Hochschule Augsburg | Fakultät für Informatik | Sommer 2020
Prof. Dr. Högl | Embedded Linux | 2020-04-28

Memo-#4: **Versuche auf der Kommandozeile (2)**

Inhalt

Updates

```
2020-04-29 - Connman zur Netzwerkeinstellung empfohlen
```

1 Allgemeine Kommandos

Alle Kommandozeileneingaben wurden auf dem Beagle-Bone Black gemacht.

Wer ist eingeloggt?

```
$ who
debian   ttyS0        2020-04-28 15:57
```

Wer ist eingeloggt und was macht er?

```
$ w
15:58:56 up 55 min,  1 user,  load average: 0.00, 0.03, 0.05
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
debian   ttyS0    -                15:57    0.00s  0.50s  0.03s w
```

Wer bin ich?

```
$ whoami
debian
```

Wie heisst der Rechner?

```
$ hostname
beaglebone
```

Wann waren die letzten Reboots?

```
$ last reboot
reboot   system boot  4.19.94-ti-r42   Tue Apr 28 15:03   still running
reboot   system boot  4.19.94-ti-r42   Sat Jan  1 01:00 - 15:03 (7423+13:02)
reboot   system boot  4.19.94-ti-r42   Mon Apr 27 17:01 - 15:03  (22:02)
...
```

Wie lange läuft das Beagleboard schon?

```
$ uptime
16:02:09 up 58 min,  1 user,  load average: 0.00, 0.01, 0.03
```

Kernel Bootmeldungen (auch: `journalctl -k`)

```
$ dmesg
...
```

System Information

```
$ uname -a
Linux beaglebone 4.19.94-ti-r42 #1buster SMP PREEMPT Tue Mar 31 19:38:29 \
UTC 2020 armv7l GNU/Linux
```

Filesystem-Überblick (-h = human)

```
$ df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            215M     0  215M   0% /dev
tmpfs            49M  1.6M   47M   4% /run
/dev/mmcblk1p1  3.5G  1.9G  1.4G  58% /
tmpfs           242M     0  242M   0% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
tmpfs           242M     0  242M   0% /sys/fs/cgroup
tmpfs            49M     0   49M   0% /run/user/1000
```

Ping nach draussen

```
$ ping www.hs-augsburg.de
PING hornet.RZ.hs-augsburg.de (141.82.217.56) 56(84) bytes of data.
64 bytes from hornet.RZ.HS-Augsburg.DE (141.82.217.56): icmp_seq=1 ttl=57
time=22.5 ms
64 bytes from hornet.RZ.HS-Augsburg.DE (141.82.217.56): icmp_seq=2 ttl=57
time=24.0 ms
64 bytes from hornet.RZ.HS-Augsburg.DE (141.82.217.56): icmp_seq=3 ttl=57
time=22.4 ms
...
```

Lokale Zeit setzen

```
$ cd /etc
$ rm localtime
$ sudo ln -s /usr/share/zoneinfo/Europe/Berlin localtime

$ date
Tue 28 Apr 2020 03:12:39 PM CEST
```

Alternativ: `dpkg-reconfigure tzdata`

Lit.: http://derekmolloy.ie/automatically-setting-the-beaglebone-black-time-using-ntp/

Prozesse ansehen (nur eine Auswahl ist gezeigt)

```
$ ps -e
  PID TTY          TIME CMD
    1 ?        00:00:04 systemd
  737 ?        00:00:01 systemd-journal
  754 ?        00:00:01 systemd-udevd
  788 ?        00:00:14 nodejs
  802 ?        00:00:00 avahi-daemon
  805 ?        00:00:00 systemd-logind
  809 ?        00:00:00 wpa_supplicant
  815 ?        00:00:00 cron
  822 ?        00:00:00 avahi-daemon
  859 ?        00:00:00 sshd
  869 tty1     00:00:00 agetty
  886 ?        00:00:00 ptp0
  934 ?        00:00:00 nginx
  936 ?        00:00:00 nginx
 1004 ?        00:00:00 file-storage
 1038 ?        00:00:00 dnsmasq
 1049 ttyS0    00:00:00 login
 1346 ttyS0    00:00:01 bash
 1620 ?        00:00:00 alsactl
 1623 ttyGS0   00:00:00 agetty
```

