
openway
be fast. be smart. be unique.
#1 digital payment software platform provider
Operational Monitoring / Konstantin Ryadov
2018
Acquiring
White Label
Prepaid, Debit, Credit, Fuel Card Issuing
Tokenisation / Switch & E-Commerce Gateway

Isolated enterprise:

- Many OS: AIX POWER, SPARC Solaris, Windows / Linux x86_64
- Domain specific objects (Services, Transactions, Tasks)

Operational Unix-way terminal monitoring (cookbook)

Operational UI monitoring: real-time dashboards

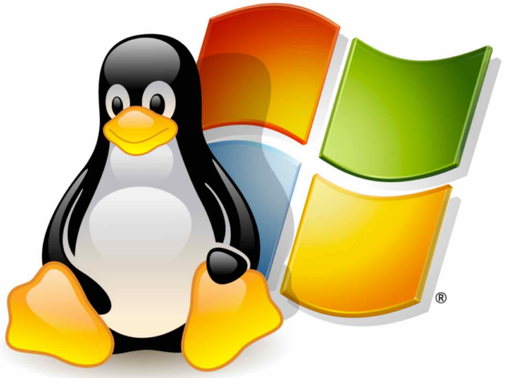
Integrated Management Console

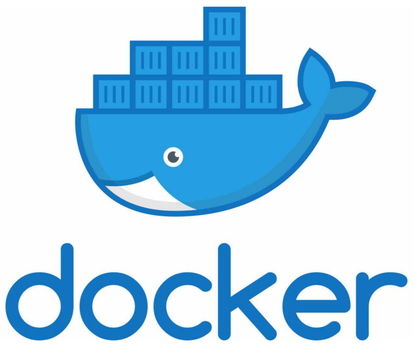
what do you need?

- **System:**
  - Availability
  - Performance
  - Errors
  - …
- **Business:**
  - Authorization TPS
  - Risk Management
  - Specific Codes
  - …

Operational monitoring

- **AIX Power**
  - LPAR/WPAR
- **Linux x86**
  - VM / Containers
- **Solaris x86/SPARC**
  - LDOM / Zones
- **Windows x86**
  - Hyper-V





Many HW/OS Environment

- **AWS VPC**
  - EC2 / …
- **GCP VPC**
  - Compute Engine / App Engine
- **RedHat**
  - Openstack / Openshift
- **Microsoft Private Cloud**
  - Azure

Private Cloud Environment

- **AWS VPC**
  - EC2 / … - Amazon CloudWatch
- **GCP VPC**
  - Compute Engine / App Engine - VPC Flow Logs
- **RedHat**
  - Openstack / Openshift - Operations/Monitoring
- **Microsoft Private Cloud**
  - Azure - Azure Monitor

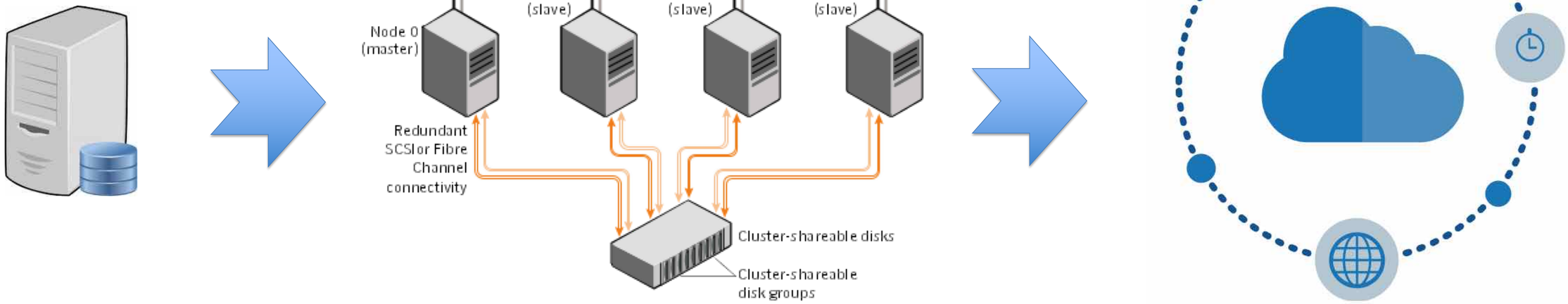
Monitoring Categories:

1. Traditional service monitoring
2. Tenant health monitoring
3. Expose this monitoring to tenants
4. Provide monitoring as a service for tenants

Private Cloud Environment

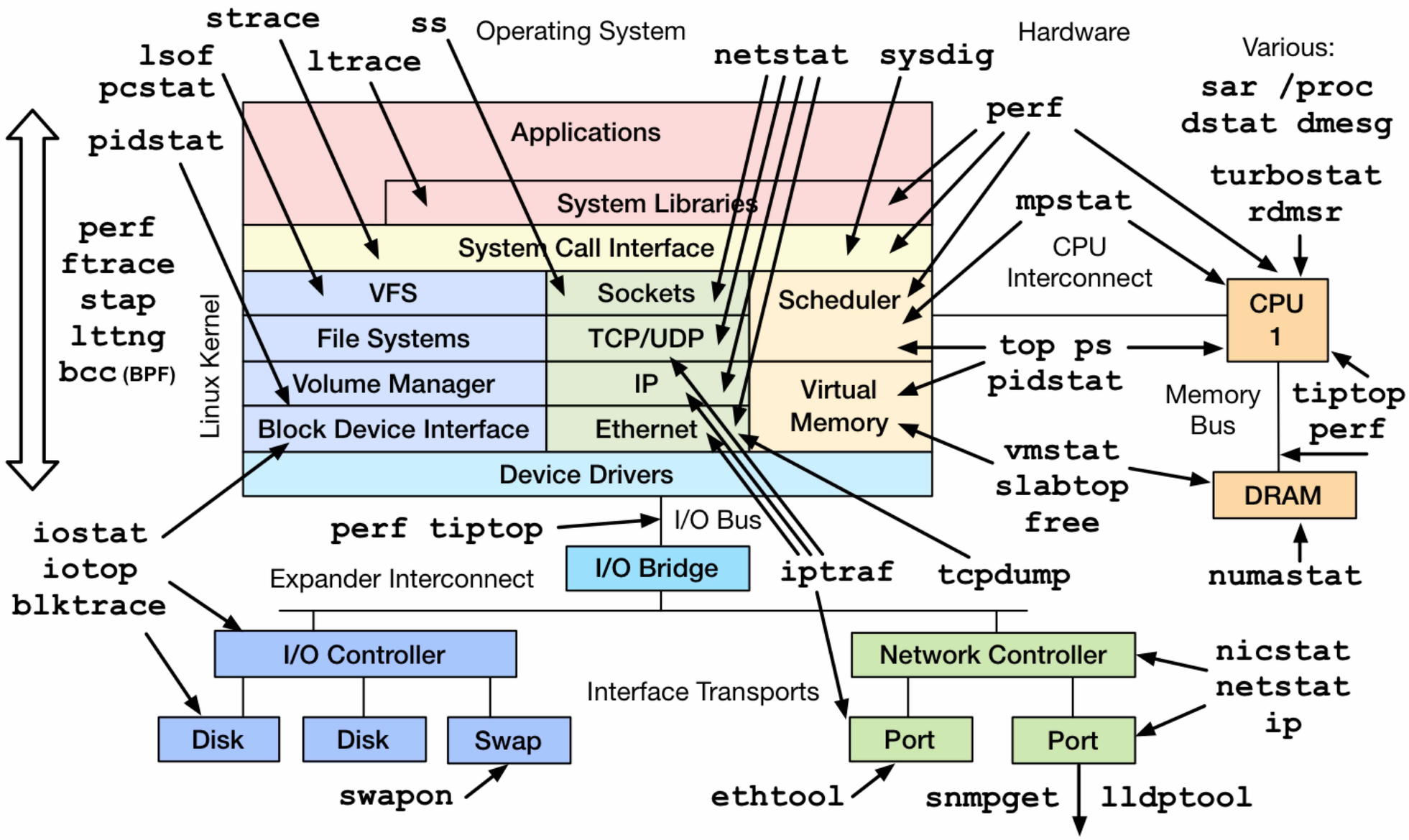
1. Many various resources
2. Real-time is needed
3. Many clients (not one project)
4. Centralized?
5. Part of management system?
6. No admin access?
7. Little time to make decision?

No silver bullet



What is available by default?

