



Факультет программной инженерии и компьютерной техники
Направление подготовки: Информатика и вычислительная техника
Дисциплина «Операционные системы»

Лабораторная работа №1

Вариант 165788

Выполнил:

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P33302

Преподаватель

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г. Санкт-Петербург, 2022 г.

Задание:

Выяснить следующую информацию:

1. Количество потоков создаваемое программой;
2. Список файлов и сетевых соединений с которыми работает программа
3. Карту памяти процесса;
4. Содержимое передаваемых по сети данных;
5. Построить графики:
 - Потребления программой сру;
 - Нагрузки генерируемой программой на подсистему ввода-вывода;
 - Нагрузки генерируемой программой на сетевую подсистему.
 - Смены состояния исполнения потоков;

PID процесса:

```
albogotov@MSI:~/Desktop$ ps aux | grep 165788
albogot+ 1378 306 30.7 3266780 1958064 pts/4 Sl+ 21:43 5:00 ./165788
albogot+ 1407 0.0 0.0 8164 728 pts/3 S+ 21:45 0:00 grep --color=au
to 165788
```

Количество потоков создаваемое программой:

```
Every 2.0s: ps -o thcount 1378 MSI: Sat Sep 24 21:47:28 2022

THCNT
25
```

Данные о потоках:

top -H -p <pid>

```
top - 21:48:55 up 41 min, 0 users, load average: 1.89, 1.50, 0.88
Threads: 25 total, 1 running, 24 sleeping, 0 stopped, 0 zombie
%Cpu(s): 3.7 us, 8.8 sy, 0.0 ni, 87.4 id, 0.0 wa, 0.0 hi, 0.2 si, 0.0 st
MiB Mem : 6218.5 total, 695.2 free, 2929.8 used, 2593.6 buff/cache
MiB Swap: 2048.0 total, 2048.0 free, 0.0 used. 2978.6 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1383	albogot+	20	0	3266780	1.9g	3404	S	29.9	30.8	0:18.40	165788
1388	albogot+	20	0	3266780	1.9g	3404	S	14.0	30.8	0:12.25	165788
1380	albogot+	20	0	3266780	1.9g	3404	S	7.0	30.8	0:11.47	165788
1389	albogot+	20	0	3266780	1.9g	3404	R	5.3	30.8	0:20.36	165788
1379	albogot+	20	0	3266780	1.9g	3404	S	2.0	30.8	0:24.24	165788
1387	albogot+	20	0	3266780	1.9g	3404	S	2.0	30.8	0:25.84	165788
1381	albogot+	20	0	3266780	1.9g	3404	S	0.7	30.8	0:27.35	165788
1391	albogot+	20	0	3266780	1.9g	3404	S	0.7	30.8	0:22.26	165788
1393	albogot+	20	0	3266780	1.9g	3404	S	0.7	30.8	0:27.29	165788
1385	albogot+	20	0	3266780	1.9g	3404	S	0.3	30.8	0:27.23	165788
1378	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:00.01	165788
1382	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:18.18	165788
1384	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:10.26	165788
1386	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:18.64	165788
1390	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:11.00	165788
1392	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:17.53	165788
1394	albogot+	20	0	3266780	1.9g	3404	S	0.0	30.8	0:14.56	165788

или `ps -T -p <pid>`

```
albogatov@MSI:~/Desktop$ ps -T -p 1378
```

PID	SPID	TTY	TIME	CMD
1378	1378	pts/4	00:00:00	165788
1378	1379	pts/4	00:00:25	165788
1378	1380	pts/4	00:00:12	165788
1378	1381	pts/4	00:00:30	165788
1378	1382	pts/4	00:00:19	165788
1378	1383	pts/4	00:00:19	165788
1378	1384	pts/4	00:00:11	165788
1378	1385	pts/4	00:00:29	165788
1378	1386	pts/4	00:00:20	165788
1378	1387	pts/4	00:00:27	165788
1378	1388	pts/4	00:00:14	165788
1378	1389	pts/4	00:00:21	165788
1378	1390	pts/4	00:00:12	165788
1378	1391	pts/4	00:00:23	165788
1378	1392	pts/4	00:00:20	165788
1378	1393	pts/4	00:00:29	165788
1378	1394	pts/4	00:00:16	165788
1378	1395	pts/4	00:00:00	165788
1378	1396	pts/4	00:00:00	165788
1378	1397	pts/4	00:00:00	165788
1378	1398	pts/4	00:00:00	165788
1378	1399	pts/4	00:00:00	165788
1378	1400	pts/4	00:02:24	165788
1378	1401	pts/4	00:02:24	165788
1378	1402	pts/4	00:02:24	165788

```
albogatov@MSI:~/Desktop$
```

Список файлов, с которыми работает программа:

Посмотреть открытые в данный момент программой файлы:

