EP-Lab03-2021

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EX1:

```
5400 RPM
5.5 RD

Divide 5400 RPM by 60 seconds: 90 RPS
Convert 1 of 90 to decimal: 0.011 seconds per rotation
Multiply the seconds per rotation by 1000 milliseconds: 11 ms per rotation
Divide the total in half: 5.5 MS
```

EX2:
TaskA:

```
avg-cpu:  %user   %nice %system %iowait  %steal   %idle
          11,16    0,00    3,10    0,08    0,00   85,65

Device            r/s     w/s     rkB/s     wkB/s   rrqm/s   wrqm/s  %rrqm  %wrqm r_await w_await aqu-sz rareq-sz wareq-sz  svctm  %util
nvme0n1          0,00    0,00      0,00      0,00     0,00     0,00   0,00   0,00    0,00    0,00   0,00     0,00     0,00   0,00   0,00
sda              0,00   12,00      0,00    148,00     0,00    12,00   0,00  50,00    0,00    1,83   0,01     0,00    12,33   3,00   3,60

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
          11,61    0,00    3,70    0,50    0,00   84,19

Device            r/s     w/s     rkB/s     wkB/s   rrqm/s   wrqm/s  %rrqm  %wrqm r_await w_await aqu-sz rareq-sz wareq-sz  svctm  %util
nvme0n1          0,00    2,00      0,00     64,00     0,00    14,00   0,00  87,50    0,00   22,00   0,04     0,00    32,00  24,00   4,80
sda              0,00    4,00      0,00     96,00     0,00    20,00   0,00  83,33    0,00    5,75   0,01     0,00    24,00   5,00   2,00
```

```
-----------------------------------------------------------
1st reading:
sda:
0,00 rkB/s / 0,00 r/s = proof that you have
infinite efficency when you do nothing.

148,00 wkB/s / 12,00 w/s = 12.33

-----------------------------------------------------------
2nd reading:
sda:
0,00 rkB/s / 0,00 r/s = further proof that you have
infinite efficency when you do nothing.

96,00 wkB/s / 4,00 w/s = 24.00
```

TaskB:

```
Total DISK READ :       0.00 B/s | Total DISK WRITE :     238.08 K/s
Actual DISK READ:       0.00 B/s | Actual DISK WRITE:     464.45 K/s
  TID  PRIO  USER     DISK READ  DISK WRITE  SWAPIN     IO>    COMMAND
 1280 be/3 root        0.00 B/s   11.71 K/s  0.00 % 98.84 % [jbd2/sda4-8]
13282 be/4 ghostpan    0.00 B/s   97.57 K/s  0.00 %  0.76 % dd if=/dev/zero ~0000 oflag=dsync
 8534 be/4 ghostpan    0.00 B/s   31.22 K/s  0.00 %  0.00 % chrome --enable-crashpad
 8575 be/4 ghostpan    0.00 B/s   35.13 K/s  0.00 %  0.00 % chrome --enable-~Chrome_IOThread]
 5455 be/4 ghostpan    0.00 B/s   23.42 K/s  0.00 %  0.00 % chrome --enable-~ThreadPoolForeg]
11113 be/4 ghostpan    0.00 B/s   27.32 K/s  0.00 %  0.00 % chrome --enable-~ThreadPoolForeg]
11206 be/4 ghostpan    0.00 B/s   11.71 K/s  0.00 %  0.00 % chrome --type=ut~ThreadPoolForeg]
```

```
$ ps ax  | grep dummy
21599 pts/2    S+     0:00 /bin/bash ./dummy.sh
22506 pts/1    R+     0:00 grep --color=auto --exclude-dir=.bzr --exclude-dir=CVS --exclude-dir=.git --exclude-dir=.hg --exclude-dir=.sv
n --exclude-dir=.idea --exclude-dir=.tox dummy
┌─ghostpants@ghostmachine in ~/Documents/UPB_IV_C2_2020-2021/EP/lab03/ex3 on EP-2021 ✘ (origin/EP-2021)
└$ ps -o ppid= -p 21599
 5545
┌─ghostpants@ghostmachine in ~/Documents/UPB_IV_C2_2020-2021/EP/lab03/ex3 on EP-2021 ✘ (origin/EP-2021)
┌─ghostpants@ghostmachine in ~/Documents/UPB_IV_C2_2020-2021/EP/lab03/ex3 on EP-2021 ✘ (origin/EP-2021)
└$ ps ax  | grep dummy
22709 pts/1    S+     0:00 grep --color=auto --exclude-dir=.bzr --exclude-dir=CVS --exclude-dir=.git --exclude-dir=.hg --exclude-dir=.sv
n --exclude-dir=.idea --exclude-dir=.tox dummy
┌─ghostpants@ghostmachine in ~/Documents/UPB_IV_C2_2020-2021/EP/lab03/ex3 on EP-2021 ✘ (origin/EP-2021)
└$
```

