Advanced Embedded Software Development
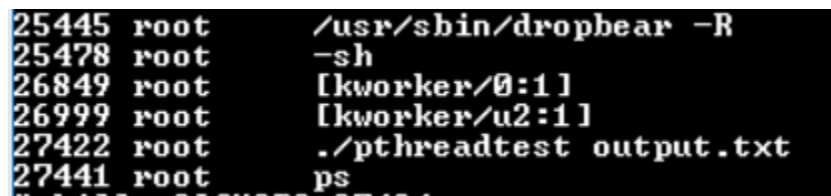
Homework 4

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Question 1

1) Processing Algorithm and Data structure used:
   Since only alphabets were required to be processed, a static array of 26 was used by hashing the input characters using their ASCII values as indices to the counter array. The input file was scanned character by character and the termination signals were checked after processing each and every character.

2) Screenshot of the ps command on BBG:

```
25445 root      /usr/sbin/dropbear -R
25478 root      -sh
26849 root      [kworker/0:1]
26999 root      [kworker/u2:1]
27422 root      ./pthreadtest output.txt
27441 root      ps
```

3) Log file text of the first thread running to completion (The Homework requirements file was used as the source file to be scanned):

   (CPU Utilization thread is fired every 100 ms but not running to completion unless given any of the SIGUSR1 or SIGUSR2 signals)

   Character Processing thread started, PID 27422 TID 27423
   Start Time for Character Processing Thread: sec=5063, nanosec=11455895
   Character Processing thread terminating by completion
   B:55
   F:85
   K:20
   Q:8

V:25
W:55
X:23
Y:44
Z:4
End Time for Character Processing Thread: sec=5063, nanosec=24502561
CPU Utilization thread started, PID 27422 TID 27424
Start Time for CPU Utilization Thread: sec=5062, nanosec=996901228
CPU Utilization: cpu 37269 0 208587 259195 256 0 203 0 0 0

CPU Utilization: cpu 37271 0 208595 259195 256 0 203 0 0 0

4) <u>Usage of SIGUSR1 to terminate the CPU Processing Thread</u>
   CPU Utilization: cpu 39024 0 217270 346287 324 0 220 0 0 0

   CPU Utilization: cpu 39028 0 217276 346287 324 0 220 0 0 0

   CPU Utilization: cpu 39029 0 217285 346287 324 0 220 0 0 0

   CPU Utilization: cpu 39029 0 217295 346287 324 0 220 0 0 0

   CPU Utilization: cpu 39030 0 217304 346287 324 0 220 0 0 0

   CPU utilization thread teminating with SIGUSR1
   End Time for CPU Utilization Thread: sec=6042, nanosec=257997011

   Kill command: `# kill -SIGUSR1 32620`

   <u>Usage of SIGUSR2 to terminate the CPU Utilization Thread</u>

   CPU Utilization: cpu 37554 0 210021 259195 256 0 204 0 0 0

   CPU Utilization: cpu 37554 0 210031 259195 256 0 204 0 0 0

   CPU Utilization: cpu 37554 0 210041 259195 256 0 204 0 0 0

   CPU utilization thread teminating with SIGUSR2
   End Time for CPU Utilization Thread: sec=5080, nanosec=544847188

   Kill command: `# kill -SIGUSR2 27424`