```
albogatov@MSI:~/Desktop$ lsof -p 1378
```

COMMAND	PID	USER	FD	TYPE	DEVICE	SIZE/OFF	NODE	NAME
165788	1378	albogatov	cwd	DIR	8,16	4096	94117	/home/albogatov/Downloads
165788	1378	albogatov	rtd	DIR	8,16	4096	2	/
165788	1378	albogatov	txt	REG	8,16	248752	143656	/home/albogatov/Downloads/165788
165788	1378	albogatov	mem	REG	8,16	2029224	12114	/usr/lib/x86_64-linux-gnu/libc-2.31.so
165788	1378	albogatov	mem	REG	8,16	157224	12484	/usr/lib/x86_64-linux-gnu/libpthread-2.31.so
165788	1378	albogatov	mem	REG	8,16	104984	12228	/usr/lib/x86_64-linux-gnu/libgcc_s.so.1
165788	1378	albogatov	mem	REG	8,16	1369352	12357	/usr/lib/x86_64-linux-gnu/libm-2.31.so
165788	1378	albogatov	mem	REG	8,16	1956992	12538	/usr/lib/x86_64-linux-gnu/libstdc++.so.6.0.28
165788	1378	albogatov	mem	REG	8,16	191472	11981	/usr/lib/x86_64-linux-gnu/ld-2.31.so
165788	1378	albogatov	0u	CHR	136,4	0t0	7	/dev/pts/4
165788	1378	albogatov	1u	CHR	136,4	0t0	7	/dev/pts/4
165788	1378	albogatov	2u	CHR	136,4	0t0	7	/dev/pts/4
165788	1378	albogatov	3u	sock	0,7	0t0	31884	protocol: TCP
165788	1378	albogatov	4u	IPv4	31882	0t0	TCP	*:4947 (LISTEN)

Посмотреть все файлы, которые открывала программа за последние 30 секунд:

```
timeout 30 strace -f -t -e trace=file -p 856 2>&1 >/dev/null | awk -F "" '!seen[$2] {print $2;} {++seen[$2]}
```

```
albogatov@MSI:~/Desktop$ timeout 30 strace -f -t -e trace=file -p 856 2>&1 >/dev/null | awk -F "" '!seen[$2] {print $2;} {++seen[$2]}
```

13553890257905065566
/etc/passwd
11576761484161525814
/dev/zero
12271515046363969678
2022048254756203850
18134296188166314802
3469286547223404889
12966888916250230423
7561982518006718680
10263659426985177859
6984463500224149286
6478227200748025043
4965104702427855506
6385848987412134065
11049604089384987395
17284930747909707490
9051488070670766602

Список сетевых соединений, с которыми работает программа:

```
albogatov@MSI:~/Desktop$ lsof -i | grep 406
165788  406  albogatov    3u  IPv4  21963      0t0  TCP *:4948 (LISTEN)
165788  406  albogatov    5u  IPv4  21948      0t0  TCP *:4947 (LISTEN)
albogatov@MSI:~/Desktop$ netstat -nlp | grep 406
(Not all processes could be identified, non-owned process info
will not be shown, you would have to be root to see it all.)
tcp        0      0 0.0.0.0:4947          0.0.0.0:*            LISTEN      406/./165788
```

Карта памяти процесса:

```
albogatov@MSI:~/Desktop$ pmap -d 406
```

```
406: ./165788
```

Address	Kbytes	Mode	Offset	Device	Mapping
0000000000400000	240	r-x--	0000000000000000	008:00010	165788
0000000000063b000	4	r----	0000000000003b000	008:00010	165788
0000000000063c000	4	rw---	0000000000003c000	008:00010	165788
0000000000098d000	132	rw---	0000000000000000	000:00000	[anon]
00007fd958900000	121856	rw---	0000000000000000	000:00000	[anon]
00007fd960000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd960021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd968000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd968021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd96c000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd96c021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd970000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd970021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd974000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd974021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd978000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd978021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd984900000	121856	rw---	0000000000000000	000:00000	[anon]
00007fd98c000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd98c021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd993600000	731136	rw---	0000000000000000	000:00000	[anon]
00007fd9c0000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9c0021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9c4000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9c4021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9c8000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9c8021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9d0000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9d0021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9d4000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9d4021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9d8000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9d8021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9dc000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9dc021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9e0000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9e0021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9e4000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9e4021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9e8000000	132	rw---	0000000000000000	000:00000	[anon]
00007fd9e8021000	65404	-----	0000000000000000	000:00000	[anon]
00007fd9ec2bb000	4	-----	0000000000000000	000:00000	[anon]
00007fd9ec2bc000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9ecabc000	4	-----	0000000000000000	000:00000	[anon]

```
<
```

00007fd9ecabd000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9ed2bd000	4	----	0000000000000000	000:00000	[anon]
00007fd9ed2be000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9edabe000	4	----	0000000000000000	000:00000	[anon]
00007fd9edabf000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9ee2bf000	4	----	0000000000000000	000:00000	[anon]
00007fd9ee2c0000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9eeac0000	4	----	0000000000000000	000:00000	[anon]
00007fd9eeac1000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9ef2c1000	4	----	0000000000000000	000:00000	[anon]
00007fd9ef2c2000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9efac2000	4	----	0000000000000000	000:00000	[anon]
00007fd9efac3000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f02c3000	4	----	0000000000000000	000:00000	[anon]
00007fd9f02c4000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f0ac4000	4	----	0000000000000000	000:00000	[anon]
00007fd9f0ac5000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f12c5000	4	----	0000000000000000	000:00000	[anon]
00007fd9f12c6000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f1ac6000	4	----	0000000000000000	000:00000	[anon]
00007fd9f1ac7000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f22c7000	4	----	0000000000000000	000:00000	[anon]
00007fd9f22c8000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f2ac8000	4	----	0000000000000000	000:00000	[anon]
00007fd9f2ac9000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f32c9000	4	----	0000000000000000	000:00000	[anon]
00007fd9f32ca000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f3aca000	4	----	0000000000000000	000:00000	[anon]
00007fd9f3acb000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f42cb000	4	----	0000000000000000	000:00000	[anon]
00007fd9f42cc000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f4acc000	4	----	0000000000000000	000:00000	[anon]
00007fd9f4acd000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f52cd000	4	----	0000000000000000	000:00000	[anon]
00007fd9f52ce000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f5ace000	4	----	0000000000000000	000:00000	[anon]
00007fd9f5acf000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f62cf000	4	----	0000000000000000	000:00000	[anon]
00007fd9f62d0000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f6ad0000	4	----	0000000000000000	000:00000	[anon]
00007fd9f6ad1000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f72d1000	4	----	0000000000000000	000:00000	[anon]
00007fd9f72d2000	8192	rw---	0000000000000000	000:00000	[anon]
00007fd9f7ad2000	4	----	0000000000000000	000:00000	[anon]
00007fd9f7ad3000	983060	rw---	0000000000000000	000:00000	[anon]
00007fda33ad8000	148	r----	0000000000000000	008:00010	libc-2.31.so
00007fda33afd000	1504	r-x--	0000000000025000	008:00010	libc-2.31.so
00007fda33c75000	296	r----	000000000019d000	008:00010	libc-2.31.so
00007fda33cbf000	4	----	00000000001e7000	008:00010	libc-2.31.so

