

25.06.2019

Прокопив Михаил

Опыт выбора Open Source решения для сессионного кеша



МТС

Ты знаешь, что можешь!

Немного о себе



На текущий момент являюсь владельцем платформы MOAF,
участвую в разработке цифровой экосистемы online processing'a
профессиональные интересы: архитектура ПО, RealTime,
MassProcessing, Edge/Fog Computing, облачные технологии

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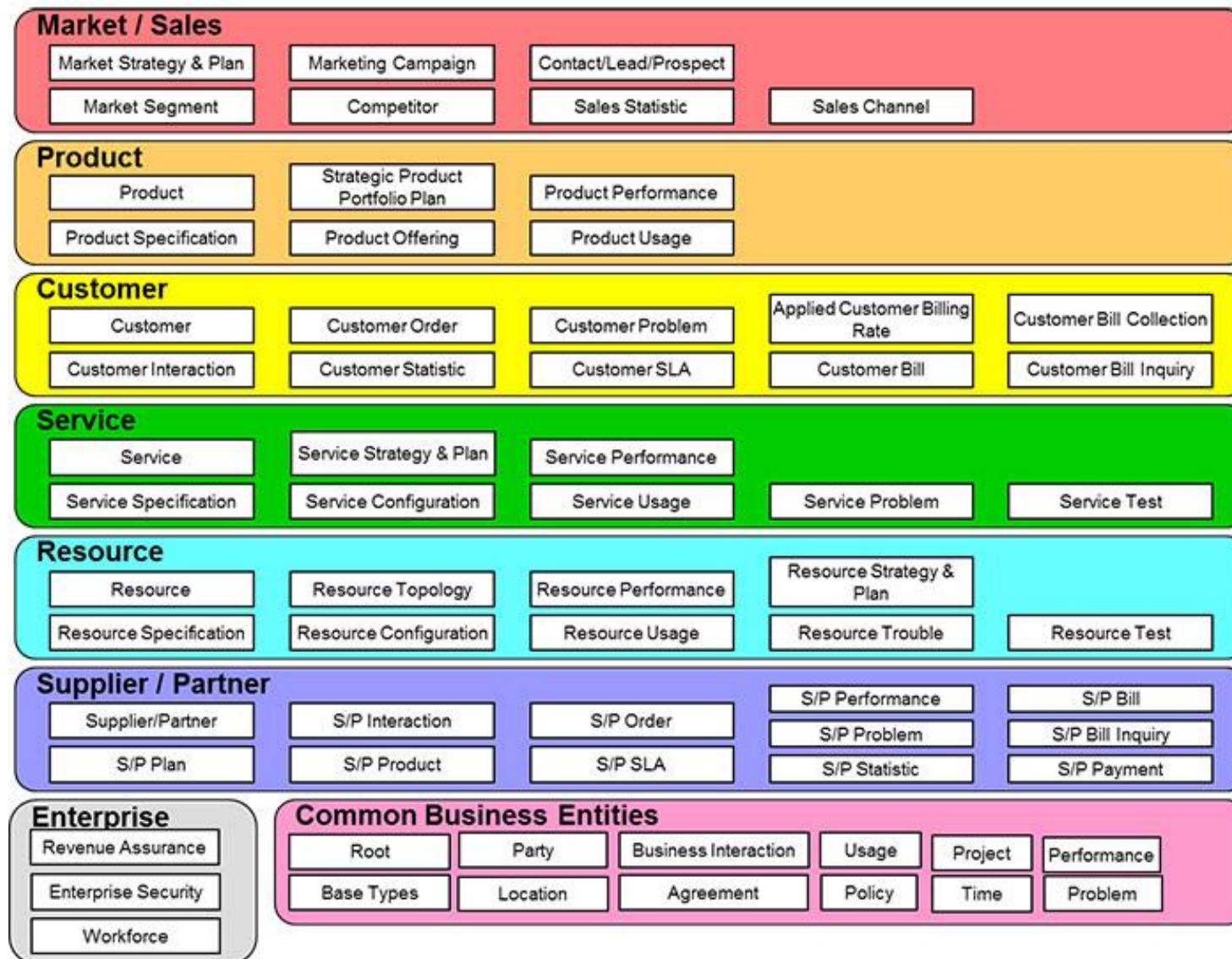


 МТС ИТ

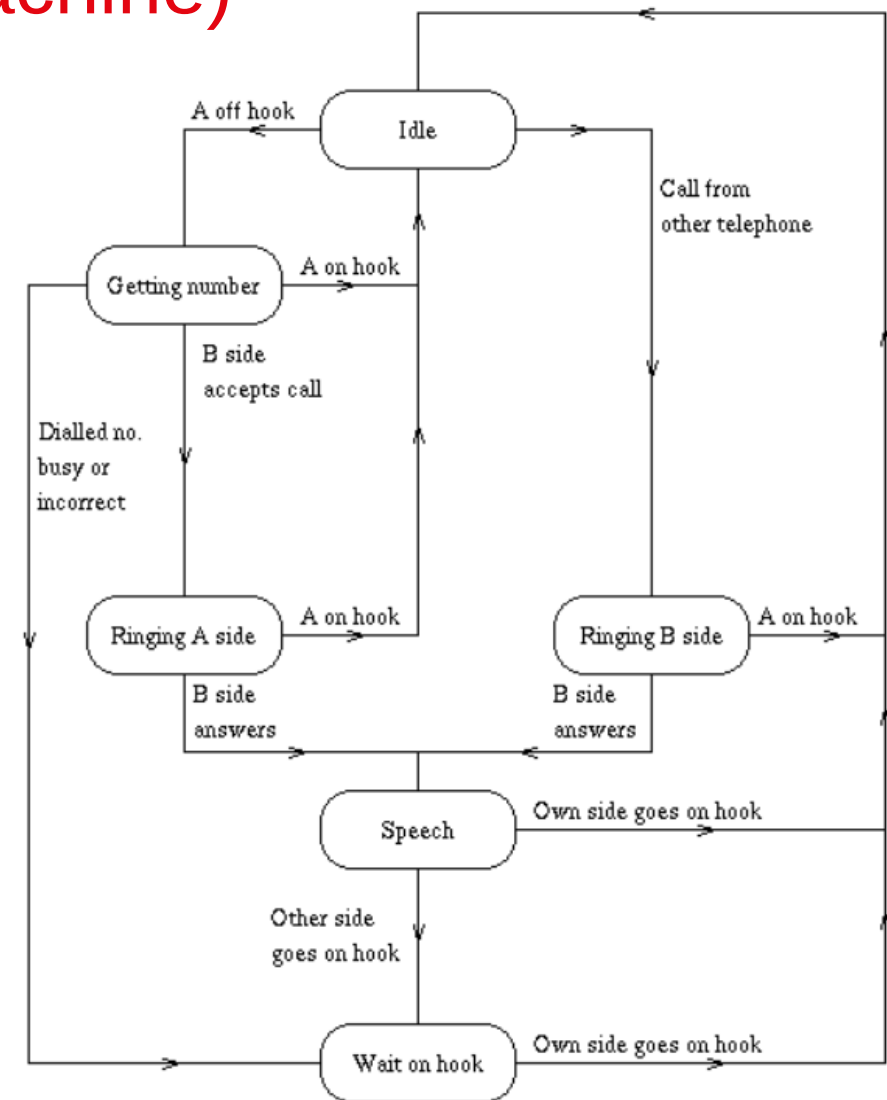
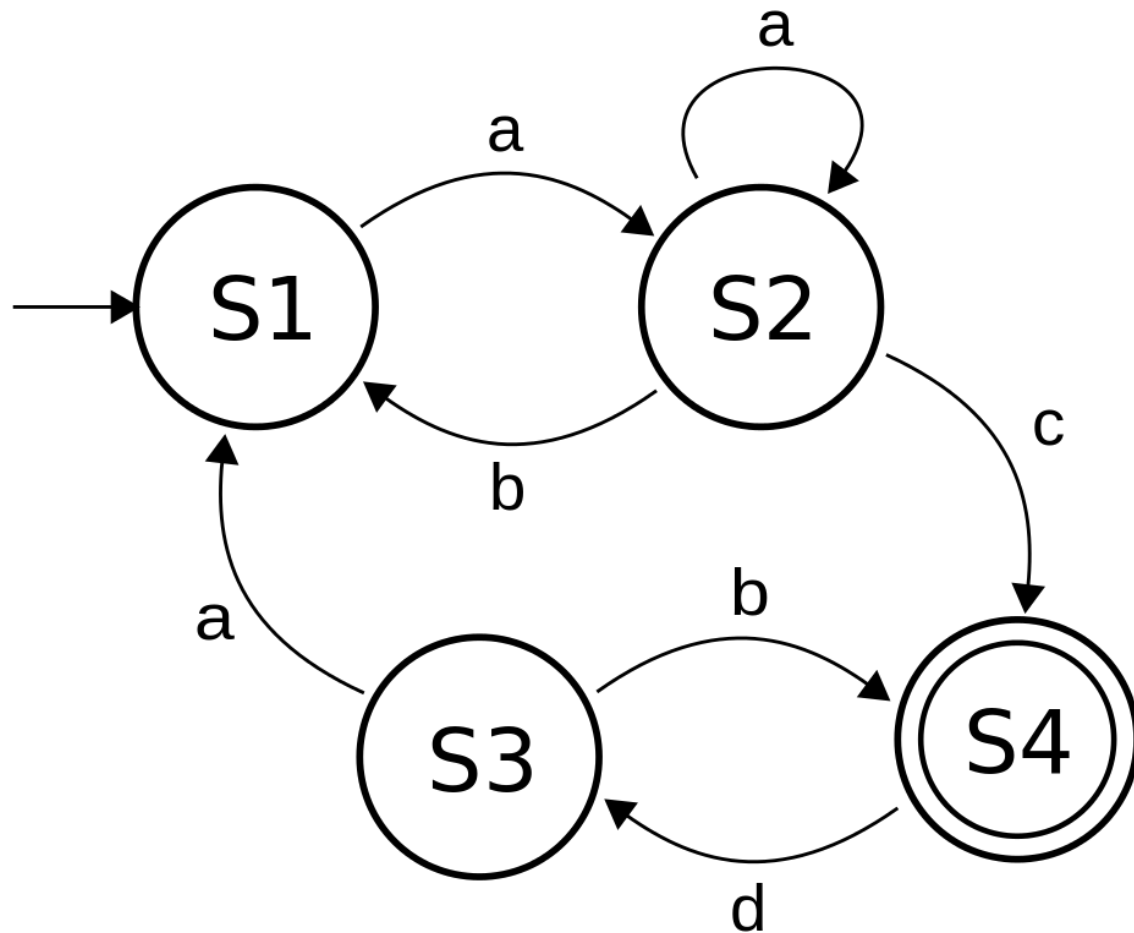
 Санкт-Петербургский
Государственный Универси...

 См. контактные сведения

Чем мы занимаемся

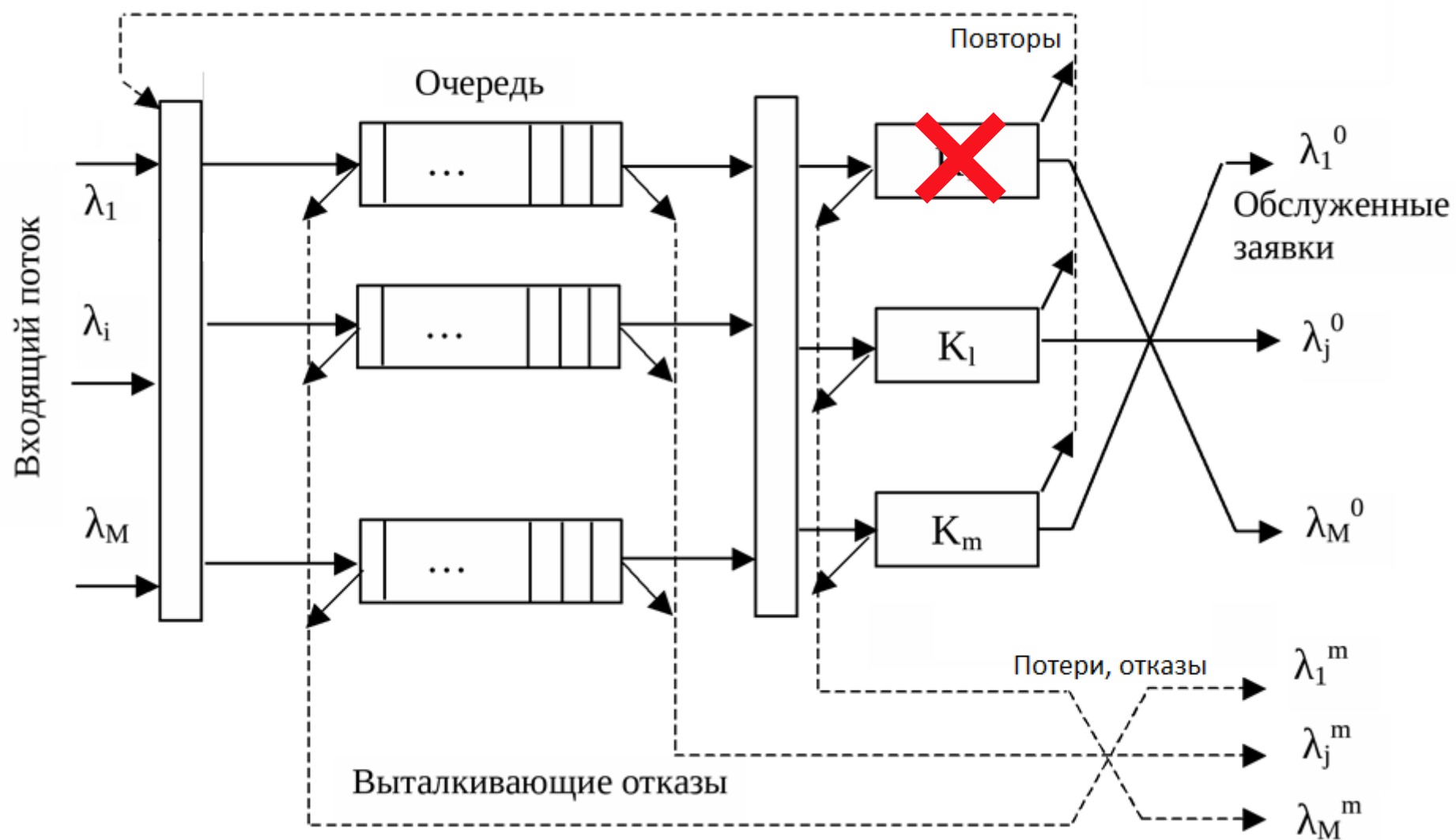


Конечные автоматы (finite-state machine)

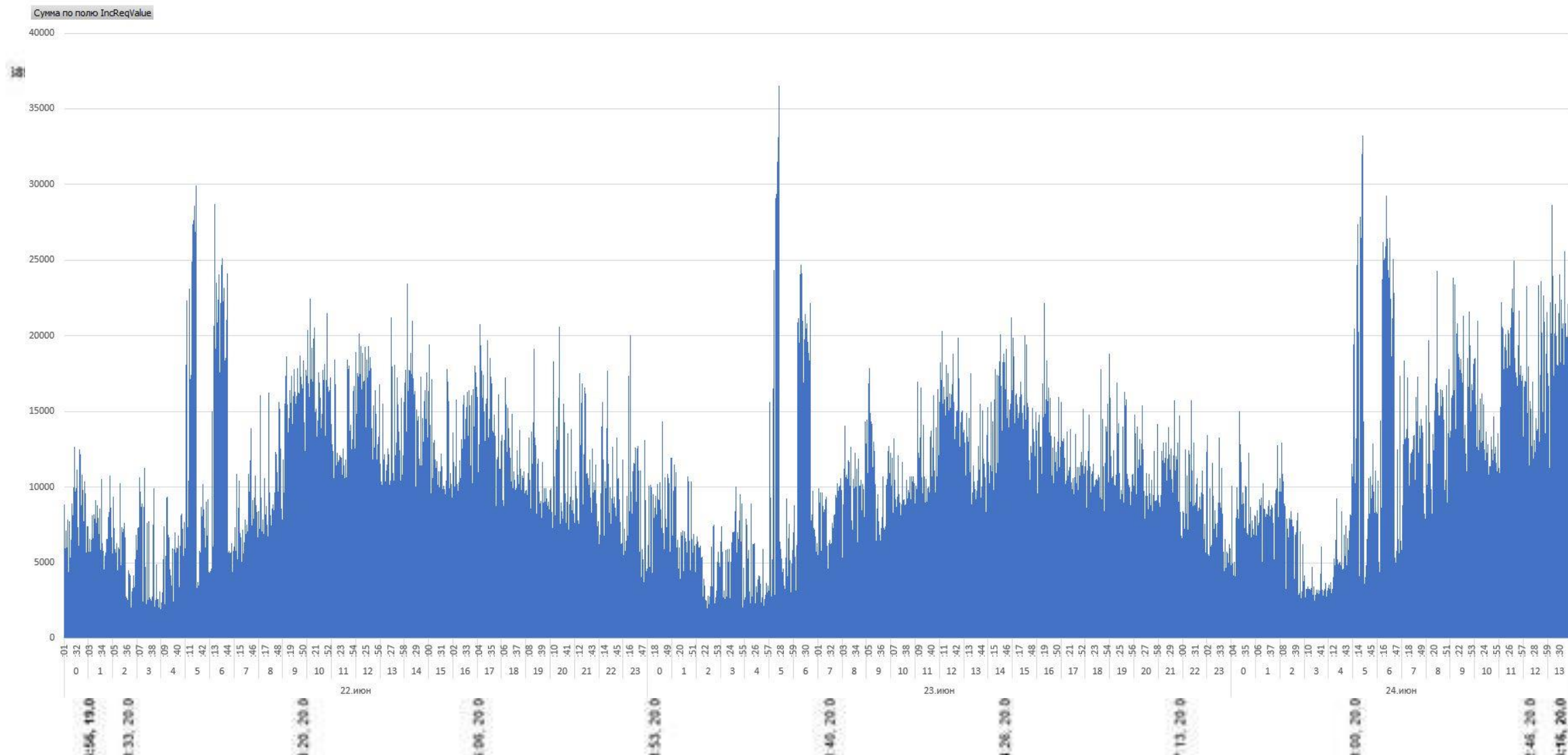


FSM Example

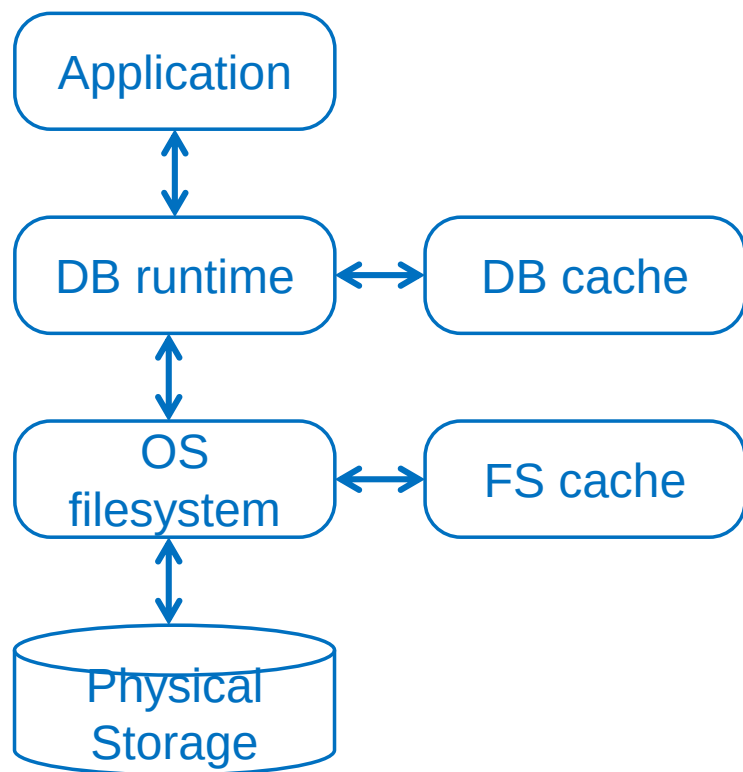
Резервирование



Реальная нагрузка



Кэш или база данных



Two CrystalDiskMark 6.0.1 x64 benchmark windows are shown side-by-side. The left window is for an Intel Optane Memory 64GB SSD, and the right window is for a RAM Disk.

