

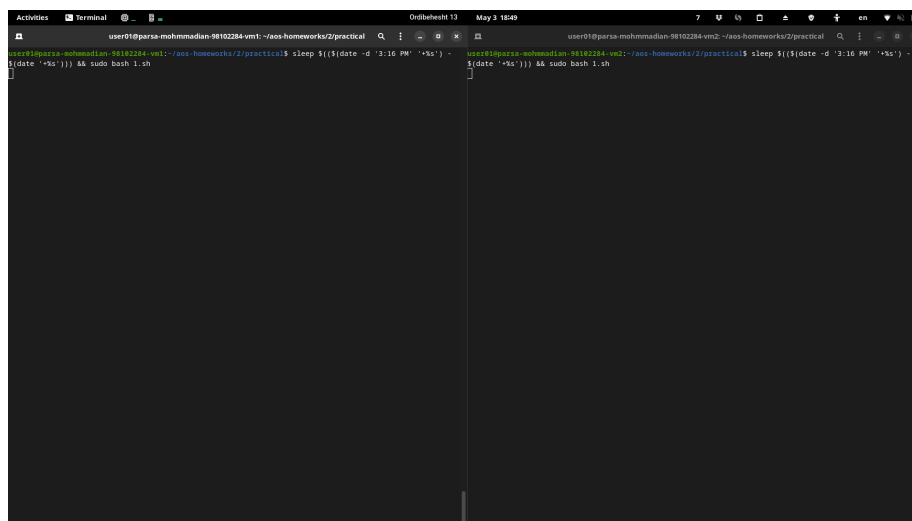
تمرین سری دوم درس سیستم‌های عامل پیشرفته

پارسا محمدیان – ۹۸۱۰۲۲۸۴

۱۴ اردیبهشت ۱۴۰۲

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کد مربوط به این بخش در فایل 1.c موجود است. اسکریپت اجرای آن نیز در فایل 1.sh موجود است. اسکریپت همانطور که در تصاویر زیر نشان داده شده، اجرا می‌شود. مقدار sleep ای که قبل از دستور قرار داده شده است، برای این است که اسکریپت به صورت همزمان در هر دو ماشین اجرا شوند. (دقت شود که ساعت سیستم با ساعت دو ماشین هماهنگ نیست ولی ساعت دو ماشین با هم هماهنگ است)



```
user01@parsa-mohammadian-98102284-vm1:~/aos-homeworks/2/practical$ sleep $(date -d '3:16 PM' +%s) -
$(date +%s )) && sudo bash 1.sh
user01@parsa-mohammadian-98102284-vm2:~/aos-homeworks/2/practical$ sleep $(date -d '3:16 PM' +%s) -
$(date +%s )) && sudo bash 1.sh
```

```
Activities Terminal OnBehesht 10 May 3 16:51
user01@parsa-mohmmadian-98102284-vm1:~/aos-homeworks/2/practical$ sleep $(($(date -d '3:16 PM' +%s') - $(date +%s))) && sudo bash 1.sh
Running 1 with 1 threads
Performance counter stats for './1 1':
        66      page-faults
       1,351    cache-misses
      208,631   dTLB-load-misses  # 2.30% of all dTLB cache hits
     9,083,608   dTLB-loads
     9,959,871   dTLB-stores
0.103882603 seconds time elapsed
0.068069000 seconds user
0.036036000 seconds sys

-----
Running 1 with 2 threads
Performance counter stats for './1 2':
        68      page-faults
       1,088    cache-misses
      412,309   dTLB-load-misses  # 2.30% of all dTLB cache hits
    17,938,345   dTLB-loads
    19,776,989   dTLB-stores
0.100759692 seconds time elapsed
0.114487000 seconds user
0.082904000 seconds sys

user01@parsa-mohmmadian-98102284-vm1:~/aos-homeworks/2/practical$

user01@parsa-mohmmadian-98102284-vm2:~/aos-homeworks/2/practical$ sleep $(($(date -d '3:16 PM' +%s') - $(date +%s))) && sudo bash 1.sh
Running 1 with 1 threads
Performance counter stats for './1 1':
        63      page-faults
       1,570    cache-misses
      208,701   dTLB-load-misses  # 2.29% of all dTLB cache hits
     9,096,343   dTLB-loads
     9,968,360   dTLB-stores
0.103917866 seconds time elapsed
0.060072000 seconds user
0.044052000 seconds sys

-----
Running 1 with 2 threads
Performance counter stats for './1 2':
        64      page-faults
       1,078    cache-misses
      412,514   dTLB-load-misses  # 2.30% of all dTLB cache hits
    17,932,761   dTLB-loads
    19,708,259   dTLB-stores
0.106430098 seconds time elapsed
0.121090000 seconds user
0.084763000 seconds sys

user01@parsa-mohmmadian-98102284-vm2:~/aos-homeworks/2/practical$
```