```

00007fda33cc0000 12 r---- 000000000001e7000 008:00010 libc-2.31.so
00007fda33cc3000 12 rw--- 000000000001ea000 008:00010 libc-2.31.so
00007fda33cc6000 16 rw--- 00000000000000000 000:00000 [ anon ]
00007fda33cca000 28 r---- 00000000000000000 008:00010 libpthread-2.31.so
00007fda33cd1000 68 r-x-- 00000000000007000 008:00010 libpthread-2.31.so
00007fda33ce2000 20 r---- 0000000000018000 008:00010 libpthread-2.31.so
00007fda33ce7000 4 r---- 000000000001c000 008:00010 libpthread-2.31.so
00007fda33ce8000 4 rw--- 000000000001d000 008:00010 libpthread-2.31.so
00007fda33ce9000 16 rw--- 00000000000000000 000:00000 [ anon ]
00007fda33ced000 12 r---- 00000000000000000 008:00010 libgcc_s.so.1
00007fda33cf0000 72 r-x-- 00000000000003000 008:00010 libgcc_s.so.1
00007fda33d02000 16 r---- 0000000000015000 008:00010 libgcc_s.so.1
00007fda33d06000 4 r---- 0000000000018000 008:00010 libgcc_s.so.1
00007fda33d07000 4 rw--- 0000000000019000 008:00010 libgcc_s.so.1
00007fda33d08000 60 r---- 00000000000000000 008:00010 libm-2.31.so
00007fda33d17000 668 r-x-- 000000000000f000 008:00010 libm-2.31.so
00007fda33dbe000 604 r---- 00000000000b6000 008:00010 libm-2.31.so
00007fda33e55000 4 r---- 0000000000014c000 008:00010 libm-2.31.so
00007fda33e56000 4 rw--- 0000000000014d000 008:00010 libm-2.31.so
00007fda33e57000 600 r---- 00000000000000000 008:00010 libstdc++.so.6.0.28
00007fda33eed000 964 r-x-- 0000000000096000 008:00010 libstdc++.so.6.0.28
00007fda33fde000 292 r---- 00000000000187000 008:00010 libstdc++.so.6.0.28
00007fda34027000 4 ----- 000000000001d0000 008:00010 libstdc++.so.6.0.28
00007fda34028000 44 r---- 000000000001d0000 008:00010 libstdc++.so.6.0.28
00007fda34033000 12 rw--- 000000000001db000 008:00010 libstdc++.so.6.0.28
00007fda34036000 20 rw--- 00000000000000000 000:00000 [ anon ]
00007fda3404a000 8 rw--- 00000000000000000 000:00000 [ anon ]
00007fda3404c000 4 r---- 00000000000000000 008:00010 ld-2.31.so
00007fda3404d000 140 r-x-- 0000000000001000 008:00010 ld-2.31.so
00007fda34070000 32 r---- 0000000000024000 008:00010 ld-2.31.so
00007fda34078000 4 rw--- 00000000000000000 000:00000 [ anon ]
00007fda34079000 4 r---- 000000000002c000 008:00010 ld-2.31.so
00007fda3407a000 4 rw--- 000000000002d000 008:00010 ld-2.31.so
00007fda3407b000 4 rw--- 00000000000000000 000:00000 [ anon ]
00007ffe4f16f000 132 rw--- 00000000000000000 000:00000 [ stack ]
00007ffe4f1ba000 16 r---- 00000000000000000 000:00000 [ anon ]
00007ffe4f1be000 4 r-x-- 00000000000000000 000:00000 [ anon ]
mapped: 3266780K writeable/private: 2148944K shared: 0K
albogotov@MSI:~/Desktop$ █

