Securing your daemons using systemd

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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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Unit files

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```
# /etc/systemd/system/mydaemon.service
[Service]
ExecStart=/usr/local/bin/mydaemon
```

```
$ systemctl start mydaemon.service
```

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

(end of intro)

Basics

```
User=
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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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- `ProtectSystem=yes|full|strict`
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- `ReadWritePaths=`
- `BindPaths=`
- `ReadOnlyBindPaths=`

- `PrivateTmp=yes`

Limiting access to the file system a better way

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- `RuntimeDirectory=`*`foo`* /run/*foo*/
- `StateDirectory=`*`foo`* /var/lib/*foo*/
- `CacheDirectory=`*`foo`* /var/cache/*foo*/
- `LogsDirectory=`*`foo`* /var/log/*foo*/
- `ConfigurationDirectory=`*`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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"`PrivateNetwork=yes` is the recommeded way to run network services"

Socket Activation

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Two types of socket activation:

`Accept=yes`
→ a single instance of the service is started for each connection
→ “wait” under inetd/xinetd

`Accept=no`
→ a single instance of the service is started for each connection
→ “nowait” under inetd/xinetd

Low level stuff

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

Capability limits

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

System call filtering

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  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=*`

Future features

Upcoming features

- `PortIngressAllow=`
- `PortIngressDeny=`
- `PortEgressAllow=`
- `PortEgressDeny=`

Upcoming features, ctd

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

Possible upcoming features

https://github.com/systemd/systemd/issues

label=RFE → 504 Open, 466 Closed

The End

https://github.com/systemd/systemd
docs: http://systemd.github.io/
https://www.freedesktop.org/wiki/Software/systemd/
this: https://github.com/keszybz/jesien-systemd-security
https://github.com/keszybz/jesien-systemd-security/blob/master/jesień-systemd-security.pdf