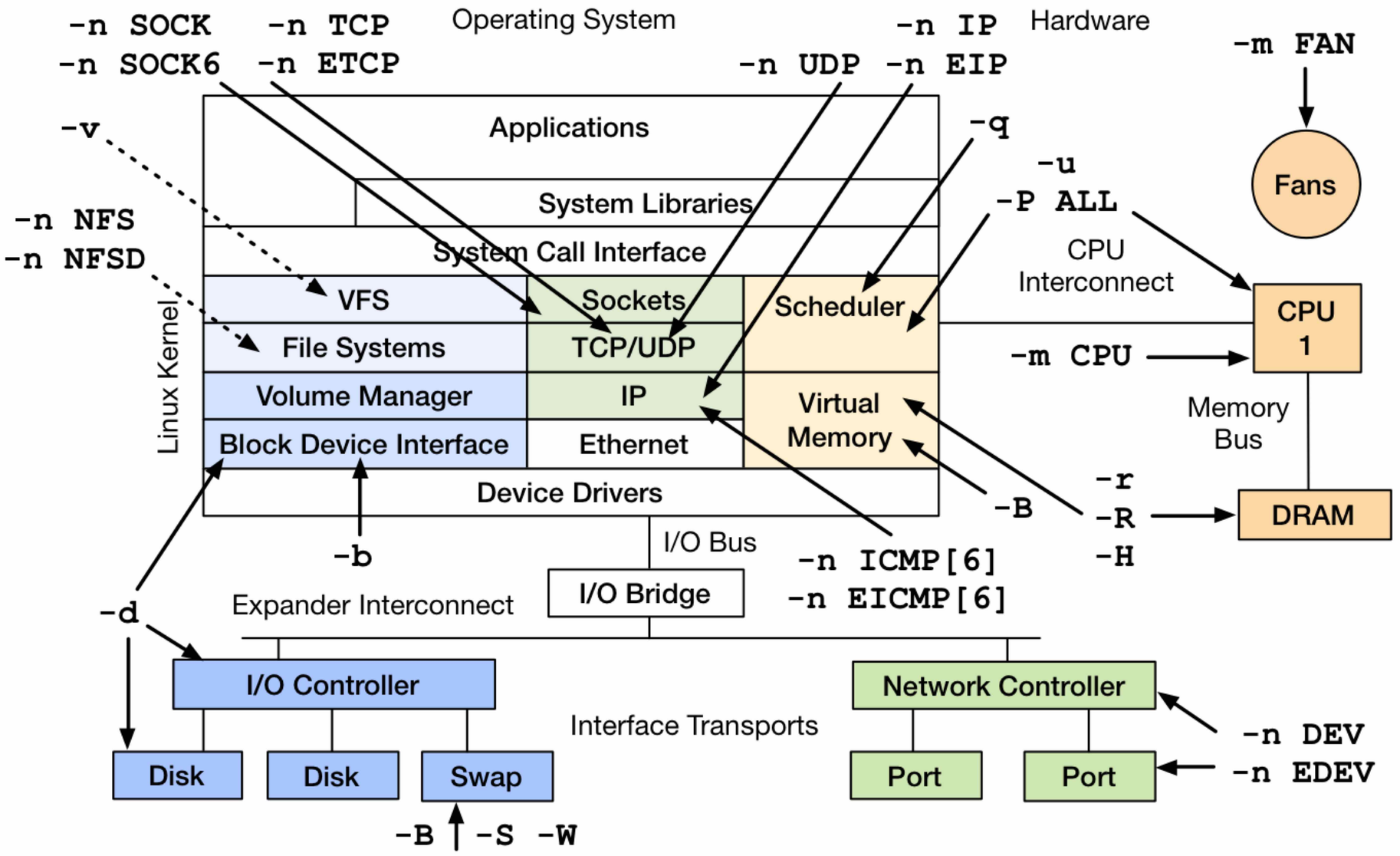
Linux Performance Observability Tools



Linux

http://www.brendangregg.com/linuxperf.html 2017

Linux Performance Observability: sar



Linux

http://www.brendangregg.com/linuxperf.html 2016

```
[root@jds-4 etc]# adduser -M -s `which top` monitor

[root@jds-4 etc]# cat /etc/passwd |grep monitor
monitor:x:1006:1006::/home/monitor:/usr/bin/top
```

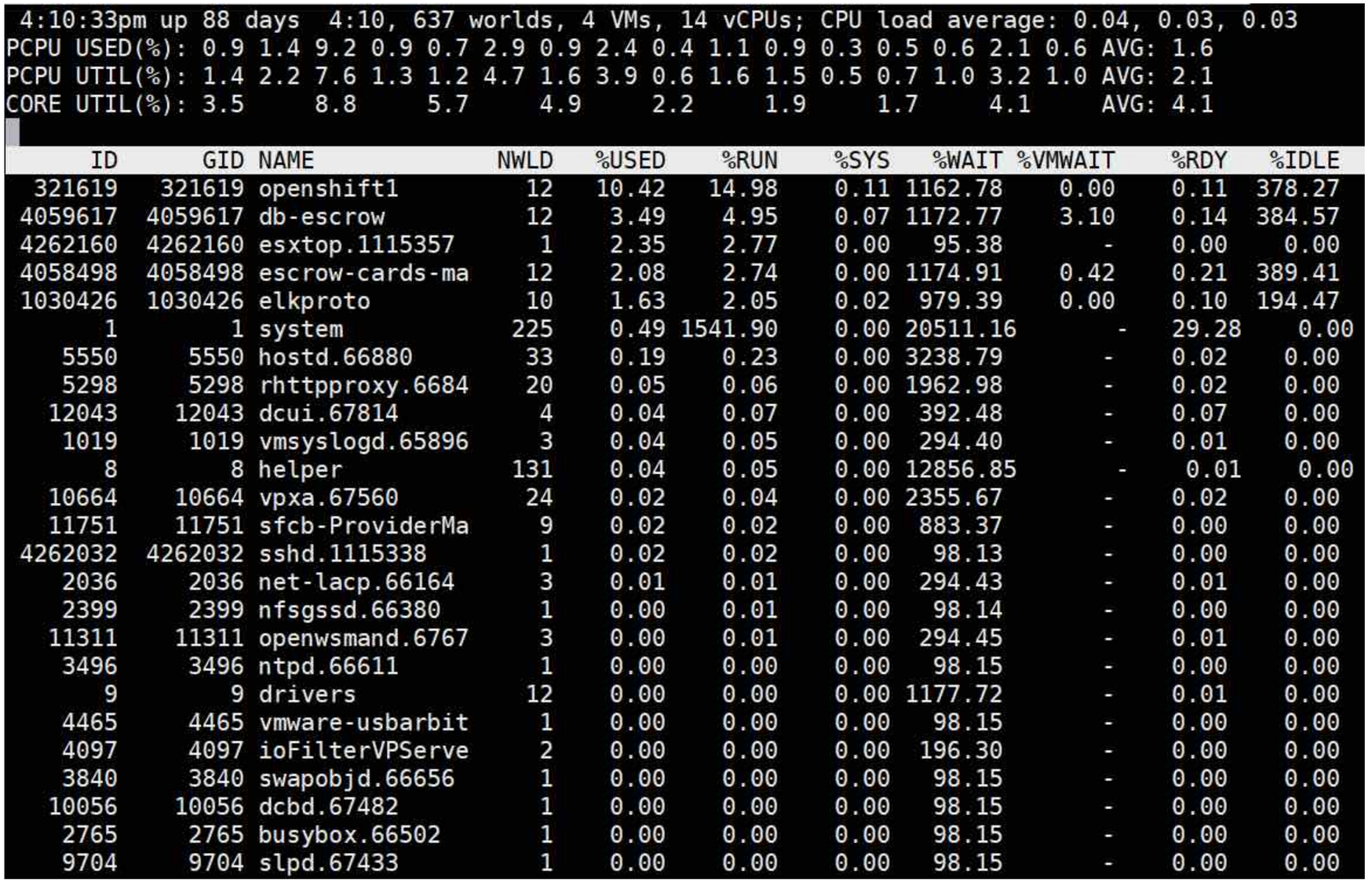
```
-top - 13:47:58 up 77 days, 17:56,  2 users,  load average: 0.05, 0.05, 0.05
Tasks: 268 total,   1 running, 267 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.1 us,  0.1 sy,  0.0 ni, 99.8 id,  0.1 wa,  0.0 hi,  0.0 si,  0.0 st
KiB Mem : 32770348 total, 11890480 free,  5184572 used, 15695296 buff/cache
KiB Swap: 16515068 total, 16515068 free,        0 used. 25795348 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S  %CPU %MEM     TIME+ COMMAND
21312 way4      20   0 8099132 451204  19992 S   1.0  1.4   2:44.63 /home/way4/appserver/app
24958 way4      20   0 10.254g 0.978g  17320 S   0.7  3.1  10:52.58 /home/way4/appserver/app
   10 root      20   0       0      0      0 S   0.3  0.0 123:13.63 [rcu_sched]
  540 root      20   0       0      0      0 S   0.3  0.0 134:29.23 [xfsaild/dm-0]
 7381 root      20   0 1566588  19608   4624 S   0.3  0.1  66:19.13 /usr/bin/docker-containe
17583 root      20   0       0      0      0 S   0.3  0.0   0:10.23 [kworker/u48:0]
21227 root      20   0       0      0      0 S   0.3  0.0   0:00.05 [kworker/5:2]
21814 monitor   20   0   54260   2312   1488 R   0.3  0.0   0:00.45 -top
24910 way4      20   0 9423740 882600  15444 S   0.3  2.7  47:34.43 /home/way4/appserver/app
    1 root      20   0   51720   3880   2384 S   0.0  0.0  18:19.97 /usr/lib/systemd/systemd
    2 root      20   0       0      0      0 S   0.0  0.0   0:04.38 [kthreadd]
    3 root      20   0       0      0      0 S   0.0  0.0   0:38.26 [ksoftirqd/0]
    5 root       0 -20       0      0      0 S   0.0  0.0   0:00.00 [kworker/0:0H]
    8 root      rt   0       0      0      0 S   0.0  0.0   0:00.35 [migration/0]
    9 root      20   0       0      0      0 S   0.0  0.0   0:00.01 [rcu_bh]
   11 root      rt   0       0      0      0 S   0.0  0.0   0:18.96 [watchdog/0]
```

Linux top

docker stats [OPTIONS] - Display a live stream of container(s) resource usage statistics