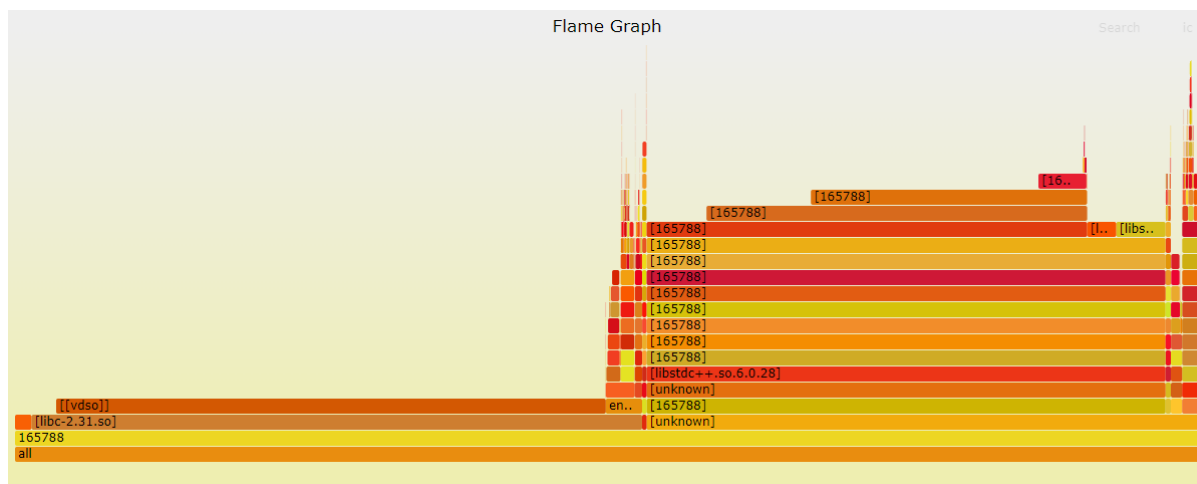
```


Содержимое передаваемых данных:

```
albogatov@MSI:~/Desktop$ strace -p 406 -f -e trace=network -s 10000
strace: Process 406 attached with 25 threads
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 425] socket(AF_INET, SOCK_STREAM, IPPROTO_IP) = 6
[pid 425] setsockopt(6, SOL_SOCKET, SO_REUSEADDR, [1], 4) = 0
[pid 425] bind(6, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("0.0.0.0")}, 16) = 0
[pid 425] listen(6, 128) = 0
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = 0
[pid 426] sendto(4, "mykys", 6, 0, NULL, 0 <unfinished ...>)
[pid 425] accept(6, <unfinished ...>) = 6
[pid 426] <... sendto resumed> = 6
[pid 425] <... accept resumed>{sa_family=AF_INET, sin_port=htons(46614), sin_addr=inet_addr("127.0.0.1")}, [16] = 3
[pid 425] recvfrom(3, "mykys", 2727, 0, NULL, NULL) = 6
[pid 425] recvfrom(3, "", 2727, 0, NULL, NULL) = 0
[pid 424] socket(AF_INET, SOCK_STREAM, IPPROTO_TCP) = 3
[pid 424] connect(3, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 424] connect(3, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 424] connect(3, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 424] connect(3, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 426] socket(AF_INET, SOCK_STREAM, IPPROTO_TCP) = 4
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 424] connect(3, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 423] socket(AF_INET, SOCK_STREAM, IPPROTO_IP) = 5
[pid 423] setsockopt(5, SOL_SOCKET, SO_REUSEADDR, [1], 4) = 0
[pid 423] bind(5, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("0.0.0.0")}, 16) = 0
[pid 423] listen(5, 128) = 0
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 424] connect(3, {sa_family=AF_INET, sin_port=htons(4947), sin_addr=inet_addr("127.0.0.1")}, 16) = 0
[pid 424] sendto(3, "mykys", 6, 0, NULL, 0 <unfinished ...>)
[pid 423] accept(5, <unfinished ...>) = 6
[pid 424] <... sendto resumed> = 6
[pid 423] <... accept resumed>{sa_family=AF_INET, sin_port=htons(60318), sin_addr=inet_addr("127.0.0.1")}, [16] = 6
[pid 423] recvfrom(6, "mykys", 2727, 0, NULL, NULL) = 6
[pid 423] recvfrom(6, "", 2727, 0, NULL, NULL) = 0
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
[pid 426] connect(4, {sa_family=AF_INET, sin_port=htons(4948), sin_addr=inet_addr("127.0.0.1")}, 16) = -1 ECONNREFUSED (Connection refused)
```