Ex3:

TaskA:

```
└$ df -Th
Filesystem     Type      Size  Used Avail Use% Mounted on
udev           devtmpfs  3,8G     0  3,8G   0% /dev
tmpfs          tmpfs     782M  1,9M  780M   1% /run
/dev/nvme0n1p5 ext4       83G   70G  9,1G  89% /
tmpfs          tmpfs     3,9G   49M  3,8G   2% /dev/shm
tmpfs          tmpfs     5,0M  4,0K  5,0M   1% /run/lock
tmpfs          tmpfs     3,9G     0  3,9G   0% /sys/fs/cgroup
/dev/sda4      ext4      457G  228G  206G  53% /home
/dev/nvme0n1p2 vfat       95M   33M   63M  35% /boot/efi
tmpfs          tmpfs     782M   56K  782M   1% /run/user/1000
ext4           tmpfs     1,0G     0  1,0G   0% /mnt/ramdisk
```

TaskB:

```
┌─ghostpants@ghostmachine in ~/Documents/UPB_IV_C2_2020-2021/EP/lab03/ex3 on EP-2021 ✘ (origin/EP-2021)
└$ pv /dev/urandom | dd of=/mnt/ramdisk/rand  bs=2048 count=$((512 * 1024 * 1024 / 2048))
262144+0 records in,6MiB/s] [                    <=>
262144+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 11,7917 s, 45,5 MB/s
 512MiB 0:00:11 [43,4MiB/s] [                     <=>
┌─ghostpants@ghostmachine in ~/Documents/UPB_IV_C2_2020-2021/EP/lab03/ex3 on EP-2021 ✘ (origin/EP-2021)
└$ pv /dev/urandom | dd of=/home/ghostpants/rand bs=2048 count=$((512 * 1024 * 1024 / 2048))
 512MiB 0:00:12 [42,1MiB/s] [                      <=>
262144+0 records in
262144+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 19,0046 s, 28,2 MB/s
```

Conclusion: Writing to RAM is much faster.

Ex4:

TaskA:

```
                american fuzzy lop 2.57b (fuzzgoat)

┌─ process timing ─────────────────────┬─ overall results ─────┐
│        run time : 0 days, 0 hrs, 0 min, 27 sec │  cycles done : 0      │
│   last new path : 0 days, 0 hrs, 0 min, 0 sec  │  total paths : 158    │
│ last uniq crash : 0 days, 0 hrs, 0 min, 14 sec │ uniq crashes : 18     │
│  last uniq hang : none seen yet                │   uniq hangs : 0      │
├─ cycle progress ─────┬─ map coverage ──────────┴───────────────────────┘
│  now processing : 69 (43.67%)    │   map density : 0.12% / 0.54%
│ paths timed out : 0 (0.00%)      │ count coverage : 2.22 bits/tuple
├─ stage progress ─────┼─ findings in depth ─────────────────────────────┐
│  now trying : havoc              │ favored paths : 47 (29.75%)          │
│ stage execs : 10.7k/32.8k (32.67%)│  new edges on : 66 (41.77%)         │
│ total execs : 142k               │ total crashes : 105 (18 unique)      │
│  exec speed : 5098/sec           │  total tmouts : 0 (0 unique)         │
├─ fuzzing strategy yields ────────┴──────────────┬─ path geometry ──────┤
│   bit flips : 11/776, 1/752, 2/704              │    levels : 3        │
│  byte flips : 0/97, 0/73, 1/36                  │   pending : 135      │
│ arithmetics : 23/5381, 0/403, 0/0               │  pend fav : 27       │
│  known ints : 2/475, 0/2015, 0/1582             │ own finds : 157      │
│  dictionary : 0/0, 0/0, 0/0                     │  imported : n/a      │
│       havoc : 125/117k, 0/0                     │ stability : 100.00%  │
│        trim : 50.00%/27, 0.00%                  │                      │
└─────────────────────────────────────────────────┴──────────────────────┘
                                                           [cpu000: 16%]
```