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آمار در ماشین مجازی اول به صورت زیر است.

Running 1 with 1 threads

```
Performance counter stats for './1 1':
        66      page-faults
       1,351    cache-misses
      208,631   dTLB-load-misses  # 2.30% of all dTLB cache hits
     9,083,608   dTLB-loads
     9,959,871   dTLB-stores
0.103882603 seconds time elapsed
0.068069000 seconds user
0.036036000 seconds sys
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Running 1 with 2 threads

```
Performance counter stats for './1 2':
        68      page-faults
       1,088    cache-misses
      412,309   dTLB-load-misses  # 2.30% of all dTLB cache hits
    17,938,345   dTLB-loads
    19,776,989   dTLB-stores
0.100759692 seconds time elapsed
0.114487000 seconds user
0.082904000 seconds sys
```

آمار در ماشین مجازی دوم به صورت زیر است.

Running 1 with 1 threads

```
Performance counter stats for './1 1':
        63      page-faults
       1,570    cache-misses
      208,701   dTLB-load-misses  # 2.29% of all dTLB cache hits
     9,096,343   dTLB-loads
     9,968,360   dTLB-stores
0.103917866 seconds time elapsed
0.060072000 seconds user
0.044052000 seconds sys
```

Running 1 with 2 threads

Performance counter stats for './1 2':

| | | | |
|------------|------------------|---|------------------------------|
| 64 | page-faults | | |
| 1,078 | cache-misses | | |
| 412,514 | dTLB-load-misses | # | 2.30% of all dTLB cache hits |
| 17,932,761 | dTLB-loads | | |
| 19,780,259 | dTLB-stores | | |

0.106430090 seconds time elapsed

0.121090000 seconds user

0.084763000 seconds sys

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TODO

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کد این برنامه در فایل 2.c قرار دارد و اسکریپت اجرای آن در فایل 2.sh.

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ابتدا این برنامه را بر روی سیستم خودم اجرا کردم.

```
Activities Terminal 0/100% May 3 19:23
para@osus-manjaro:~/Documents/aos-homeworks/2/practical$ sudo ./test 2.sh
[sudo] password for para:
Running 2 with SYNC

Performance counter stats for './2 SYNC':

   67      page-faults
 66,468    cache-misses
   1,726   dTLB-load-misses      #  0.52% of all dTLB cache accesses
 329,574   dTLB-loads
 171,898   dTLB-stores

   0.003173850 seconds time elapsed
   0.001173000 seconds user
   0.000000000 seconds sys

-----
Running 2 with ASYNC

Performance counter stats for './2 ASYNC':

   62      page-faults
 24,965    cache-misses
   1,260   dTLB-load-misses      #  0.41% of all dTLB cache accesses
 386,580   dTLB-loads
 156,641   dTLB-stores

   0.000946210 seconds time elapsed
   0.000997000 seconds user
   0.000000000 seconds sys