```
albogatov@MSI:~/Desktop$ sudo tcpdump -n -i any | grep -e \\4948 -e \\4947
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked v1), capture size 262144 bytes
13:12:34.134219 IP 127.0.0.1.4948 > 127.0.0.1.47388: Flags [S], seq 740396213, win 65495, options [mss 65495,sackOK,TS val 103646864 ecr 0,nop,wscale 7], length 0
13:12:34.134226 IP 127.0.0.1.4948 > 127.0.0.1.47388: Flags [R.], seq 0, ack 740396214, win 0, length 0
13:12:34.731313 IP 127.0.0.1.32846 > 127.0.0.1.4947: Flags [S], seq 2854816252, win 65495, options [mss 65495,sackOK,TS val 1036469238 ecr 0,nop,wscale 7], length 0
13:12:34.731321 IP 127.0.0.1.4947 > 127.0.0.1.32846: Flags [S.], seq 928193458, ack 2854816253, win 65483, options [mss 65495,sackOK,TS val 1036469238 ecr 1036469238,nop,wscale 7], length 0
13:12:34.731329 IP 127.0.0.1.32846 > 127.0.0.1.4947: Flags [.], ack 1, win 512, options [nop,nop,TS val 1036469238 ecr 1036469238], length 0
13:12:34.731358 IP 127.0.0.1.32846 > 127.0.0.1.4947: Flags [P.], seq 1:7, ack 1, win 512, options [nop,nop,TS val 1036469238 ecr 1036469238], length 6
13:12:34.731361 IP 127.0.0.1.4947 > 127.0.0.1.32846: Flags [.], ack 7, win 512, options [nop,nop,TS val 1036469238 ecr 1036469238], length 0
13:12:34.731369 IP 127.0.0.1.32846 > 127.0.0.1.4947: Flags [F.], seq 7, ack 1, win 512, options [nop,nop,TS val 1036469238 ecr 1036469238], length 0
13:12:34.731413 IP 127.0.0.1.4947 > 127.0.0.1.32846: Flags [F.], seq 1, ack 8, win 512, options [nop,nop,TS val 1036469238 ecr 1036469238], length 0
13:12:34.731421 IP 127.0.0.1.32846 > 127.0.0.1.4947: Flags [.], ack 2, win 512, options [nop,nop,TS val 1036469238 ecr 1036469238], length 0
13:12:35.134326 IP 127.0.0.1.47392 > 127.0.0.1.4948: Flags [S], seq 740396216, win 65495, options [mss 65495,sackOK,TS val 1036469641 ecr 0,nop,wscale 7], length 0
13:12:35.134333 IP 127.0.0.1.4948 > 127.0.0.1.47392: Flags [R.], seq 0, ack 740396217, win 0, length 0
13:12:36.134394 IP 127.0.0.1.47394 > 127.0.0.1.4948: Flags [S], seq 740396219, win 65495, options [mss 65495,sackOK,TS val 1036470641 ecr 0,nop,wscale 7], length 0
13:12:36.134401 IP 127.0.0.1.4948 > 127.0.0.1.47394: Flags [R.], seq 0, ack 740396220, win 0, length 0
13:12:37.134545 IP 127.0.0.1.47396 > 127.0.0.1.4948: Flags [S], seq 740396222, win 65495, options [mss 65495,sackOK,TS val 1036471641 ecr 0,nop,wscale 7], length 0
13:12:37.134553 IP 127.0.0.1.4948 > 127.0.0.1.47396: Flags [S.], seq 2433930567, ack 740396223, win 65483, options [mss 65495,sackOK,TS val 1036471641 ecr 1036471641,nop,wscale 7], length 0
13:12:37.134559 IP 127.0.0.1.47396 > 127.0.0.1.4948: Flags [.], ack 1, win 512, options [nop,nop,TS val 1036471641 ecr 1036471641], length 0
13:12:37.134587 IP 127.0.0.1.47396 > 127.0.0.1.4948: Flags [P.], seq 1:7, ack 1, win 512, options [nop,nop,TS val 1036471641 ecr 1036471641], length 6
13:12:37.134590 IP 127.0.0.1.4948 > 127.0.0.1.47396: Flags [.], ack 7, win 512, options [nop,nop,TS val 1036471641 ecr 1036471641], length 0
13:12:37.134597 IP 127.0.0.1.47396 > 127.0.0.1.4948: Flags [F.], seq 7, ack 1, win 512, options [nop,nop,TS val 1036471641 ecr 1036471641], length 0
13:12:37.134629 IP 127.0.0.1.4948 > 127.0.0.1.47396: Flags [F.], seq 1, ack 8, win 512, options [nop,nop,TS val 1036471641 ecr 1036471641], length 0
13:12:37.134637 IP 127.0.0.1.47396 > 127.0.0.1.4948: Flags [.], ack 2, win 512, options [nop,nop,TS val 1036471641 ecr 1036471641], length 0
```


График потребления CPU по вызовам в программе (Flamegraph):

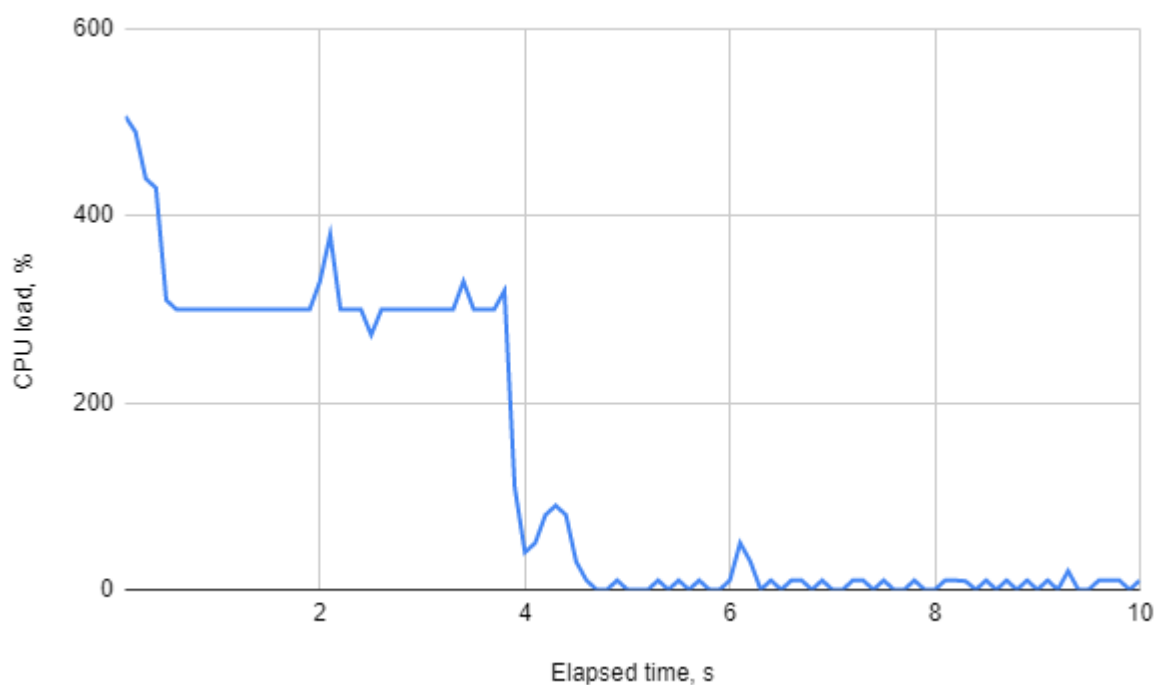