CONTAINER	CPU %	MEM USAGE/LIMIT	MEM %	NET I/O
archive	0.01%	15.75 MiB/7.798 GiB	0.20%	24.08 MiB/23.65 MiB
broadcast	0.15%	180.6 MiB/7.798 GiB	2.26%	49.12 MiB/41.32 MiB
consul	7.57%	22.75 MiB/7.798 GiB	0.28%	0 B/0 B
github-webhooks	0.00%	6.508 MiB/7.798 GiB	0.08%	28.56 MiB/25.7 MiB
grafana	0.01%	15.73 MiB/7.798 GiB	0.20%	9.858 MiB/42.69 MiB
influxdb	0.05%	54.32 MiB/7.798 GiB	0.68%	25.86 MiB/402.6 MiB
master-binaries	0.00%	8.93 MiB/7.798 GiB	0.11%	287.1 MiB/940.5 MiB
master-docs	0.01%	28.16 MiB/7.798 GiB	0.35%	1.047 GiB/5.885 MiB
mysql-drone	0.16%	450.3 MiB/7.798 GiB	5.64%	30.73 MiB/114.4 MiB
nginx	0.01%	26.04 MiB/7.798 GiB	0.33%	0 B/0 B
nsqadmin	0.00%	12.18 MiB/7.798 GiB	0.15%	24.7 MiB/198 MiB
nsqd1	0.72%	12.33 MiB/7.798 GiB	0.15%	38.2 MiB/106.4 MiB
nsqlookupd1	0.08%	10.9 MiB/7.798 GiB	0.14%	34.93 MiB/34.84 MiB
octostats	0.00%	1.02 MiB/7.798 GiB	0.01%	4.786 KiB/4.239 KiB
patch-parser	0.01%	15.07 MiB/7.798 GiB	0.19%	21.47 MiB/3.333 MiB
rethinkdb	0.70%	116.9 MiB/7.798 GiB	1.46%	36.83 MiB/119.8 MiB
znc	0.04%	24.07 MiB/7.798 GiB	0.30%	2.652 MiB/2.045 MiB

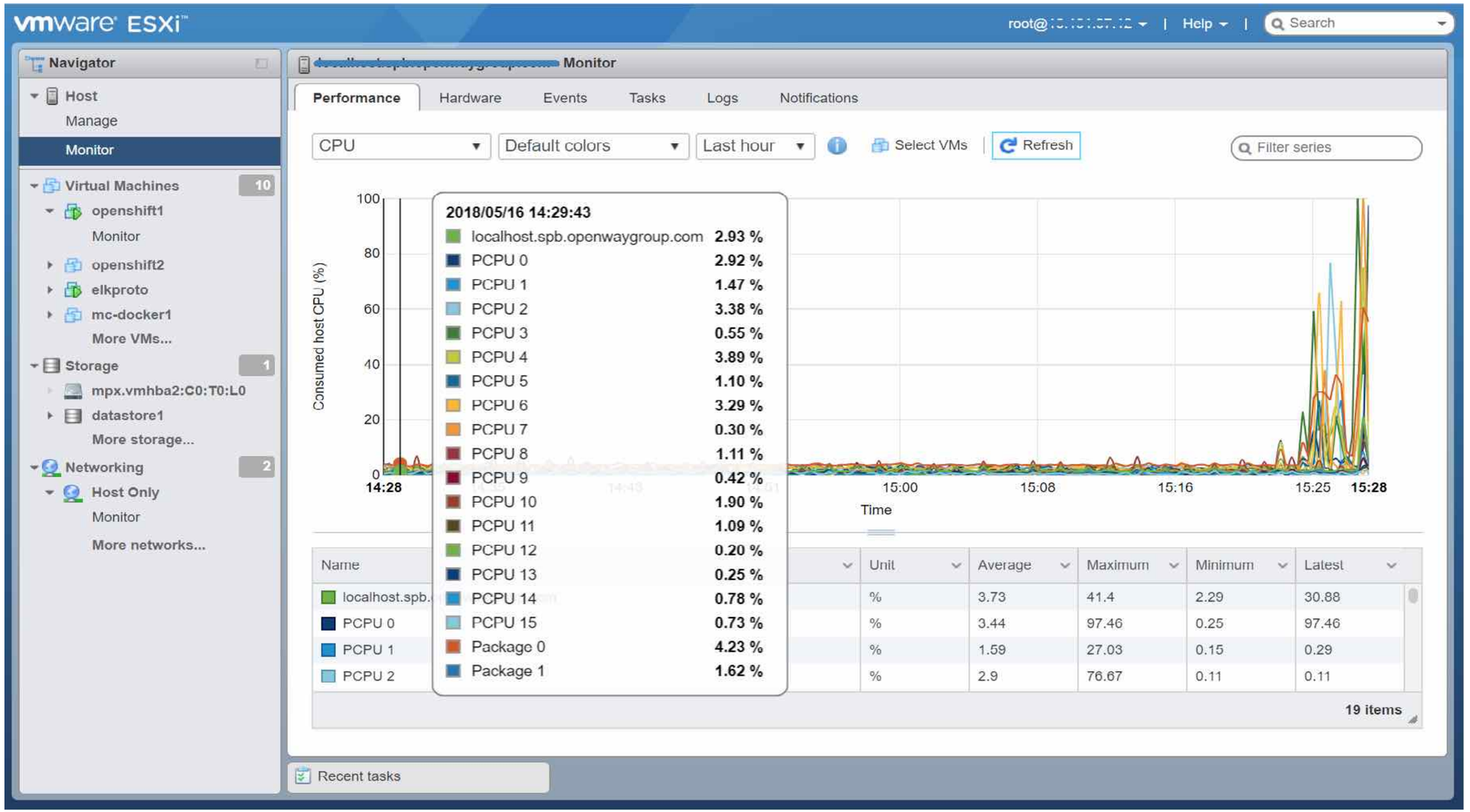
Linux docker



```
 4:10:33pm up 88 days  4:10, 637 worlds, 4 VMs, 14 vCPUs; CPU load average: 0.04, 0.03, 0.03
PCPU USED(%): 0.9 1.4 9.2 0.9 0.7 2.9 0.9 2.4 0.4 1.1 0.9 0.3 0.5 0.6 2.1 0.6 AVG: 1.6
PCPU UTIL(%): 1.4 2.2 7.6 1.3 1.2 4.7 1.6 3.9 0.6 1.6 1.5 0.5 0.7 1.0 3.2 1.0 AVG: 2.1
CORE UTIL(%): 3.5     8.8     5.7     4.9     2.2     1.9     1.7     4.1     AVG: 4.1

      ID      GID NAME             NWLD   %USED    %RUN    %SYS   %WAIT %VMWAIT    %RDY   %IDLE
  321619   321619 openshift1         12   10.42   14.98    0.11 1162.78    0.00    0.11  378.27
 4059617  4059617 db-escrow          12    3.49    4.95    0.07 1172.77    3.10    0.14  384.57
 4262160  4262160 esxtop.1115357      1    2.35    2.77    0.00   95.38       -    0.00    0.00
 4058498  4058498 escrow-cards-ma    12    2.08    2.74    0.00 1174.91    0.42    0.21  389.41
 1030426  1030426 elkproto           10    1.63    2.05    0.02  979.39    0.00    0.10  194.47
       1        1 system            225    0.49 1541.90    0.00 20511.16       -   29.28    0.00
    5550     5550 hostd.66880        33    0.19    0.23    0.00 3238.79       -    0.02    0.00
    5298     5298 rhttpproxy.6684    20    0.05    0.06    0.00 1962.98       -    0.02    0.00
   12043    12043 dcui.67814          4    0.04    0.07    0.00  392.48       -    0.07    0.00
    1019     1019 vmsyslogd.65896     3    0.04    0.05    0.00  294.40       -    0.01    0.00
       8        8 helper            131    0.04    0.05    0.00 12856.85       -    0.01    0.00
   10664    10664 vpxa.67560         24    0.02    0.04    0.00 2355.67       -    0.02    0.00
   11751    11751 sfcb-ProviderMa     9    0.02    0.02    0.00  883.37       -    0.00    0.00
 4262032  4262032 sshd.1115338        1    0.02    0.02    0.00   98.13       -    0.00    0.00
    2036     2036 net-lacp.66164      3    0.01    0.01    0.00  294.43       -    0.01    0.00
    2399     2399 nfsgssd.66380       1    0.00    0.01    0.00   98.14       -    0.00    0.00
   11311    11311 openwsmand.6767     3    0.00    0.01    0.00  294.45       -    0.01    0.00
    3496     3496 ntpd.66611          1    0.00    0.00    0.00   98.15       -    0.00    0.00
       9        9 drivers           12    0.00    0.00    0.00 1177.72       -    0.01    0.00
    4465     4465 vmware-usbarbit     1    0.00    0.00    0.00   98.15       -    0.00    0.00
    4097     4097 ioFilterVPServe     2    0.00    0.00    0.00  196.30       -    0.00    0.00
    3840     3840 swapobjd.66656      1    0.00    0.00    0.00   98.15       -    0.00    0.00
   10056    10056 dcbd.67482          1    0.00    0.00    0.00   98.15       -    0.00    0.00
    2765     2765 busybox.66502       1    0.00    0.00    0.00   98.15       -    0.00    0.00
    9704     9704 slpd.67433          1    0.00    0.00    0.00   98.15       -    0.00    0.00
```

