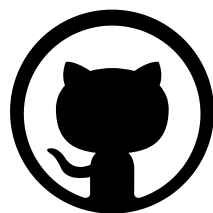


DERECK LAM HON WAH

3rd Year BSc. Computer Science (System Engineering)
Student from Middlesex University Mauritius



Dereck Lam Hon Wah



derecklhw



DISCLAIMER



WORKING WITH SYSTEMD SERVICES

SYSTEMD

- An **Init system** and a **service manager** from boot to shutdown for **Linux OS**.
- Handle **services, processes, network, authentication, logging** etc...

SYSTEMD UNITS

- Entities or objects managed by **systemd**.
- Unit types that **systemd** can manage :
 - service
 - socket
 - device
 - mount or automount point
 - swap file
 - timer
 - startup target (runlevel)
 - path etc...

UNIT FILE LOCATIONS

| | |
|--------------------------------|--------------------------------|
| /lib/systemd/system | standard systemd unit files |
| /usr/lib/systemd/system | from locally installed package |
| /etc/systemd/system | custom unit files |

SYSTEMCTL

- To manage services on a **systemd** enabled server.

To list all units listed as "**active**"

\$ systemctl list-units

| UNIT | LOAD | ACTIVE | SUB | DESCRIPTION |
|---|--------|--------|---------|--|
| proc-sys-fs-binfmt_misc.automount | loaded | active | running | Arbitrary Executable File Formats File System Automount Point |
| sys-devices-LNXSYSTM:00-LNXXSYBUS:00-INTC6000:00-tpm-tpm0.device | loaded | active | plugged | /sys/devices/LNXSYSTM:00/LNXXSYBUS:00/INTC6000:00/tpm/tpm0 |
| sys-devices-LNXSYSTM:00-LNXXSYBUS:00-INTC6000:00-tpmrm-tpmrm0.device | loaded | active | plugged | /sys/devices/LNXSYSTM:00/LNXXSYBUS:00/INTC6000:00/tpmrm/tpmrm0 |
| sys-devices-pci0000:00-0000:00:02.0-drm-card0-card0\x2deDP\x2d1-intel_backlight.device | loaded | active | plugged | /sys/devices/pci0000:00/0000:00:02.0/drm/card0/card0-eDP-1/intel_backlight |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p1.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB ESP |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p2.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB Microsoft\x20reserved\x20partition |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p3.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB OS |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p4.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB 4 |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p5.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB Image |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p6.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB DELL SUPPORT |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p7.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB boot |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p8.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB rootfs |
| sys-devices-pci0000:00-0000:00:0e.0-pci10000:e0-10000:e0:1c.4-10000:e1:00.0-nvme-nvme0-nvme0n1-nvme0n1p9.device | loaded | active | plugged | KBG40ZNS256G NVMe KIOXIA 256GB |
| sys-devices-pci0000:00-0000:00:14.0-usb1-1\x2d10-1\x2d10:1.0-bluetooth-hci0.device | loaded | active | plugged | /sys/devices/pci0000:00/0000:00:14.0/usb1/1-10/1-10:1.0/bluetooth/hci0 |
| sys-devices-pci0000:00-0000:00:1d.0-0000:01:00.0-net-wlp1s0.device | loaded | active | plugged | RTL8821CE 802.11ac PCIe Wireless Network Adapter |
| sys-devices-pci0000:00-0000:00:1f.3-sound-card0-controlC0.device | loaded | active | plugged | /sys/devices/pci0000:00/0000:00:1f.3/sound/card0/controlC0 |
| sys-devices-platform-serial8250-tty-ttyS0.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS0 |
| sys-devices-platform-serial8250-tty-ttyS1.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS1 |
| sys-devices-platform-serial8250-tty-ttyS10.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS10 |
| sys-devices-platform-serial8250-tty-ttyS11.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS11 |
| sys-devices-platform-serial8250-tty-ttyS12.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS12 |
| sys-devices-platform-serial8250-tty-ttyS13.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS13 |
| sys-devices-platform-serial8250-tty-ttyS14.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS14 |
| sys-devices-platform-serial8250-tty-ttyS15.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS15 |
| sys-devices-platform-serial8250-tty-ttyS16.device | loaded | active | plugged | /sys/devices/platform/serial8250/tty/ttyS16 |

lines 1-26

SYSTEMCTL

To list all units listed as "**active**"