```
sudo perf record -p <pid> -F 99 -g -- sleep 60
```

```
perf script | ./stackcollapse-perf.pl > out.perf-folded
```

```
./flamegraph.pl out.perf-folded > perf.svg
```

График нагрузки на ЦП с помощью top:



```

albogatov@MSI:~/Downloads$ top -b -n 100 -d .1 -p 846
top - 18:00:10 up 15 min,  0 users,  load average: 1.90, 1.43, 0.90
Tasks:  1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,   0.0 sy,   0.0 ni,100.0 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  6218.5 total,   1972.6 free,   2001.0 used,   2244.9 buff/cache
MiB Swap:  2048.0 total,   2048.0 free,     0.0 used.  3971.1 avail Mem

   PID USER      PR  NI   VIRT   RES   SHR S  %CPU  %MEM    TIME+  COMMAND
   846 albogat+  20   0 3266780  1.9g  3320 S   0.0   30.8    0:31.75 165788

top - 18:00:10 up 15 min,  0 users,  load average: 1.90, 1.43, 0.90
Tasks:  1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,   0.0 sy,   0.0 ni,100.0 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  6218.5 total,   1972.6 free,   2001.0 used,   2244.9 buff/cache
MiB Swap:  2048.0 total,   2048.0 free,     0.0 used.  3971.1 avail Mem

   PID USER      PR  NI   VIRT   RES   SHR S  %CPU  %MEM    TIME+  COMMAND
   846 albogat+  20   0 3266780  1.9g  3320 S   0.0   30.8    0:31.75 165788

top - 18:00:10 up 15 min,  0 users,  load average: 1.90, 1.43, 0.90
Tasks:  1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,   0.0 sy,   0.0 ni,100.0 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  6218.5 total,   1972.6 free,   2001.0 used,   2244.9 buff/cache
MiB Swap:  2048.0 total,   2048.0 free,     0.0 used.  3971.1 avail Mem

   PID USER      PR  NI   VIRT   RES   SHR S  %CPU  %MEM    TIME+  COMMAND
   846 albogat+  20   0 3266780  1.9g  3320 S  20.0   30.8    0:31.77 165788

top - 18:00:10 up 15 min,  0 users,  load average: 1.90, 1.43, 0.90
Tasks:  1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,   0.0 sy,   0.0 ni,100.0 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  6218.5 total,   1972.6 free,   2001.0 used,   2244.9 buff/cache
MiB Swap:  2048.0 total,   2048.0 free,     0.0 used.  3971.1 avail Mem

   PID USER      PR  NI   VIRT   RES   SHR S  %CPU  %MEM    TIME+  COMMAND
   846 albogat+  20   0 3266780  1.9g  3320 S   0.0   30.8    0:31.77 165788

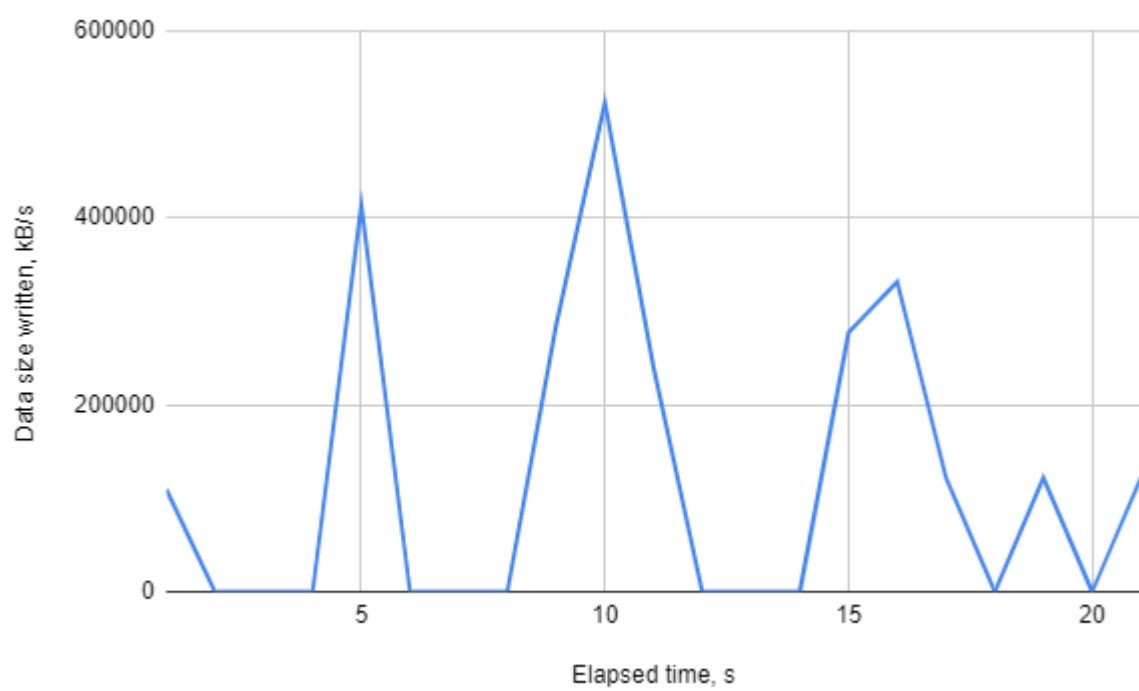
top - 18:00:10 up 15 min,  0 users,  load average: 1.90, 1.43, 0.90
Tasks:  1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,   0.0 sy,   0.0 ni,100.0 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  6218.5 total,   1972.6 free,   2001.0 used,   2244.9 buff/cache
MiB Swap:  2048.0 total,   2048.0 free,     0.0 used.  3971.1 avail Mem