Proc Filesystem

```
$ ls /proc/
1      12177  1551   26     400   7779         irq
10     12187  1553   260    402   7816         kallsyms
1001   12216  156    261    404   7860         kcore
1002   1230   1571   262    406   8507         keys
1003   1232   1572   263    409   8784         key-users
1005   13     1573   264    41    8804         kmsg
1006   1305   1576   265    410   8812         kpagecgroup
1007   1313   1578   266    413   8819         kpagecount
1008   1319   1580   267    414   9            kpageflags
1009   1322   1590   268    42    926          loadavg
1010   1346   1592   269    43    927          locks
1011   1347   16     27     4345  947          mdstat
1076   1350   1639   276    4349  949          meminfo
1077   136    1648   28     4363  9500         misc
1093   137    1649   2841   4365  9540         modules
1097   138    1661   29     4366  9607         mounts
10980  1396   167    3      4380  9636         mtrr
11     1397   1672   30     44    9641         net
11018  14     1673   308    4437  984          pagetypeinfo
11040  140    1682   310    4538  989          partitions
1108   1401   17     311    4540  991          pressure
11136  141    1705   316    4541  993          sched_debug
1124   1413   1708   32     4601  994          schedstat
11508  142    1709   321    4602  995          scsi
1152   143    1712   32457  4637  996          self
11578  144    1716   32458  479   997          slabinfo
11579  145    1749   32551  5151  acpi         softirqs
11580  1477   1754   33     5310  asound       stat
1160   148    1759   34     549   buddyinfo    swaps
11641  149    1763   35     556   bus          sys
11810  15     1767   359    6     cgroups      sysrq-trigger
```

```
11894  150    1783   36     6039  cmdline      sysvipc
11921  1500   1785   376    6078  consoles     thread-self
11933  1502   1790   381    6096  cpuinfo      timer_list
11956  1507   18     382    6508  crypto       tty
11978  15099  188    384    657   devices      uptime
11990  1511   18900  387    6735  diskstats    version
12     1517   2      388    758   dma          version_signature
12003  1523   20     39     7589  driver       vmallocinfo
12015  1527   21     391    7654  execdomains  vmstat
12026  153    22     393    7658  fb           zoneinfo
12038  1530   23     395    7659  filesystems
12070  1535   24     397    7663  fs
12074  154    247    398    7666  interrupts
12140  1544   258    4      7687  iomem
12176  1545   259    40     7690  ioports
```

CPU-Info

```
$ cat /proc/cpuinfo
processor       : 0
model name      : ARMv7 Processor rev 2 (v7l)
BogoMIPS        : 995.32
Features        : half thumb fastmult vfp edsp thumbee neon \
                  vfpv3 tls vfpd32
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x3
CPU part        : 0xc08
CPU revision    : 2

Hardware        : Generic AM33XX (Flattened Device Tree)
Revision        : 0000
Serial          : 3614BBBK0076
```

Speicher-Info

```
$ cat /proc/meminfo
MemTotal:         495024 kB
MemFree:          335232 kB
MemAvailable:     424940 kB
Buffers:           12072 kB
Cached:            68884 kB
...
```

Interrupts

```
$ cat /proc/interrupts
           CPU0
16:      79526      INTC  68 Level     gp_timer
18:          0      INTC   3 Level     arm-pmu
19:          1      INTC  78 Level     wkup_m3_txev
20:       7773      INTC  12 Level     49000000.edma_ccint
22:         87      INTC  14 Level     49000000.edma_ccerrint
26:          0      INTC  96 Level     44e07000.gpio
27:          0      INTC  98 Level     4804c000.gpio
28:          0      INTC  32 Level     481ac000.gpio
29:          0      INTC  62 Level     481ae000.gpio
30:       7281      INTC  72 Level     44e09000.serial
36:       1530      INTC  70 Level     44e0b000.i2c
37:          0      INTC  71 Level     4802a000.i2c
38:        106      INTC  30 Level     4819c000.i2c
```

```
39:         13      INTC  64 Level     mmc0
40:      24973      INTC  28 Level     mmc1
44:          0      INTC  77 Level     wkup_m3
50:          0      INTC  75 Level     rtc0
51:          0      INTC  76 Level     rtc0
...
```