-----
para@osus-manjaro:~/Documents/aos-homeworks/2/practical$
```

نتایج به صورت زیر هستند.

Running 2 with SYNC

Performance counter stats for './2 SYNC':

| | | | |
|--------|------------------|---|----------------------------------|
| 67 | page-faults | | |
| 66,468 | cache-misses | | |
| 1,726 | dTLB-load-misses | # | 0.52% of all dTLB cache accesses |

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```

329,574      dTLB-loads
171,898      dTLB-stores

0.003173850 seconds time elapsed

0.001373000 seconds user
0.000000000 seconds sys

Running 2 with ASYNC

Performance counter stats for './2 ASYNC':

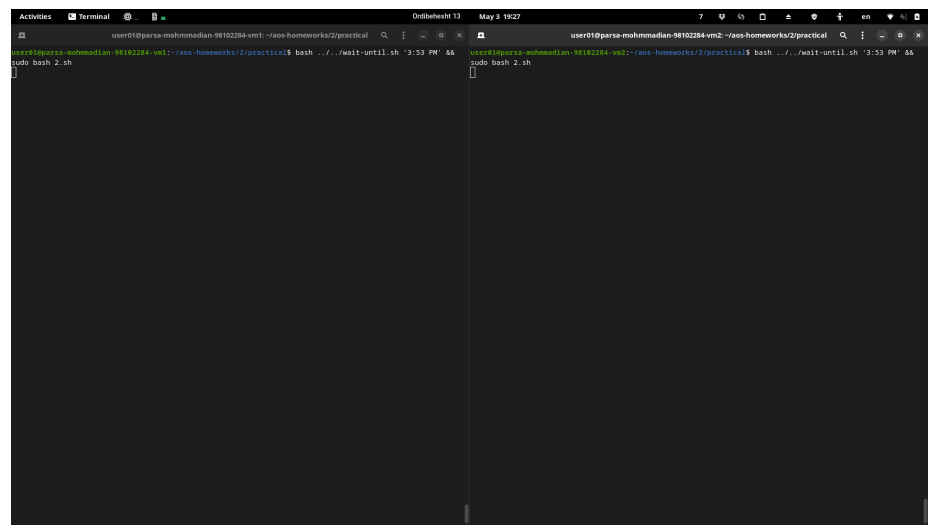
      62      page-faults
24,961      cache-misses
  1,269      dTLB-load-misses          #    0.41% of all dTLB cache accesses
306,500      dTLB-loads
156,641      dTLB-stores

0.000946218 seconds time elapsed

0.000997000 seconds user
0.000000000 seconds sys

```

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```
Activities Terminal OnBehesht 13 May 3 19:27
user01@para-mohammadian-98102284-vm1:~/aos-homeworks/2/practical$ bash .././wait-until.sh '3:53 PM' AS
sudo bash 2.sh
Running 2 with SYNC
Performance counter stats for './2 SYNC':
        65      page-faults
       1,532    cache-misses
       8,824    dTLB-load-misses # 2.62% of all dTLB cache hits
      336,631   dTLB-loads
      227,949   dTLB-stores
0.005053908 seconds time elapsed
0.003396000 seconds user
0.000000000 seconds sys

-----
Running 2 with ASYNC
Performance counter stats for './2 ASYNC':
        63      page-faults
        744     cache-misses
       6,865    dTLB-load-misses # 2.43% of all dTLB cache hits
      282,344   dTLB-loads
       193,235   dTLB-stores
0.002844051 seconds time elapsed
0.000000000 seconds user
0.003352000 seconds sys

user01@para-mohammadian-98102284-vm1:~/aos-homeworks/2/practical$

user01@para-mohammadian-98102284-vm2:~/aos-homeworks/2/practical$ bash .././wait-until.sh '3:53 PM' AS
sudo bash 2.sh
Running 2 with SYNC
Performance counter stats for './2 SYNC':
        69      page-faults
       1,603    cache-misses
       7,845    dTLB-load-misses # 2.31% of all dTLB cache hits
      339,245   dTLB-loads
      225,842   dTLB-stores
0.004817587 seconds time elapsed
0.002889000 seconds user
0.000000000 seconds sys