esxtop

VMware ESXi



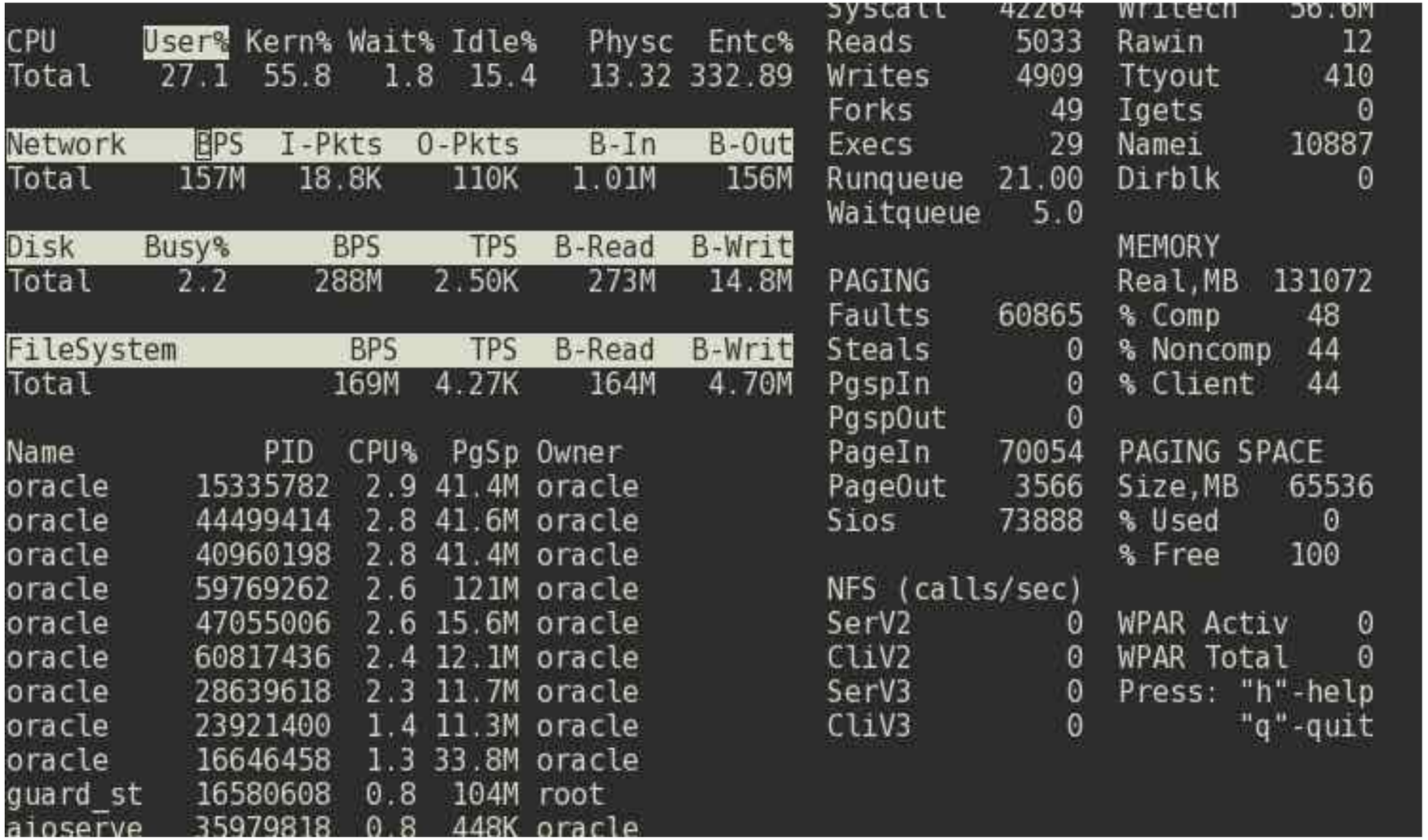
VMware ESXi console

top, vmstat, iostat, fsstat, netstat and ldm list

```
root@sunsrv1:~# ldm list
NAME         STATE      FLAGS   CONS    VCPU  MEMORY   UTIL  NORM  UPTIME
primary      active     -n-cv-  UART    4     16G      4.0%  4.0%  697d 18h
as-sol       bound      ------  5005    8     8G
netserv      active     -n----  5003    4     4G       6.1%  6.1%  17d 16h 10m
padss        active     -n----  5007    2     8G       8.3%  8.3%  199d 20h
solmnode     active     -n----  5004    12    32G      2.7%  2.7%  196d 1h
sunset       active     -n----  5000    8     8G       0.4%  0.4%  196d
tcsol1       active     -n----  5001    8     12G       11%   11%  1d 10h 10m
tcsol2       active     -n----  5002    8     12G      0.2%  0.2%  22h 59m
```