Kernelkonfiguration betrachten (vergleiche die Kernelversion auch mit der Ausgabe des `uname -a` Kommando)

```
$ zcat /proc/config.gz | less
```

Freier und benutzter Speicher

```
$ free -m
              total        used        free      shared  buff/cache   available
Mem:            483          59         225           2         198         414
Swap:             0           0           0
```

Top

```
$ top
top - 15:53:20 up 50 min,  1 user,  load average: 0.00, 0.09, 0.07
Tasks:  86 total,   1 running,  85 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,  0.3 sy,  0.0 ni, 99.7 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :    483.4 total,    225.8 free,     59.3 used,    198.3 buff/cache
MiB Swap:      0.0 total,      0.0 free,      0.0 used.    414.7 avail Mem

  PID   PR  NI    VIRT    RES    SHR S  %CPU  %MEM    COMMAND
 6184   20   0    9244   2536   2108 R   1.0   0.5    top
    1   20   0   29932   6640   5120 S   0.0   1.3    systemd
    2   20   0       0      0      0 S   0.0   0.0    kthreadd
    3    0 -20       0      0      0 I   0.0   0.0    rcu_gp
    4    0 -20       0      0      0 I   0.0   0.0    rcu_par_gp
    6    0 -20       0      0      0 I   0.0   0.0    kworker/0+
    7   20   0       0      0      0 I   0.0   0.0    kworker/u+
    8    0 -20       0      0      0 I   0.0   0.0    mm_percpu+
    9   20   0       0      0      0 S   0.0   0.0    ksoftirqd+
   10   20   0       0      0      0 I   0.0   0.0    rcu_preem+
   11   20   0       0      0      0 I   0.0   0.0    rcu_sched
   12   20   0       0      0      0 I   0.0   0.0    rcu_bh
   13   rt   0       0      0      0 S   0.0   0.0    migration+
   14   20   0       0      0      0 S   0.0   0.0    cpuhp/0
   15   20   0       0      0      0 S   0.0   0.0    kdevtmpfs
   16    0 -20       0      0      0 I   0.0   0.0    netns
   17   20   0       0      0      0 S   0.0   0.0    rcu_tasks+
```

Vmstat

```
$ vmstat
procs -----------memory---------- ---swap-- -----io---- -system-- ------cpu-----
r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
0  0      0 230736  16764 186804    0    0   757    11  140  145  2  2 94  2  0
```

Ausschalten oder Neustarten

```
$ shutdown now
$ shutdown --poweroff    # --poweroff = default
$ shutdown --reboot
$ shutdown --halt
$ halt
$ poweroff
$ reboot
```

Kalender

```
$ cal

April 2020
Su Mo Tu We Th Fr Sa
          1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30
```

2 Netzwerkkommandos (ip)

Gadget-Ethernet abschalten. BBB mit FritzBox über Ethernet-Kabel verbinden. Das `arp` Tool ist im `net-tools` Paket enthalten. Mein Heimnetz hat die IP Nummern 192.168.178.0/24, die Broadcast-Adresse ist 192.168.178.255.

```
host$ ip a show enxd05fb8e8e3d9
7: enxd05fb8e8e3d9: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UNK
 link/ether d0:5f:b8:e8:e3:d9 brd ff:ff:ff:ff:ff:ff
 inet 192.168.7.1/24 brd 192.168.7.255 scope global dynamic noprefixroute enxd05fb8e8e3
    valid_lft 72sec preferred_lft 72sec
 inet6 fe80::b6bc:4c7e:664:fa59/64 scope link noprefixroute
    valid_lft forever preferred_lft forever

host$ sudo ip link set dev enxd05fb8e8e3d9 down

host$ host beaglebone
beaglebone.fritz.box has address 192.168.178.41

host$ host -a beaglebone
Trying "beaglebone.fritz.box"
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 7918
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;beaglebone.fritz.box.          IN      ANY

;; ANSWER SECTION:
beaglebone.fritz.box.   9       IN      A       192.168.178.41
beaglebone.fritz.box.   9       IN      NS      fritz.box.

Received 68 bytes from 127.0.0.53#53 in 8 ms


host$ arp -a
beaglebone.fritz.box (192.168.178.41) at d0:5f:b8:e8:e3:d6 [ether] on enp0s25
fritz.box (192.168.178.1) at c8:0e:14:67:b0:cf [ether] on enp0s25
...


host$ ping beaglebone.fritz.box

# Web-Browser auf Host: beaglebone.fritz.box
http://beaglebone.fritz.box/ide.html

host$ arp beaglebone.fritz.box
Address                  HWtype  HWaddress           Flags Mask  Iface
beaglebone.fritz.box     ether   d0:5f:b8:e8:e3:d6   C           enp0s25
```

```
host$ ssh debian@beaglebone.fritz.box

debian@beaglebone:~$ ip a show eth0
4: eth0: <BROADCAST,MULTICAST,DYNAMIC,UP,LOWER_UP> mtu 1500 qdisc mq state UP       gr
    link/ether d0:5f:b8:e8:e3:d6 brd ff:ff:ff:ff:ff:ff
    inet 192.168.178.41/24 brd 192.168.178.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::d25f:b8ff:fee8:e3d6/64 scope link
       valid_lft forever preferred_lft forever
```

