Securing your daemons using systemd

Zbigniew Jędrzejewski-Szmek

redhat.

zbyszek@in.waw.pl

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Before we begin...
Why use systemd for this at all?

- ▶ centralization
- ▶ abstraction of hardware architecture / kernel version
- ▶ unprivileged operation

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Numbers:

```
$ dnf repoquery --releasever=32 -l --whatprovides \
    '/usr/lib/systemd/system/*' \
    rg -i '^/usr/lib/systemd/system/[a-z0-9_@.\\-]+$' | \
    sort -u | wc -l
1740!!!
```

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Unit files

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$ sudo /usr/local/bin/mydameon

$ sudo systemd-run /usr/local/bin/mydameon
$ sudo systemd-run -t /usr/local/bin/mydameon
```

Basics

```
User=
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```
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    $ systemd-run whoami
    root

    $ systemd-run -p User=zbyszek whoami
    zbyszek
    $ systemd-run --uid=zbyszek whoami
    zbyszek
```

Limiting access to the file system

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- `BindPaths=`
- `ReadOnlyBindPaths=`

Limiting access to the file system

- `PrivateTmp=yes`

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- `RuntimeDirectory=`*foo*
- `StateDirectory=`*foo*
- `CacheDirectory=`*foo*
- `LogsDirectory=`*foo*
- `ConfigurationDirectory=`*foo*

/run/*foo*/
/var/lib/*foo*/
/var/cache/*foo*/
/var/log/*foo*/
/etc/*foo*/

```
$ sudo systemd-run -t -p User=zbyszek \
                   -p RuntimeDirectory=foo \
                   ls -ld /run/foo
```

- ▶ automatic *creation* and *ownership*
- ▶ automatic *removal*

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    bash -c 'grep .; whoami' | \
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▶ `PrivateNetwork=yes`

"`PrivateNetwork=yes` is the recommeded way to run network services"

Socket Activation

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Two types of socket activation:

Accept=yes	Accept=no
→ a single instance of the service is started for each connection	→ a single instance of the service is started for each connection
→ "wait" under inetd/xinetd	→ "nowait" under inetd/xinetd

Low level stuff

- `MemoryDenyWriteExecute=yes`
- `PrivateDevices=yes`
- `NoNewPrivileges=yes`
- `RestrictAddressFamilies=AF_UNIX|AF_INET|AF_INET6`
  `|AF_CAN|AF_APPLETALK|...`
- `RestrictSUIDSGID=yes`
- `ProtectKernelTunables=yes`
- `ProtectHostname=yes`
- `ProtectKernelLogs=yes`
- `SystemCallArchitectures=native|x86_64|i386|...`
- `LockPersonality=yes`

Capability limits

- `CapabilityBoundingSet=`
- `Capability=`
- `DropCapability=`
- `AmbientCapabilities=`

System call filtering

"seccomp mode 2"

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- ▶ `SyscallFilter=...`
  implemented using `libseccomp`
- ▶ `syscall1 | syscall2 | @group`
- ▶ `@basic-io`
- ▶ `@obsolete`

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```
$ systemd-analyze syscall-filter @obsolete
```

Per-service network firewall

- IPAddressAllow=10.20.30.0/24 1.2.3.4
- IPAddressDeny=∗
- IP{Ingress,Egress}FilterPath=

systemd-analyze security

```
$ systemd-analyze security systemd-resolved.service
```

The End

```
https://github.com/systemd/systemd
docs: https://systemd.io/
      https://www.freedesktop.org/wiki/Software/systemd/

this: https://github.com/keszybz/systemd-security-talk
https://github.com/keszybz/jesien-systemd-security/
blob/master/systemd-security.pdf
```