	Read [MB/s]	Write [MB/s]
All	5	1GiB
Seq Q32T1	1488.4	647.3
4KiB Q8T8	1451.6	596.3
4KiB Q32T1	387.4	346.1
4KiB Q1T1	132.3	112.7

Intel Optane Memory 64GB SSD

	Read [MB/s]	Write [MB/s]
All	5	1GiB
Seq Q32T1	5317.9	8851.6
4KiB Q8T8	2000.4	1713.8
4KiB Q32T1	678.5	600.5
4KiB Q1T1	379.5	349.6

RAM Disk

Профиль нагрузки и описание стенда

```
while(keepWork)
{
    mdp.GetMsDataScur(new GetMsDataScurInput(...));
    stats.IncrementRequests();

    mdp.FirstReservationScur(new FirstReservationScurInput(...));
    stats.IncrementRequests();

    mdp.GetMsData2Scur(sesion);
    stats.IncrementRequests();

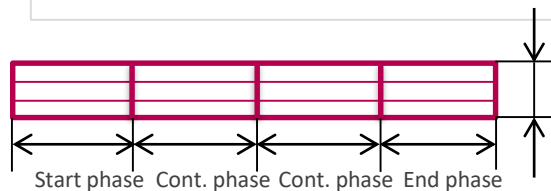
    mdp.UpdateScur(update);
    stats.IncrementRequests();

    mdp.GetMsData2Scur(sesion);
    stats.IncrementRequests();

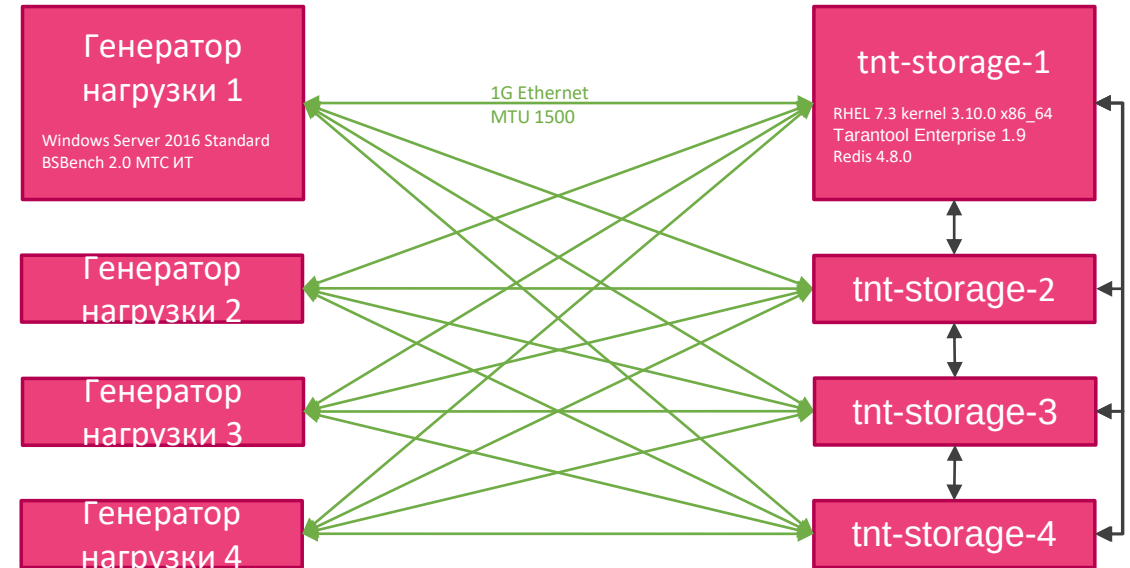
    mdp.UpdateScur(update);
    stats.IncrementRequests();

    mdp.ClearScur(sesion);
    stats.IncrementRequests();
}
```

х 150 потоков х 4 генератора нагрузки



Start ph. = GetMSDataSCUR + FirstReservationSCUR
Cont. ph. = GetMSData2SCUR + UpdateSCUR
End ph. = GetMSData2SCUR + DeleteSCUR



HOST	vCPU	RAM, Gb	OS
tnt-storage (1-4)	12 (2 сокета по 6 ядер)	64	RHEL 7.3 kernel 3.10
loader-(1-4)	8 (2 сокета по 4 ядра)	8	Windows Server 2016 Standard

На стенде используются серверы IBM BladeCenter HS22 [7870WT] с процессорами Intel(R) Xeon(R) CPU X5570 @ 2.93GHz. Применяется виртуализация VMware с включенным режимом [EVC](#), который обеспечивает однородность процессоров. Выбран режим Intel "Nehalem" Gen (formerly Intel Xeon Core i7). Установлен массив хранения данных CX4-240 с дисками SATA. Виртуальная сеть 1G.ы

Кандидаты

<https://redis.io/>



redis

three clause BSD license

<https://tarantool.org/>



ModifiedBSD license

<https://www.mysql.com/products/cluster/>



GPLv2 license

<https://ignite.apache.org/features/sql.html>

Apache License, Version 2.0



<https://www.aerospike.com/products/aerospike-database-platform/>

AGPL 3.0

◀EROSPIKE

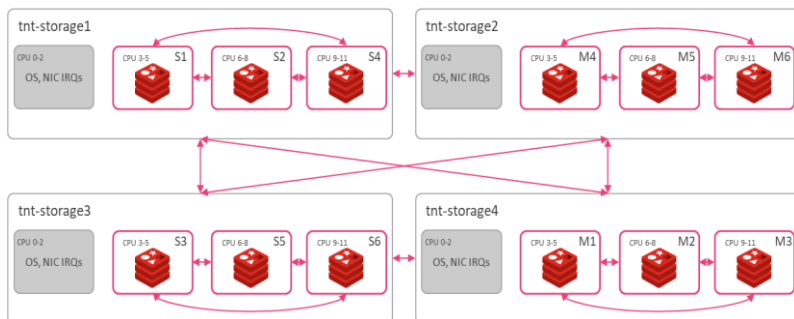
<https://hazelcast.org/>



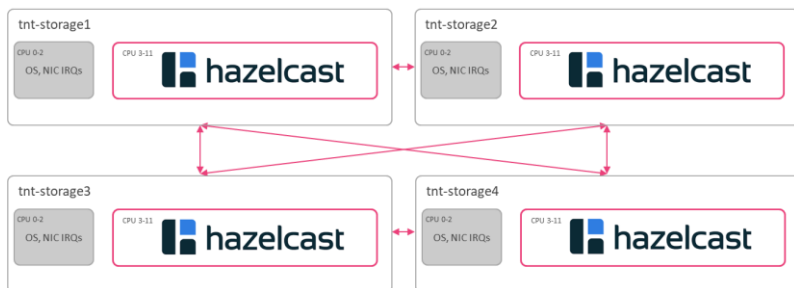
Apache License, Version 2.0

Схема кластера

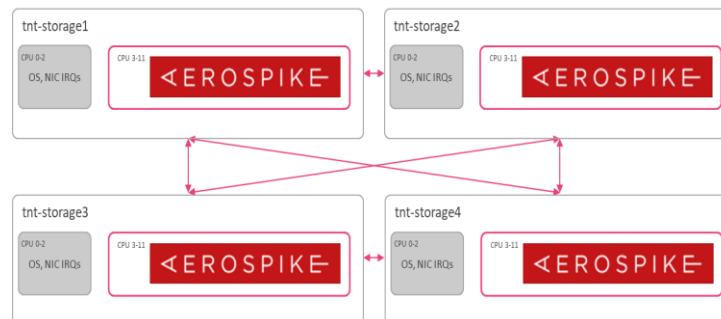
12 узлов — 6 пар мастер-подчинённый, Redis 4.0.8



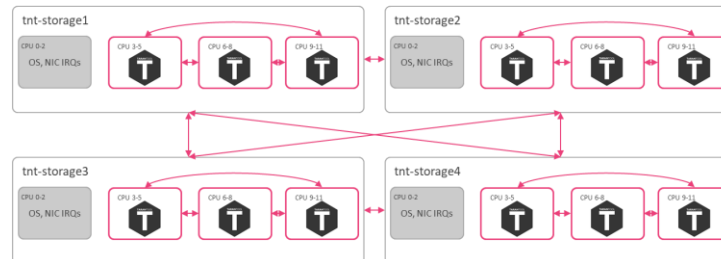
4 узла — Hazelcast 3.11



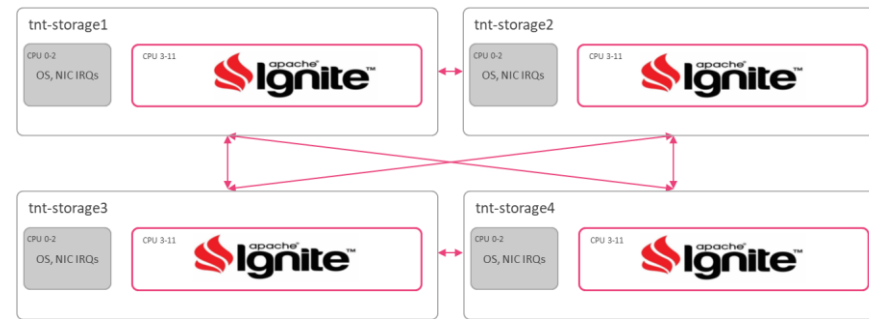
4 узла — Aerospike 4.5.1



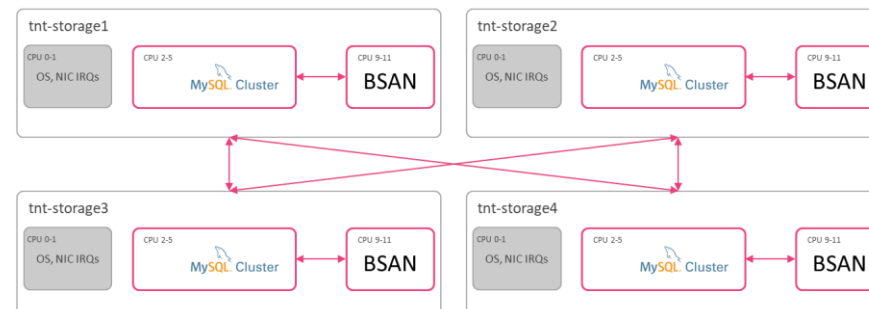
12 узлов — Tarantool 1.9



4 узла — Ignite 2.6.0



4 узла — MySQL Cluster 7.6 + BSAN



Подход «в лоб»

База данных	Реализация	Среднее количество бизнес-операций в секунду	Среднее время отклика, мс	Загрузка CPU, суммарно по всем хостам	Загрузка сети, суммарно по всем хостам			
					rxpck/s	txpck/s	rxkB/s	txkB/s
Tarantool	Логика в хранимых процедурах Lua на сервере	105 924	4,00	1 057,08	84 580,33	65 346,00	15 798,72	6 540,20
Redis	Логика на клиентах	102 965	7,20	572,40	220 420,93	139 076,54	155 868,73	115 795,50
Tarantool	Логика на клиентах + хранимые процедуры на Lua для bulk-операций	61 367	27,90	785,40	114 872,67	92 210,00	48 474,16	49 871,10
Tarantool	Логика на клиентах	45 738	8,20	688,20	132 429,01	76 609,33	37 907,87	58 291,99
Aerospike	Логика на клиентах	37 116	19,10	428,31	375 902,33	368 888,00	70 538,47	71 225,24
Ignite	Логика на клиентах	29 807	19,40	859,50	200 442,67	176 498,66	106 096,09	96 537,97
Hazelcast	Логика на клиентах	20 111	70,20	688,77	110 397,67	118 481,68	58 414,95	55 951,67
MySQL NDB Cluster	Логика реализована в BSAN, который выступил в роли middle-end	20 061	26,10	1 022,69	160 734,66	153 407,01	69 133,66	68 307,91

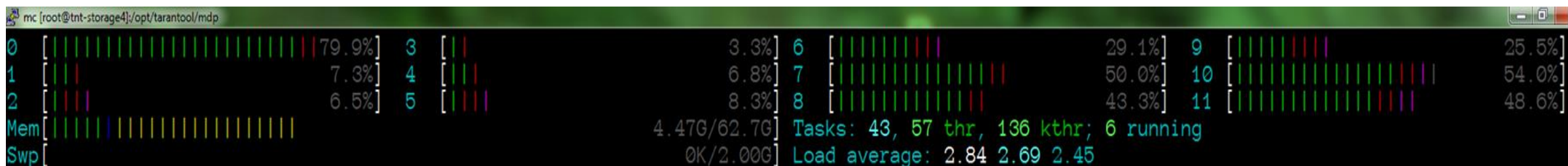
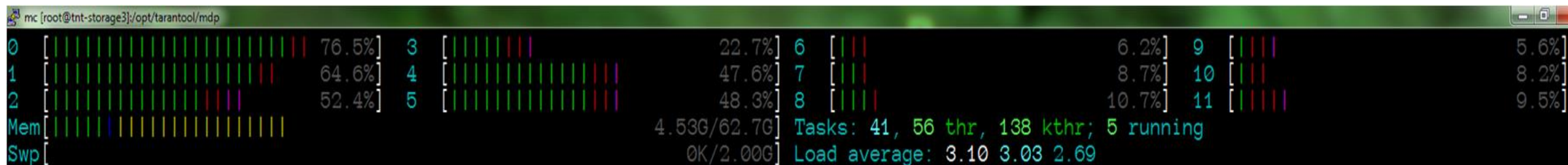
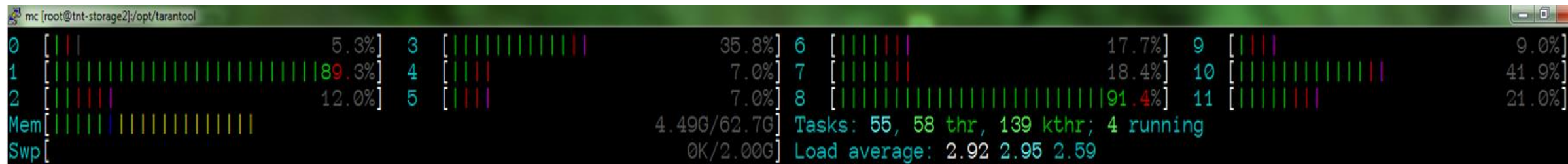
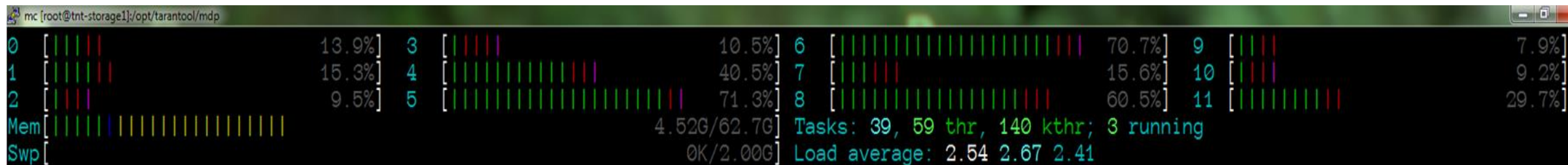
На примере Tarantool (1/4) — 105924,3 запросов в секунду



На примере Tarantool (2/4) — среднее время отклика 4 мс



На примере Tarantool (3/4) — утилизация CPU 1272,94%

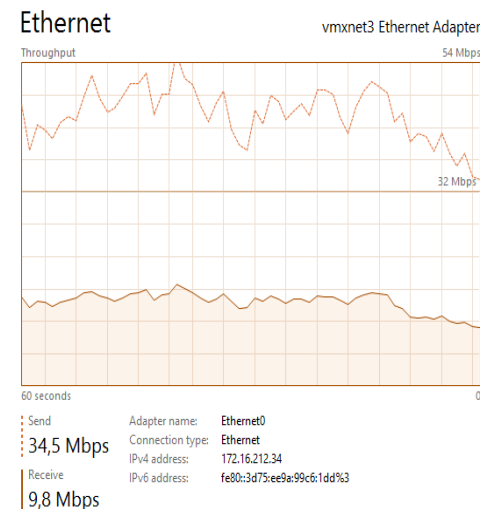


На примере Tarantool (4/4) — утилизация сети

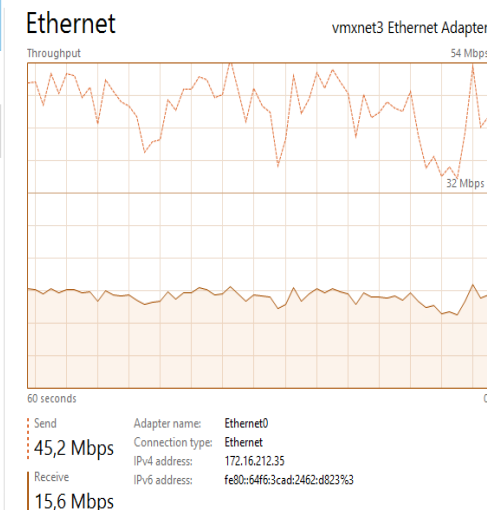
sar -N DEV

HOST	rxpck/s	txpck/s	rxkB/s	txkB/s
server1	21255	16939	3904	1653
server2	22639	16952	4030	1669
server3	19928	15435	3920	1592
server4	20758	16020	3945	1627

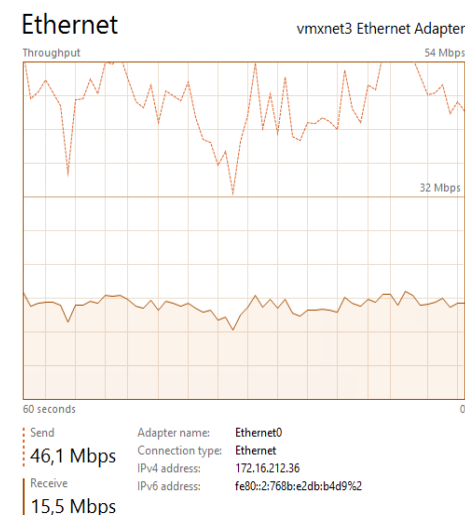
CPU
50% 2,93 GHz
 Memory
2,4/8,0 GB (30%)
 Ethernet
S: 34,5 Mbps R: 9,8 Mbps



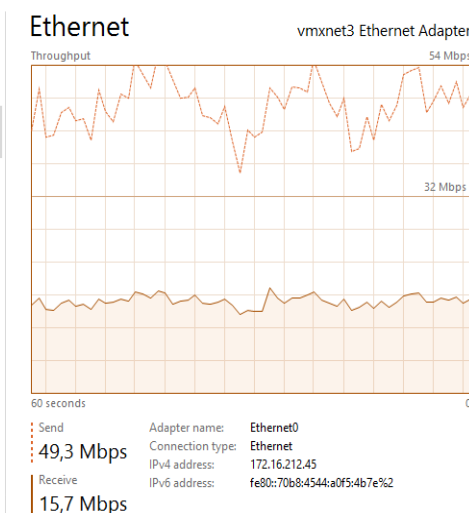
CPU
56% 2,93 GHz
 Memory
2,3/8,0 GB (29%)
 Ethernet
S: 45,2 Mbps R: 15,6 Mbps



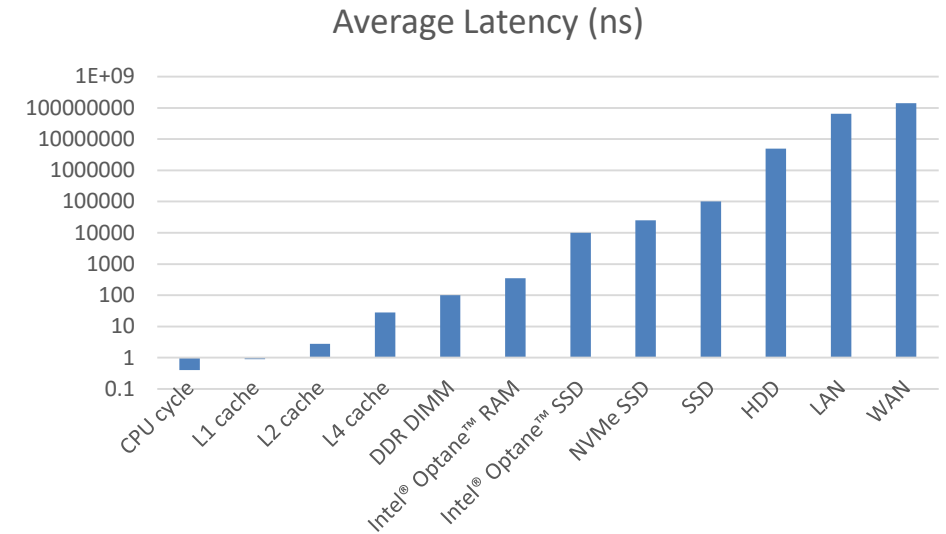
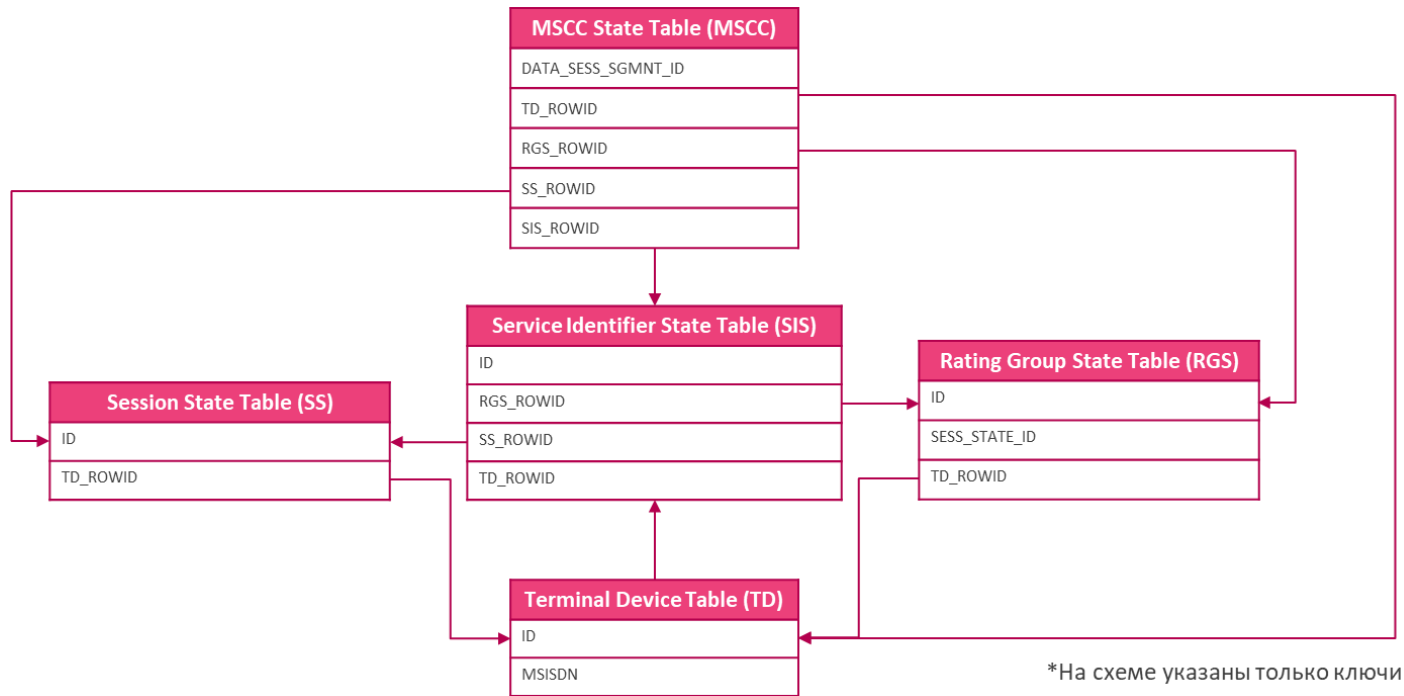
CPU
51% 2,93 GHz
 Memory
2,2/8,0 GB (28%)
 Ethernet
S: 46,1 Mbps R: 15,5 Mbps