   PID USER      PR  NI   VIRT   RES   SHR S  %CPU  %MEM    TIME+  COMMAND
   846 albogat+  20   0 3266780  1.9g  3320 S   0.0   30.8    0:31.77 165788

top - 18:00:10 up 15 min,  0 users,  load average: 1.90, 1.43, 0.90
Tasks:  1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,   0.0 sy,   0.0 ni,100.0 id,   0.0 wa,   0.0 hi,   0.0 si,   0.0 st
MiB Mem :  6218.5 total,   1972.6 free,   2001.0 used,   2244.9 buff/cache
MiB Swap:  2048.0 total,   2048.0 free,     0.0 used.  3971.1 avail Mem

```

График нагрузки на I/O подсистему:



```
albogotov@MSI:~/Downloads$ pidstat -p 25 -dl 1
Linux 5.10.16.3-microsoft-standard-WSL2 (MSI)    09/25/22    _x86_64_    (8 CPU)
```

	UID	PID	kB_rd/s	kB_wr/s	kB_ccwr/s	iodelay	Command
17:55:16							
17:55:17	1000	25	0.00	365568.00	0.00	0	./165788
17:55:18	1000	25	0.00	243712.00	0.00	0	./165788
17:55:19	1000	25	0.00	0.00	0.00	0	./165788
17:55:20	1000	25	0.00	365568.00	0.00	0	./165788
17:55:21	1000	25	0.00	365568.00	0.00	0	./165788
17:55:22	1000	25	0.00	187148.00	0.00	0	./165788
17:55:23	1000	25	0.00	56564.00	0.00	0	./165788
17:55:24	1000	25	0.00	365568.00	0.00	0	./165788
17:55:25	1000	25	0.00	0.00	0.00	0	./165788
17:55:26	1000	25	0.00	0.00	0.00	0	./165788
17:55:27	1000	25	0.00	0.00	0.00	0	./165788
17:55:28	1000	25	0.00	0.00	0.00	0	./165788
17:55:29	1000	25	0.00	0.00	0.00	0	./165788
17:55:30	1000	25	0.00	0.00	0.00	0	./165788
17:55:31	1000	25	0.00	0.00	0.00	0	./165788
17:55:32	1000	25	0.00	0.00	0.00	0	./165788
17:55:33	1000	25	0.00	0.00	0.00	0	./165788
17:55:34	1000	25	0.00	0.00	0.00	0	./165788
17:55:35	1000	25	0.00	0.00	0.00	0	./165788
17:55:36	1000	25	0.00	0.00	0.00	0	./165788
17:55:37	1000	25	0.00	0.00	0.00	0	./165788
17:55:38	1000	25	0.00	0.00	0.00	0	./165788
17:55:39	1000	25	0.00	0.00	0.00	0	./165788
17:55:40	1000	25	0.00	0.00	0.00	0	./165788
17:55:41	1000	25	0.00	0.00	0.00	0	./165788
17:55:42	1000	25	0.00	365568.00	0.00	0	./165788
