6.conf      kea-netconf.conf
keactrl.conf         kea-dhcp4.conf    kea-dhcp-ddns.conf
[aclegg@centos kea]$
```



ISC Daemon Specifics

- When looking for your configuration, read the configuration!
- BIND: look for: `named.conf`

```
[root@centos ~]# locate named.conf | grep conf\.$ | grep -v aclegg  
/etc/named.conf  
/etc/namedb/named.conf  
/usr/lib/tmpfiles.d/named.conf  
/usr/share/doc/bind-9.11.4/sample/etc/named.conf  
[root@centos ~]#
```




ISC Daemon Specifics

```
[root@centos etc]# ls -al named*
-rw-r-----. 1 root named 1806 Aug  8 08:16 named.conf
-rw-r--r--. 1 root named 3923 Aug  8 08:16 named.iscdlv.key
-rw-r-----. 1 root named  931 Jun 21  2007 named.rfc1912.zones
-rw-r--r--. 1 root named 1886 Apr 13  2017 named.root.key

named:
total 12
drwxr-x---.  2 root named    6 Aug  8 08:16 .
drwxr-xr-x. 79 root root 8192 Sep 24 20:16 ..

namedb:
total 16
drwxr-xr-x.  2 root root   41 Sep 24 19:36 .
drwxr-xr-x. 79 root root 8192 Sep 24 20:16 ..
-rw-r--r--.  1 root root 1989 Sep 24 14:31 bind.keys
-rw-r--r--.  1 root root    0 Sep 24 19:36 named.conf
[root@centos etc]#
```



ISC Daemon Specifics

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

options {
    listen-on port 53 { 127.0.0.1; };
    listen-on-v6 port 53 { ::1; };
    directory      "/var/named";
    dump-file      "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    recursing-file  "/var/named/data/named.recursing";
    secroots-file  "/var/named/data/named.secroots";
    allow-query    { localhost; };
[...]
```



Moving forward..

- A (very) short list of commands has been presented that you should be familiar with.
- There are a countably infinite number of other commands to learn and use
- Go forth! Learn UNIX!

Questions?

Comments?



<https://www.isc.org>