\$ systemctl list-units -all

| UNIT | LOAD | ACTIVE | SUB | DESCRIPTION |
|-----------------------------------|--------|--------|---------|---|
| proc-sys-fs-binfmt_misc.automount | loaded | active | running | Arbitrary Executable File Formats File System Automount Point |
| dev-disk-by\x2ddiskseq-1.device | loaded | active | plugged | /dev/disk/by-diskseq/1 |
| dev-disk-by\x2ddiskseq-13.device | loaded | active | plugged | /dev/disk/by-diskseq/13 |
| dev-disk-by\x2ddiskseq-14.device | loaded | active | plugged | /dev/disk/by-diskseq/14 |
| dev-disk-by\x2ddiskseq-15.device | loaded | active | plugged | /dev/disk/by-diskseq/15 |
| dev-disk-by\x2ddiskseq-16.device | loaded | active | plugged | /dev/disk/by-diskseq/16 |
| dev-disk-by\x2ddiskseq-17.device | loaded | active | plugged | /dev/disk/by-diskseq/17 |
| dev-disk-by\x2ddiskseq-18.device | loaded | active | plugged | /dev/disk/by-diskseq/18 |
| dev-disk-by\x2ddiskseq-19.device | loaded | active | plugged | /dev/disk/by-diskseq/19 |
| dev-disk-by\x2ddiskseq-2.device | loaded | active | plugged | /dev/disk/by-diskseq/2 |
| dev-disk-by\x2ddiskseq-20.device | loaded | active | plugged | /dev/disk/by-diskseq/20 |
| dev-disk-by\x2ddiskseq-21.device | loaded | active | plugged | /dev/disk/by-diskseq/21 |
| dev-disk-by\x2ddiskseq-22.device | loaded | active | plugged | /dev/disk/by-diskseq/22 |
| dev-disk-by\x2ddiskseq-23.device | loaded | active | plugged | /dev/disk/by-diskseq/23 |
| dev-disk-by\x2ddiskseq-24.device | loaded | active | plugged | /dev/disk/by-diskseq/24 |
| dev-disk-by\x2ddiskseq-25.device | loaded | active | plugged | /dev/disk/by-diskseq/25 |
| dev-disk-by\x2ddiskseq-26.device | loaded | active | plugged | /dev/disk/by-diskseq/26 |
| dev-disk-by\x2ddiskseq-27.device | loaded | active | plugged | /dev/disk/by-diskseq/27 |
| dev-disk-by\x2ddiskseq-28.device | loaded | active | plugged | /dev/disk/by-diskseq/28 |
| dev-disk-by\x2ddiskseq-29.device | loaded | active | plugged | /dev/disk/by-diskseq/29 |
| dev-disk-by\x2ddiskseq-3.device | loaded | active | plugged | /dev/disk/by-diskseq/3 |
| dev-disk-by\x2ddiskseq-30.device | loaded | active | plugged | /dev/disk/by-diskseq/30 |
| dev-disk-by\x2ddiskseq-31.device | loaded | active | plugged | /dev/disk/by-diskseq/31 |
| dev-disk-by\x2ddiskseq-32.device | loaded | active | plugged | /dev/disk/by-diskseq/32 |
| dev-disk-by\x2ddiskseq-33.device | loaded | active | plugged | /dev/disk/by-diskseq/33 |