CPU
60% 2,93 GHz
 Memory
2,3/8,0 GB (29%)
 Ethernet
S: 49,3 Mbps R: 15,7 Mbps



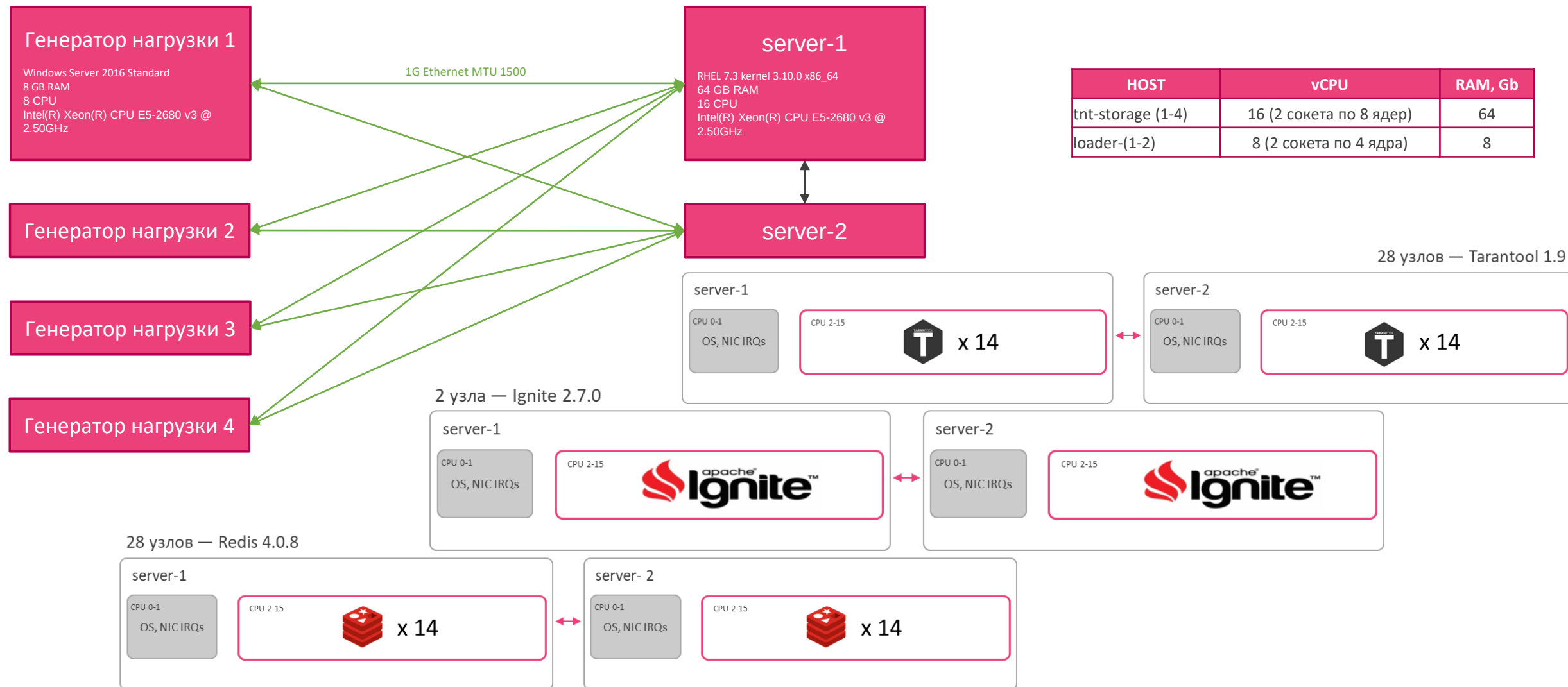
Анализ узких мест



Гипотеза - предобработка на серверной стороне нам поможет:

- Tarantool – модуль на Lua
- Ignite – модуль на Java
- Redis – модуль на C

Новый стенд



Финальный результат

База данных	Реализация	Репликация	Среднее количество бизнес-операций в секунду	Среднее время отклика, мс	Загрузка CPU, суммарно по всем хостам	Загрузка сети, суммарно по всем хостам			
						rxpck/s	txpck/s	rxkB/s	txkB/s
Redis	Логика на сервере	Да	505894,2	1,5	1240,43	220678	152366	59349,34	24785,26
Ignite	Логика на сервере	Да	140755,5	11,5	1694,27	80710,34	67061,67	90227,17	35977,05
Tarantool	Логика на сервере	Да	130645,4	2,1	2510,84	241450,9	208516,6	66052,23	90967,39
Tarantool	Логика на сервере	Нет	210903,1	1,5	2542,31	234866,7	177056,7	40531,93	91434,3
Ignite	Логика на сервере	Нет	147093,5	9,5	1655,41	64582,66	59685,66	84853,64	33859,59

Спасибо!



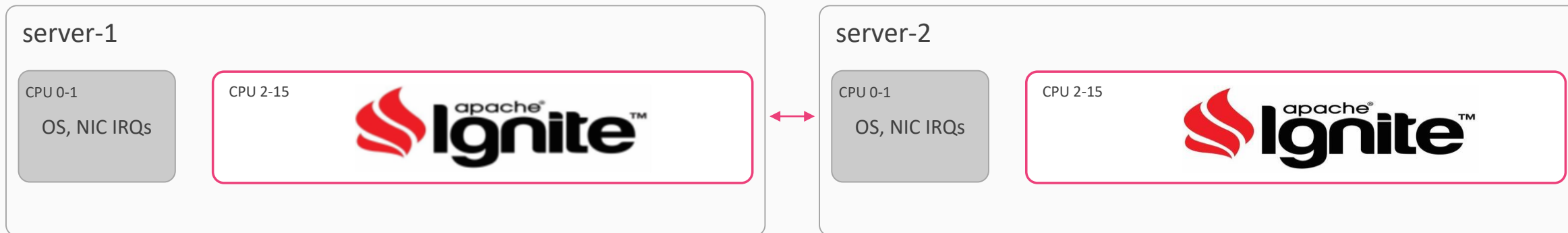
Ты знаешь, что можешь!

Ignite

Бизнес-логика на сервере,
в подключаемом модуле на Java

Ignite Java lib — схема кластера

2 узла — Ignite 2.7.0



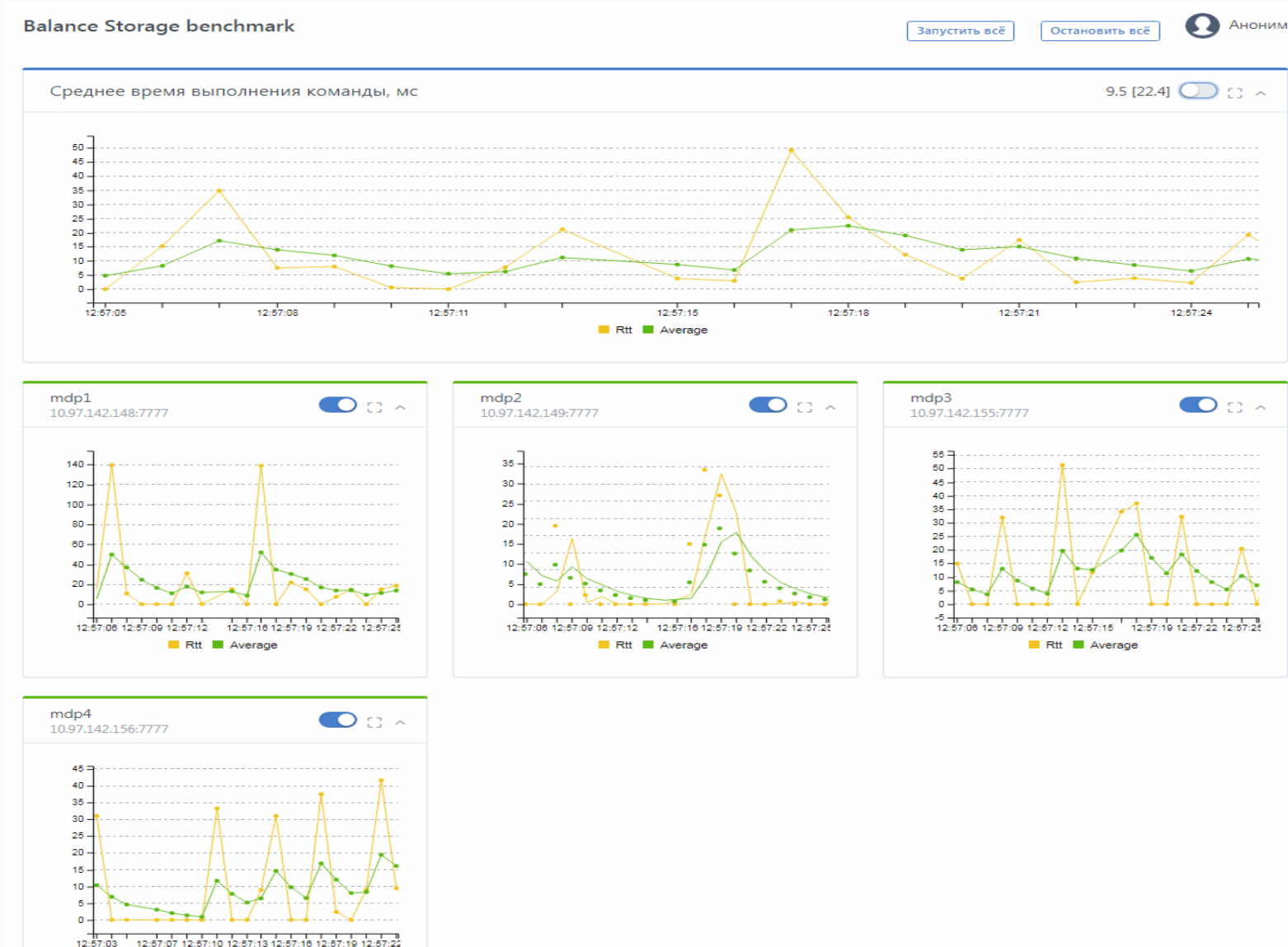
Ignite Java lib — без репликации

```
<!-- CACHE CONFIG -->
<property name="cacheConfiguration">
  <list>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_td"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="0"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_ss"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="0"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_sis"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="0"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_rgs"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="0"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_mscs"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="0"/>
    </bean>
  </list>
</property>
```

Ignite Java lib — 147093,5 запросов в секунду



Ignite Java lib — среднее время отклика 9,5 мс



Ignite Java lib — утилизация CPU 1655,41% из 3200%

```

CPU [|||||] 0.3% 4 [|||||] 66.4% 8 [|||||] 04.4% 12 [|||||] 00.2%
    [|||||] 0.1% 7 004 [|||||] 07.1% 9 [|||||] 00.5% 13 [|||||] 00.4%
Mem [|||||] 68.7% [|||||] 65.8% 10 [|||||] 00.0% 14 [|||||] 00.3%
Swp [|||||] 66.0% [|||||] 65.5% 11 [|||||] 07.8% 15 [|||||] 66.0%
Hostname: moaf-swap-mdp-1 Tasks: 33, 142 thr; 3 running
Load average: 7.50 7.32 4.92
Uptime: 12 days, 19:54:18

PID USER NLWP NI PRI UTIME+ STIME+ DISK READ DISK WRITE IO MEM% VIRT RES SHR CPU% Command
3528 root 129 0 20 1h47:25 16:43.01 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 970 S 2 /usr/bin/java -XX:+AggressiveOpts -Xm
3805 root 129 0 20 6:32.81 0:33.14 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 60.3 S 5 java
3808 root 129 0 20 6:31.56 0:35.03 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 60.3 S 2 java
3806 root 129 0 20 6:31.89 0:35.19 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 59.6 S 6 java
3810 root 129 0 20 6:29.95 0:34.55 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 58.2 S 8 java
3812 root 129 0 20 6:30.35 0:34.46 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 58.2 S 4 java
3813 root 129 0 20 6:30.77 0:33.22 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 57.5 S 11 java
3809 root 129 0 20 6:30.32 0:33.03 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 57.5 S 7 java
3817 root 129 0 20 6:31.23 0:32.86 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 56.8 R 14 java
3815 root 129 0 20 6:31.67 0:32.78 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 56.2 S 10 java
3816 root 129 0 20 6:29.17 0:34.90 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 56.2 S 15 java
3804 root 129 0 20 6:32.08 0:35.26 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 55.5 S 9 java
3811 root 129 0 20 6:31.32 0:32.94 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 54.8 S 10 java
3814 root 129 0 20 6:30.85 0:34.55 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 54.8 S 13 java
3807 root 129 0 20 6:32.35 0:32.79 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 54.8 S 12 java
3620 root 129 0 20 1:46.35 1:21.43 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 26.7 S 8 java
3619 root 129 0 20 1:18.37 1:12.43 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 26.7 S 3 java
3618 root 129 0 20 1:00.55 1:01.47 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 24.7 S 5 java
3617 root 129 0 20 2:04.31 1:44.70 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 22.6 S 5 java
3615 root 129 0 20 1:32.58 1:13.98 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 20.5 R 14 java
3614 root 129 0 20 1:37.51 1:30.87 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 15.1 S 12 java
3616 root 129 0 20 0:58.43 1:02.76 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 13.7 S 2 java
3532 root 129 0 20 0:09.56 0:00.03 0.00 B/s 0.00 B/s B4 13.8 18.3G 8839M 20036 2.7 S 6 java

```

Mem										24.60/52.2%										Tasks: 38, 142 thr; 10 running										0.000%										120									
Swp										OK/4.40G										Load average: 8.65 7.52 5.10										0.000%										130									
Hostname: moaf-swap-mdp-2																				Uptime: 12 days, 22:43:03										0.000%										140									
PID USER NLWP NI PRI UTIME+ STIME+ DISK READ DISK WRITE IO MEM% VIRT RES SHR CPU% S CPU Command																																																	
6121 root 129 0 20 1h44:56 16:07:62 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 906.0 10 /usr/bin/java -XX:+AggressiveOp																																																	
6402 root 129 0 200 0:04:00 0:03:04 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 55.5 8 java																																																	
6398 root 129 0 200 0:04:00 0:03:40 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 54.8 11 java																																																	
6407 root 129 0 200 0:04:00 0:03:00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 53.4 12 java																																																	
6411 root 129 0 200 0:04:00 0:02:88 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 53.4 3 java																																																	
6403 root 129 0 200 0:04:00 0:02:72 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 53.4 9 java																																																	
6399 root 129 0 200 0:04:15 0:02:96 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 53.4 5 java																																																	
6404 root 129 0 200 0:04:16 0:03:84 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 53.4 15 java																																																	
6409 root 129 0 200 0:04:77 0:03:01 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 53.4 10 java																																																	
6406 root 129 0 200 0:04:17 0:03:86 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 52.7 6 java																																																	
6400 root 129 0 200 0:04:46 0:03:33 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 52.7 10 java																																																	
6401 root 129 0 200 0:04:22 0:03:41 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 52.0 13 java																																																	
6408 root 129 0 200 0:04:32 0:03:80 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 51.3 4 java																																																	
6410 root 129 0 200 0:04:15 0:03:87 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 51.3 14 java																																																	
6405 root 129 0 200 0:04:00 0:03:43 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 49.0 5 java																																																	
6211 root 129 0 200 0:03:00 0:02:43 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 39.0 2 java																																																	
6209 root 129 0 200 0:03:00 0:02:43 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 39.0 2 java																																																	
6208 root 129 0 200 0:03:00 0:02:43 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 39.0 2 java																																																	
6211 root 129 0 200 0:03:00 0:02:43 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 39.0 2 java																																																	
6212 root 129 0 200 0:03:00 0:02:43 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 39.0 2 java																																																	
6120 root 129 0 200 0:07:08 0:00:03 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 13.7 7 java																																																	
6126 root 129 0 200 0:07:08 0:00:03 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 13.7 7 java																																																	
6125 root 129 0 200 0:07:08 0:00:03 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 13.7 5 java																																																	
6123 root 129 0 200 0:07:08 0:00:03 0.00 B/s 0.00 B/s B4 13.7 18.3G 8804M 200552 13.7 10 java																																																	

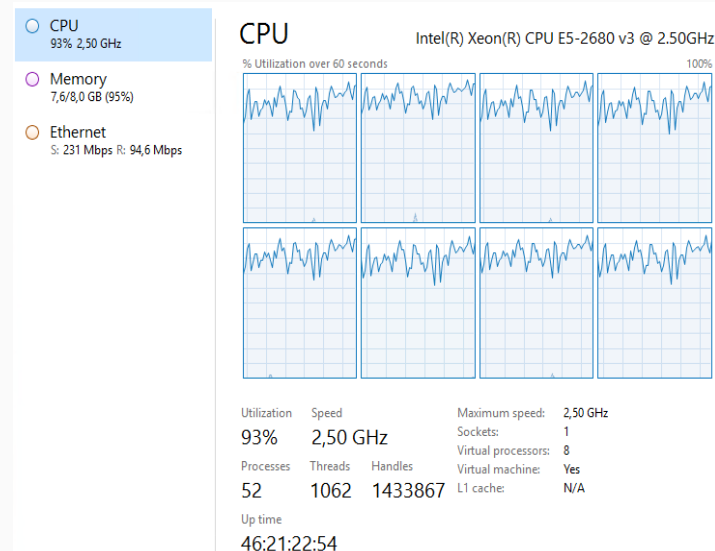
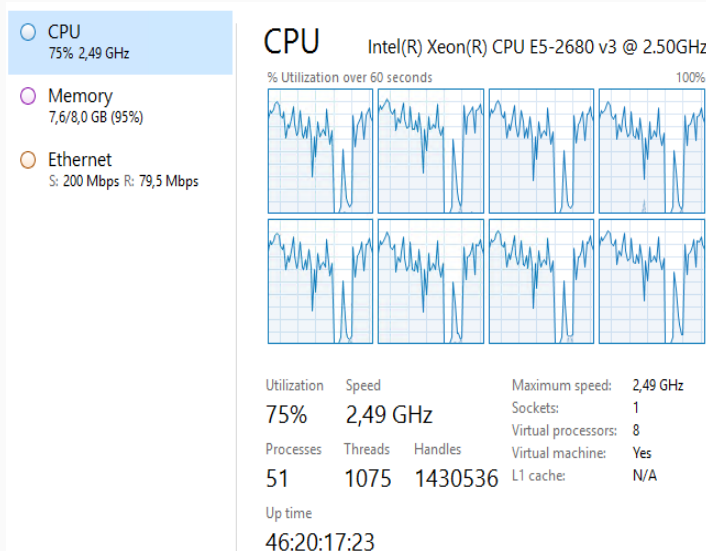
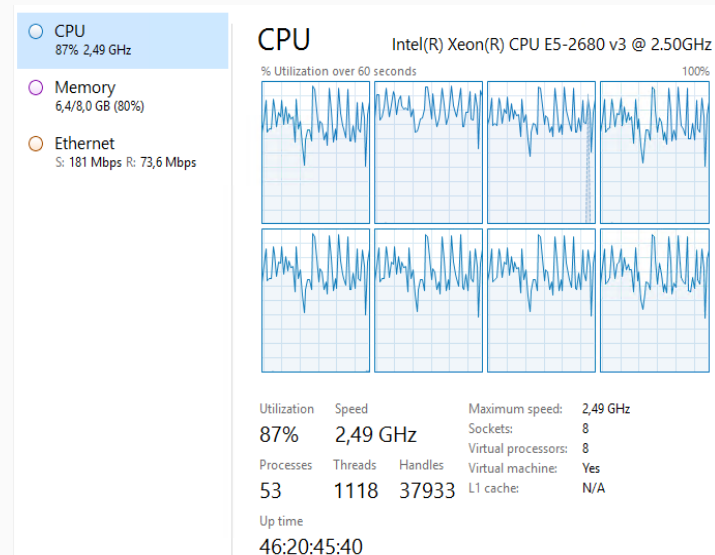
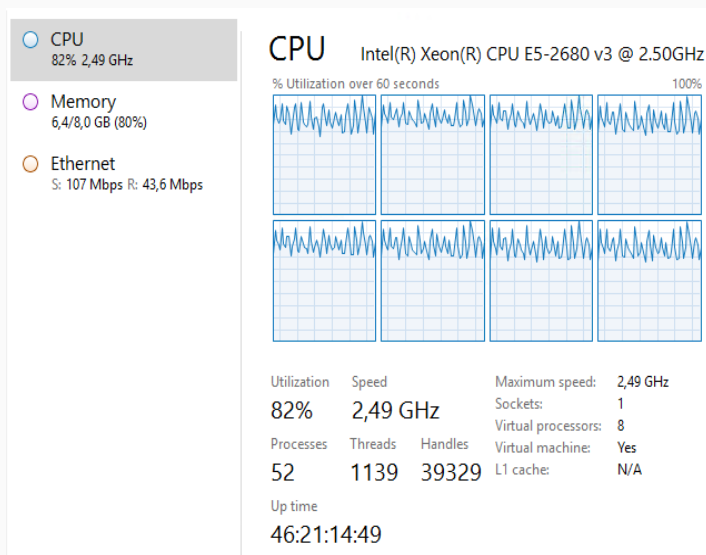
Ignite Java lib — утилизация CPU 1655,41% из 3200%

Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle	Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle
moaf-1	0	0	0	1,67	0	0	0,42	0	0	0	97,92	moaf-2	0	0	0	0	0	0	0,78	0	0	0	99,22
	1	0	0	0	0	0	0,8	0	0	0	99,2		1	0,87	0	2,61	0	0	1,3	0	0	0	95,22
	2	54,61	0	7,17	0	0	0	0	0	0	38,23		2	51,74	0	8,33	0	0	0	0	0	0	39,93
	3	53,08	0	6,85	0	0	0	0	0	0	40,07		3	51,72	0	8,62	0	0	0	0	0	0	39,66
	4	53,06	0	7,14	0	0	0	0	0	0	39,8		4	52,05	0	7,88	0	0	0	0	0	0	40,07
	5	51,03	0	6,51	0	0	0	0	0	0	42,47		5	51,72	0	7,93	0	0	0	0	0	0	40,34
	6	50	0	7,48	0	0	0	0	0	0	42,52		6	53,29	0	7,61	0	0	0	0	0	0	39,1
	7	54,61	0	6,83	0	0	0	0	0	0	38,57		7	54,61	0	6,83	0	0	0	0	0	0	38,57
	8	49,49	0	6,48	0	0	0	0	0	0	44,03		8	54,83	0	6,21	0	0	0	0	0	0	38,97
	9	52,05	0	5,82	0	0	0	0	0	0	42,12		9	52,4	0	7,19	0	0	0	0	0	0	40,41
	10	51,69	0	6,42	0	0	0	0	0	0	41,89		10	52,58	0	6,19	0	0	0	0	0	0	41,24
	11	50,68	0	6,12	0	0	0	0	0	0	43,2		11	52,4	0	5,82	0	0	0	0	0	0	41,78
	12	51,37	0	5,14	0	0	0	0	0	0	43,49		12	54,45	0	5,82	0	0	0	0	0	0	39,73
	13	48,97	0	5,86	0	0	0	0	0	0	45,17		13	49,66	0	6,51	0	0	0	0	0	0	43,84
	14	51,53	0	5,42	0	0	0	0	0	0	43,05		14	52,72	0	6,8	0	0	0	0	0	0	40,48
	15	51,7	0	6,8	0	0	0	0	0	0	41,5		15	51,57	0	5,57	0	0	0	0	0	0	42,86
Всего	1460,48	0	191,63	0	0	0	3,3	0	0	0	1544,65												

