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systemd for Administrators, Part 1

As many of you know, <u>systemd</u> is the new Fedora init system, starting with F14,

and it is also on its way to being adopted in a number of other distributions as well (for example, OpenSUSE). For administrators systemd provides a variety of new features and changes and enhances the administrative process substantially. This blog story is the first part of a series of articles I plan to post roughly every week for the next months. In every post I will try to explain one new feature of systemd. Many of these features are small and simple, so these stories should be interesting to a broader audience. However, from time to time we'll dive a little bit deeper into the great new features systemd provides you with.

Verifying Bootup

Traditionally, when booting up a Linux system, you see a lot of little messages passing by on your screen. As we work on speeding up and parallelizing the boot process these messages are becoming visible for a shorter and shorter time only and be less and less readable -- if they are shown at all, given we use graphical boot splash technology like Plymouth these days. Nonetheless the information of the boot screens was and still is very relevant, because it shows you for each service that is being started as part of bootup, wether it managed to start up successfully or failed (with those green or red [OK] or [FAILED] indicators). To improve the situation for machines that boot up fast and parallelized and to make this information more nicely available during runtime, we added a feature to systemd that tracks and remembers for each service whether it started up successfully, whether it exited with a non-zero exit code, whether it timed out, or whether it terminated abnormally (by segfaulting or similar), both during start-up and runtime. By simply typing `systemctl` in your shell you can query the state of all services, both systemd native and SysV/LSB services:

```
[root@lambda] ~# systemctl
```

```
UNIT                                        LOAD   ACTIVE   SUB
dev-hugepages.automount                     loaded active   running
dev-mqueue.automount                        loaded active   running
proc-sys-fs-binfmt_misc.automount           loaded active   waiting
sys-kernel-debug.automount                  loaded active   waiting
sys-kernel-security.automount               loaded active   waiting
sys-devices-pc...0000:02:00.0-net-eth0.device loaded active   plugged
[...]
sys-devices-virtual-tty-tty9.device         loaded active   plugged
-.mount                                     loaded active   mounted
boot.mount                                  loaded active   mounted
dev-hugepages.mount                         loaded active   mounted
dev-mqueue.mount                            loaded active   mounted
home.mount                                  loaded active   mounted
proc-sys-fs-binfmt_misc.mount               loaded active   mounted
abrtd.service                               loaded active   running
accounts-daemon.service                     loaded active   running
acpid.service                               loaded active   running
atd.service                                 loaded active   running
auditd.service                              loaded active   running
avahi-daemon.service                        loaded active   running
bluetooth.service                           loaded active   running
console-kit-daemon.service                  loaded active   running
cpuspeed.service                            loaded active   exited
crond.service                               loaded active   running
cups.service                                loaded active   running
dbus.service                                loaded active   running
getty@tty2.service                          loaded active   running
getty@tty3.service                          loaded active   running
getty@tty4.service                          loaded active   running
getty@tty5.service                          loaded active   running
getty@tty6.service                          loaded active   running
haldaemon.service                           loaded active   running
hdapsd@sda.service                          loaded active   running
irqbalance.service                          loaded active   running
iscsi.service                               loaded active   exited
iscsid.service                              loaded active   exited
livesys-late.service                        loaded active   exited
livesys.service                             loaded active   exited
lvm2-monitor.service                        loaded active   exited
mdmonitor.service                           loaded active   running
modem-manager.service                       loaded active   running
netfs.service                               loaded active   exited
NetworkManager.service                      loaded active   running
```

```
ntpd.service                                loaded maintenance  maintenan
polkitd.service                             loaded active       running
prefdm.service                              loaded active       running
rc-local.service                            loaded active       exited
rpcbind.service                             loaded active       running
rsyslog.service                             loaded active       running
rtkit-daemon.service                        loaded active       running
sendmail.service                            loaded active       running
sshd@172.31.0.53:22-172.31.0.4:36368.service loaded active      running
sysinit.service                             loaded active       running
systemd-logger.service                      loaded active       running
udev-post.service                           loaded active       exited
udisks.service                              loaded active       running
upowerd.service                             loaded active       running
wpa_supplicant.service                      loaded active       running
avahi-daemon.socket                         loaded active       listening
cups.socket                                 loaded active       listening
dbus.socket                                 loaded active       running
rpcbind.socket                              loaded active       listening
sshd.socket                                 loaded active       listening
systemd-initctl.socket                      loaded active       listening
systemd-logger.socket                       loaded active       running
systemd-shutdownd.socket                    loaded active       listening
dev-disk-by\x1...x1db22a\x1d870f1adf2732.swap loaded active     active
basic.target                                loaded active       active
bluetooth.target                            loaded active       active
dbus.target                                 loaded active       active
getty.target                                loaded active       active
graphical.target                            loaded active       active
local-fs.target                             loaded active       active
multi-user.target                           loaded active       active
network.target                              loaded active       active
remote-fs.target                            loaded active       active
sockets.target                              loaded active       active
swap.target                                 loaded active       active
sysinit.target                              loaded active       active

LOAD   = Reflects whether the unit definition was properly loaded.
ACTIVE = The high-level unit activation state, i.e. generalization of SUB.
SUB    = The low-level unit activation state, values depend on unit type.
JOB    = Pending job for the unit.

221 units listed. Pass --all to see inactive units, too.
[root@lambda] ~#
```

(I have shortened the output above a little, and removed a few lines not relevant for this blog post.)

Look at the ACTIVE column, which shows you the high-level state of a service (or in fact of any kind of unit systemd maintains, which can be more than just services, but we'll have a look on this in a later blog posting), whether it is *active* (i.e. running), *inactive* (i.e. not running) or in any other state. If you look closely you'll see one item in the list that is marked *maintenance* and highlighted in red. This informs you about a service that failed to run or otherwise encountered a problem. In this case this is ntpd. Now, let's find out what actually happened to ntpd, with the `systemctl status` command:

```
[root@lambda] ~# systemctl status ntpd.service
ntpd.service - Network Time Service
        Loaded: loaded (/etc/systemd/system/ntpd.service)
        Active: maintenance
          Main: 953 (code=exited, status=255)
         CGroup: name=systemd:/systemd-1/ntpd.service
[root@lambda] ~#
```

This shows us that NTP terminated during runtime (when it ran as PID 953), and tells us exactly the error condition: the process exited with an exit status of 255.

In a later systemd version, we plan to hook this up to ABRT, as soon as this enhancement request is fixed. Then, if `systemctl status` shows you information about a service that crashed it will direct you right-away to the appropriate crash dump in ABRT.

Summary: use `systemctl` and `systemctl status` as modern, more complete replacements for the traditional boot-up status messages of SysV services.

`systemctl status` not only captures in more detail the error condition but also shows runtime errors in addition to start-up errors.

That's it for this week, make sure to come back next week, for the next posting about systemd for administrators!

Category: projects

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