Oracle Solaris 11

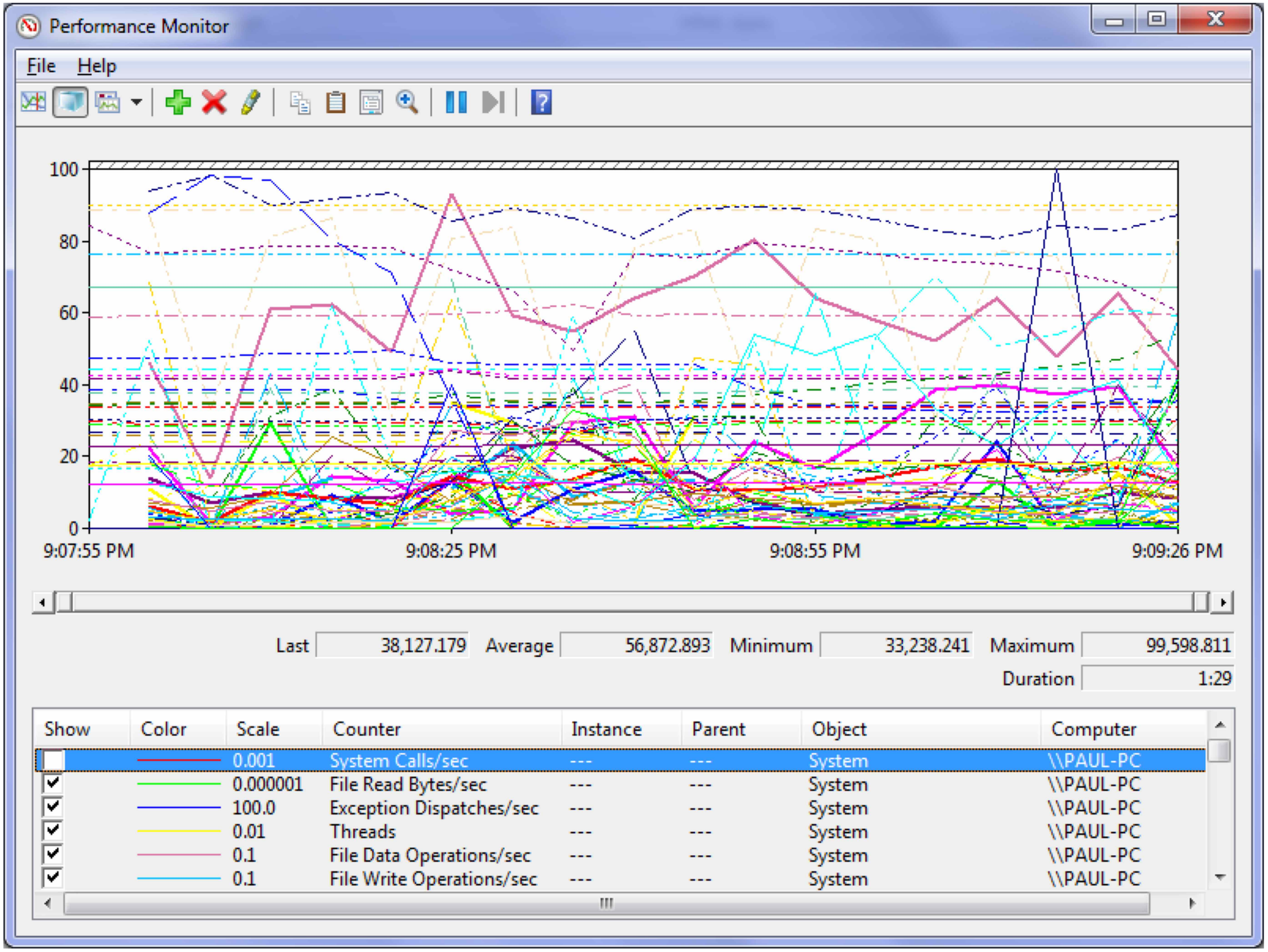
ORACLE®
SOLARIS



topas

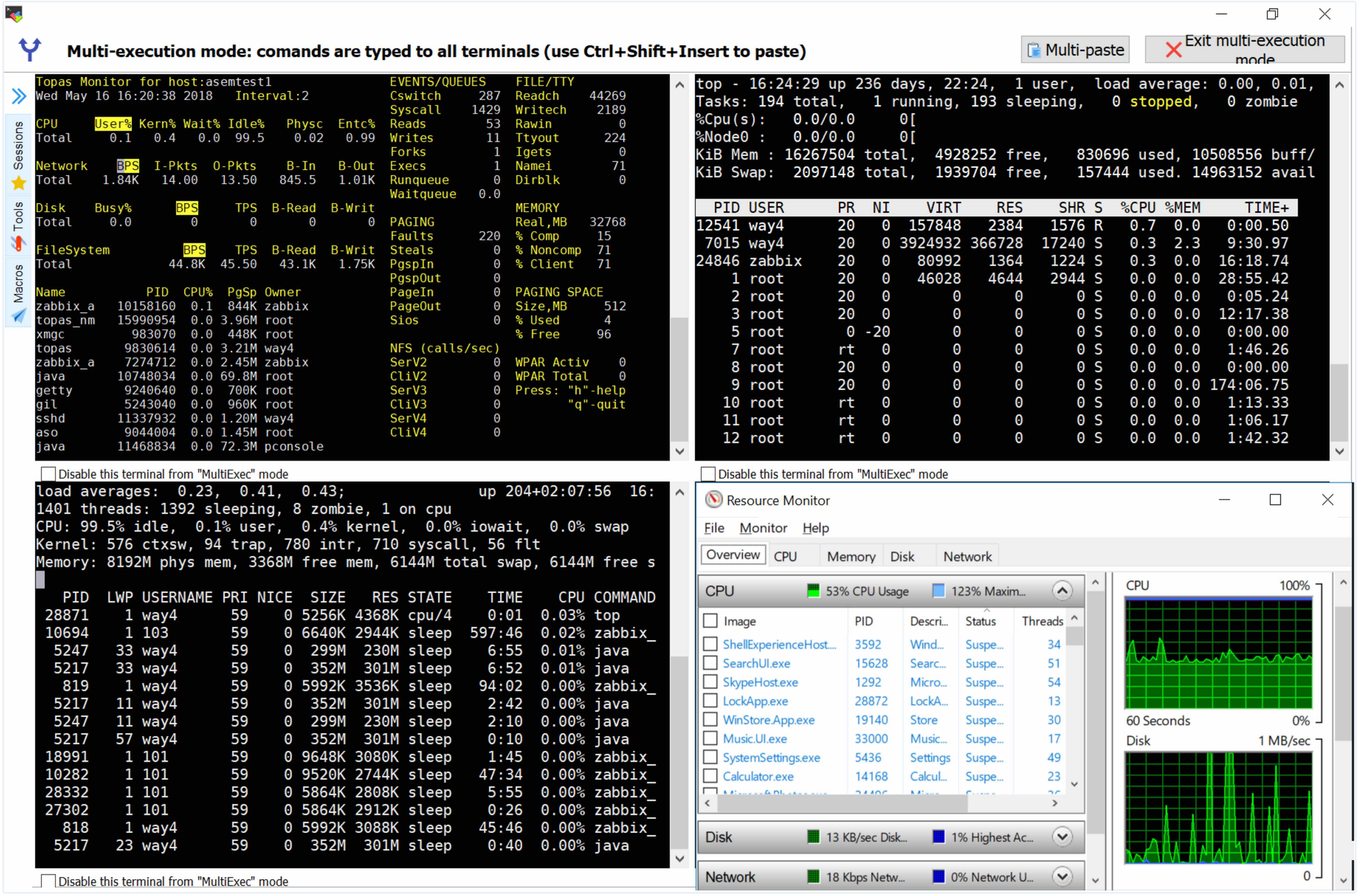
- Reports selected local and remote system statistics.

IBM AIX



1. OS Metrics
2. Hyper-V metrics
3. Process / business metrics

Windows

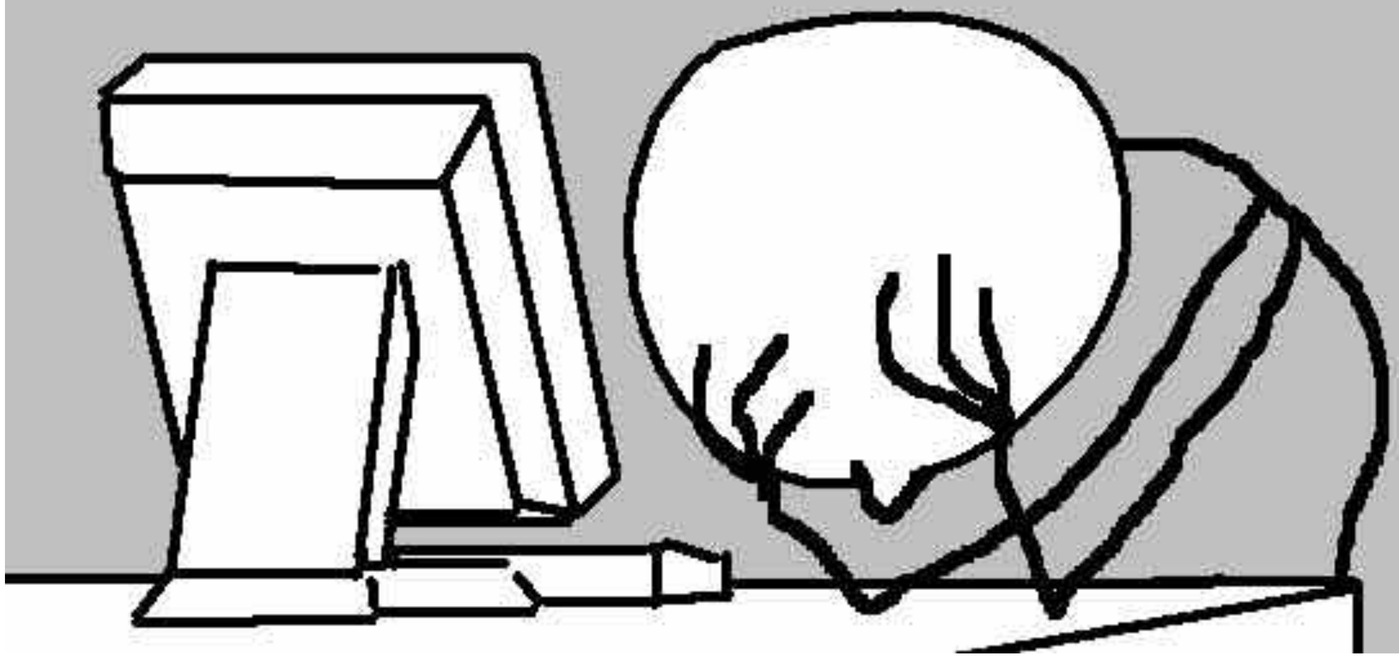

Multi-execution mode: comands are typed to all terminals (use Ctrl+Shift+Insert to paste)
Multi-paste
Exit multi-execution mode
Sessions
Tools
Macros
Topas Monitor for host:asemtest1
Wed May 16 16:20:38 2018 Interval:2
top - 16:24:29 up 236 days, 22:24, 1 user, load average: 0.00, 0.01,
Tasks: 194 total, 1 running, 193 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0/0.0 0[
%Node0 : 0.0/0.0 0[
KiB Mem : 16267504 total, 4928252 free, 830696 used, 10508556 buff/
KiB Swap: 2097148 total, 1939704 free, 157444 used. 14963152 avail
load averages: 0.23, 0.41, 0.43; up 204+02:07:56 16:
1401 threads: 1392 sleeping, 8 zombie, 1 on cpu
CPU: 99.5% idle, 0.1% user, 0.4% kernel, 0.0% iowait, 0.0% swap
Kernel: 576 ctxsw, 94 trap, 780 intr, 710 syscall, 56 flt
Memory: 8192M phys mem, 3368M free mem, 6144M total swap, 6144M free s
Disable this terminal from "MultiExec" mode
Resource Monitor
File Monitor Help
Overview CPU Memory Disk Network
CPU 53% CPU Usage 123% Maxim...
Disk 13 KB/sec Disk... 1% Highest Ac...
Network 18 Kbps Netw... 0% Network U...
60 Seconds 0%
1 MB/sec

Mix them all ...

Should I buy commercial soft

or

use opensource for operational monitoring*?