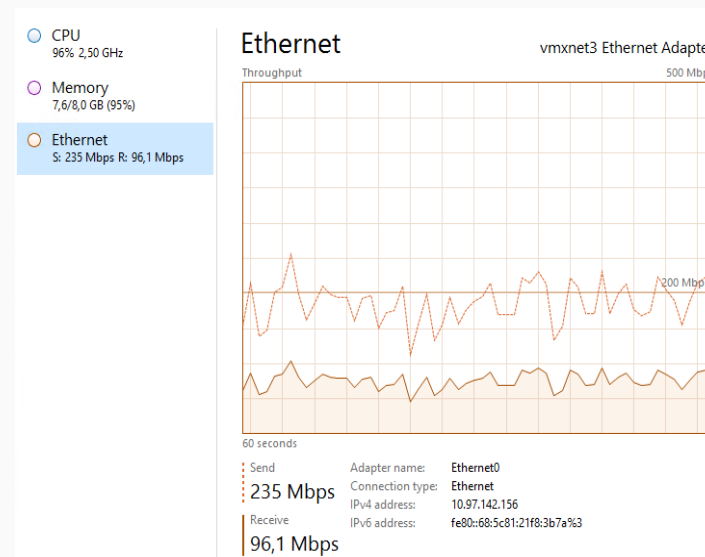
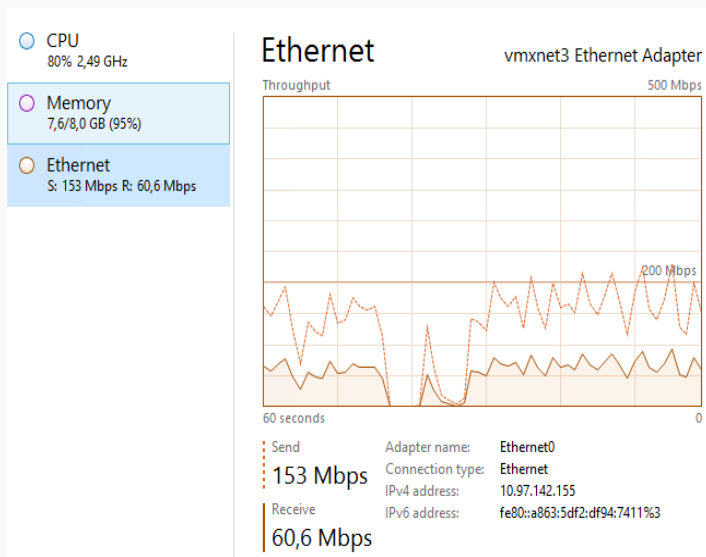
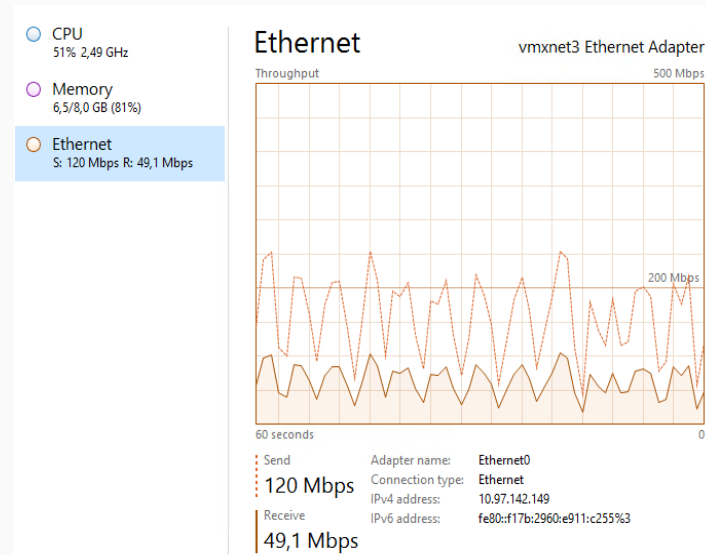
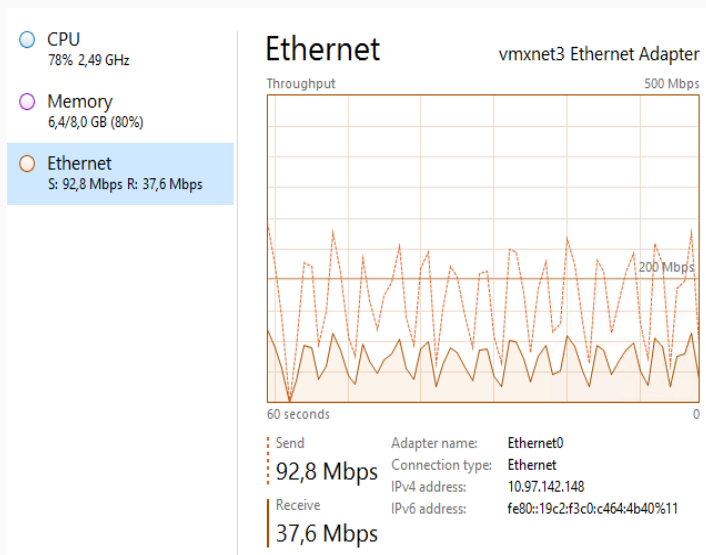
Ignite Java lib — sar -N DEV

HOST	rxpck/s	txpck/s	rxkB/s	txkB/s
moaf-1	29801,33	28535,33	43409,94	17307,44
moaf-2	34781,33	31150,33	41443,7	16552,15

Ignite Java lib — генераторы нагрузки



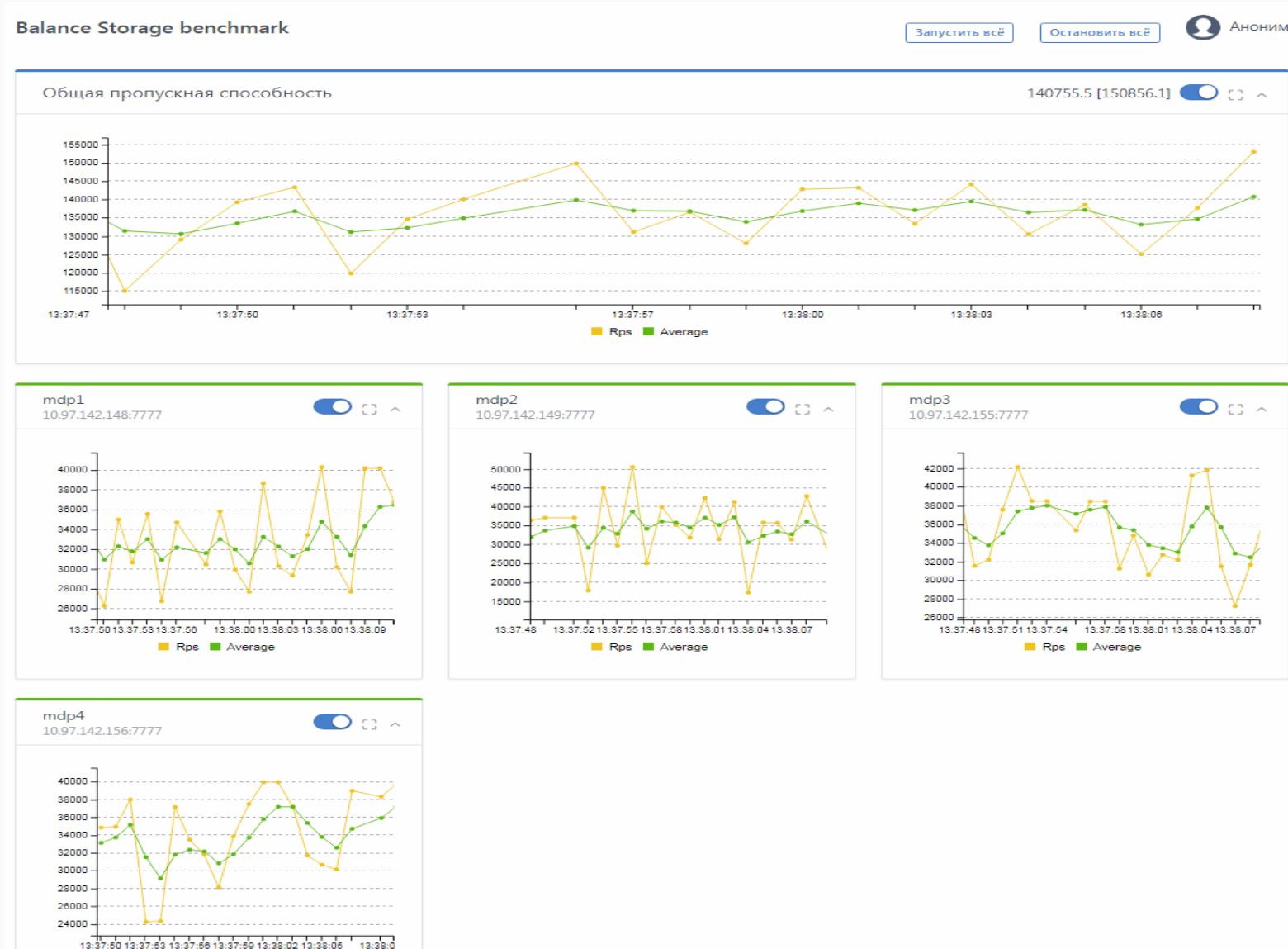
Ignite Java lib — генераторы нагрузки



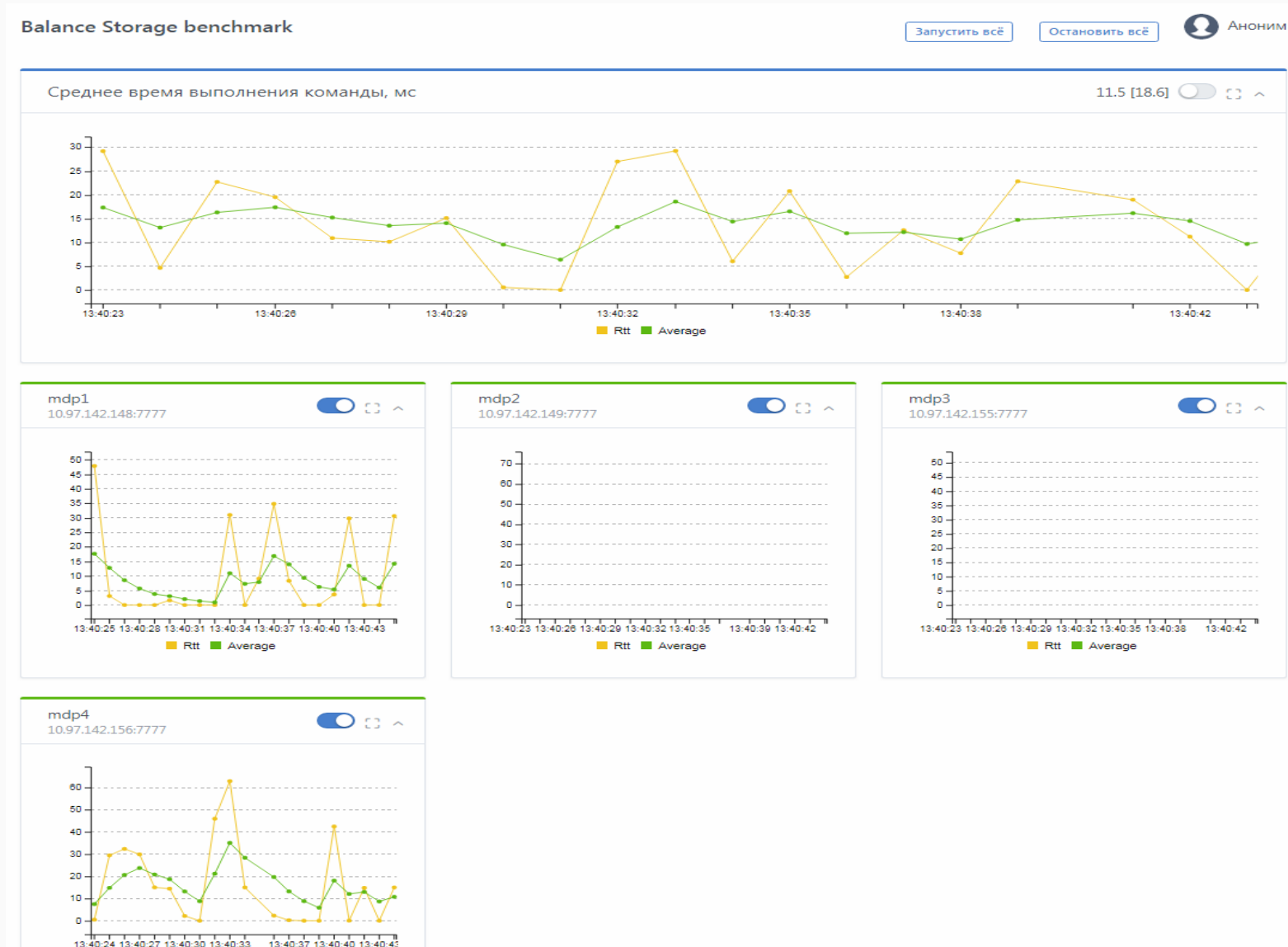
Ignite Java lib — с репликацией

```
<!-- CACHE CONFIG -->
<property name="cacheConfiguration">
  <list>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_td"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="1"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_ss"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="1"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_sis"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="1"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_rgs"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="1"/>
    </bean>
    <bean class="org.apache.ignite.configuration.CacheConfiguration">
      <property name="name" value="mdp_mscs"/>
      <property name="cacheMode" value="PARTITIONED"/>
      <property name="backups" value="1"/>
    </bean>
  </list>
</property>
```

Ignite Java lib — 140755,5 запросов в секунду



Ignite Java lib — среднее время отклика 11,5 мс



Ignite Java lib — утилизация CPU 1694,27% из 3200%

```

0 [root] 1.8% 004 [root] 61.6% 8 [root] 0.5% 12 [root] 62.6%
1 [root] 1.0% 004 [root] 61.4% 9 [root] 0.3% 13 [root] 63.3%
2 [root] 0.4% 004 [root] 60.3% 10 [root] 0.0% 14 [root] 63.8%
3 [root] 0.2% 004 [root] 61.2% 11 [root] 0.0% 15 [root] 62.6%
Mem 18.0G/62.7G Tasks: 29, 140 thr: 16 running
Swp 0K/4.40G Load average: 11.13 7.47 3.91
Hostname: moaf-swap-mdp-1 Uptime: 1 day, 21:41:47

PID USER NLWP NI PRI UTIME+ STIME+ DISK READ DISK WRITE IO MEM% VIRT RES SHR CPU% S CPU Command
1 root 1 0 20 0:12.11 0:21.41 0.00 B/s 0.00 B/s B4 0.0 187M 6676 3840 0.0 S 0 /usr/lib/systemd/systemd --switched-r
26484 root 1 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 0.0 112M 3112 2860 0.0 S 10 /bin/bash /opt/ignite/bin/ignite.s
26704 root 127 0 20 0:49.49 0:37.15 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 951.1 S 4 /usr/bin/java -XX:+AggressiveOp
28747 root 127 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 5 java
28721 root 127 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 5 java
28710 root 127 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 4 java
28701 root 127 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 4 java
28688 root 127 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 3 java
28679 root 127 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 5 java
28414 root 127 0 20 0:00.03 0:00.01 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 7 java
28413 root 127 0 20 0:00.03 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 2 java
28195 root 127 0 20 3:07.50 0:11.77 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 56.5 R 8 java
28194 root 127 0 20 3:08.13 0:11.09 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 57.2 R 15 java
28193 root 127 0 20 3:08.38 0:11.41 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 58.6 S 12 java
28192 root 127 0 20 3:06.39 0:11.22 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 53.0 R 12 java
28191 root 127 0 20 3:05.31 0:11.44 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 53.7 S 10 java
28190 root 127 0 20 3:00.43 0:11.07 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 53.0 R 5 java
28184 root 127 0 20 3:06.71 0:11.53 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 55.1 S 11 java
28183 root 127 0 20 3:07.25 0:11.96 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 58.0 R 4 java
28182 root 127 0 20 3:06.59 0:11.51 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 50.5 R 12 java
28181 root 127 0 20 3:07.04 0:11.55 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 50.9 R 14 java
28180 root 127 0 20 3:08.10 0:11.99 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 50.9 R 7 java
28179 root 127 0 20 3:08.10 0:11.51 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 54.4 R 6 java
28178 root 127 0 20 3:07.48 0:11.34 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 55.3 S 0 java
28177 root 127 0 20 3:06.56 0:11.72 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 57.2 S 14 java
28921 root 127 0 20 0:01.40 0:00.35 0.00 B/s 0.00 B/s B4 13.7 18.3G 8817M 20116 0.0 S 6 java

```

```

Mem 0.8% 0.7% 0.004 0.3% 8 58.0% 12 58.0%
Swp 0.7% 0.1% 0.001 0.1% 13 58.0%
    0.1% 0.3% 0.003 0.3% 10 58.1%
    0.7% 0.8% 0.011 0.8% 11 58.4%

Tasks: 31, 144 thr; 3 running
Load average: 0.34 7.15 3.80
Uptime: 23:25:30

Hostname: moaf-swap-mdp-2

  PID USER      NLWFO  NI PRI  UTIME+  STIME+  DISK READ  DISK WRITE  IO  MEM%  VIRT%  RES%  SHR%  GPU%  S  CPU Command
4482 root      1 0 20 0:00.00 2:15.32 0.00 B/s 0.00 B/s B4 0.0 0.0 187M 6800 3840 0.0 S 1 /usr/lib/systemd/systemd --switched-r
4702 root      131 0 20 0:00.00 7:32.15 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 909.0 S 10 /bin/bash /opt/ignite/bin/ignite.s
50070 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 /usr/bin/java -XX:+AggressiveOp
50074 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50074 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50061 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50050 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50049 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50017 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50010 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50009 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50006 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50004 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
50003 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4084 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4083 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4078 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4076 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4075 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4074 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4073 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4071 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4070 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4060 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4060 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
4067 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
40000 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
40000 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java
40000 root      131 0 20 0:00.00 0:00.00 0.00 B/s 0.00 B/s B4 13.7 18.3G 8818M 20148 0.0 S 1 java

```

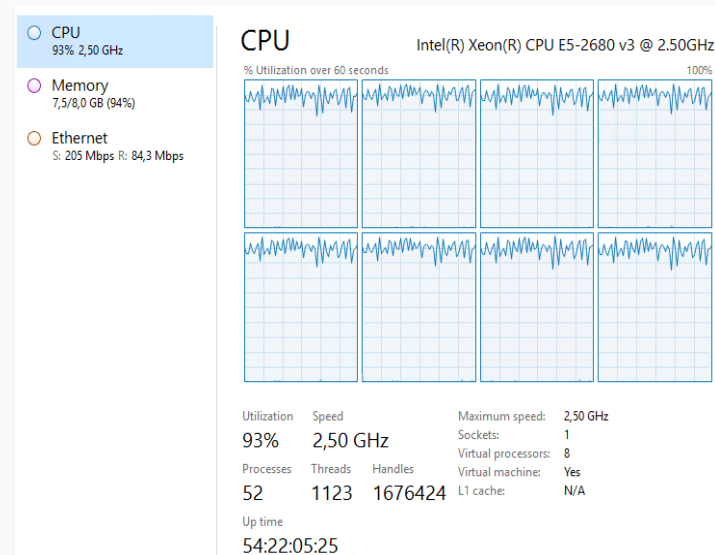
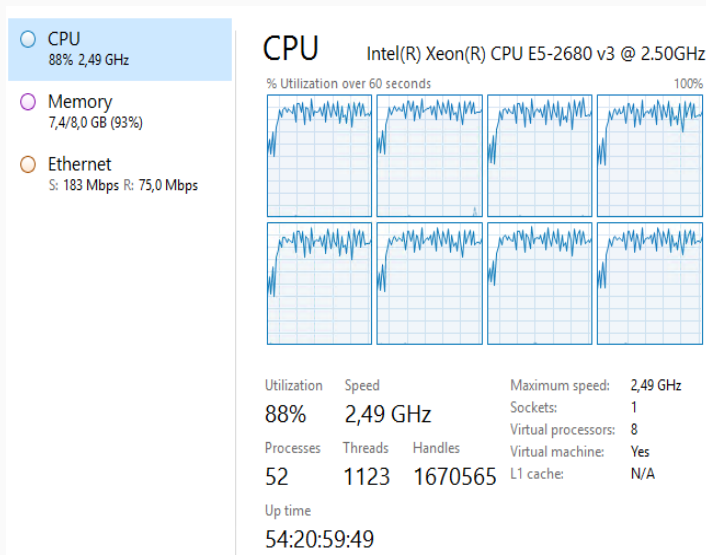
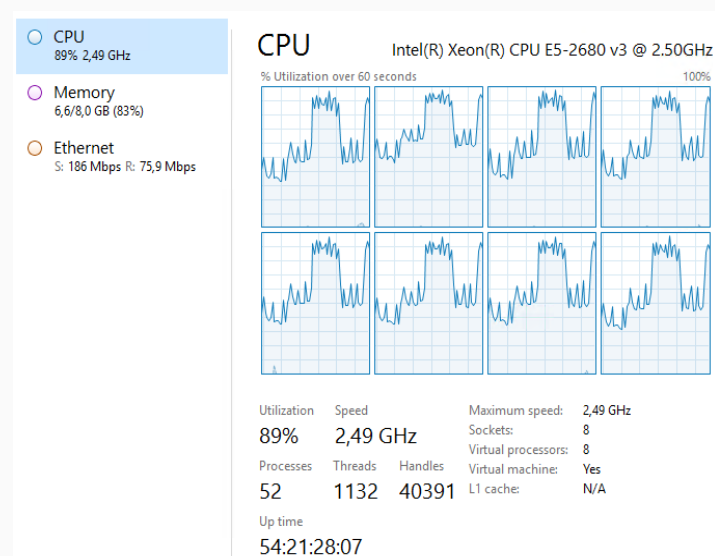
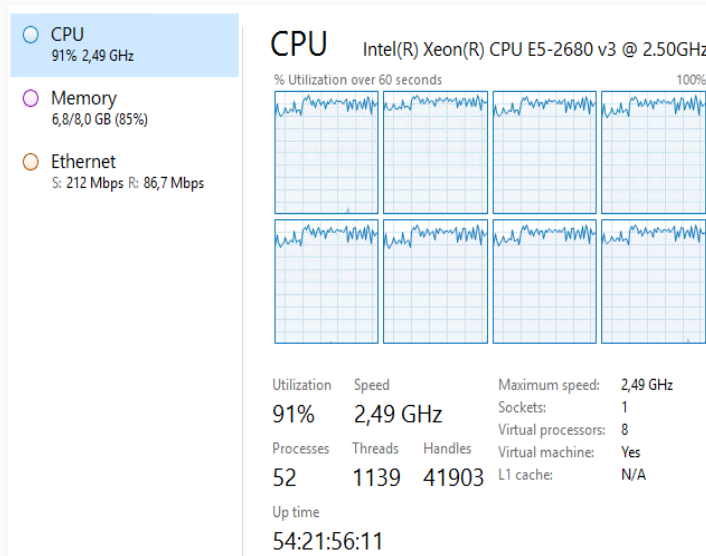
Ignite Java lib — утилизация CPU 1694,27% из 3200%

Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle	Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle
moaf-1	0	0	0	0	0	0	0,45	0	0	0	99,55	moaf-2	0	1,17	0	1,95	0	0	1,17	0	0	0	95,7
	1	0	0	0	0	0	0,8	0	0	0	99,2		1	0	0	0	0	0	1,36	0	0	0	98,64
	2	60,34	0	6,55	0	0	0	0	0	0	33,1		2	54,98	0	7,9	0	0	0	0	0	0	37,11
	3	56,9	0	6,55	0	0	0	0	0	0	36,55		3	54,45	0	7,19	0	0	0	0	0	0	38,36
	4	57,39	0	7,56	0	0	0	0	0	0	35,05		4	51,71	0	7,88	0	0	0	0	0	0	40,41
	5	53,61	0	8,93	0	0	0	0	0	0	37,46		5	51,36	0	7,48	0	0	0	0	0	0	41,16
	6	53,95	0	8,25	0	0	0	0	0	0	37,8		6	50,86	0	8,25	0	0	0	0	0	0	40,89
	7	57,19	0	7,19	0	0	0	0	0	0	35,62		7	52,23	0	7,22	0	0	0	0	0	0	40,55
	8	56,7	0	6,53	0	0	0	0	0	0	36,77		8	50,17	0	5,8	0	0	0	0	0	0	44,03
	9	54,98	0	5,84	0	0	0	0	0	0	39,18		9	49,66	0	7,19	0	0	0	0	0	0	43,15
	10	56,85	0	6,16	0	0	0	0	0	0	36,99		10	47,93	0	7,59	0	0	0	0	0	0	44,48
	11	54,45	0	6,16	0	0	0	0	0	0	39,38		11	48,64	0	7,14	0	0	0	0	0	0	44,22
	12	54,79	0	6,51	0	0	0	0	0	0	38,7		12	49,66	0	7,19	0	0	0	0	0	0	43,15
	13	53,45	0	6,55	0	0	0	0	0	0	40		13	50,85	0	6,14	0	0	0	0	0	0	43
	14	52,4	0	6,85	0	0	0	0	0	0	40,75		14	49,14	0	5,84	0	0	0	0	0	0	45,02
	15	54,45	0	6,85	0	0	0	0	0	0	0		38,7	15	51,53	0	7,46	0	0	0	0	0	0
Всего	1460,48	0	191,63	0	0	0	3,3	0	0	0	1544,65												

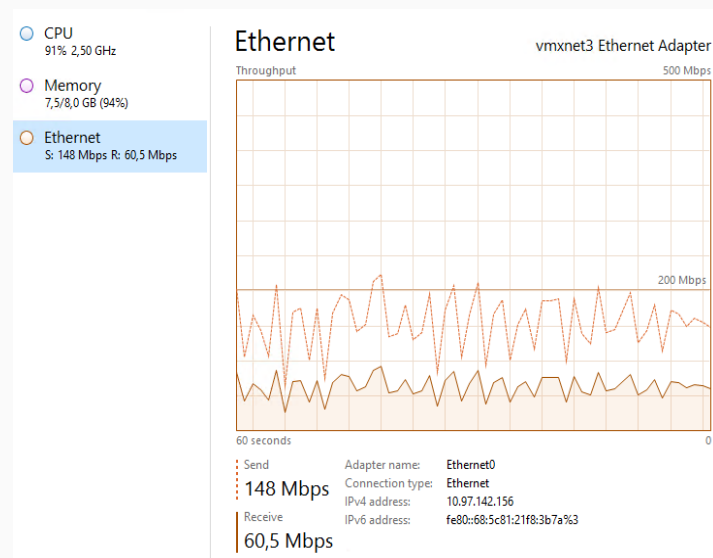
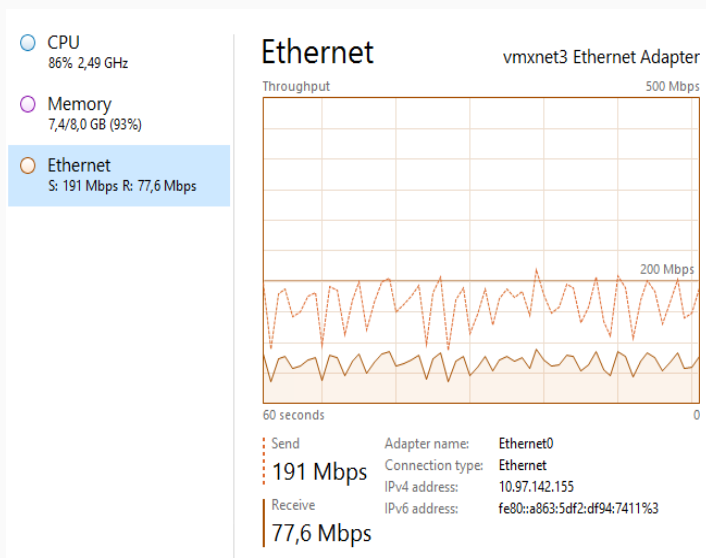
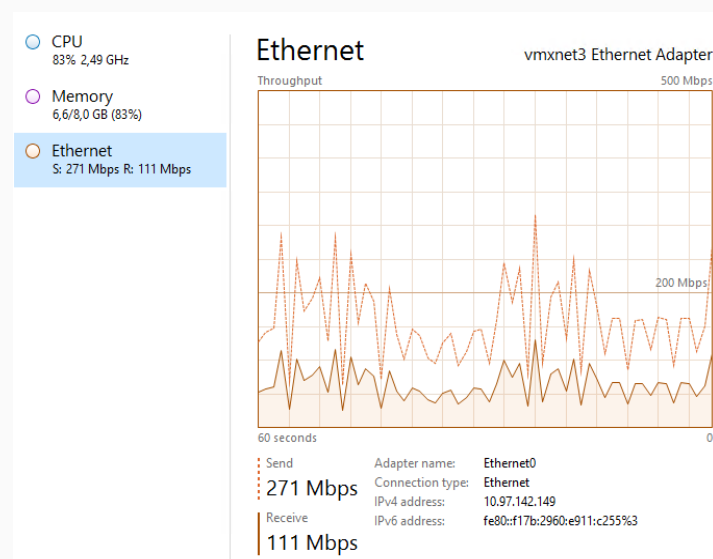
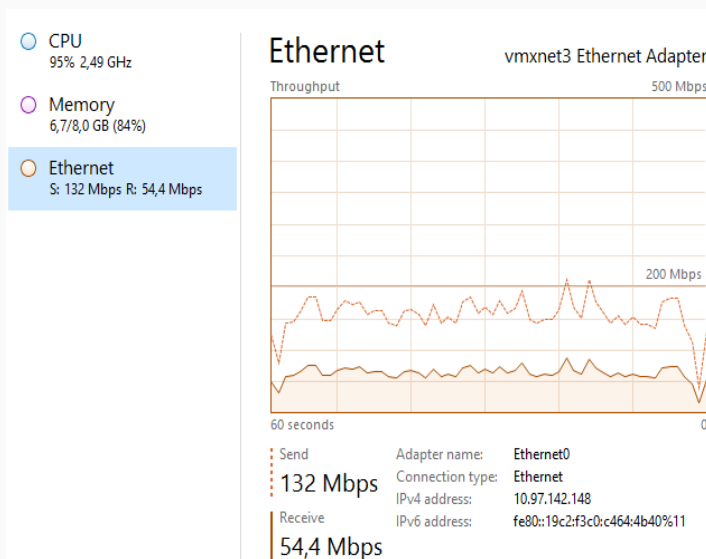
Ignite Java lib — sar -N DEV

HOST	rxpck/s	txpck/s	rxkB/s	txkB/s
moaf-1	50652,67	37185,67	46615,37	18543,87
moaf-2	30057,67	29876	43611,8	17433,18

Ignite Java lib — генераторы нагрузки



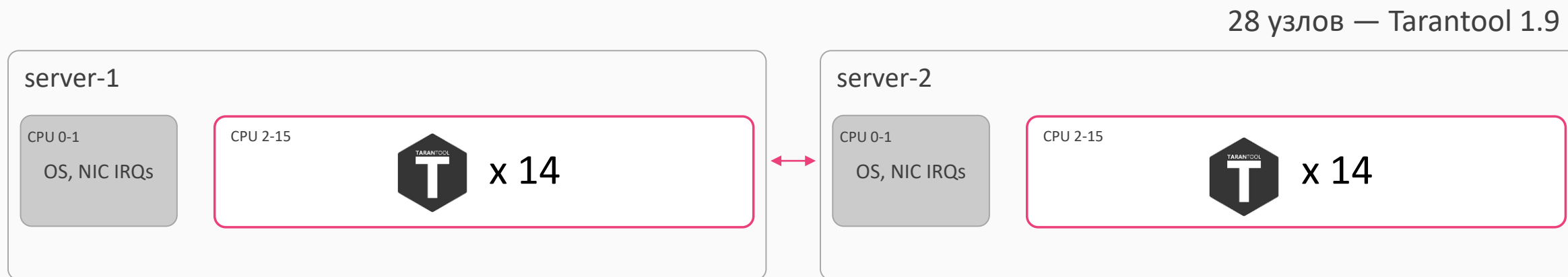
Ignite Java lib — генераторы нагрузки



Tarantool

Бизнес-логика на сервере,
в подключаемом модуле на Lua

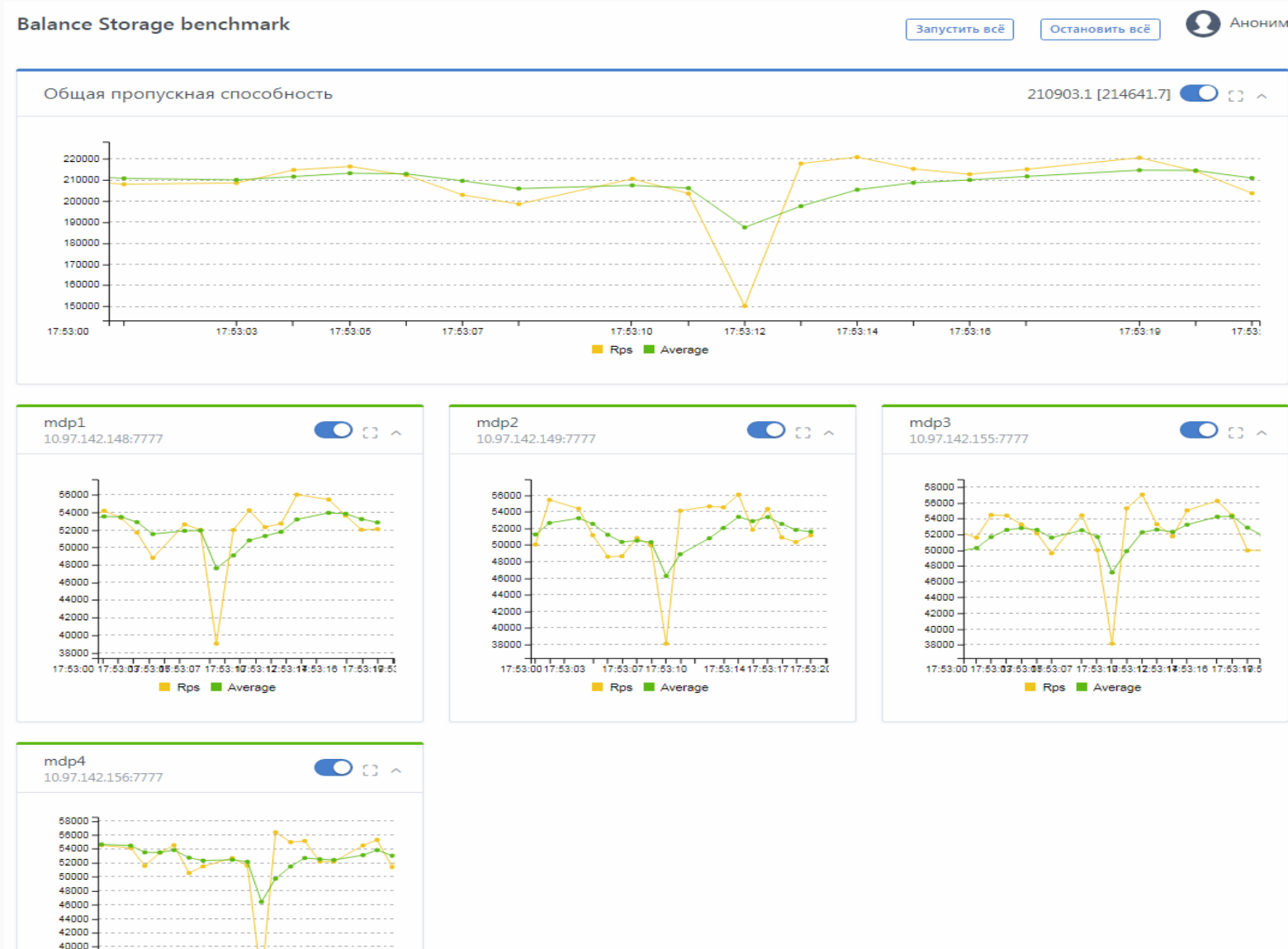
Tarantool Lua lib — схема кластера



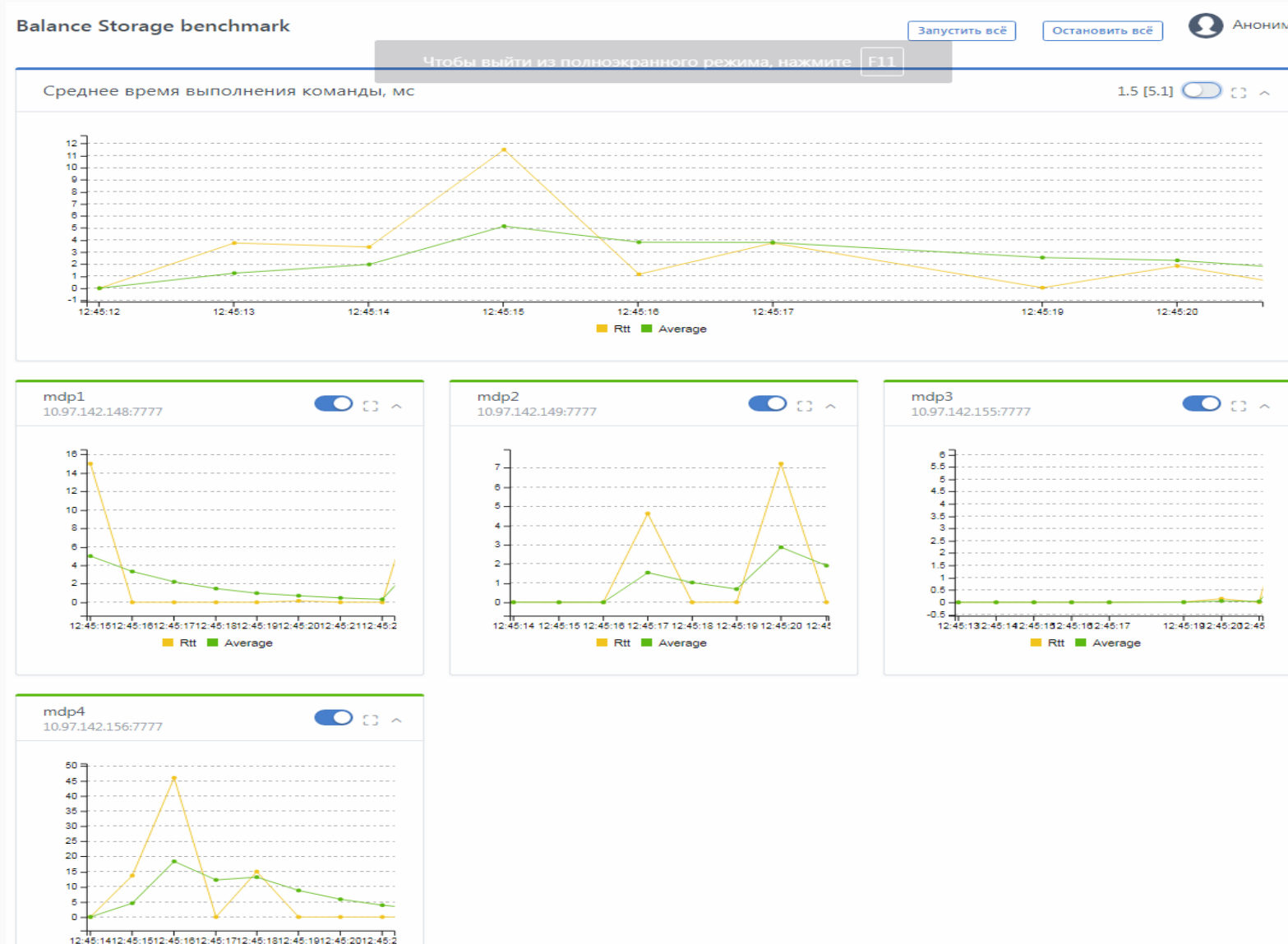
Tarantool Lua lib — без репликации

```
feedback_enabled = false,
sharding = {
  ['65631c15-a540-589e-b694-a8e5377cf92e'] = {
    replicas = {
      ['676ebc6b-b99c-59d5-94c6-6e37236edfe6'] = {
        uri = 'storage:storage@10.97.142.134:8001',
        name = 'storage_tnt2_1',
        master = true,
      },
    },
  },
  ['4e63b6e7-c554-5ae5-b614-0e1cdef5d718'] = {
    replicas = {
      ['d02fbd60-6a68-5dcc-beb0-6dd39ebef08e'] = {
        uri = 'storage:storage@10.97.142.134:8002',
        name = 'storage_tnt2_2',
        master = true,
      },
    },
  },
  ['47597dd8-1f56-5666-aedb-b47688b0f0e4'] = {
    replicas = {
      ['e6e44a2b-a22b-577d-a1da-78677d85f77b'] = {
        uri = 'storage:storage@10.97.142.133:8001',
        name = 'storage_tnt1_1',
        master = true,
      },
    },
  },
}
```

Tarantool Lua lib — 210903,1 запросов в секунду



Tarantool Lua lib — среднее время отклика 1,5 мс



Tarantool Lua lib — утилизация CPU 2542,31% из 3200%

1	1	1	0	20	4.7%	7.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
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1	root	1	0	20	0:41.55	2:15.28	0.00 B/s	0.00 B/s	B4	0.0	187M	6800	3840	0.0 S	0	/usr/lib/systemd/systemd --switched-root
2742	root	4	0	20	0:26.89	0:25.14	0.00 B/s	0.00 M/s	B4	0.3	4901M	1890M	7268	101.0 R	11	tarantool storage_tnt2_14.lua <runn
2743	root	4	0	20	0:26.89	0:25.14	0.00 B/s	0.00 M/s	B4	0.3	4901M	1890M	7268	101.0 R	11	coio
2744	root	4	0	20	0:14.97	0:04.50	0.00 B/s	2.23 M/s	B4	0.3	4901M	1890M	7268	12.5 S	10	wal
2743	root	4	0	20	0:06.48	0:17.88	0.00 B/s	0.00 B/s	B4	0.3	4901M	1890M	7268	16.0 S	15	iproto
2691	root	4	0	20	0:18.49	0:32.23	0.00 B/s	1.37 M/s	B4	0.3	4865M	173M	7268	106.0 R	7	tarantool storage_tnt2_13.lua <runn
2695	root	4	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4865M	173M	7268	0.0 S	7	coio
2693	root	4	0	20	0:15.06	0:05.20	0.00 B/s	1.37 M/s	B4	0.3	4865M	173M	7268	9.8 R	7	wal
2692	root	4	0	20	0:07.01	0:19.29	0.00 B/s	0.00 B/s	B4	0.3	4865M	173M	7268	11.1 R	7	iproto
2639	root	4	0	20	0:08.52	0:34.36	0.00 B/s	1.74 M/s	B4	0.3	4833M	163M	7268	104.0 R	5	tarantool storage_tnt2_12.lua <runn
2643	root	4	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4833M	163M	7268	10.0 S	9	coio
2641	root	4	0	20	0:15.45	0:00.00	0.00 B/s	0.00 M/s	B4	0.3	4833M	163M	7268	13.2 S	5	wal
2640	root	4	0	20	0:34.36	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4833M	163M	7268	13.2 S	4	iproto
2587	root	4	0	20	0:09.30	0:34.16	0.00 B/s	2.37 M/s	B4	0.3	4893M	180M	7268	94.8 R	8	tarantool storage_tnt2_11.lua <runn
2591	root	4	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4893M	180M	7268	0.0 S	10	coio
2589	root	4	0	20	0:15.37	0:05.37	0.00 B/s	2.37 M/s	B4	0.3	4893M	180M	7268	12.5 S	10	wal
2588	root	4	0	20	0:06.86	0:20.73	0.00 B/s	0.00 B/s	B4	0.3	4893M	180M	7268	16.0 S	8	iproto
2533	root	4	0	20	0:28.42	0:30.33	0.00 B/s	2.25 M/s	B4	0.3	4901M	191M	7268	99.0 S	13	tarantool storage_tnt2_10.lua <runn
2537	root	4	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4901M	191M	7268	0.0 S	5	coio
2535	root	4	0	20	0:15.62	0:04.76	0.00 B/s	2.24 M/s	B4	0.3	4901M	191M	7268	11.8 S	14	wal
2534	root	4	0	20	0:06.46	0:18.87	0.00 B/s	0.00 B/s	B4	0.3	4901M	191M	7268	15.3 S	13	iproto
2476	root	6	0	20	0:14.33	0:31.41	0.00 B/s	2.33 M/s	B4	0.3	4941M	176M	7268	9.0 R	14	tarantool storage_tnt2_9.lua <runn
2499	root	6	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4941M	176M	7268	0.0 S	0	coio
2581	root	6	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4941M	176M	7268	0.0 S	0	coio
2483	root	6	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4941M	176M	7268	0.0 S	0	coio
2481	root	6	0	20	0:15.57	0:05.07	0.00 B/s	2.33 M/s	B4	0.3	4941M	176M	7268	11.8 S	14	wal
2480	root	6	0	20	0:06.84	0:19.15	0.00 B/s	0.00 B/s	B4	0.3	4941M	176M	7268	15.3 R	13	iproto

