Analyze Jetson processor and memory usage

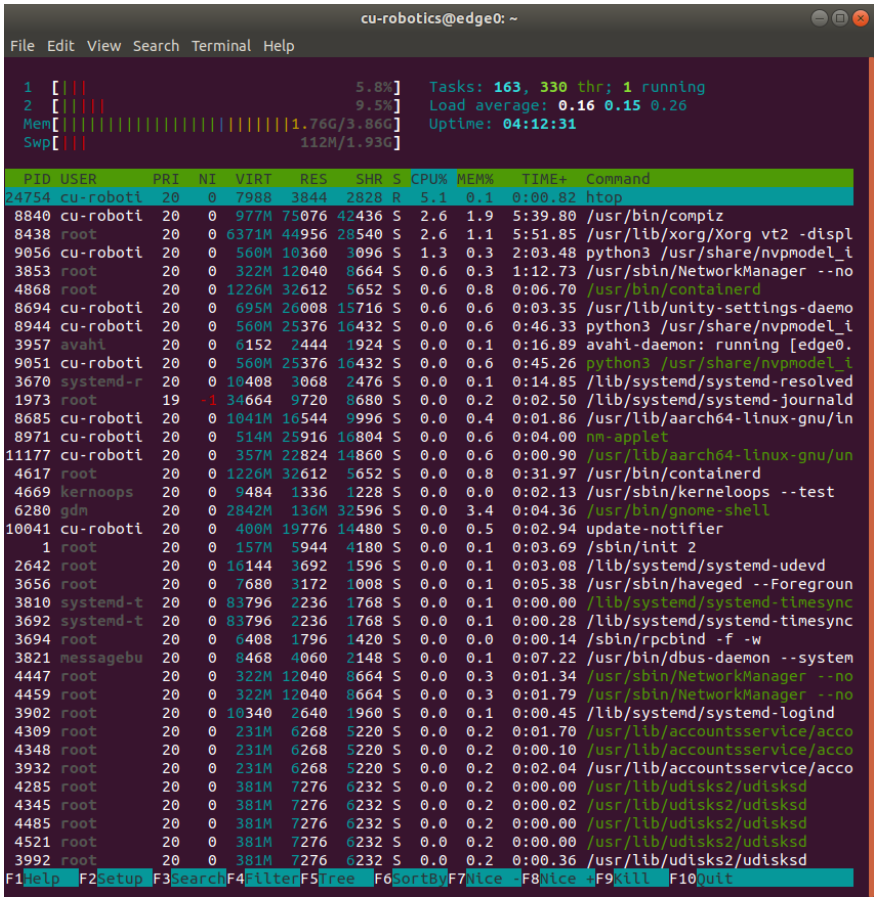
An important part of edge computing is optimizing our programs to get the most out of our processor. This document gives an overview of how to monitor your processor and memory usage.

Viewing processor stats

In this example we will be working with a 4GB Jetson nano. This device has 4 cores in max power mode (10W) and 2 in 5W mode. The Jetson also has 4GB of RAM (hence the name 4GB) and a 2GB swapfile (usually half the size of RAM). To view the processor usage we will use the command htop. Open a terminal and run:

htop

You should now see the below output:



This window shows all of the running process and the resources they are consuming. At the top there are some overall stats on the processor. You can see that we have two cores that are hardly being utilized and we are using 1.76GB of RAM (out of 3.86GB, not truely 4GB). This window also shows our swapfile usage (swapfiles are used to help with context switching).