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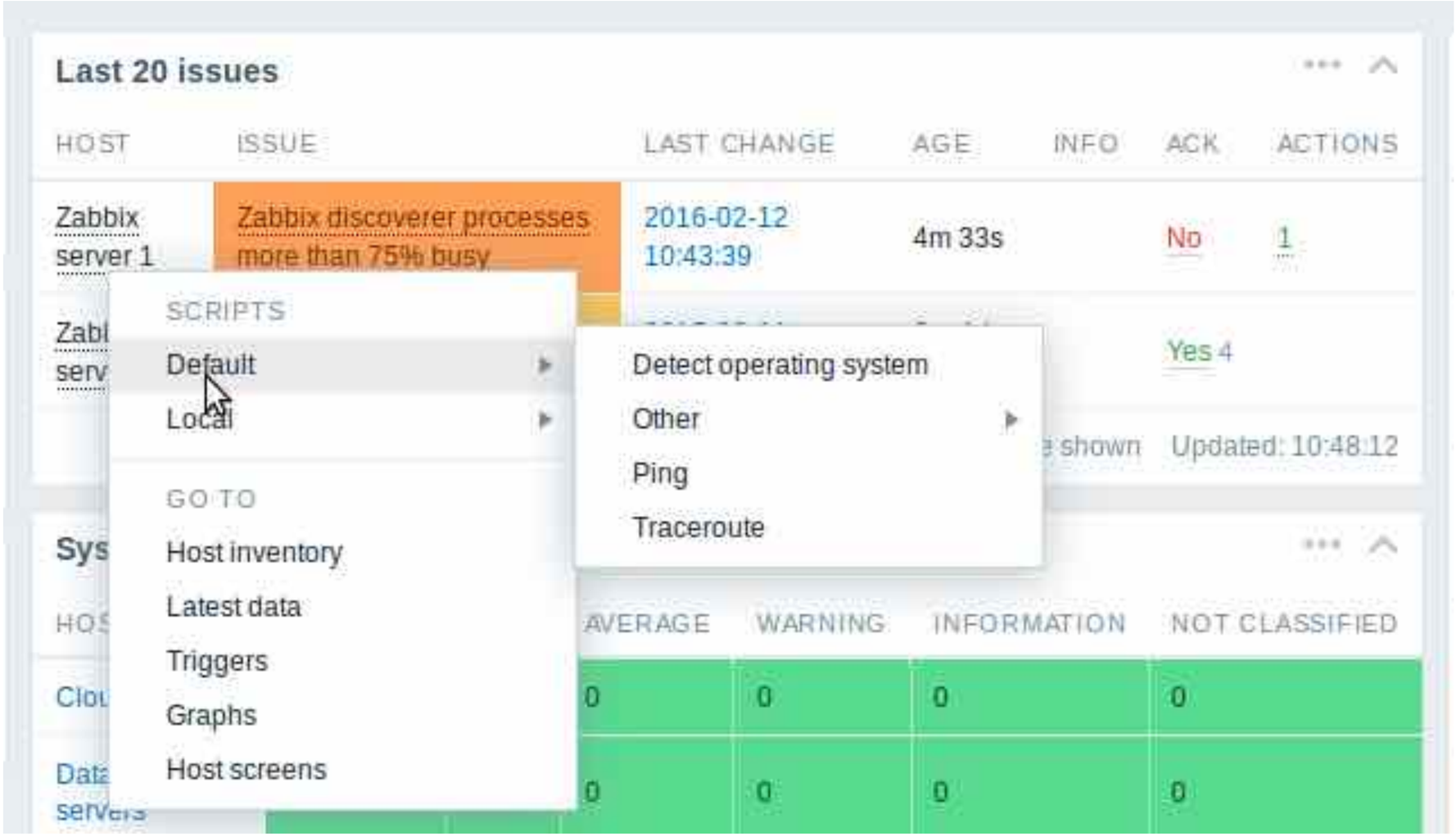
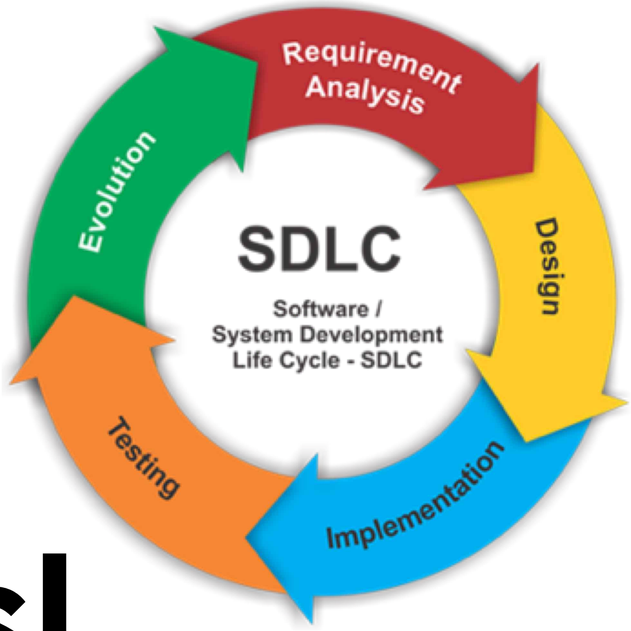
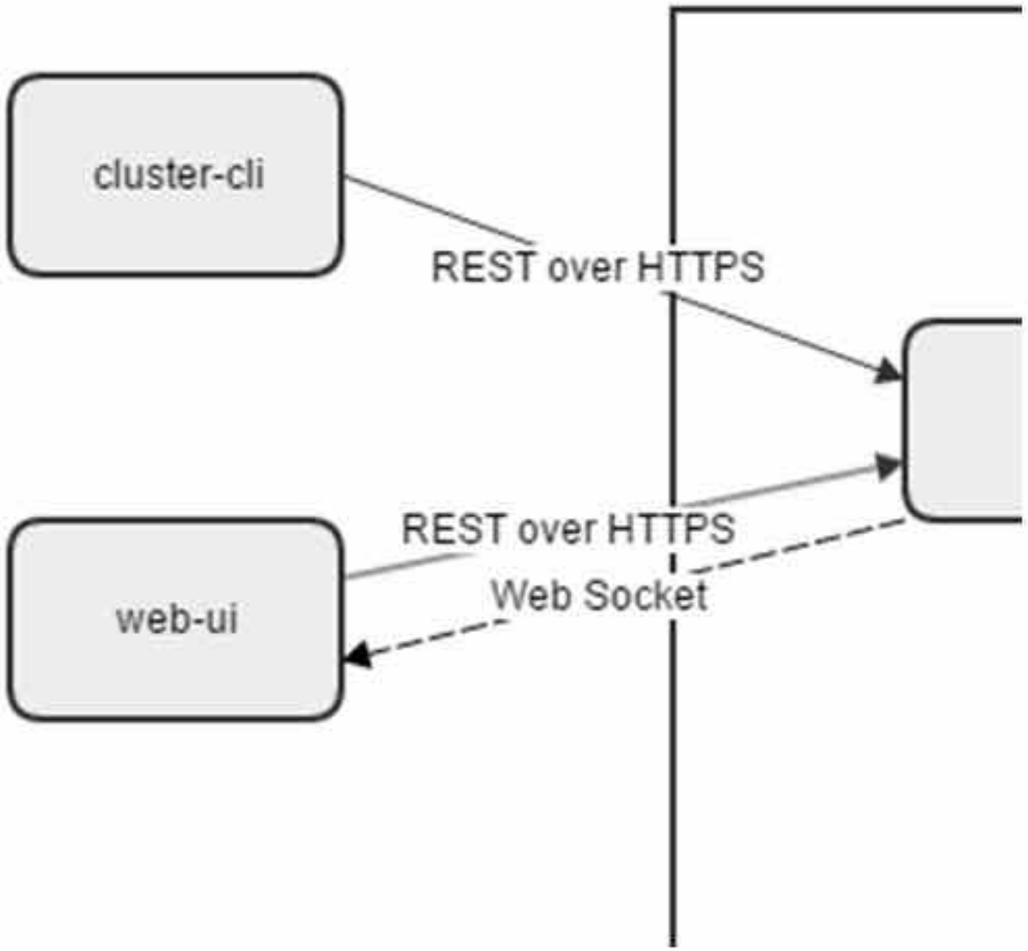


Monitoring & Management

1. **Define business needs / domain (simple as possible)**
    1. E.g. we need to monitor **Servers** => **Applications** => **Business Services**
    2. Our metrics are: **CPU/RAM usage**, **Application status**, **Uptime**, **Errors Count**, **TPS**
    3. **Multiplatform!!!**
2. **Evaluate: Calculate Cost and ROI**
    1. **Planning** + **Architecture**
    2. (Master/Slave + CQRS + **Java**) + PoC (5 nodes cluster)
3. **Produce it**
    1. Development + Dev QA + DevOps + Pilot QA + ProdOps
4. **Profit!**



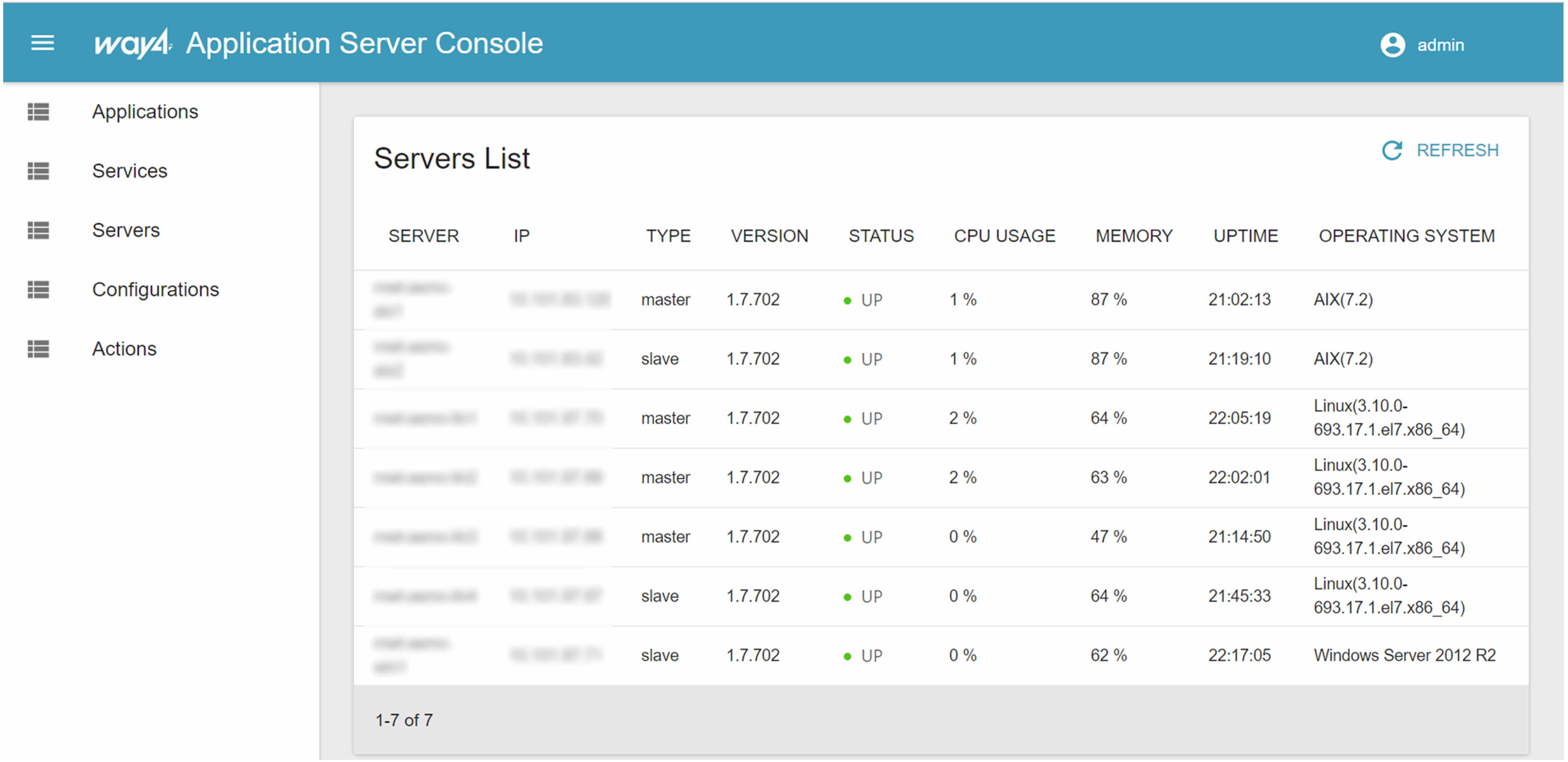
You have developers!