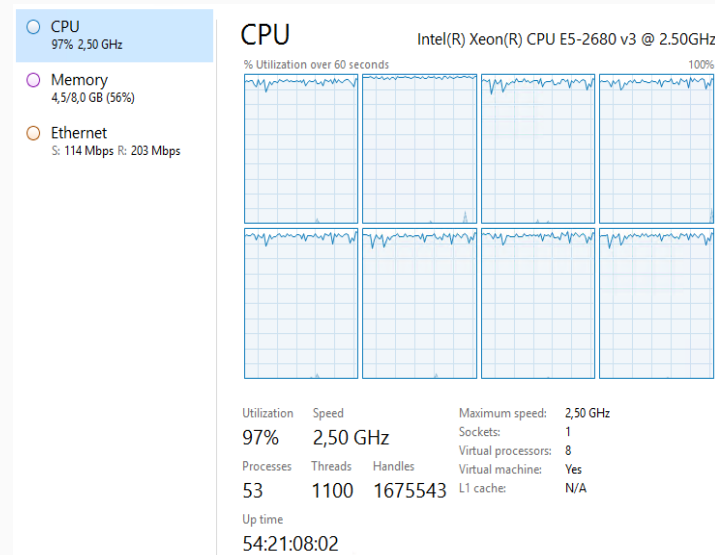
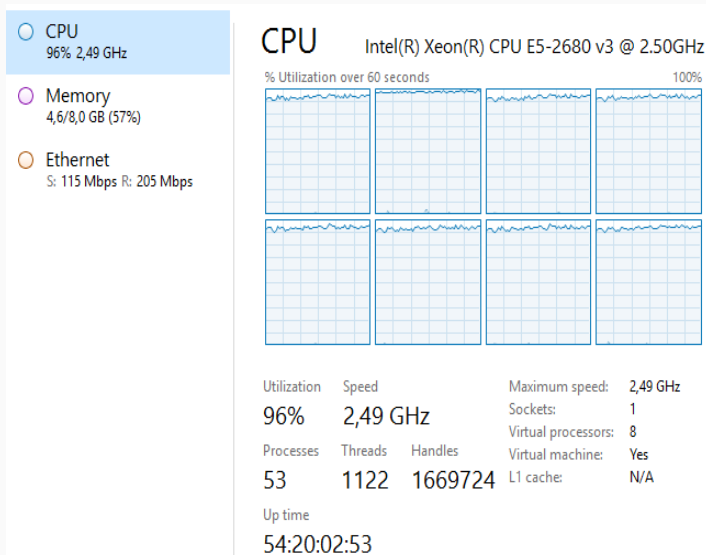
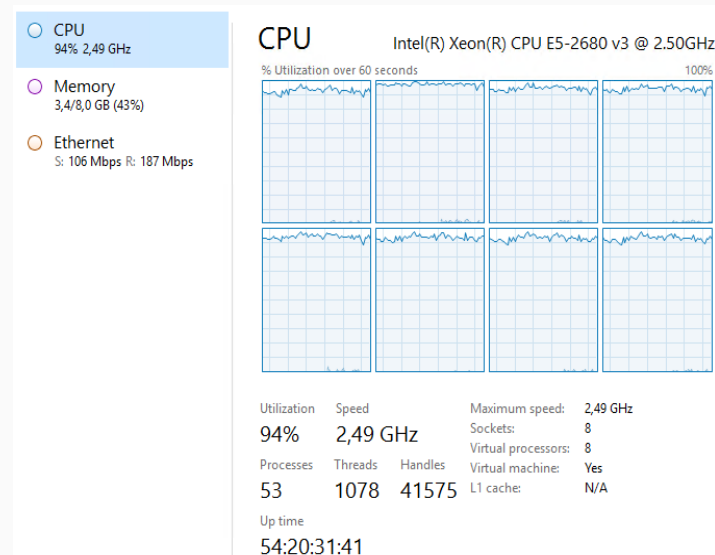
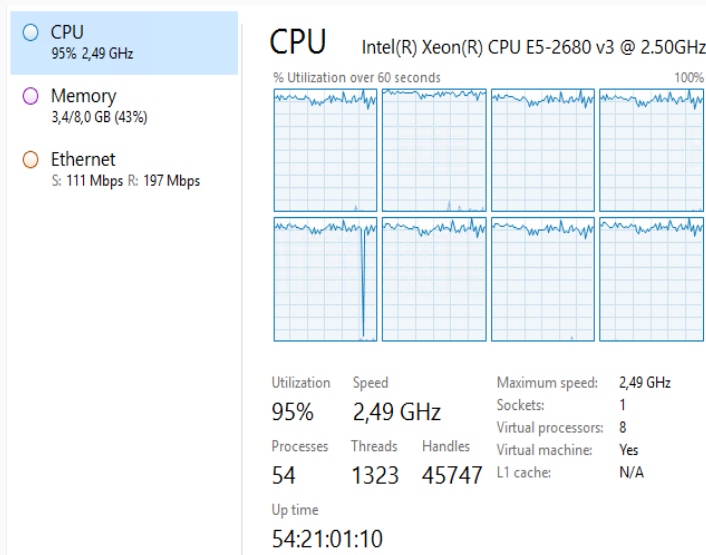
Tarantool Lua lib — утилизация CPU 2542,31% из 3200%

Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle	Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle
moaf-1	0	0	0	0	0	0	2,35	0	0	0	97,65	moaf-2	0	0,61	0	1,21	0	0	2,42	0	0	0	95,76
	1	0,62	0	1,86	0	0	3,11	0	0	0	94,41		1	0,6	0	0,6	0	0	1,81	0	0	0	96,99
	2	78,11	0	15,15	0	0	0	0	0	0	6,73		2	87,71	0	8,97	0	0	0,33	0	0	0	2,99
	3	72,05	0	18,52	0	0	0	0	0	0	9,43		3	83,67	0	11,33	0	0	0	0	0	0	5
	4	69,13	0	20,13	0	0	0	0	0	0	10,74		4	77,44	0	15,15	0	0	0	0	0	0	7,41
	5	73,06	0	17,85	0	0	0	0	0	0	9,09		5	80,13	0	13,13	0	0	0	0	0	0	6,73
	6	71,53	0	17,97	0	0	0	0	0	0	10,51		6	84,85	0	11,45	0	0	0	0	0	0	3,7
	7	71,19	0	17,97	0	0	0	0	0	0	10,85		7	77,78	0	14,81	0	0	0	0	0	0	7,41
	8	69,73	0	19,05	0	0	0,34	0	0	0	10,88		8	70,31	0	17,06	0	0	0	0	0	0	12,63
	9	69,28	0	19,45	0	0	0	0	0	0	11,26		9	69,05	0	18,71	0	0	0	0	0	0	12,24
	10	69,05	0	19,73	0	0	0	0	0	0	11,22		10	69,59	0	18,92	0	0	0	0	0	0	11,49
	11	69,15	0	20	0	0	0	0	0	0	10,85		11	69,97	0	18,43	0	0	0	0	0	0	11,6
	12	69,52	0	19,86	0	0	0	0	0	0	10,62		12	69,39	0	19,05	0	0	0	0	0	0	11,56
	13	69,28	0	19,45	0	0	0,34	0	0	0	10,92		13	70,37	0	17,51	0	0	0	0	0	0	12,12
	14	71,03	0	18,28	0	0	0	0	0	0	10,69		14	70,31	0	18,09	0	0	0	0	0	0	11,6
	15	71,03	0	18,62	0	0	0	0	0	0	10,34		15	68,71	0	19,05	0	0	0	0	0	0	12,24
Всего		2044,25	0	487,36	0	0	10,7	0	0	0	657,66												

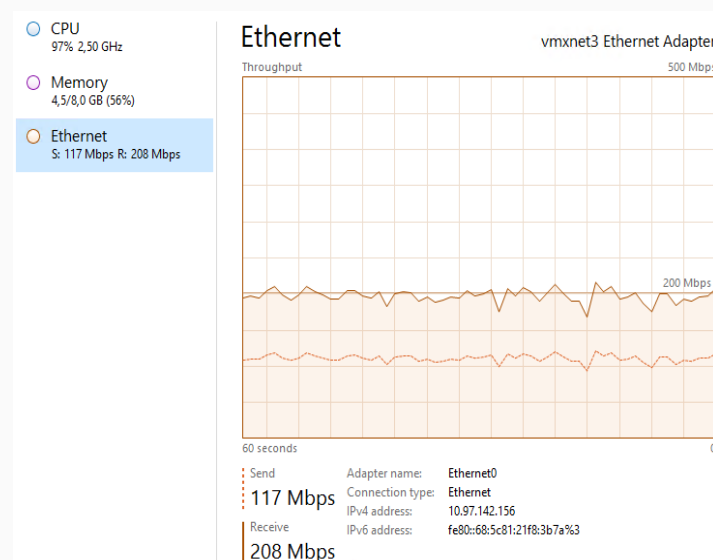
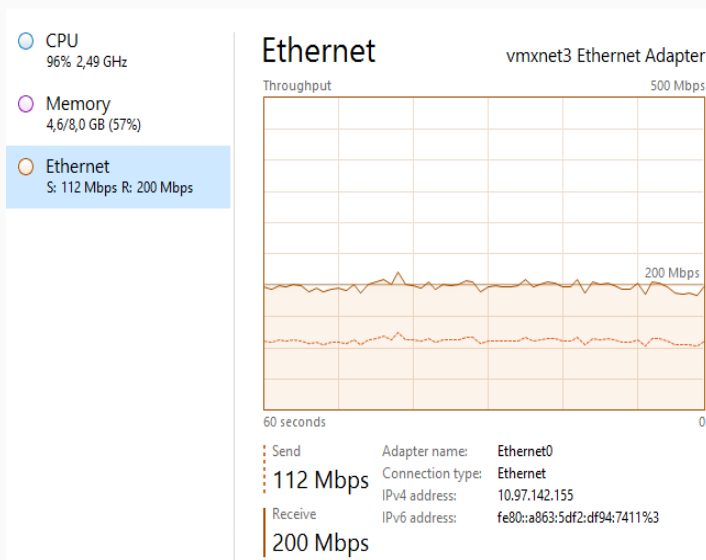
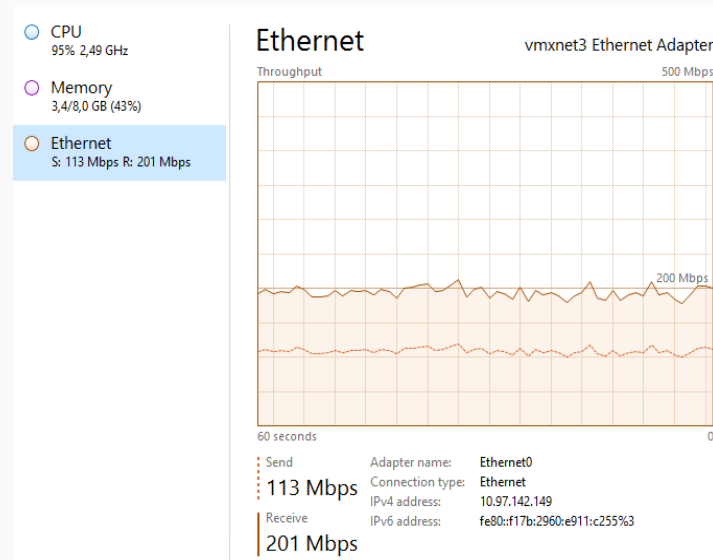
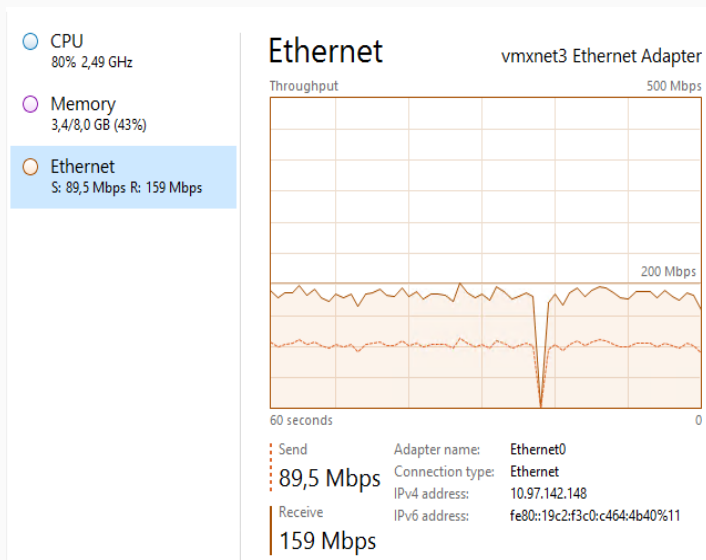
Tarantool Lua lib — sar -N DEV

HOST	rxpck/s	txpck/s	rxkB/s	txkB/s
moaf-1	124533,3	94542	20624,83	45998,98
moaf-2	110333,3	82514,67	19907,1	45435,32

Tarantool Lua lib — генераторы нагрузки



Tarantool Lua lib — генераторы нагрузки



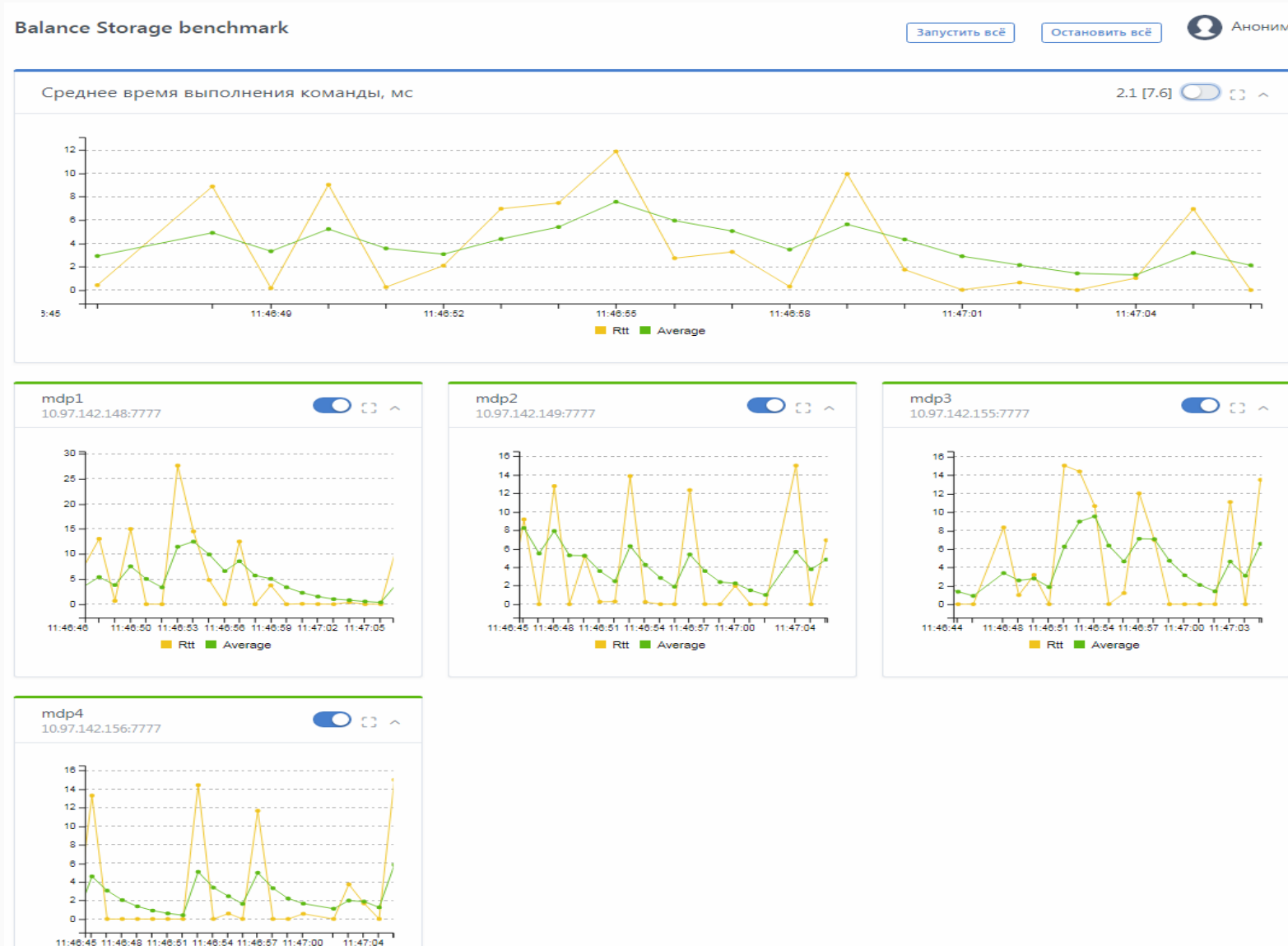
Tarantool Lua lib — с репликацией

```
feedback_enabled = false,
sharding = {
  ['ac5ead08-e07b-5636-877e-46413c2533dd'] = {
    replicas = {
      ['676ebc6b-b99c-59d5-94c6-6e37236edfe6'] = {
        uri = 'storage:storage@10.97.142.134:8001',
        name = 'storage_tnt2_1_a',
        master = true,
      },
      ['47597dd8-1f56-5666-aedb-b47688b0f0e4'] = {
        uri = 'storage:storage@10.97.142.133:9001',
        name = 'storage_tnt1_1_b',
      },
    },
  },
  ['832e8409-ea70-54c6-84de-966f0cbbfa20'] = {
    replicas = {
      ['d02fbd60-6a68-5dcc-beb0-6dd39ebef08e'] = {
        uri = 'storage:storage@10.97.142.134:8002',
        name = 'storage_tnt2_2_a',
        master = true,
      },
      ['8ac965e3-7637-5379-b179-39efa465a238'] = {
        uri = 'storage:storage@10.97.142.133:9002',
        name = 'storage_tnt1_2_b',
      },
    },
  },
  ['95617a84-3dec-58aa-832a-1dc1cb6f24f0'] = {
    replicas = {
      ['e6e44a2b-a22b-577d-a1da-78677d85f77b'] = {
```

Tarantool Lua lib — 130645,4 запросов в секунду



Tarantool Lua lib — среднее время отклика 2,1 мс



Tarantool Lua lib — утилизация CPU 2510,84% из 3200%

```
0  [|||||] 18.5%] 4 [|||||] 74.5%] 8 [|||||] 03.3%] 12 [|||||] 92.6%]
1  [|||||] 4.1%] 5 [|||||] 73.2%] 9 [|||||] 01.8%] 13 [|||||] 92.7%]
2  [|||||] 79.0%] 6 [|||||] 76.6%] 10 [|||||] 03.3%] 14 [|||||] 91.9%]
3  [|||||] 73.6%] 7 [|||||] 74.3%] 11 [|||||] 01.9%] 15 [|||||] 94.0%]
Mem [|||||]
Swp [|||||] 10.9G/62.7G Tasks: 43, 87 thr; 16 running
                               Load average: 11.45 5.08 7.53
                               OK/4.40G Uptime: 1 day, 20:19:14
Hostname: moaf-swap-mdp-1
```