TaskB:

```
Samples: 269K of event 'cycles', Event count (approx.): 19706349508
Overhead  Command   Shared Object      Symbol
   6,38%  fuzzgoat  libc-2.27.so       [.] _dl_addr
   3,76%  fuzzgoat  [kernel.kallsyms]  [k] page_fault
   3,62%  fuzzgoat  [kernel.kallsyms]  [k] prepare_exit_to_usermode
   3,62%  fuzzgoat  [kernel.kallsyms]  [k] filemap_map_pages
   3,47%  fuzzgoat  [kernel.kallsyms]  [k] __slab_free
   2,93%  fuzzgoat  [kernel.kallsyms]  [k] rcu_cblist_dequeue
   2,56%  fuzzgoat  [kernel.kallsyms]  [k] unmap_page_range
   1,89%  fuzzgoat  [kernel.kallsyms]  [k] kfree
   1,57%  fuzzgoat  [kernel.kallsyms]  [k] swapgs_restore_regs_and_return_to_usermode
   1,54%  fuzzgoat  [kernel.kallsyms]  [k] sync_regs
   1,29%  fuzzgoat  [kernel.kallsyms]  [k] do_syscall_64
   1,25%  fuzzgoat  [kernel.kallsyms]  [k] release_pages
   1,19%  fuzzgoat  [kernel.kallsyms]  [k] kmem_cache_free
   1,17%  fuzzgoat  [kernel.kallsyms]  [k] error_entry
   1,13%  fuzzgoat  [kernel.kallsyms]  [k] __handle_mm_fault
   1,10%  afl-fuzz  [kernel.kallsyms]  [k] __slab_free
   1,10%  fuzzgoat  [kernel.kallsyms]  [k] ftrace_profile_free_filter
   1,06%  fuzzgoat  [kernel.kallsyms]  [k] page_remove_rmap
   1,03%  fuzzgoat  [kernel.kallsyms]  [k] page_add_file_rmap
   0,97%  fuzzgoat  [kernel.kallsyms]  [k] alloc_set_pte
   0,89%  fuzzgoat  [kernel.kallsyms]  [k] unlock_page
   0,88%  fuzzgoat  [kernel.kallsyms]  [k] clear_page_erms
   0,77%  fuzzgoat  [kernel.kallsyms]  [k] entry_SYSCALL_64
   0,76%  fuzzgoat  [kernel.kallsyms]  [k] native_flush_tlb_one_user
   0,69%  fuzzgoat  [kernel.kallsyms]  [k] file_free_rcu
   0,63%  afl-fuzz  [kernel.kallsyms]  [k] rcu_cblist_dequeue
   0,62%  afl-fuzz  afl-fuzz           [.] save_if_interesting
   0,61%  fuzzgoat  [kernel.kallsyms]  [k] copy_page
   0,61%  fuzzgoat  [kernel.kallsyms]  [k] lock_page_memcg
   0,60%  afl-fuzz  [kernel.kallsyms]  [k] kfree
   0,57%  afl-fuzz  [kernel.kallsyms]  [k] kmem_cache_free
   0,56%  fuzzgoat  [kernel.kallsyms]  [k] _raw_spin_lock
```

Ex5: