

Module: R0: The Missing Semester

Section: Data Wrangling Task: 04

Task:

Find your average, median, and max system boot time over the last ten boots. Use `journalctl` on Linux, and look for log timestamps near the beginning and end of each boot. On Linux, they may look something like:

Logs begin at ...

and

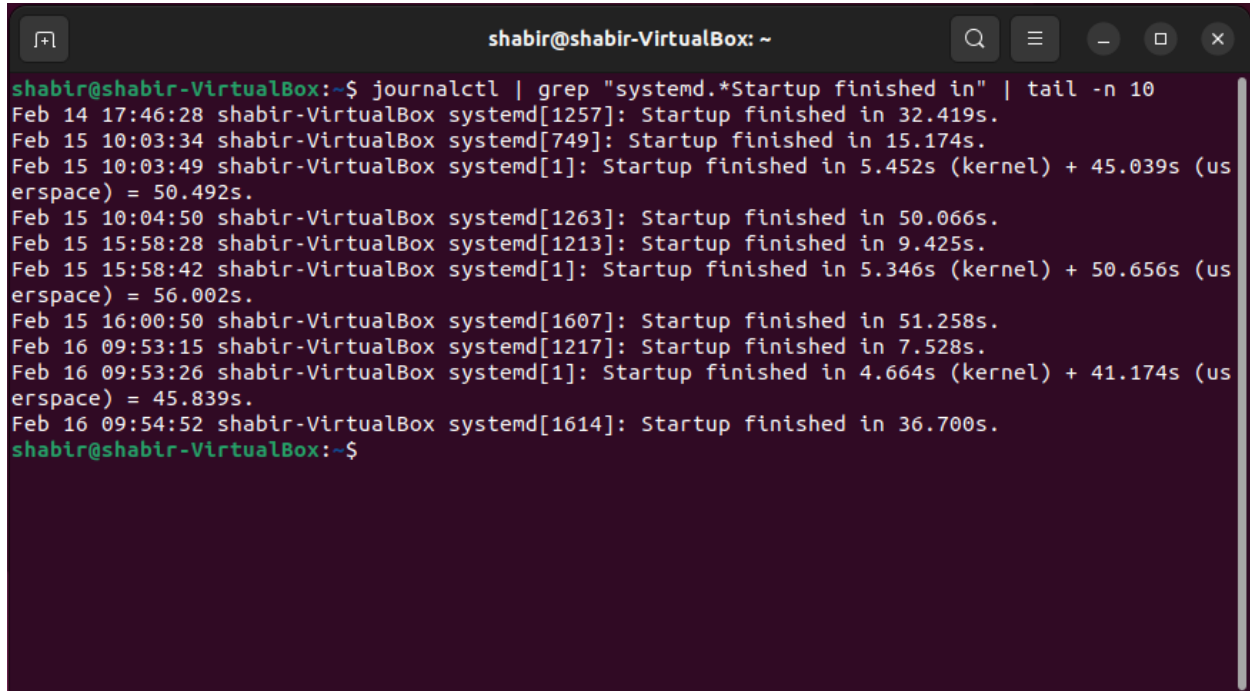
systemd[577]: Startup finished in ...

Explanation:

To get the system log data, I have used the command ***journalctl*** in the shell. The output is shown below,

```
shabir@shabir-VirtualBox: ~
shabir@shabir-VirtualBox:~$ journalctl
Feb 01 12:49:57 shabir-VirtualBox kernel: Linux version 6.5.0-15-generic (buildd@bos03-amd64-0
Feb 01 12:49:57 shabir-VirtualBox kernel: Command line: BOOT_IMAGE=/boot/vmlinuz-6.5.0-15-gene
Feb 01 12:49:57 shabir-VirtualBox kernel: KERNEL supported cpus:
Feb 01 12:49:57 shabir-VirtualBox kernel: Intel GenuineIntel
Feb 01 12:49:57 shabir-VirtualBox kernel: AMD AuthenticAMD
Feb 01 12:49:57 shabir-VirtualBox kernel: Hygon HygonGenuine
Feb 01 12:49:57 shabir-VirtualBox kernel: Centaur CentaurHauls
Feb 01 12:49:57 shabir-VirtualBox kernel: zhaoxin Shanghai
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-provided physical RAM map:
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x0000000000000000-0x000000000009fbf
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x000000000009fc00-0x000000000009fff
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x00000000000f0000-0x00000000000ffff
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x0000000000100000-0x00000000005f6eff
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x00000000005f6f0000-0x00000000005f6fff
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x00000000fec00000-0x00000000fec00ff
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x00000000fee00000-0x00000000fee00ff
Feb 01 12:49:57 shabir-VirtualBox kernel: BIOS-e820: [mem 0x00000000fffc0000-0x00000000ffffff
Feb 01 12:49:57 shabir-VirtualBox kernel: NX (Execute Disable) protection: active
Feb 01 12:49:57 shabir-VirtualBox kernel: SMBIOS 2.5 present.
Feb 01 12:49:57 shabir-VirtualBox kernel: DMI: innotek GmbH VirtualBox/VirtualBox, BIOS Virtua
Feb 01 12:49:57 shabir-VirtualBox kernel: Hypervisor detected: KVM
Feb 01 12:49:57 shabir-VirtualBox kernel: kvm-clock: Using msrs 4b564d01 and 4b564d00
Feb 01 12:49:57 shabir-VirtualBox kernel: kvm-clock: using sched offset of 7346479485 cycles
```