Now we can put our device into 10W mode and run htop again:

```
sudo nvpmodel -m0 1
htop
```

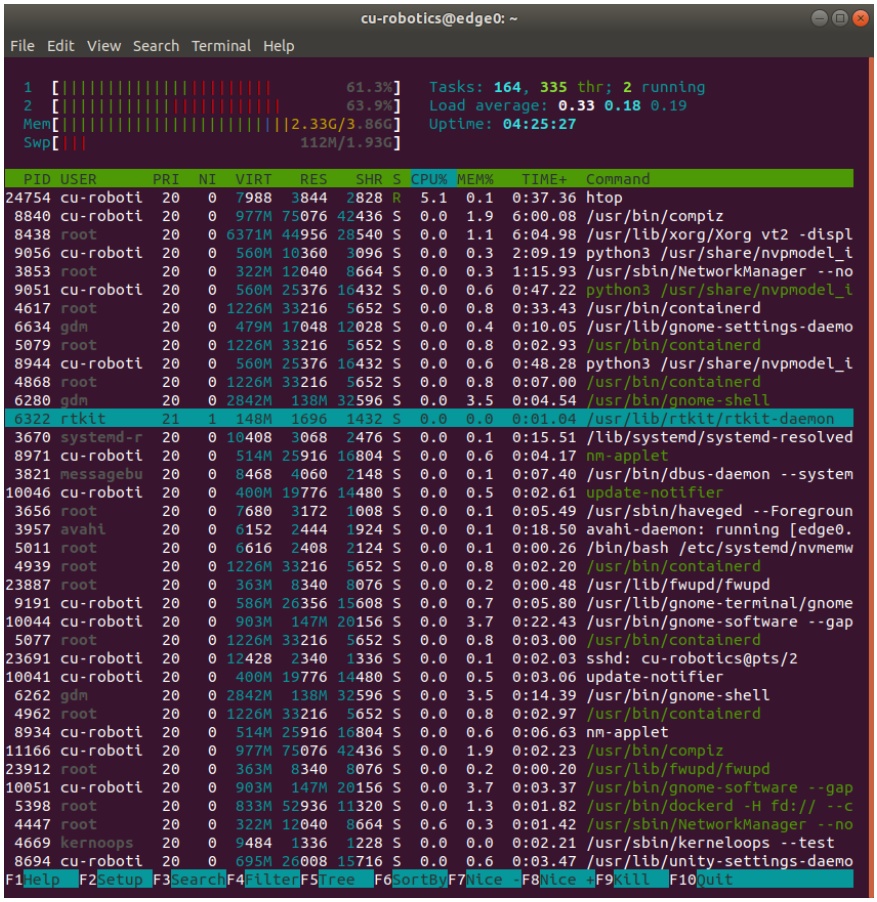
Now the output will show all four cores.

Running a compute intensive example

For this example we will run a jetson inference object detection example. This part requires that jetson inference is installed. Change into the jetson-inference bin and run the example:

```
cd jetson-inference/build/aarch64/bin
./detectnet.py --network=ssd-mobilenet-v2 images/peds_0.jpg images/test/output.jpg
```

Now run htop in another terminal and watch the process take up the devices resources.