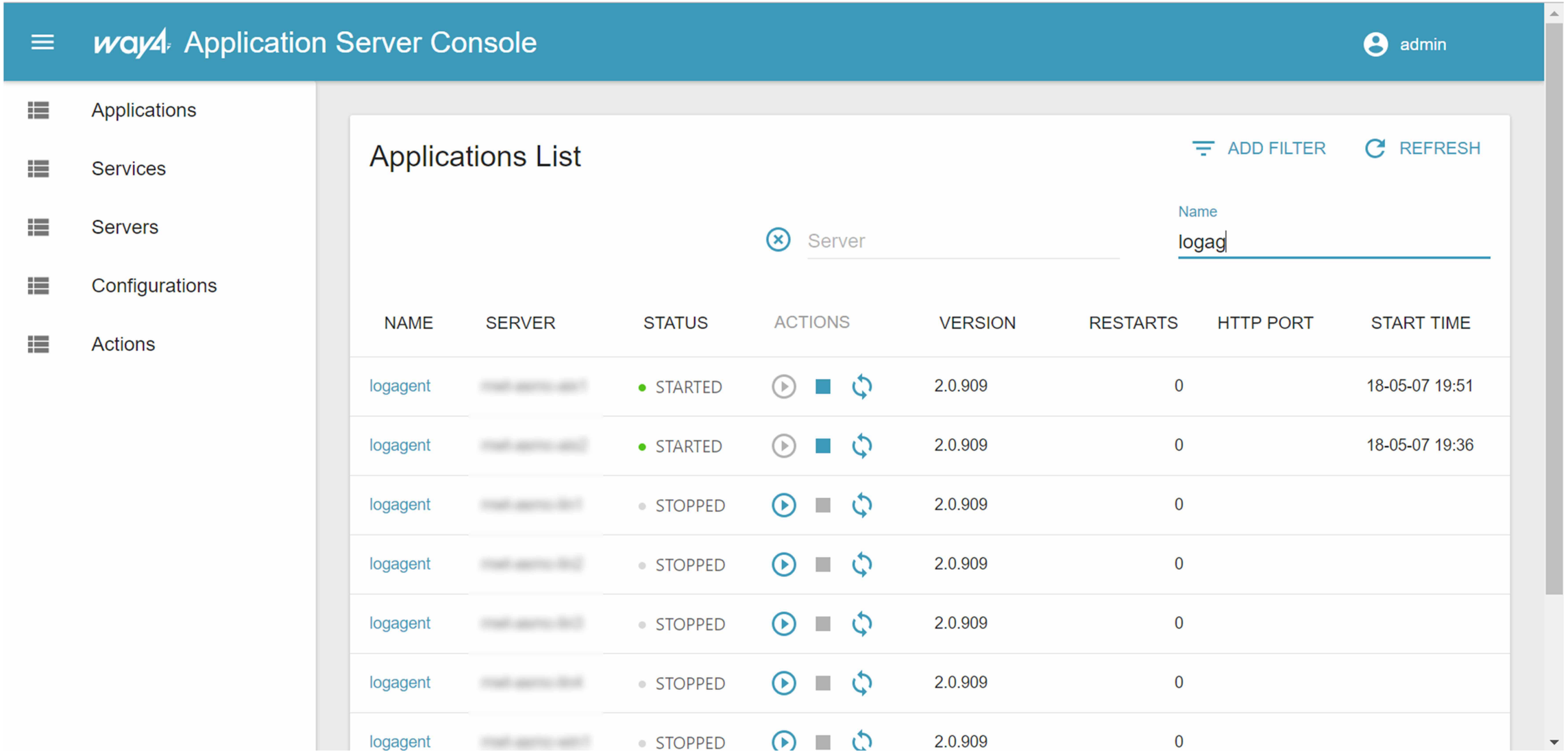


AWS-compatible REST

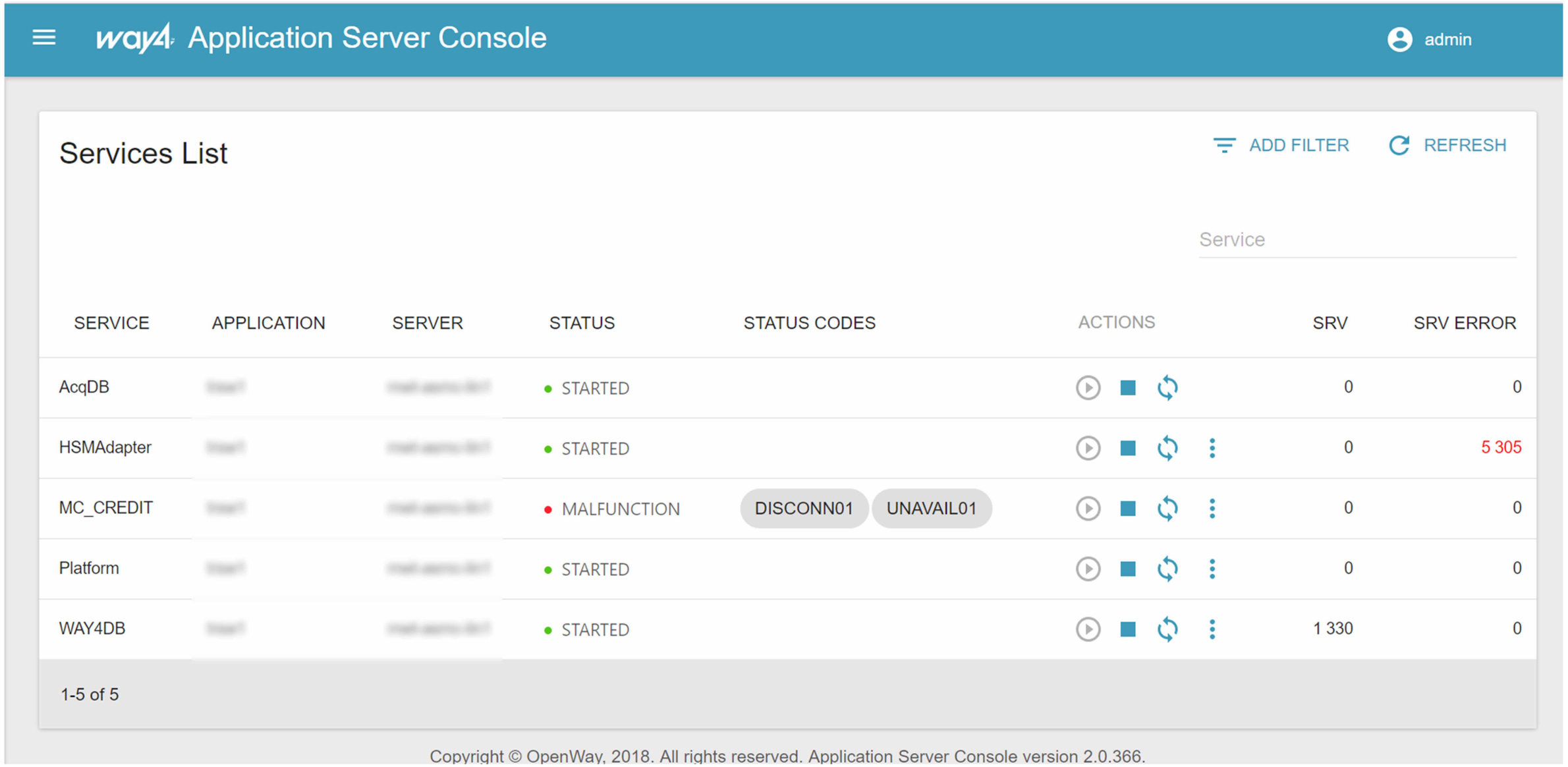
Typical architecture

Servers = OS

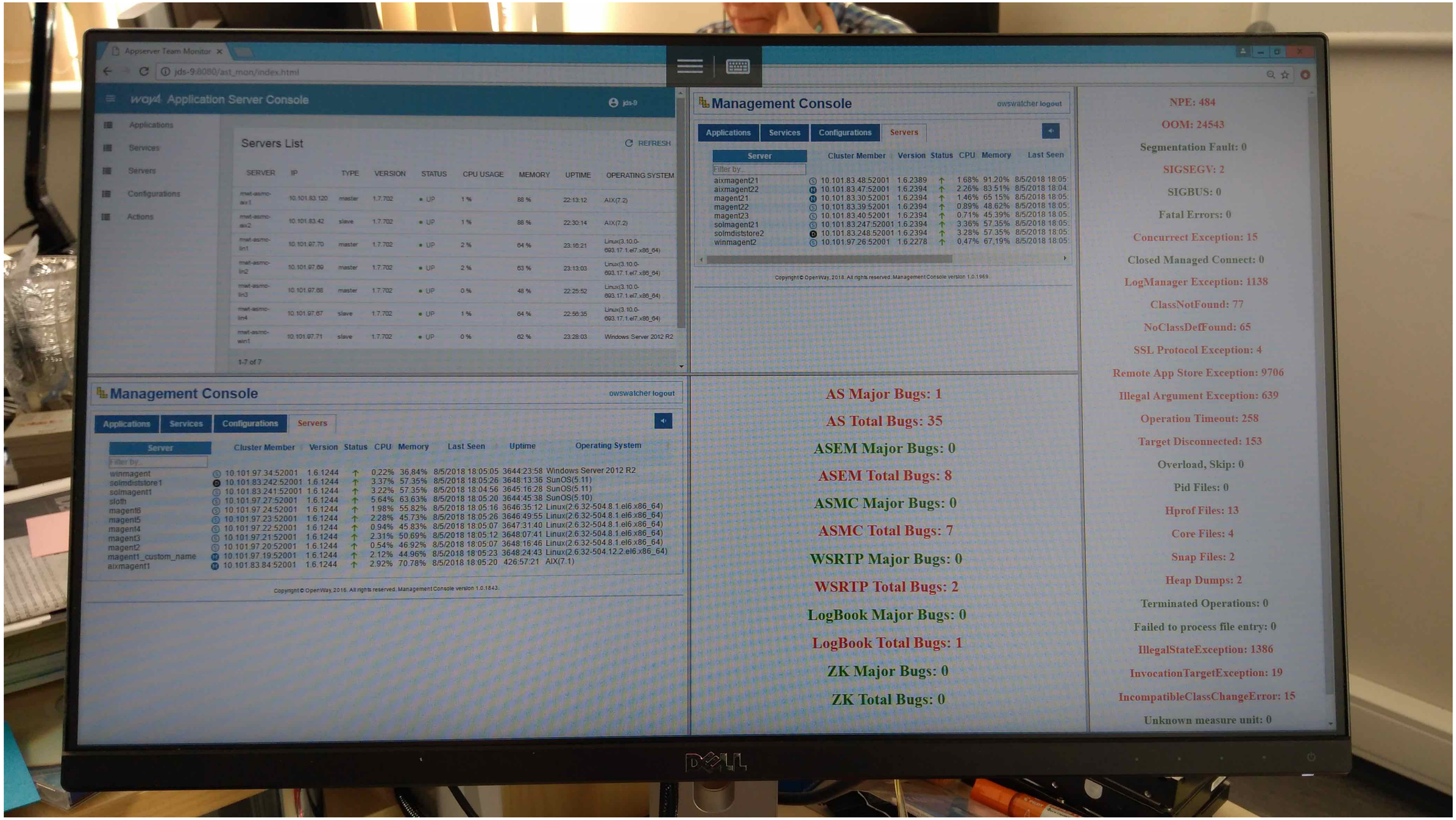

way4 Application Server Console
admin
Applications
Services
Servers
Configurations
Actions
Servers List
REFRESH
SERVER
IP
TYPE
VERSION
STATUS
CPU USAGE
MEMORY
UPTIME
OPERATING SYSTEM
master 1.7.702 UP 1 % 87 % 21:02:13 AIX(7.2)
slave 1.7.702 UP 1 % 87 % 21:19:10 AIX(7.2)
master 1.7.702 UP 2 % 64 % 22:05:19 Linux(3.10.0-693.17.1.el7.x86_64)
master 1.7.702 UP 2 % 63 % 22:02:01 Linux(3.10.0-693.17.1.el7.x86_64)
master 1.7.702 UP 0 % 47 % 21:14:50 Linux(3.10.0-693.17.1.el7.x86_64)
slave 1.7.702 UP 0 % 64 % 21:45:33 Linux(3.10.0-693.17.1.el7.x86_64)
slave 1.7.702 UP 0 % 62 % 22:17:05 Windows Server 2012 R2
1-7 of 7



Business+OS = Applications



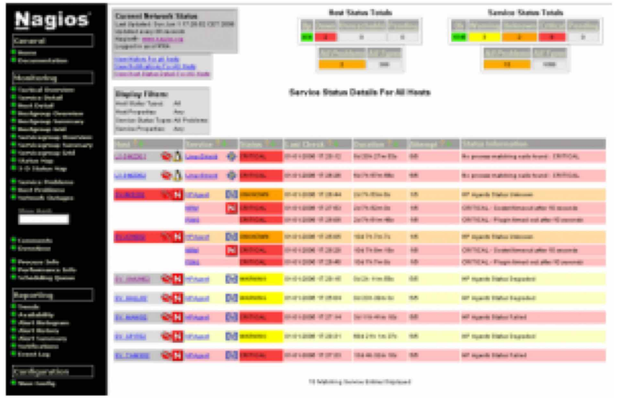
Business = Services

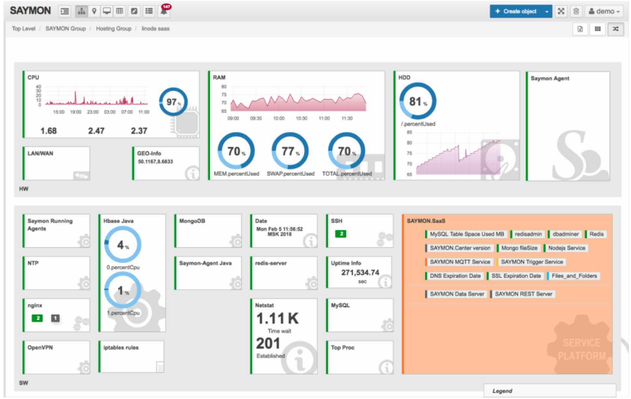


Aggregate them all: profit !

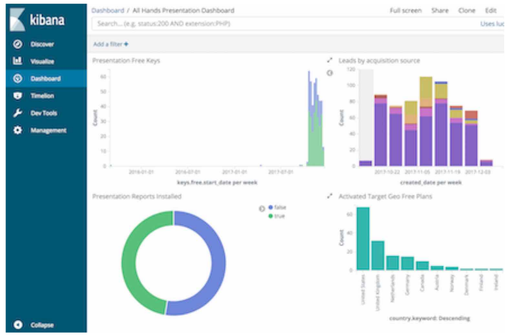
```
C:\WAY4ApplicationServer\appserver\applications\m_tools\commands>apps.cmd
Application      Server                State    MemoryUsed   StartedTime       Restarts HttpPort
examples         [redacted]            STARTED  31.1m        16-05-17 13:26    0        14750