To get the system boot time, I have used the grep command with pipelining of journalctl. The command I have used ***journalctl | grep "systemd.*Startup finished in | tail -n 10". tail -n 10*** is used as I am only interested in the last 10 boots. The output of that command is shown below,



```
shabir@shabir-VirtualBox: ~
shabir@shabir-VirtualBox:~$ journalctl | grep "systemd.*Startup finished in" | tail -n 10
Feb 14 17:46:28 shabir-VirtualBox systemd[1257]: Startup finished in 32.419s.
Feb 15 10:03:34 shabir-VirtualBox systemd[749]: Startup finished in 15.174s.
Feb 15 10:03:49 shabir-VirtualBox systemd[1]: Startup finished in 5.452s (kernel) + 45.039s (userspace) = 50.492s.
Feb 15 10:04:50 shabir-VirtualBox systemd[1263]: Startup finished in 50.066s.
Feb 15 15:58:28 shabir-VirtualBox systemd[1213]: Startup finished in 9.425s.
Feb 15 15:58:42 shabir-VirtualBox systemd[1]: Startup finished in 5.346s (kernel) + 50.656s (userspace) = 56.002s.
Feb 15 16:00:50 shabir-VirtualBox systemd[1607]: Startup finished in 51.258s.
Feb 16 09:53:15 shabir-VirtualBox systemd[1217]: Startup finished in 7.528s.
Feb 16 09:53:26 shabir-VirtualBox systemd[1]: Startup finished in 4.664s (kernel) + 41.174s (userspace) = 45.839s.
Feb 16 09:54:52 shabir-VirtualBox systemd[1614]: Startup finished in 36.700s.
shabir@shabir-VirtualBox:~$
```

Since I need the boot time which is listed on the end of each line. As the in the first line (32.419s.) is the boot time. So I used the the awk command to get the end of each line. Since I need only the numeric number, I remove the (dot and s) from the end of the line. The command I have used ***journalctl | grep systemd.*Startup finished in | tail -n 10 | awk '{sub(/s\./, ,); print }'***. The output is shown below,

```
shabir@shabir-VirtualBox: ~
shabir@shabir-VirtualBox:~$ journalctl | grep "systemd.*Startup finished in" | tail -n 10 | awk
'{sub(/s\.$/, "", $NF); print $NF}'
32.419
15.174
50.492
50.066
9.425
56.002
51.258
7.528
45.839
36.700
shabir@shabir-VirtualBox:~$
```

To get average, median and mode of that boot time I have used R programming language to extract this data, and write a small script to get the summary of this data. The command I used on the terminal which gives me average, mean, median, and mode is ***journalctl | grep systemd.*Startup finished in | tail -n 10 | awk '{sub(/s\.\$/, ,); print }' | R --slave -e 'x <- scan(file=stdin, quiet=TRUE); summary(x)'***. The output is shown below,

```
shabir@shabir-VirtualBox: ~
shabir@shabir-VirtualBox:~$ journalctl | grep "systemd.*Startup finished in" | tail -n 10 | awk
'{sub(/s\.$/, "", $NF); print $NF}' | R --slave -e 'x <- scan(file="stdin", quiet=TRUE); summa
ry(x)'
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 7.528 19.485  41.270  35.490  50.386  56.002
shabir@shabir-VirtualBox:~$
```