17:55:43	1000	25	0.00	243712.00	0.00	0	./165788
17:55:44	1000	25	0.00	0.00	0.00	0	./165788
17:55:45	1000	25	0.00	365568.00	0.00	0	./165788
17:55:46	1000	25	0.00	296040.00	0.00	0	./165788
17:55:47	1000	25	0.00	191384.00	0.00	0	./165788
17:55:48	1000	25	0.00	121856.00	0.00	0	./165788
17:55:49	1000	25	0.00	365568.00	0.00	0	./165788
17:55:50	1000	25	0.00	0.00	0.00	0	./165788
17:55:51	1000	25	0.00	0.00	0.00	0	./165788
17:55:52	1000	25	0.00	0.00	0.00	0	./165788
17:55:53	1000	25	0.00	0.00	0.00	0	./165788
17:55:54	1000	25	0.00	0.00	0.00	0	./165788
17:55:55	1000	25	0.00	0.00	0.00	0	./165788
17:55:56	1000	25	0.00	0.00	0.00	0	./165788
17:55:57	1000	25	0.00	0.00	0.00	0	./165788
17:55:58	1000	25	0.00	0.00	0.00	0	./165788
17:55:59	1000	25	0.00	0.00	0.00	0	./165788
17:56:00	1000	25	0.00	0.00	0.00	0	./165788
17:56:01	1000	25	0.00	0.00	0.00	0	./165788
17:56:02	1000	25	0.00	0.00	0.00	0	./165788
17:56:03	1000	25	0.00	0.00	0.00	0	./165788
17:56:04	1000	25	0.00	0.00	0.00	0	./165788
17:56:05	1000	25	0.00	0.00	0.00	0	./165788
17:56:06	1000	25	0.00	0.00	0.00	0	./165788
17:56:07	1000	25	0.00	365568.00	0.00	0	./165788
17:56:08	1000	25	0.00	141988.00	0.00	0	./165788
17:56:09	1000	25	0.00	101724.00	0.00	0	./165788
17:56:10	1000	25	0.00	365568.00	0.00	0	./165788
17:56:11	1000	25	0.00	243712.00	0.00	0	./165788
17:56:12	1000	25	0.00	148316.00	0.00	0	./165788
^C							
Average:	1000	25	0.00	94040.50	0.00	0	./165788

График нагрузки на сетевую подсистему:

bmon

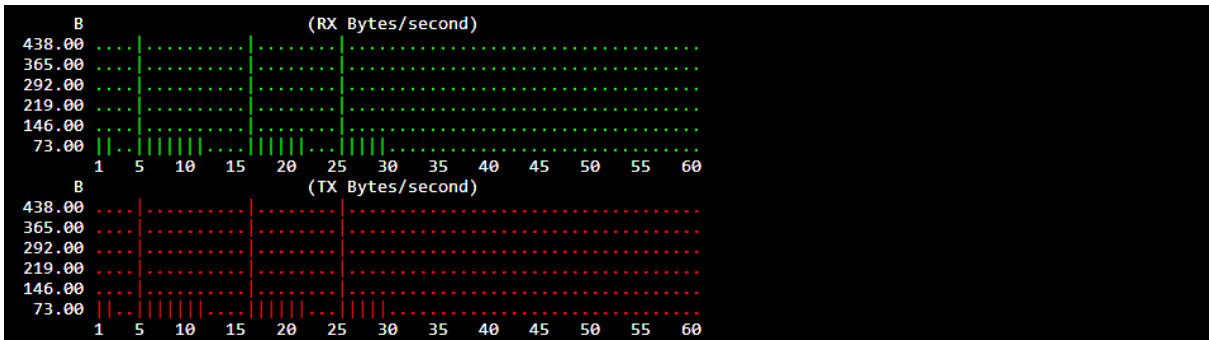
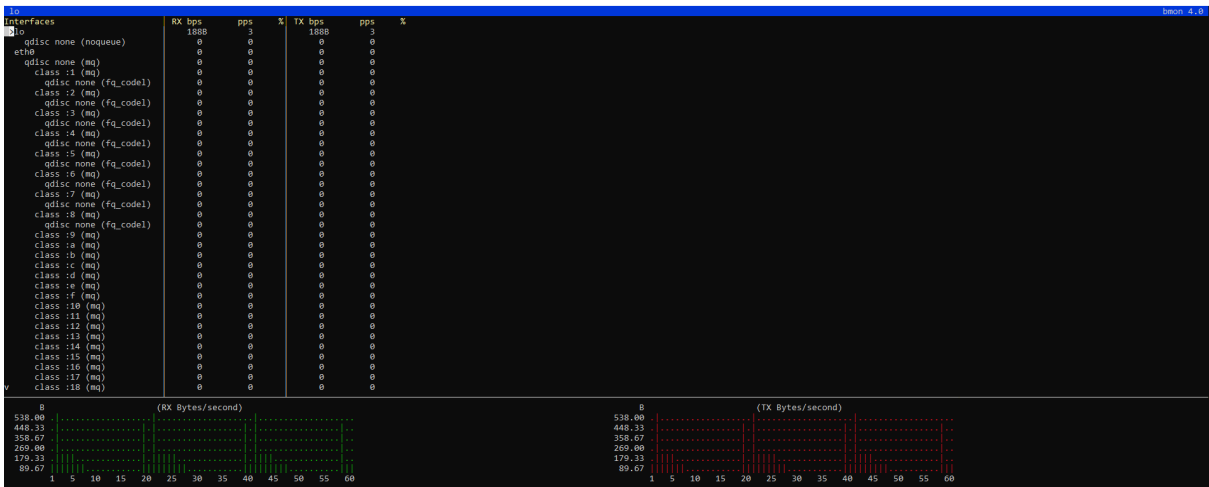
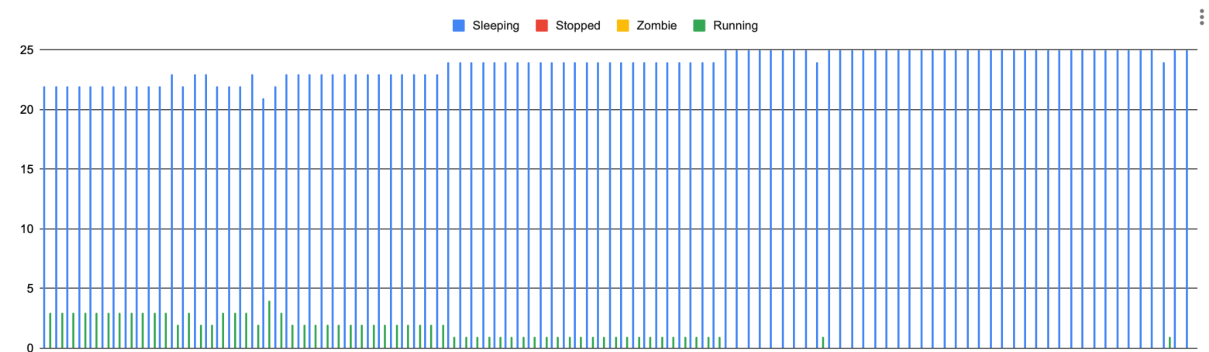


График смены состояния исполнения потоков:

top -b -n 100 -d .1 -H -p 2989 | grep Threads | awk '{print \$4,"",\$6,"",\$8,"",\$10}'



Вывод:

При выполнении данной лабораторной работы были изучены средства мониторинга и профилирования ЦПУ, подсистем памяти и сети для конкретных процессов.