-----
Running 2 with ASYNC
Performance counter stats for './2 ASYNC':
        62      page-faults
       1,212    cache-misses
       5,888    dTLB-load-misses # 2.07% of all dTLB cache hits
      285,411   dTLB-loads
       194,891   dTLB-stores
0.001626137 seconds time elapsed
0.000000000 seconds user
0.001870000 seconds sys

user01@para-mohammadian-98102284-vm2:~/aos-homeworks/2/practical$
```

آمار در ماشین مجازی اول به صورت زیر است.

```
Running 2 with SYNC

Performance counter stats for './2 SYNC':

        65      page-faults
       1,532    cache-misses
       8,824    dTLB-load-misses # 2.62% of all dTLB cache hits
      336,631   dTLB-loads
      227,949   dTLB-stores

0.005053908 seconds time elapsed

0.003396000 seconds user
0.000000000 seconds sys
```

```
Running 2 with ASYNC

Performance counter stats for './2 ASYNC':

        63      page-faults
        744     cache-misses
       6,865    dTLB-load-misses # 2.43% of all dTLB cache hits
      282,344   dTLB-loads
       193,235   dTLB-stores

0.002844051 seconds time elapsed

0.000000000 seconds user
0.003352000 seconds sys
```

آمار در ماشین مجازی دوم به صورت زیر است.

```
Running 2 with SYNC

Performance counter stats for './2 SYNC':

        69      page-faults
       1,603    cache-misses
       7,845    dTLB-load-misses # 2.31% of all dTLB cache hits
      339,245   dTLB-loads
      225,842   dTLB-stores

0.004817587 seconds time elapsed

0.002889000 seconds user
0.000000000 seconds sys
```

```
Running 2 with ASYNC
```

```

Performance counter stats for './2 ASYNC':

              62      page-faults
             1,212      cache-misses
             5,888      dTLB-load-misses      #    2.07% of all dTLB cache hits
            285,011      dTLB-loads
            194,891      dTLB-stores

0.001626137 seconds time elapsed

0.000000000 seconds user
0.001870000 seconds sys

```

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TODO

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همانطور که در خروجی های قسمت الف و ب مشاهده می کنیم، برنامه یک بار برای MS_ASYNC نیز اجرا شده.

TODO

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این قسمت کدی به زبان C ندارد. اسکریپت مربوط به این قسمت در فایل 3.sh می باشد.

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```

Activities Terminal May 3 2025
parsi@assus-manjaro:~/Documents/aos-homeworks/2/practical

278,686      dTLB-load-misses      #    0.00% of all dTLB cache accesses
145,836,882,174      dTLB-loads
84,426,813,286      dTLB-stores
38.881765443 seconds time elapsed
237.881800000 seconds user
0.156258000 seconds sys

Stress with --vm 4 and --vm-bytes 512M for 30 seconds
stress: info: [17743] dispatching hogs: 0 cpu, 0 io, 4 vm, 0 hdd
stress: info: [17743] successful run completed in 30s

Performance counter stats for 'stress --vm 4 --vm-bytes 512M --timeout 30':

    672,899      page-faults
   11,645,244,772      cache-misses
    1,886,161      dTLB-load-misses      #    0.00% of all dTLB cache accesses
   3,328,957,680      dTLB-loads
    1,918,450,981      dTLB-stores
38.883483432 seconds time elapsed
3.314622800 seconds user
116.132978000 seconds sys

Stress with --io 5 for 30 seconds
stress: info: [17800] dispatching hogs: 0 cpu, 5 io, 0 vm, 0 hdd
stress: info: [17800] successful run completed in 30s

Performance counter stats for 'stress --io 5 --timeout 30':

    142      page-faults
    3,429,897      cache-misses
    2,217,780      dTLB-load-misses      #    0.01% of all dTLB cache accesses
   15,382,782,747      dTLB-loads
   10,787,528,099      dTLB-stores
38.881736822 seconds time elapsed
0.593738000 seconds user
124.914511000 seconds sys