Alle zeigen:

```
ip link ls
```

Nur aktive (running) zeigen:

```
ip link ls up
```

Adressen setzen:

```
ip add 192.168.1.200/24 dev eth0
```

Adressen löschen:

```
ip del 192.168.1.200/24 dev eth0
```

IP Neighbours (n):

```
host$  ip n show
192.168.178.22 dev enp0s25 lladdr 00:15:65:39:36:6a STALE
192.168.178.20 dev enp0s25 lladdr c4:65:16:6d:6f:6b STALE
192.168.178.41 dev enp0s25 lladdr d0:5f:b8:e8:e3:d6 STALE
...
```

Output ist ähnlich `arp -a`.

Routing Table:

```
host$ ip r list
default via 192.168.178.1 dev enp0s25 proto dhcp metric 102
10.42.0.0/24 dev enxd05fb8e8e3db proto kernel scope link src 10.42.0.1 metric 101
192.168.178.0/24 dev enp0s25 proto kernel scope link src 192.168.178.103 metric 102
```

Siehe auch `netstat -rn` und `route -e`.

Alle laufenden Schnittstellen:

```
debian@beaglebone:~$ ip a show up
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
4: eth0: <BROADCAST,MULTICAST,DYNAMIC,UP,LOWER_UP> mtu 1500 qdisc mq state UP group de
    link/ether d0:5f:b8:e8:e3:d6 brd ff:ff:ff:ff:ff:ff
    inet 192.168.178.41/24 brd 192.168.178.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::d25f:b8ff:fee8:e3d6/64 scope link
       valid_lft forever preferred_lft forever
```

```
5: usb0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group de
    link/ether d0:5f:b8:e8:e3:d8 brd ff:ff:ff:ff:ff:ff
    inet 192.168.7.2/24 brd 192.168.7.255 scope global usb0
       valid_lft forever preferred_lft forever
    inet6 fe80::d25f:b8ff:fee8:e3d8/64 scope link
       valid_lft forever preferred_lft forever
6: usb1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group de
    link/ether d0:5f:b8:e8:e3:dc brd ff:ff:ff:ff:ff:ff
    inet 192.168.6.2/24 brd 192.168.6.255 scope global usb1
       valid_lft forever preferred_lft forever
    inet6 fe80::d25f:b8ff:fee8:e3dc/64 scope link
       valid_lft forever preferred_lft forever
7: wlan0: <NO-CARRIER,BROADCAST,MULTICAST,DYNAMIC,UP> mtu 1500 qdisc mq state DOWN grou
    link/ether e8:94:f6:15:ba:d2 brd ff:ff:ff:ff:ff:ff
```

Die Gadget USB Schnittstelle wird konfiguriert unter

- /opt/scripts/boot/autoconfigure_usb0.sh (udhcpd, dnsmasq)
- /opt/scripts/boot/autoconfigure_usb1.sh (CDC/ECM managed by ConnMan)

Sockets (früher `netstat`, jetzt `ss`):

```
debian@beaglebone$ ss -tulpn
...

debian@beaglebone$ ss -neopa
...
```

3 connmanctl

https://01.org/connman

Da connman auch im Molloy empfohlen wird (Kap. 12) sollte man den Dienst durchaus in Betracht ziehen. Wie er sich aber im Zusammenspiel mit anderen Netzwerkdienstprogrammen wie ifconfig, iwconfig, wpa_supplicant, wpa_cli, ip, usw. verhält ist mir noch nicht klar.