PID	USER	NLWP	NI	PRI	UTIME+	STIME+	DISK READ	DISK WRITE	IO	MEM%	VIRT	RES	SHR	CPU%	S	CPU	Command
1	root	1	0	20	0:11.83	0:20.49	0.00 B/s	0.00 B/s	B4	0.0	187M	6676	3840	0.0	S	0	/usr/lib/systemd/systemd --switched-r
18269	root	5	0	20	0:17.16	0:28.47	0.00 B/s	2.15 M/s	B4	0.0	4315M	19652	7012	71.7	S	9	tarantool storage_tnt1_7_b.lua <ru
18491	root	5	0	20	0:04.74	0:07.31	0.00 B/s	0.00 B/s	B4	0.0	4315M	19652	7012	18.8	S	8	relay/10.97.142
18339	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.0	4315M	19652	7012	0.0	S	14	coio
18271	root	5	0	20	0:05.53	0:11.97	0.00 B/s	2.15 M/s	B4	0.0	4315M	19652	7012	26.1	R	13	wal
18270	root	5	0	20	0:00.01	0:00.01	0.00 B/s	0.00 B/s	B4	0.0	4315M	19652	7012	0.0	S	11	iproto
18258	root	5	0	20	0:44.30	0:14.16	0.00 B/s	2.28 M/s	B4	0.1	4901M	85452	7268	132.1	R	3	tarantool storage_tnt1_7_a.lua <ru
18495	root	5	0	20	0:02.91	0:04.53	0.00 B/s	0.00 B/s	B4	0.1	4901M	85452	7268	18.1	R	6	relay/10.97.142
18493	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.1	4901M	85452	7268	0.0	S	4	coio
18261	root	5	0	20	0:04.32	0:01.44	0.00 B/s	2.28 M/s	B4	0.1	4901M	85452	7268	13.0	S	4	wal
18260	root	5	0	20	0:02.39	0:05.98	0.00 B/s	0.00 B/s	B4	0.1	4901M	85452	7268	19.5	S	2	iproto
18215	root	5	0	20	0:16.17	0:27.28	0.00 B/s	2.19 M/s	B4	0.0	4411M	19708	7012	71.7	R	8	tarantool storage_tnt1_6_b.lua <ru
18480	root	5	0	20	0:04.54	0:06.86	0.00 B/s	0.00 B/s	B4	0.0	4411M	19708	7012	18.8	R	14	relay/10.97.142
18330	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.0	4411M	19708	7012	0.0	S	15	coio
18217	root	5	0	20	0:05.06	0:11.51	0.00 B/s	2.19 M/s	B4	0.0	4411M	19708	7012	26.8	R	9	wal
18216	root	5	0	20	0:00.00	0:00.01	0.00 B/s	0.00 B/s	B4	0.0	4411M	19708	7012	0.0	S	12	iproto
18207	root	5	0	20	0:46.74	0:13.65	0.00 B/s	1.77 M/s	B4	0.1	4903M	90508	7268	115.1	R	15	tarantool storage_tnt1_6_a.lua <ru
18487	root	5	0	20	0:02.91	0:04.42	0.00 B/s	0.00 B/s	B4	0.1	4903M	90508	7268	13.8	S	2	relay/10.97.142
18325	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.1	4903M	90508	7268	0.0	S	3	coio
18210	root	5	0	20	0:04.20	0:01.41	0.00 B/s	1.77 M/s	B4	0.1	4903M	90508	7268	10.1	R	15	wal
18209	root	5	0	20	0:02.35	0:05.77	0.00 B/s	0.00 B/s	B4	0.1	4903M	90508	7268	13.8	S	14	iproto

```
0  [|||||] 11.7%] 4 [|||||] 86.3%] 8 [|||||] 05.4%] 12 [|||||] 96.1%]
1  [|||||] 10.0%] 5 [|||||] 84.9%] 9 [|||||] 04.7%] 13 [|||||] 96.7%]
2  [|||||] 87.9%] 6 [|||||] 94.2%] 10 [|||||] 06.1%] 14 [|||||] 94.8%]
3  [|||||] 88.0%] 7 [|||||] 85.3%] 11 [|||||] 04.1%] 15 [|||||] 94.8%]
Mem [|||||] 16.6G/62.7G Tasks: 43, 85 thr; 16 running
Swp [|||||] OK/4.40G Load average: 15.80 9.20 8.52
                               Uptime: 20 days, 22:04:32
Hostname: moaf-swap-mdp-2
```

PID	USER	NLWP	NI	PRI	UTIME+	STIME+	DISK READ	DISK WRITE	IO	MEM%	VIRT	RES	SHR	CPU%	S	CPU	Command
1	root	1	0	20	0:41.54	2:15.25	0.00 B/s	0.00 B/s	B4	0.0	187M	6800	3840	0.0	S	0	/usr/lib/systemd/systemd --switched-r
30176	root	5	0	20	0:50.67	1:28.11	0.00 B/s	2.38 M/s	B4	0.0	4412M	20848	7012	58.9	S	13	tarantool storage_tnt2_7_b.lua <ru
30338	root	5	0	20	0:13.82	0:21.53	0.00 B/s	0.00 B/s	B4	0.0	4412M	20848	7012	13.3	S	12	relay/10.97.142
30181	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.0	4412M	20848	7012	0.0	S	4	coio
30178	root	5	0	20	0:15.97	0:36.94	0.00 B/s	2.38 M/s	B4	0.0	4412M	20848	7012	21.7	S	10	wal
30177	root	5	0	20	0:00.00	0:00.02	0.00 B/s	0.00 B/s	B4	0.0	4412M	20848	7012	0.0	S	4	iproto
30168	root	5	0	20	2:33.05	0:43.12	0.00 B/s	1.69 M/s	B4	0.3	4985M	197M	7268	114.1	R	9	tarantool storage_tnt2_7_a.lua <ru
30339	root	5	0	20	0:07.08	0:12.63	0.00 B/s	0.00 B/s	B4	0.3	4985M	197M	7268	9.8	S	5	relay/10.97.142
30334	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4985M	197M	7268	0.0	S	14	coio
30171	root	5	0	20	0:16.09	0:04.84	0.00 B/s	1.69 M/s	B4	0.3	4985M	197M	7268	13.3	S	12	wal
30170	root	5	0	20	0:06.50	0:18.16	0.00 B/s	0.00 B/s	B4	0.3	4985M	197M	7268	11.9	S	9	iproto
30106	root	5	0	20	0:50.58	1:27.31	0.00 B/s	3.08 M/s	B4	0.0	4316M	19364	6884	97.5	R	7	tarantool storage_tnt2_6_b.lua <ru
30331	root	5	0	20	0:13.58	0:21.73	0.00 B/s	0.00 B/s	B4	0.0	4316M	19364	6884	25.9	R	7	relay/10.97.142
30330	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.0	4316M	19364	6884	0.0	S	13	coio
30108	root	5	0	20	0:15.85	0:36.80	0.00 B/s	3.08 M/s	B4	0.0	4316M	19364	6884	37.2	R	5	wal
30107	root	5	0	20	0:00.00	0:00.01	0.00 B/s	0.00 B/s	B4	0.0	4316M	19364	6884	0.0	S	14	iproto
30098	root	5	0	20	2:39.10	0:40.73	0.00 B/s	1.63 M/s	B4	0.3	4882M	186M	7268	123.1	R	11	tarantool storage_tnt2_6_a.lua <ru
30332	root	5	0	20	0:07.20	0:12.05	0.00 B/s	0.00 B/s	B4	0.3	4882M	186M	7268	10.5	S	3	relay/10.97.142
30322	root	5	0	20	0:00.00	0:00.00	0.00 B/s	0.00 B/s	B4	0.3	4882M	186M	7268	0.0	S	15	coio
30101	root	5	0	20	0:16.50	0:04.63	0.00 B/s	1.63 M/s	B4	0.3	4882M	186M	7268	13.0	S	11	wal
30100	root	5	0	20	0:06.38	0:17.46	0.00 B/s	0.00 B/s	B4	0.3	4882M	186M	7268	11.9	S	11	iproto

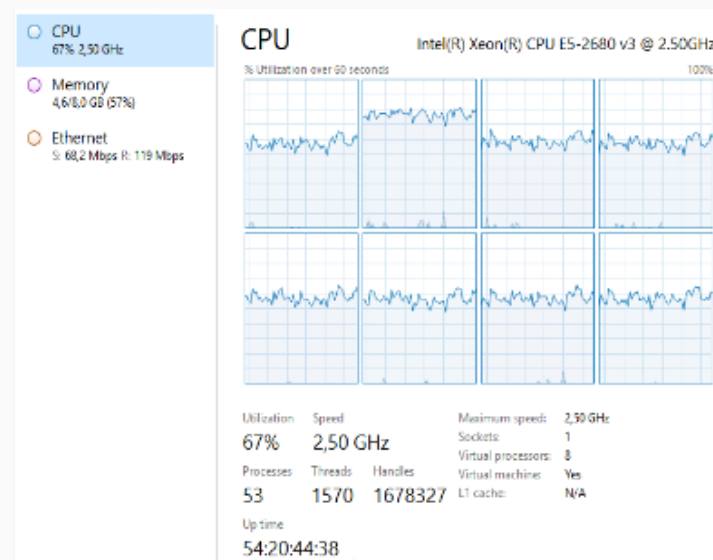
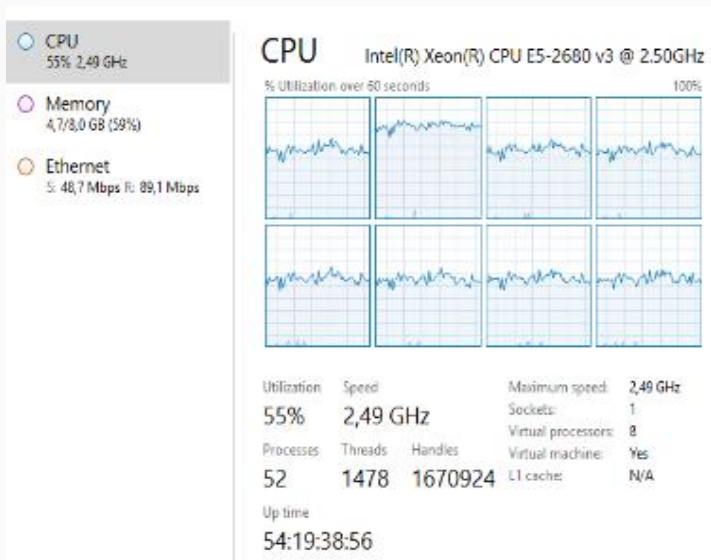
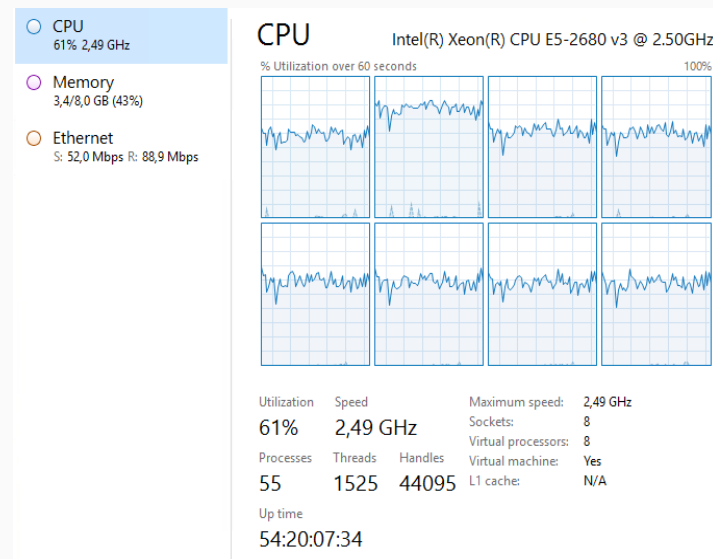
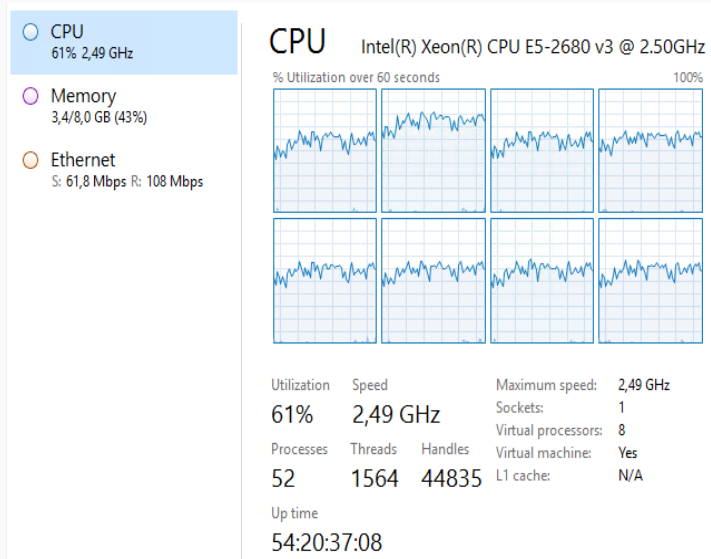
Tarantool Lua lib — утилизация CPU 2510,84% из 3200%

Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle	Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle
moaf-1	0	0,62	0	1,25	0	0	4,38	0	0	0	93,75	moaf-2	0	1,55	0	5,43	0	0	10,85	0	0	0	82,17
	1	0,68	0	1,36	0	0	3,4	0	0	0	94,56		1	0,54	0	2,72	0	0	5,98	0	0	0	90,76
	2	57,53	0	31,85	0	0	0	0	0	0	10,62		2	69,36	0	24,92	0	0	0	0	0	0	5,72
	3	53,95	0	34,02	0	0	0	0	0	0	12,03		3	54,58	0	33,56	0	0	0	0	0	0	11,86
	4	55,94	0	31,82	0	0	0	0	0	0	12,24		4	67	0	25,59	0	0	0	0	0	0	7,41
	5	53,82	0	33,68	0	0	0	0	0	0	12,5		5	60,14	0	30,41	0	0	0	0	0	0	9,46
	6	51,88	0	36,18	0	0	0	0	0	0	11,95		6	53,06	0	37,41	0	0	0	0	0	0	9,52
	7	53,63	0	33,56	0	0	0	0	0	0	12,8		7	70,75	0	20,41	0	0	0	0	0	0	8,84
	8	53,08	0	33,9	0,34	0	0	0	0	0	12,67		8	51,04	0	36,46	0	0	0	0	0	0	12,5
	9	50	0	36,46	0	0	0	0	0	0	13,54		9	52,88	0	35,25	0	0	0	0	0	0	11,86
	10	49,48	0	37,37	0	0	0	0	0	0	13,15		10	52,38	0	35,71	0	0	0	0	0	0	11,9
	11	49,48	0	36,59	0	0	0	0	0	0	13,94		11	49,66	0	37,84	0	0	0,34	0	0	0	12,16
	12	53,36	0	33,57	0	0	0	0	0	0	13,07		12	52,2	0	35,93	0	0	0	0	0	0	11,86
	13	49,66	0	36,64	0	0	0	0	0	0	13,7		13	49,83	0	37,88	0	0	0	0	0	0	12,29
	14	52,63	0	34,39	0	0	0	0	0	0	12,98		14	51,55	0	36,43	0	0	0	0	0	0	12,03
	15	54,2	0	32,87	0	0	0	0	0	0	12,94		15	51,2	0	36,43	0	0	0	0	0	0	12,37
Всего	1527,66	0	957,89	0,34	0	24,95	0	0	0	0	689,15												

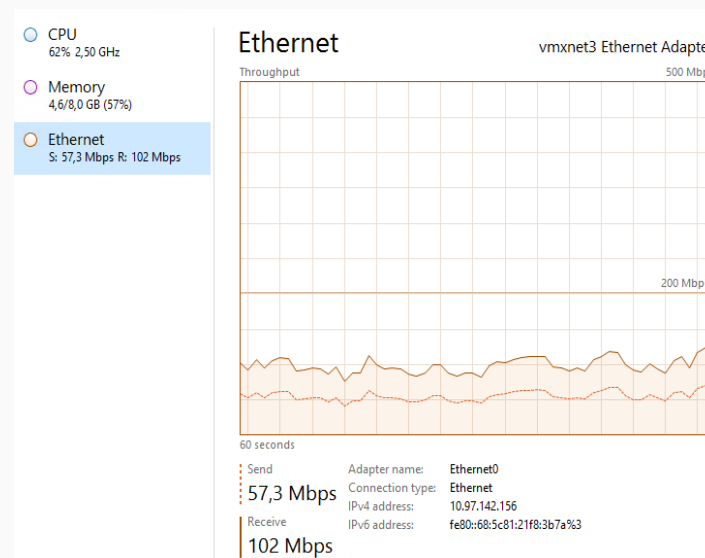
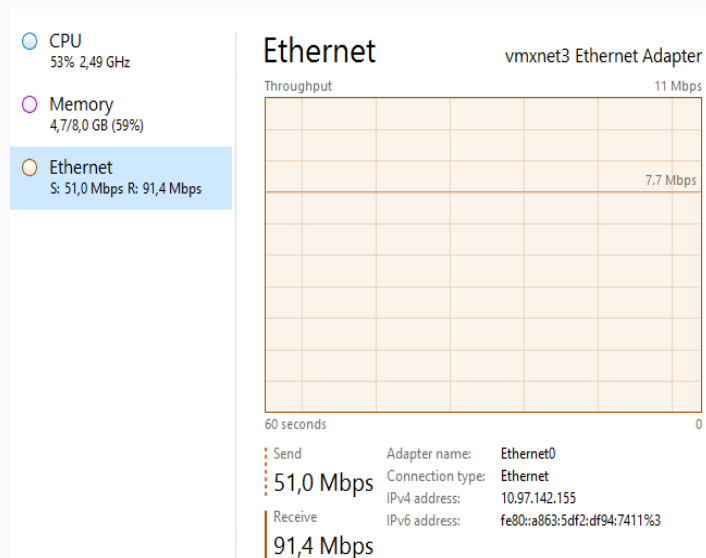
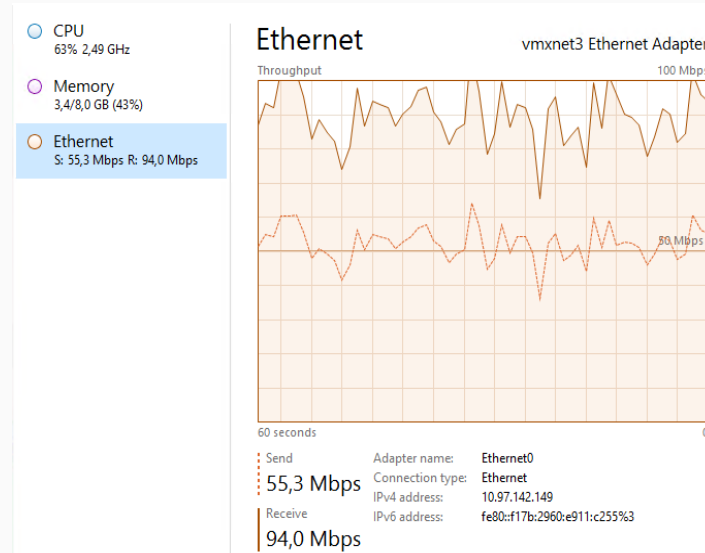
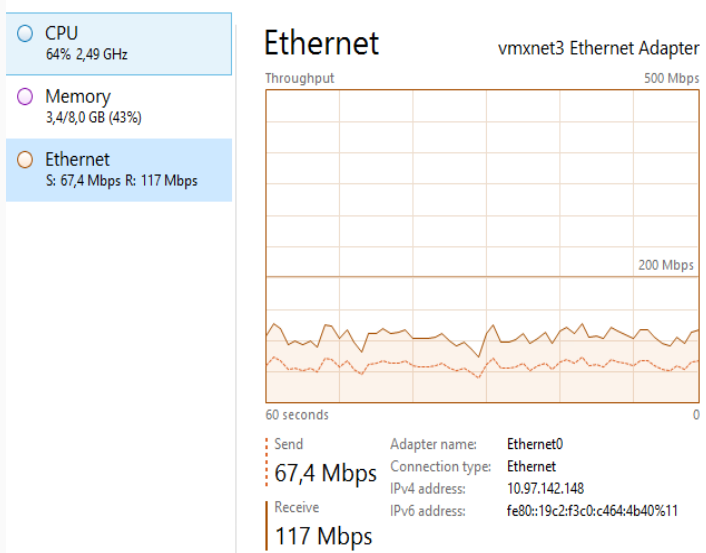
Tarantool Lua lib — sar -N DEV

HOST	rxpck/s	txpck/s	rxkB/s	txkB/s
moaf-1	137406	107686	32240,92	47661,92
moaf-2	104044,9	100830,6	33811,31	43305,47