logagent         [redacted]            STOPPED                                 0        0
logagent         [redacted]            STOPPED                                 0        0
logagent         [redacted]            STARTED  41.7m        16-05-17 13:24    0        0
monitoring       [redacted]            STARTED  76.2m        16-05-17 13:24    0        0
trsw             [redacted]            STARTED  71.5m        16-05-17 13:25    0        10200
```

Cluster CLI profit ☺


Nagios
Service Status Details For All Hosts

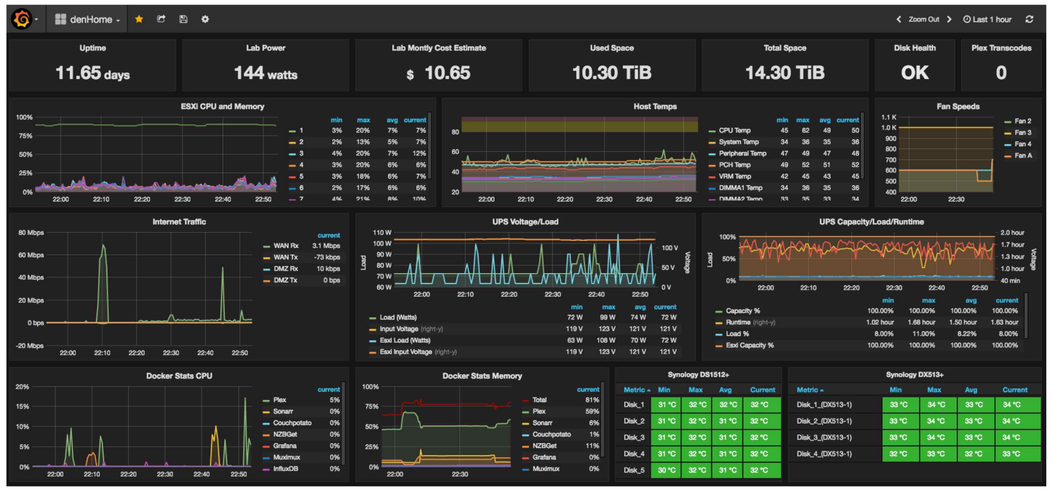

SAYMON
CPU
RAM
HDD
Saymon Agent
LAN/WAN
HW
Saymon Running Agents
Hbase Java
MongoDB
Date
SSH
SAYMON.SaaS
NTP
Saymon-Agent Java
redis-server
Uptime Info
nginx
Netstat
MySQL
OpenVPN
Iptables rules
Top Proc
SW
Legend


ZABBIX


kibana
Discover
Visualize
Dashboard
Timelion
Dev Tools
Management
Collapse


OpManager


openNMS


denHome
Uptime
11.65 days
Lab Power
144 watts
Lab Montly Cost Estimate
$ 10.65
Used Space
10.30 TiB
Total Space
14.30 TiB
Disk Health
OK
Plex Transcodes
0
ESXI CPU and Memory
Host Temps
Fan Speeds
Internet Traffic
UPS Voltage/Load
UPS Capacity/Load/Runtime
Docker Stats CPU
Docker Stats Memory
Synology DS1512+
Synology DX313+

Other way

Thank you!
Your way4

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