```

خروجی به صورت زیر است.

```

Running 3.sh
Stress with --cpu 10 for 3 seconds
stress: info: [15825] dispatching hogs: 10 cpu, 0 io, 0 vm, 0 hdd
stress: info: [15825] successful run completed in 3s

Performance counter stats for 'stress --cpu 10 --timeout 3':

          249      page-faults
        424,524    cache-misses
          40,139    dTLB-load-misses          #    0.00% of all dTLB cache accesses
       14,601,481,747 dTLB-loads
        8,453,054,195 dTLB-stores

          3.002095545 seconds time elapsed

          23.729431000 seconds user
           0.000000000 seconds sys

Stress with --vm 4 and --vm-bytes 512M for 3 seconds
stress: info: [15837] dispatching hogs: 0 cpu, 0 io, 4 vm, 0 hdd
stress: info: [15837] successful run completed in 3s

Performance counter stats for 'stress --vm 4 --vm-bytes 512M --timeout 3':

          67,552      page-faults
       1,168,546,994    cache-misses
          189,917    dTLB-load-misses          #    0.06% of all dTLB cache accesses
       333,679,196    dTLB-loads
       192,506,882    dTLB-stores

          3.003246134 seconds time elapsed

          0.348566000 seconds user
          11.572867000 seconds sys

Stress with --io 5 for 3 seconds
stress: info: [15847] dispatching hogs: 0 cpu, 5 io, 0 vm, 0 hdd
stress: info: [15847] successful run completed in 3s

Performance counter stats for 'stress --io 5 --timeout 3':

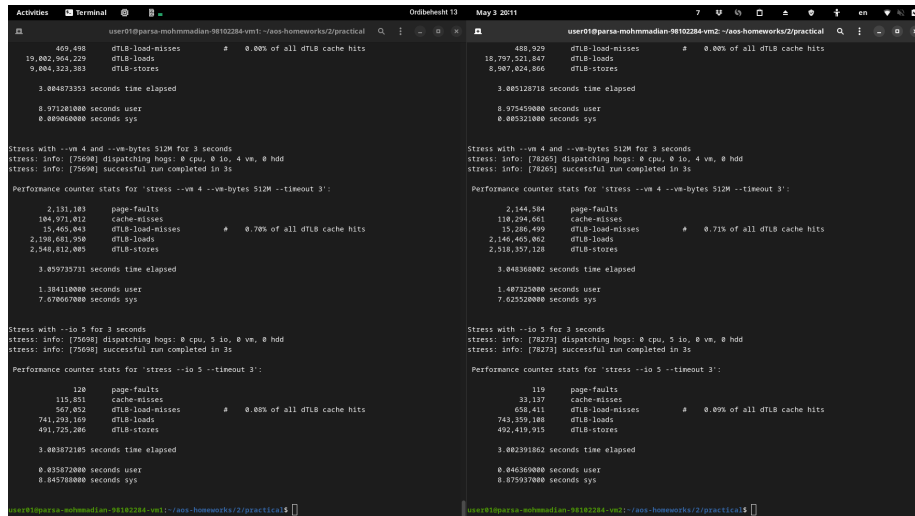
          152      page-faults
         456,272    cache-misses
          295,050    dTLB-load-misses          #    0.02% of all dTLB cache accesses
       1,678,024,471 dTLB-loads
       1,184,417,634 dTLB-stores

          3.001306920 seconds time elapsed

          0.056395000 seconds user
          12.314625000 seconds sys

```

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آمار در ماشین مجازی اول به صورت زیر است.