Praktisch ist, dass connman alles erledigt was bei Ethernet und Wifi anfällt, er kann auch mit WPA2 Passwörtern bei WiFi umgehen, so dass man wpa_supplicant nicht braucht.

```
debian@beaglebone:~$ man connmanctl

debian@beaglebone:~$ sudo connmanctl

debian@beaglebone:~$ systemctl show connman.service
debian@beaglebone:~$ systemctl show connman-wait-online.service

debian@beaglebone:~$ systemctl status connman
connman.service - Connection service
Loaded: loaded (/lib/systemd/system/connman.service; enabled; vendor preset: enabled)
Active: active (running) since Mon 2020-04-27 15:01:11 UTC; 28min ago
Main PID: 801 (connmand)
Tasks: 1 (limit: 1027)
Memory: 5.2M
CGroup: /system.slice/connman.service
        |-801 /usr/sbin/connmand -n --nodnsproxy

Apr 27 15:01:44 beaglebone connmand[801]: wlan0 {update} flags 4098 <DOWN>
Apr 27 15:01:44 beaglebone connmand[801]: wlan0 {newlink} index 7 address E8:94:F6:15:
Apr 27 15:01:44 beaglebone connmand[801]: wlan0 {newlink} index 7 operstate 2 <DOWN>
Apr 27 15:01:45 beaglebone connmand[801]: Adding interface wlan0 [ wifi ]
```

```
Apr 27 15:01:45 beaglebone connmand[801]: wlan0 {update} flags 36867 <UP>
Apr 27 15:01:45 beaglebone connmand[801]: wlan0 {newlink} index 7 address E8:94:F6:15:
Apr 27 15:01:45 beaglebone connmand[801]: wlan0 {newlink} index 7 operstate 2 <DOWN>
Apr 27 15:01:45 beaglebone connmand[801]: wlan0 {newlink} index 7 address E8:94:F6:15:
Apr 27 15:01:45 beaglebone connmand[801]: wlan0 {newlink} index 7 operstate 2 <DOWN>
Apr 27 15:18:19 beaglebone connmand[801]: ntp: adjust (slew): +0.005622 sec

debian@beaglebone:~$ connmanctl state
State = online
OfflineMode = False
SessionMode = False

debian@beaglebone:~$ connmanctl technologies
/net/connman/technology/wifi
Name = WiFi
Type = wifi
Powered = True
Connected = False
Tethering = False
/net/connman/technology/ethernet
Name = Wired
Type = ethernet
Powered = True
Connected = True
Tethering = False

# http://beaglebone.fritz.box/ide.html
debian@beaglebone:/var/lib/cloud9$ sudo connmanctl
[sudo] password for debian: temppwd
connmanctl> scan wifi
Scan completed for wifi
connmanctl> services
     MyWifi                   wifi_1234567890_1234567890123456_managed_psk
connmanctl> agent on
Agent registered
connmanctl> connect wifi_1234567890_1234567890123456_managed_psk
Agent RequestInput wifi_1234567890_1234567890123456_managed_psk
       Passphrase = [ Type=psk, Requirement=mandatory, Alternates=[ WPS ] ]
       WPS = [ Type=wpspin, Requirement=alternate ]
Passphrase? MySecretPassphrase
Connected wifi_1234567890_1234567890123456_managed_psk
connmanctl> quit


journalctl /usr/sbin/connmand
```

4 Systemd/systemctl

Alle Kommandos auf dem BBB. Argumente mit Tab vervollständigen!