SYSTEMCTL

To list all unit installed in BEAUTIFUL way

\$ **systemctl list-unit-files**

| UNIT FILE | STATE | PRESET |
|---|-----------|----------|
| proc-sys-fs-binfmt_misc.automount | static | - |
| -.mount | generated | - |
| boot-efi.mount | generated | - |
| boot.mount | generated | - |
| dev-hugepages.mount | static | - |
| dev-mqueue.mount | static | - |
| proc-sys-fs-binfmt_misc.mount | disabled | disabled |
| snap-bare-5.mount | enabled | enabled |
| snap-core-15419.mount | enabled | enabled |
| snap-core-15511.mount | enabled | enabled |
| snap-core18-2751.mount | enabled | enabled |
| snap-core18-2785.mount | enabled | enabled |
| snap-core20-1950.mount | enabled | enabled |
| snap-core20-1974.mount | enabled | enabled |
| snap-core22-806.mount | enabled | enabled |
| snap-core22-817.mount | enabled | enabled |
| snap-dbeaver\x2dce-241.mount | enabled | enabled |
| snap-dbeaver\x2dce-243.mount | enabled | enabled |
| snap-drawio-180.mount | enabled | enabled |
| snap-drawio-181.mount | enabled | enabled |
| snap-firefox-2880.mount | enabled | enabled |
| snap-firefox-2908.mount | enabled | enabled |
| snap-gnome\x2d3\x2d28\x2d1804-198.mount | enabled | enabled |
| snap-gnome\x2d3\x2d34\x2d1804-93.mount | enabled | enabled |
| snap-gnome\x2d3\x2d38\x2d2004-140.mount | enabled | enabled |

lines 1-26

SYSTEMCTL STATUS COMMAND

To check if a service is running

\$ sudo systemctl status <service_name>

Output:

```
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; preset: enabled)
   Active: active (running) since Sat 2023-07-15 12:10:48 +04; 13s ago
     Docs: https://httpd.apache.org/docs/2.4/
  Main PID: 13601 (apache2)
    Tasks: 55 (limit: 9059)
   Memory: 5.4M
      CPU: 20ms
   CGroup: /system.slice/apache2.service
           └─13601 /usr/sbin/apache2 -k start
             └─13602 /usr/sbin/apache2 -k start
               └─13603 /usr/sbin/apache2 -k start

zil 15 12:10:48 dodoadmin-Inspiron-15-3511 systemd[1]: Starting The Apache HTTP Server...
zil 15 12:10:48 dodoadmin-Inspiron-15-3511 apachectl[13600]: AH00558: apache2: Could not reli
zil 15 12:10:48 dodoadmin-Inspiron-15-3511 systemd[1]: Started The Apache HTTP Server.
```

SYSTEMCTL COMMANDS

To start a service

\$ systemctl status <service_name>

To stop a service

\$ systemctl stop <service_name>

To restart a service

\$ systemctl restart <service_name>

To reload a service

\$ systemctl reload <service_name>

SYSTEMCTL ENABLE/DISABLE COMMAND

To enable the service to start at boot

\$ systemctl enable <service_name>

To disable the service to start at boot

\$ systemctl disable <service_name>

MINIMAL SERVICE UNIT FILE EXAMPLE

[Unit]

Description=A very simple service

After=network.target

[Service]

Type=simple

ExecStart=/usr/local/bin/exampleProgram

[Install]

WantedBy=multi-user.target

SYSTEMCTL

To make systemd re-read all unit files

\$ systemctl daemon-reload

DEMO

CREATING A CUSTOM UNIT FILE

JOURNALCTL

- Log information from applications and the kernel

To see all log entries from the general system state

\$ journalctl

Flags:

- -b (current boot)
- -k (only kernel message)
- -k -b (only kernel message of current boot)

JOURNALCTL

QUERYING UNIT STATES AND LOGS

To see log entries for a specific unit

\$ journalctl -u <service_name>

To see log entries for a specific unit of the current boot

\$ journalctl -b -u <service_name>

To see updated log entries for a specific unit as they are generated

\$ journalctl -u <service_name> -f