Running 3.sh

Stress with —cpu 10 for 3 seconds
stress: info: [75674] dispatching hogs: 10 cpu, 0 io, 0 vm, 0 hdd
stress: info: [75674] successful run completed in 3s

Performance counter stats for 'stress —cpu 10 —timeout 3':

```

              190          page-faults
              60,794        cache-misses
              469,498      dTLB-load-misses          #    0.00% of all dTLB cache hits
19,002,964,229      dTLB-loads
          9,004,323,383      dTLB-stores

              3.004873353 seconds time elapsed

              8.971201000 seconds user
              0.009060000 seconds sys
```

Stress with —vm 4 and —vm-bytes 512M for 3 seconds
stress: info: [75690] dispatching hogs: 0 cpu, 0 io, 4 vm, 0 hdd
stress: info: [75690] successful run completed in 3s

Performance counter stats for 'stress —vm 4 —vm-bytes 512M —timeout 3':

```

              2,131,103      page-faults
104,971,012          cache-misses
          15,465,043        dTLB-load-misses          #    0.70% of all dTLB cache hits
2,198,681,950      dTLB-loads
2,548,812,005      dTLB-stores

              3.059735731 seconds time elapsed

              1.384110000 seconds user
              7.670667000 seconds sys
```

Stress with —io 5 for 3 seconds
stress: info: [75698] dispatching hogs: 0 cpu, 5 io, 0 vm, 0 hdd
stress: info: [75698] successful run completed in 3s

Performance counter stats for 'stress —io 5 —timeout 3':

```

              120          page-faults
              115,851        cache-misses
              567,052        dTLB-load-misses          #    0.08% of all dTLB cache hits
741,293,169          dTLB-loads
491,725,206          dTLB-stores
```

^


```
3.003872105 seconds time elapsed
0.035872000 seconds user
8.845788000 seconds sys
```

آمار در ماشین مجازی دوم به صورت زیر است.

```
Running 3.sh
Stress with --cpu 10 for 3 seconds
stress: info: [78249] dispatching hogs: 10 cpu, 0 io, 0 vm, 0 hdd
stress: info: [78249] successful run completed in 3s

Performance counter stats for 'stress --cpu 10 --timeout 3':

      199          page-faults
    197,577        cache-misses
    488,929        dTLB-load-misses          #    0.00% of all dTLB cache hits
  18,797,521,847   dTLB-loads
    8,907,024,866   dTLB-stores

    3.005128718 seconds time elapsed

    8.975459000 seconds user
    0.005321000 seconds sys
```

```
Stress with --vm 4 and --vm-bytes 512M for 3 seconds
stress: info: [78265] dispatching hogs: 0 cpu, 0 io, 4 vm, 0 hdd
stress: info: [78265] successful run completed in 3s

Performance counter stats for 'stress --vm 4 --vm-bytes 512M --timeout 3':

    2,144,584      page-faults
  110,294,661      cache-misses
    15,286,499      dTLB-load-misses          #    0.71% of all dTLB cache hits
  2,146,465,062    dTLB-loads
  2,518,357,128    dTLB-stores

    3.048368002 seconds time elapsed

    1.407325000 seconds user
    7.625520000 seconds sys
```

```
Stress with --io 5 for 3 seconds
stress: info: [78273] dispatching hogs: 0 cpu, 5 io, 0 vm, 0 hdd
stress: info: [78273] successful run completed in 3s

Performance counter stats for 'stress --io 5 --timeout 3':

      119          page-faults
    33,137          cache-misses
    658,411          dTLB-load-misses          #    0.09% of all dTLB cache hits
   743,359,108       dTLB-loads
   492,419,915       dTLB-stores

    3.002391862 seconds time elapsed

    0.046369000 seconds user
    8.875937000 seconds sys
```

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TODO