cu-robotics@edge0: ~
File Edit View Search Terminal Help
1 [61.3%]
2 [63.9%]
Mem[2.33G/3.86G]
Swp[112M/1.93G]
Tasks: 164, 335 thr; 2 running
Load average: 0.33 0.18 0.19
Uptime: 04:25:27
PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
24754 cu-roboti 20 0 7988 3844 2828 R 5.1 0.1 0:37.36 htop
8840 cu-roboti 20 0 977M 75076 42436 S 0.0 1.9 6:00.08 /usr/bin/compiz
8438 root 20 0 6371M 44956 28540 S 0.0 1.1 6:04.98 /usr/lib/xorg/Xorg vt2 -displ
9056 cu-roboti 20 0 560M 10360 3096 S 0.0 0.3 2:09.19 python3 /usr/share/nvpmodel_i
3853 root 20 0 322M 12040 8664 S 0.0 0.3 1:15.93 /usr/sbin/NetworkManager --no
9051 cu-roboti 20 0 560M 25376 16432 S 0.0 0.6 0:47.22 python3 /usr/share/nvpmodel_i
4617 root 20 0 1226M 33216 5652 S 0.0 0.8 0:33.43 /usr/bin/containerd
6634 gdm 20 0 479M 17048 12028 S 0.0 0.4 0:10.05 /usr/lib/gnome-settings-daemo
5079 root 20 0 1226M 33216 5652 S 0.0 0.8 0:02.93 /usr/bin/containerd
8944 cu-roboti 20 0 560M 25376 16432 S 0.0 0.6 0:48.28 python3 /usr/share/nvpmodel_i
4868 root 20 0 1226M 33216 5652 S 0.0 0.8 0:07.00 /usr/bin/containerd
6280 gdm 20 0 2842M 138M 32596 S 0.0 3.5 0:04.54 /usr/bin/gnome-shell
6322 rtkit 21 1 148M 1696 1432 S 0.0 0.0 0:01.04 /usr/lib/rtkit/rtkit-daemon
3670 systemd-r 20 0 10408 3068 2476 S 0.0 0.1 0:15.51 /lib/systemd/systemd-resolved
8971 cu-roboti 20 0 514M 25916 16804 S 0.0 0.6 0:04.17 nm-applet
3821 messagebu 20 0 8468 4060 2148 S 0.0 0.1 0:07.40 /usr/bin/dbus-daemon --system
10046 cu-roboti 20 0 400M 19776 14480 S 0.0 0.5 0:02.61 update-notifier
3656 root 20 0 7680 3172 1008 S 0.0 0.1 0:05.49 /usr/sbin/haveged --Foregroun
3957 avahi 20 0 6152 2444 1924 S 0.0 0.1 0:18.50 avahi-daemon: running [edge0.
5011 root 20 0 6616 2408 2124 S 0.0 0.1 0:00.26 /bin/bash /etc/systemd/nvmemw
4939 root 20 0 1226M 33216 5652 S 0.0 0.8 0:02.20 /usr/bin/containerd
23887 root 20 0 363M 8340 8076 S 0.0 0.2 0:00.48 /usr/lib/fwupd/fwupd
9191 cu-roboti 20 0 586M 26356 15608 S 0.0 0.7 0:05.80 /usr/lib/gnome-terminal/gnome
10044 cu-roboti 20 0 903M 147M 20156 S 0.0 3.7 0:22.43 /usr/bin/gnome-software --gap
5077 root 20 0 1226M 33216 5652 S 0.0 0.8 0:03.00 /usr/bin/containerd
23691 cu-roboti 20 0 12428 2340 1336 S 0.0 0.1 0:02.03 sshd: cu-robotics@pts/2
10041 cu-roboti 20 0 400M 19776 14480 S 0.0 0.5 0:03.06 update-notifier
6262 gdm 20 0 2842M 138M 32596 S 0.0 3.5 0:14.39 /usr/bin/gnome-shell
4962 root 20 0 1226M 33216 5652 S 0.0 0.8 0:02.97 /usr/bin/containerd
8934 cu-roboti 20 0 514M 25916 16804 S 0.0 0.6 0:06.63 nm-applet
11166 cu-roboti 20 0 977M 75076 42436 S 0.0 1.9 0:02.23 /usr/bin/compiz
23912 root 20 0 363M 8340 8076 S 0.0 0.2 0:00.20 /usr/lib/fwupd/fwupd
10051 cu-roboti 20 0 903M 147M 20156 S 0.0 3.7 0:03.37 /usr/bin/gnome-software --gap
5398 root 20 0 833M 52936 11320 S 0.0 1.3 0:01.82 /usr/bin/dockerd -H fd:// --c
4447 root 20 0 322M 12040 8664 S 0.6 0.3 0:01.42 /usr/sbin/NetworkManager --no
4669 kernoops 20 0 9484 1336 1228 S 0.0 0.0 0:02.21 /usr/sbin/kerneloops --test
8694 cu-roboti 20 0 695M 26008 15716 S 0.0 0.6 0:03.47 /usr/lib/unity-settings-daemo
F1Help F2Setup F3SearchF4FilterF5Tree F6SortBy F7Nice -F8Nice +F9Kill F10Quit