Tarantool Lua lib — генераторы нагрузки



Tarantool Lua lib — генераторы нагрузки

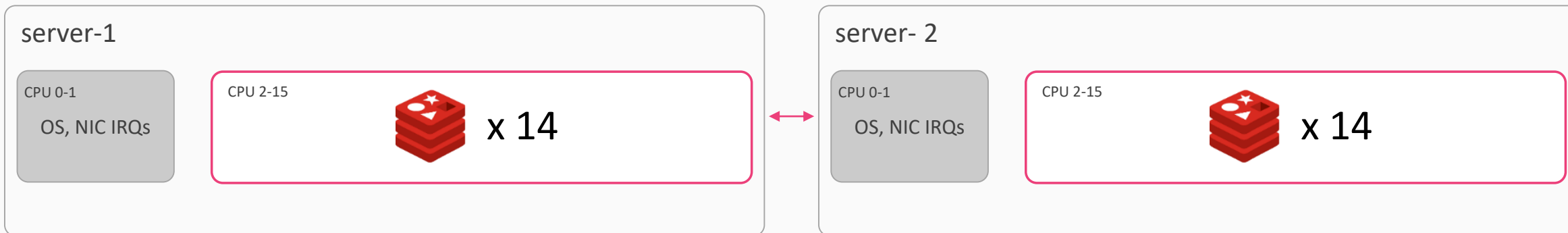


Redis

Бизнес-логика на сервере,
в подключаемом модуле на С

Redis C lib — схема кластера

28 узлов — Redis 4.0.8



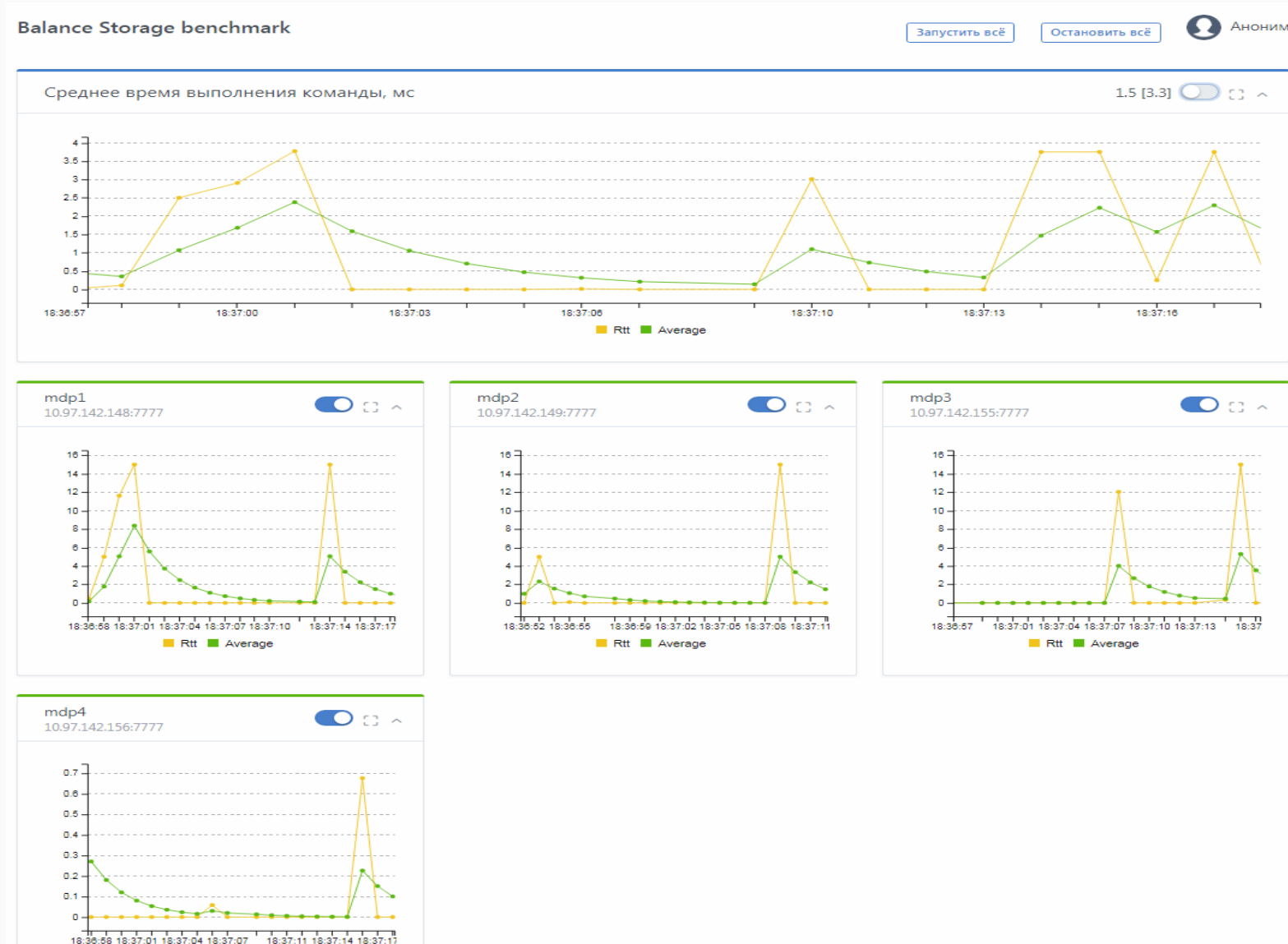
Redis C lib — с репликацией

```
859d9ee86caeca4014fbbbd0b759cc70aaddb10d 10.97.142.134:7012@17012 slave 420c9b3d0ffa4f37ec9ed15a47d13bb843b447ea 0
63e08389b580cbdf24d94cb0ba4c83a889b4f8a2 10.97.142.133:7006@17006 master - 0 1560431682563 6 connected 11703-1287
452548d597dee098d35d3b30c23f898ef9df6113 10.97.142.134:7011@17011 slave 40fae4c4184f5373502ea8c457739497780c4d14 0
420c9b3d0ffa4f37ec9ed15a47d13bb843b447ea 10.97.142.133:7005@17005 master - 0 1560431682000 5 connected 9362-10532
3c59675492883a15313cbf1efbc9d8c7c087bca0 10.97.142.133:7008@17008 slave 65ddb592990c0b1fb804c5cd2636e2f6e23c3019 0
68c471596f7a2a2e28fe0f1d05f4885e70e47d35 10.97.142.134:7004@17004 master - 0 1560431682563 18 connected 8192-9361
caffd1191af17d8d82af44893d80ec795c860315 10.97.142.133:7013@17013 slave 64830ba6f30190528ce55d753313a85e4d9518ab 0
64830ba6f30190528ce55d753313a85e4d9518ab 10.97.142.134:7005@17005 master - 0 1560431683566 19 connected 10533-1170
16246be986d2852fe71be7626162b38604f335bd 10.97.142.133:7010@17010 slave b0cbb1b6937e939405e55b9c3ab1f96cf32186e7 0
40fae4c4184f5373502ea8c457739497780c4d14 10.97.142.133:7004@17004 master - 0 1560431683064 4 connected 7022-8191
d31c5f5378ef0dc46087e0e59d1c49c0d55f8b62 10.97.142.134:7001@17001 master - 0 1560431681662 15 connected 1170-2340
172ce1258be066ecc686e1c8296c5857240c479e 10.97.142.133:7014@17014 slave 7632860c73ebf82cb0d5d522775c82cc34bea130 0
65ddb592990c0b1fb804c5cd2636e2f6e23c3019 10.97.142.134:7007@17007 master - 0 1560431683065 21 connected 15214-1638
2d3820421d2518bb4d24eb9515c2a6851de8da35 10.97.142.134:7010@17010 slave 4f1c2d0fad9f2f13f1f1fd0e1b1f5f07812ccdbf 0
c7229e1598c0f2f443f177c1924be83e0b128bd4 10.97.142.133:7012@17012 slave 68c471596f7a2a2e28fe0f1d05f4885e70e47d35 0
1778dc7e0f266aed3457c5f29e2e5742bae34498 10.97.142.133:7007@17007 master - 0 1560431683064 7 connected 14043-15218
5b8177f2a7fee7bea558784e7be215da5d43fbdb 10.97.142.133:7009@17009 slave d31c5f5378ef0dc46087e0e59d1c49c0d55f8b62 0
2dba52533416f6a90f6e2331b4d26c46c46eadf0 10.97.142.134:7014@17014 slave 1778dc7e0f266aed3457c5f29e2e5742bae34498 0
9a57de6a9a49afd733689509b35f2f27661a42c7 10.97.142.133:7001@17001 myself,master - 0 1560431682000 1 connected 0-15
84b98fab6074103b1ce1798619436553d77db6d 10.97.142.134:7013@17013 slave 63e08389b580cbdf24d94cb0ba4c83a889b4f8a2 0
193989750b73b54c28a9808eee21a5e3ff05449e 10.97.142.134:7003@17003 master - 0 1560431682563 17 connected 5851-7021
7632860c73ebf82cb0d5d522775c82cc34bea130 10.97.142.134:7006@17006 master - 1560431683565 1560431681000 20 connecte
4f1c2d0fad9f2f13f1f1fd0e1b1f5f07812ccdbf 10.97.142.133:7003@17003 master - 0 1560431681462 3 connected 4681-5850
b0cbb1b6937e939405e55b9c3ab1f96cf32186e7 10.97.142.134:7002@17002 master - 0 1560431681463 16 connected 3511-4680
d53f62206c920f9ad02500b5386157a289793603 10.97.142.133:7011@17011 slave 193989750b73b54c28a9808eee21a5e3ff05449e 0
df71cd3e693812673c5e86b2191952f28272d541 10.97.142.133:7002@17002 master - 0 1560431683064 2 connected 2341-3510
19ca61c95cbb6f80d28783b5531ed6baccd9f16e 10.97.142.134:7008@17008 slave 9a57de6a9a49afd733689509b35f2f27661a42c7 0
739a0d324868bd479e2c54b9bbdb6a7878415f0d 10.97.142.134:7009@17009 slave df71cd3e693812673c5e86b2191952f28272d541 f
```

Redis C lib — 505894,2 запросов в секунду



Redis C lib — среднее время отклика 1,5 мс



Redis C lib — утилизация CPU 1240,43% из 3200%

```
0 [ 0.0%] 4 [||||| 93.3%] 8 [||||| 47.6%] 12 [||||| 41.6%]
1 [ 0.0%] 5 [||||| 0.0%] 9 [||||| 31.8%] 13 [||||| 38.7%]
2 [||||| 93.3%] 6 [||||| 0.0%] 10 [||||| 42.6%] 14 [||||| 68.5%]
3 [||||| 92.7%] 7 [||||| 0.0%] 11 [||||| 29.7%] 15 [||||| 24.7%]
Mem [||||| 18.4G/62.7G] Tasks: 45, 56 thr; 8 running
Swp [||||| 0K/4.40G] Load average: 5.27 5.15 4.73
Hostname: moaf-swap-mdp-1 Uptime: 8 days, 01:34:01
```

PID	USER	NLWP	NI	PRI	UTIME+	STIME+	DISK READ	DISK WRITE	IO	MEM%	VIRT	RES	SHR	CPU%	S	CPU	Command
1	root	1	0	20	0:41.41	1:11.79	0.00 B/s	0.00 B/s	B4	0.0	187M	6640	3840	0.0	S	4	/usr/lib/systemd/systemd --switched-r
32730	root	4	0	20	0:01.97	0:02.45	0.00 B/s	0.00 B/s	B4	0.0	60452	8644	6128	0.0	S	12	+ /usr/local/bin/redis-server 10.97.
32692	root	4	0	20	0:02.00	0:02.48	0.00 B/s	0.00 B/s	B4	0.0	60452	8656	6128	0.0	S	13	+ /usr/local/bin/redis-server 10.97.
32655	root	4	0	20	0:02.00	0:02.53	0.00 B/s	0.00 B/s	B4	0.0	60452	8620	6128	0.0	S	8	+ /usr/local/bin/redis-server 10.97.
32615	root	4	0	20	19:25.56	6:09.18	0.00 B/s	0.00 B/s	B4	0.0	60452	9504	6192	85.7	R	15	+ /usr/local/bin/redis-server 10.97.
32580	root	4	0	20	19:24.08	6:04.78	0.00 B/s	0.00 B/s	B4	0.0	60452	9756	6192	98.9	R	3	+ /usr/local/bin/redis-server 10.97.
32539	root	4	0	20	19:13.28	6:05.23	0.00 B/s	0.00 B/s	B4	0.0	60452	9748	6192	83.6	R	14	+ /usr/local/bin/redis-server 10.97.
32501	root	4	0	20	19:28.91	6:07.09	0.00 B/s	0.00 B/s	B4	0.0	60452	9736	6192	98.9	R	2	+ /usr/local/bin/redis-server 10.97.
32464	root	4	0	20	19:23.04	6:10.70	0.00 B/s	0.00 B/s	B4	0.0	60452	9528	6192	99.6	R	4	+ /usr/local/bin/redis-server 10.97.
32423	root	4	0	20	19:19.56	6:18.74	0.00 B/s	0.00 B/s	B4	0.0	60452	9456	6192	87.8	R	9	+ /usr/local/bin/redis-server 10.97.
32386	root	4	0	20	19:19.14	6:13.13	0.00 B/s	0.00 B/s	B4	0.0	60452	9452	6192	86.4	R	12	+ /usr/local/bin/redis-server 10.97.

```
0 [ 0.0%] 4 [||||| 0.7%] 8 [||||| 20.7%] 12 [||||| 49.0%]
1 [|| 2.1%] 5 [||||| 93.9%] 9 [||||| 47.0%] 13 [||||| 21.6%]
2 [||||| 97.4%] 6 [||||| 0.7%] 10 [||||| 0.0%] 14 [||||| 40.7%]
3 [||||| 92.6%] 7 [||||| 94.7%] 11 [||||| 58.4%] 15 [||||| 32.2%]
Mem [||||| 15.8G/62.7G] Tasks: 46, 56 thr; 7 running
Swp [||||| 0K/4.40G] Load average: 5.56 5.52 5.12
Hostname: moaf-swap-mdp-2 Uptime: 8 days, 04:25:31
```

PID	USER	NLWP	NI	PRI	UTIME+	STIME+	DISK READ	DISK WRITE	IO	MEM%	VIRT	RES	SHR	CPU%	S	CPU	Command
1	root	1	0	20	0:37.21	2:05.11	0.00 B/s	0.00 B/s	B4	0.0	187M	6800	3840	0.0	S	3	/usr/lib/systemd/systemd --switched-r
28036	root	4	0	20	0:02.66	0:02.80	0.00 B/s	0.00 B/s	B4	0.0	60452	8644	6128	0.0	S	14	+ /usr/local/bin/redis-server 10.97.
27983	root	4	0	20	0:02.76	0:02.72	0.00 B/s	0.00 B/s	B4	0.0	60452	8648	6128	0.0	S	6	+ /usr/local/bin/redis-server 10.97.
27930	root	4	0	20	0:02.77	0:02.75	0.00 B/s	0.00 B/s	B4	0.0	60452	8640	6128	0.0	S	2	+ /usr/local/bin/redis-server 10.97.
27877	root	4	0	20	0:02.82	0:02.72	0.00 B/s	0.00 B/s	B4	0.0	60452	8660	6128	0.7	S	4	+ /usr/local/bin/redis-server 10.97.
27824	root	4	0	20	0:02.70	0:02.72	0.00 B/s	0.00 B/s	B4	0.0	60452	8648	6128	0.0	S	10	+ /usr/local/bin/redis-server 10.97.
27771	root	4	0	20	0:02.66	0:02.77	0.00 B/s	0.00 B/s	B4	0.0	60452	8640	6128	0.0	S	10	+ /usr/local/bin/redis-server 10.97.
27718	root	4	0	20	0:02.73	0:02.73	0.00 B/s	0.00 B/s	B4	0.0	60452	8644	6128	0.0	S	4	+ /usr/local/bin/redis-server 10.97.
27665	root	4	0	20	21:35.71	6:32.92	0.00 B/s	0.00 B/s	B4	0.0	60452	9708	6192	98.0	R	12	+ /usr/local/bin/redis-server 10.97.
27612	root	4	0	20	21:42.96	6:33.48	0.00 B/s	0.00 B/s	B4	0.0	60452	9944	6192	100.	R	5	+ /usr/local/bin/redis-server 10.97.
27559	root	4	0	20	21:27.58	6:37.25	0.00 B/s	0.00 B/s	B4	0.0	60452	9736	6192	96.7	R	11	+ /usr/local/bin/redis-server 10.97.
27506	root	4	0	20	21:41.21	6:33.18	0.00 B/s	0.00 B/s	B4	0.0	60452	9824	6192	101.	R	7	+ /usr/local/bin/redis-server 10.97.
27453	root	4	0	20	21:28.37	6:35.86	0.00 B/s	0.00 B/s	B4	0.0	60452	9812	6192	99.4	R	6	+ /usr/local/bin/redis-server 10.97.
27400	root	4	0	20	21:37.05	6:37.06	0.00 B/s	0.00 B/s	B4	0.0	60452	9608	6192	94.6	R	14	+ /usr/local/bin/redis-server 10.97.
27347	root	4	0	20	21:36.26	6:36.70	0.00 B/s	0.00 B/s	B4	0.0	60452	9744	6192	103.	S	2	+ /usr/local/bin/redis-server 10.97.

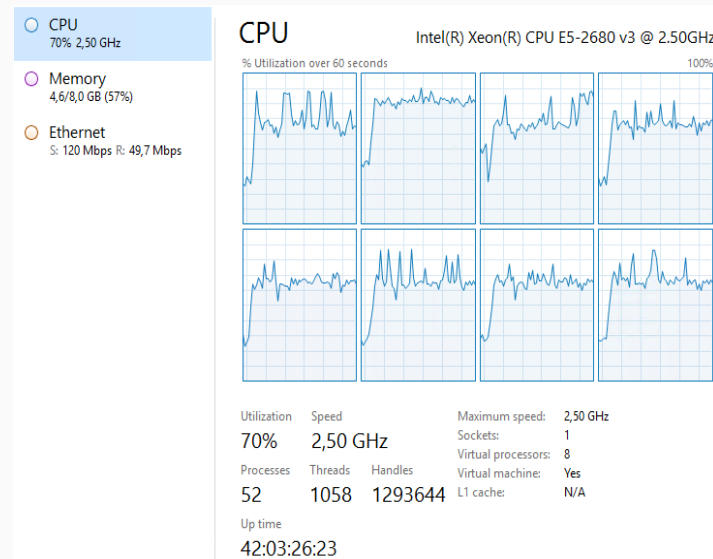
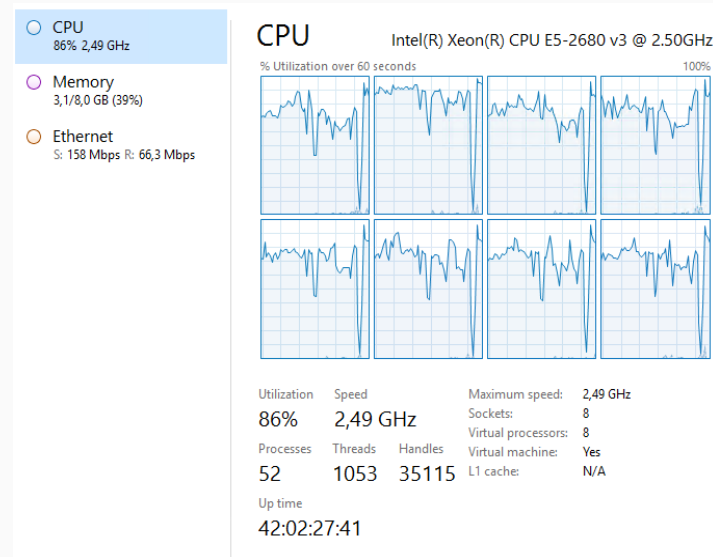
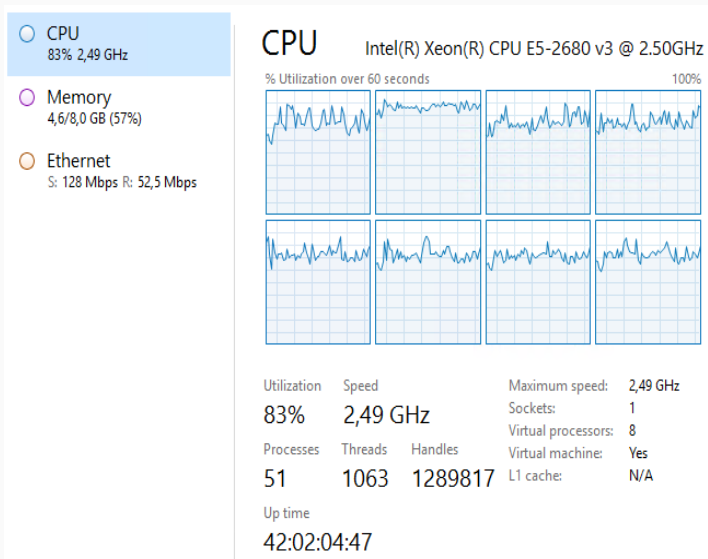
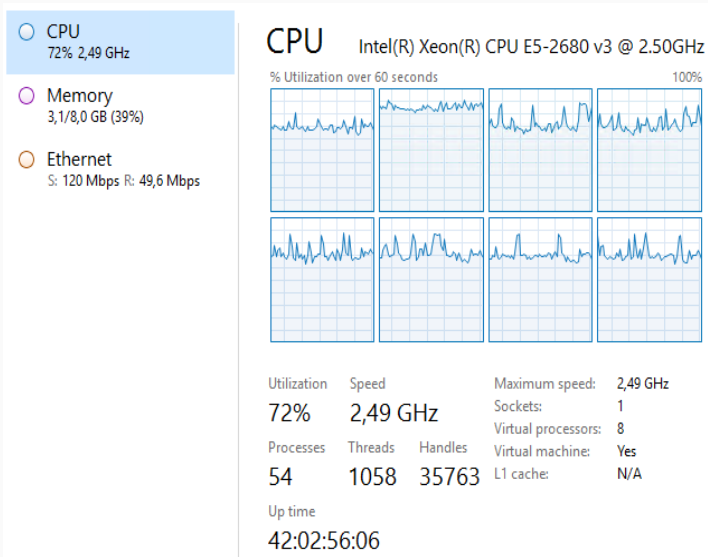
Redis C lib — утилизация CPU 1240,43 % из 3200%

Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle	Хост	CPU	%usr	%nice	%sys	%iowait	%irq	%soft	%steal	%guest	%gnice	%idle
moaf-1	0	0,51	0	1,01	0	0	1,01	0	0	0	97,47	moaf-2	0	0	0	0	0	0	0	0	0	0	100
	1	0	0	0	0	0	0	0	0	0	100		1	0	0	0	0	0	0	0	0	0	100
	2	64,31	0	17,17	0	0	0	0	0	0	18,52		2	61,95	0	15,82	0	0	0	0	0	0	22,22
	3	0,33	0	0,33	0	0	0	0	0	0	99,33		3	0	0	0,33	0	0	0	0	0	0	99,67
	4	67	0	21,21	0	0	0	0	0	0	11,78		4	1	0	0,33	0	0	0	0	0	0	98,67
	5	70,27	0	19,59	0	0	0	0	0	0	10,14		5	16,84	0	5,05	0	0	0	0	0	0	78,11
	6	0	0	0	0	0	0	0	0	0	100		6	51,33	0	15,67	0	0	0	0	0	0	33
	7	10,7	0	2,68	0	0	0	0	0	0	86,62		7	64	0	18	0	0	0	0	0	0	18
	8	59,53	0	21,4	0	0	0	0	0	0	19,06		8	36,05	0	11,9	0	0	0	0	0	0	52,04
	9	40,68	0	13,56	0	0	0	0	0	0	45,76		9	31,63	0	10,2	0	0	0	0	0	0	58,16
	10	45,82	0	15,05	0	0	0	0	0	0	39,13		10	45,42	0	13,22	0	0	0	0	0	0	41,36
	11	22,07	0	8,36	0	0	0	0	0	0	69,57		11	30,98	0	8,75	0	0	0	0	0	0	60,27
	12	40,61	0	14,68	0	0	0	0	0	0	44,71		12	38,64	0	12,88	0	0	0	0	0	0	48,47
	13	3,02	0	1,01	0	0	0	0	0	0	95,97		13	47,3	0	15,88	0	0	0	0	0	0	36,82
	14	8,39	0	3,02	0	0	0	0	0	0	88,59		14	31,99	0	9,76	0	0	0	0	0	0	58,25
	15	29,73	0	11,82	0	0	0	0	0	0	58,45		15	23,23	0	7,41	0	0	0	0	0	0	69,36
Всего	943,33	0	296,09	0	0	0	1,01	0	0	0	1959,5												

Redis C lib — sar -N DEV

HOST	rxpck/s	txpck/s	rxkB/s	txkB/s
moaf-1	111744	78449	29761,69	12516,56
moaf-2	108934	73917	29587,65	12268,7

Redis C lib — генераторы нагрузки



Redis C lib — генераторы нагрузки