Units: .service, .mount, .automount, .path, .socket, .target, .timer, .device, .nspawn

```
systemd                 systemd-escape           systemd-resolve
systemd-analyze         systemd-hwdb             systemd-run
systemd-ask-password    systemd-id128            systemd-socket-activate
systemd-cat             systemd-inhibit          systemd-stdio-bridge
systemd-cgls            systemd-machine-id-setup systemd-sysusers
systemd-cgtop           systemd-mount            systemd-tmpfiles
systemd-delta           systemd-notify           systemd-tty-ask-password-agent
systemd-detect-virt     systemd-path             systemd-umount
```

```
systemctl list-units
systemctl list-units --type service --all
systemctl list-unit-files     # aktuell 265 auf dem BBB!

systemctl show nginx.service
systemctl list-timers
NEXT                         LEFT     LAST                         PASSED       UNIT
Tue 2020-04-28 00:00:00 UTC  10h left Mon 2020-04-27 12:23:14 UTC  1h 30min ago logrot
Tue 2020-04-28 08:35:42 UTC  18h left Wed 2020-04-22 04:32:12 UTC  5 days ago   systemd
2 timers listed.
Pass --all to see loaded but inactive timers, too.


$ systemctl list-dependencies nginx.service


$ systemctl get-default   # Targets: ls /lib/systemd/system/*.target
graphical.target


$ systemctl status graphical.target
  graphical.target - Graphical Interface
   Loaded: loaded (/lib/systemd/system/graphical.target; static; vendor
   preset: enabled)
      Active: active since Wed 2020-04-22 04:17:49 UTC; 5 days ago
           Docs: man:systemd.special(7)

Apr 22 04:17:49 beaglebone systemd[1]: Reached target Graphical Interface.


$ systemctl isolate multi-user.target

$ systemctl poweroff

$ systemctl reboot

$ systemctl suspend

$ systemctl hibernate

$ hostnamectl
Static hostname: beaglebone
      Icon name: computer
     Machine ID: 6d222c9f74902954efc914ff5e8b2e4b
        Boot ID: f3864c3cc3cb4159ac70232259289547
 Operating System: Debian GNU/Linux 10 (buster)
         Kernel: Linux 4.19.94-ti-r42
   Architecture: arm
```

Boot-Zeit analysieren

```
$ systemd-analyze blame

44.321s generic-board-startup.service
39.673s dev-mmcblk1p1.device
 3.910s nginx.service
 3.662s loadcpufreq.service
 3.463s systemd-udev-trigger.service
 2.378s networking.service
 1.866s ssh.service
 1.857s systemd-logind.service
 1.665s dnsmasq.service
```

```
...
```

Literatur über systemd

- David Both, Learning to Love Systemd, 4/2020
  https://opensource.com/article/20/4/systemd
- Justin Ellingwood, Systemd Essentials: Working with Services, Units, and the Journal, 2015.
- Redhat Enterprise Linux System Administrators Guide, Chapter 10: Managing Services with Systemd

5 Systemd/journalctl

```
# Einstellungen, die u.a. regeln, wie viel Platz die Journals belegen
# duerfen. Wichtig bei Embedded Linux.
sudo vim /etc/systemd/journald.conf

journalctl -k    # = dmesg (kernel messages)

journalctl --system

journalctl --user

journalctl -b    # all collected since reboot

journalctl -f    # like tail -f (follow)

journalctl -f -u nginx    # follow nginx service

journalctl -b -u nginx -o json
journalctl -b -u nginx -o json-pretty

journalctl --no-pager

journalctl --list-boots
0 f3864c3cc3cb4159ac70232259289547 Wed 2020-04-22 04:17:01 UTC--Mon 2020-04-27 14:32:1

journalctl -b -1
journalctl -b f3864c3cc3cb4159ac70232259289547

journalctl --since "2020-04-27 14:00:00"
journalctl --since "2020-04-27 14:00:00" --until "2020-04-27 15:00:00"

journalctl --since yesterday

journalctl --since 09:00 --until "1 hour ago"

journalctl -u nginx.service
journalctl -u nginx.service --since today

journalctl -u nginx.service -u cloud9.service --since today

journalctl _PID=2341
journalctl _UID=33 --since today

journalctl /sbin/wpa_supplicant

# 0: emerg 1: alert 2: crit 3: err 4: warn 5: notice 6: info 7:debug
journalctl -p err -b

journalctl --no-full    # shrink output, see ...
```

```
journalctl -n           # most recent 10 entries
journalctl -n 20        # most recent 20 entries

debian@beaglebone$ journalctl --disk-usage
Archived and active journals take up 2.4M in the file system.
```

Lit.:

- Justin Ellingwood, How To Use Journalctl to View and Manipulate Systemd Logs, 2018.