Performance Analysis Flowchart

Velocity Software Inc.
196-D Castro Street
Mountain View CA 94041
650-964-8867

Velocity Software GmbH
Max-Joseph-Str. 5
D-68167 Mannheim
Germany
+49 (0)621 373844

Barton Robinson,
barton@velocitysoftware.com

If you can't measure it, I'm just not interested….

"z" is:

- Very large,
- Very complex and
- Very well instrumented
- TECHNOLOGY KEEPS CHANGING…

The challenge?

What challenge, it is "all" there!

- 200 zmon panels (with menus)
- 150 zmap reports (with table of contents)
- 3400 unique variables

Few companies have full time performance analysts.

z/VM Platform, source: Monitor (95+ reports)

***Performance Summary (4)**

ESAHDR ESATUNE ESASSUM ESASUM

***Transaction Activity (5)**

ESAUSLA **ESAXACT** ESARATE ESACLAS
ESAEXCP

***User Activity (21)**

ESASRVC ESASRV1 ESAUSRC ESAUSR1
ESAUSR2 ESAUSR3 ESAUSR4 ESAUSR5
ESAUSP2 ESAUSP3 ESAUSP4
ESAUSCP ESAUSP5
ESAUSTR ESAUSPG ESAUSEK ESAWKLD
ESAUSRQ ESASCED ESAACCT ESAPOOL

***Processor Subsystem (26)**

ESACPUU ESACPUA ESACPUS ESASMT
ESADIAG ESAINS ESALCK1 ESALCK2
ESAMFC ESAMFCA ESAMFCC ESACPUV
ESACPU1 ESACPU2 **ESADIA2**
ESAIUCV ESAIUC2 ESAIUER
ESALPARC ESALPAR ESALPARS
ESAPLDV ESAIOP ESACRYPT ESACRY2

*Storage Subsystem (11)

ESASTRC ESASTOR ESASTR1 ESASTR2
ESASTR3 ESAME ESAVDSK
ESAFREE ESADCSS ESAASPC ESASXS

*Paging Subsystem (5)

ESAPSPC ESAPAGE ESABLKP ESAXSTO
ESAPSDV

*Input/Output Subsystem (18)

ESADEV1 ESADEV2 ESADSD1 ESADSD2
ESADSD6 ESAIOAS ESACHNC ESACHAN
ESACHNH
ESADSDC ESADSD5 ESAMDC
ESA3495 ESASCSI ESASCS2
ESASEEK ESAFCP ESAEDEV

*Virtual NETWORK Reporting (7)

ESAQDIO ESAQDI2 ESANIC
ESAVSWC ESAVSW ESAVSW2
ESAOSA

*Operational Logging

ESAOPER

The Challenge: Many subsystems

- z/VM "traditional" Applications (Source: APPLMON)
  - (33 reports currently?)

```
*Shared File System  (7)

ESASFS1 ESASFS2 ESASFS3 ESASFS4
ESASFS5 ESASFS6 ESASFS7

*Byte File System   (2)

ESABFS1 ESABFS2 ESABFS3

*CMS Multitasking   (1)

ESAMTSK

*Web Serving Reports  (8)

ESAWEB1 ESAWEB2 ESAWEB3 ESAWEB4
ESAVWS1 ESAVWS2 ESAVWS3 ESAVWS4


*TCPIP Reporting  (15) (tcpip monitor records, snmp)

ESATCPC ESATCPI ESATCP1 ESATCP2
ESATCP3 ESATCP4
ESATCP5 ESATCP6 ESATCP7 ESATCP8
ESATCPP ESATCPS ESATCPA ESATCPU ESATFTP
```

Network: Source: snmp - VERY efficient, really!

- Network: mib ii (first available, from any snmp enabled server
  ESATCPC ESATCP1 ESATCP2 ESATCP3 ESATCP4
- Microsoft servers: Host mib
  ESAHST1 ESAHST2 ESAHST3 ESAHST4 ESAHSTA
- Linux servers: UCD mib
  ESAUCD1 **ESAUCD2** ESAUCD3 **ESAUCD4** ESAUCDD
- More Linux: Velocity mib
  ESALNXD ESALNXS ESALNXR **ESALNXP** ESALNXA
  ESALNXC **ESALNXF** ESALNXU ESALNXV
  ESALNXM ESALNXUP
- Linux Application "vendor" mibs
  ESAJVM ESAORAC ESAORAG ESAORAS ESAORAW
  ESAGPFN ESAGPFF ESAGPFF ESAGPFD ESAGPFS (Version 5, zvps)
  ESAMNG1 ESAMNG2 ESAMNG3 ESAMNG4 ESAMNG5 (Version 5, zvps)
  ESADOCK1 ESADOCK2 ESASSC (Version 5, zVPS)
- VSE mibs: IBM, Velocity
  ESAVSEC ESAVSES ESAVSEP ESAVSEJ
  ESAVSEP ESAVSEJ

The 25 "z/VM" Reports you need in the order you need them

Configuration: ESAHDR
System (z/VM LPAR) Load: ESASSUM

Wait states: ESAXACT
Virtual machine Config: ESAUSRC

CPU:

- LPAR Summary: ESALPARS
- CPU Consumer: ESAUSP2
- Linux Consumer: ESALNXP
- Linux Processor: ESALNXS
- CPU Cache: ESAMFC

Storage

- z/VM Requirements: ESASTR1
- User Storage: ESAUSPG
- Linux Storage: ESAUCD2
- VDISK for swap: ESAVDSK

Paging

- Configuration: ESAPSDV
- Loads by user: ESAUSPG

DASD

- Configuration: ESADSD1
- Rates: ESADSD2
- CACHE: ESADSD5
- FCP: ESAFCP
- EDEV: ESAEDEV

Network

- Configuration: ESATCPI
- Network management: ESATCP1/2/4
- OSA: ESAOSA/NIC/VSW

VELOCITY SOFTWARE

Analysis starts with "is there a problem?"

- Describe the problem (what user(s), what time)

System Configuration

- Processor model, cpu type
- Number of processors, storage size
- SMT support

Loads on the system subsystems

Wait states for those impacted

Subsystem Analysis

- DASD, Storage, Paging, Processor, Network
- Follow the leads, almost everything is available

Know the configuration: ESAHDR (B)

```
Report: ESAHDR        z/VM Monitor Analysis
Monitor initialized: 04/25/22 at 00:00:00 on 8561 s
Monitor period:         7200 seconds (   2:00:00)
-------------------------------------------------
ZMAP Release                                5.1.3.1
History Source                              5.1.3.0
Key Expiration for: Velocity               04/28/23
Components licensed:  TUN
Monitor file created:             04/25/22  00:00:00

z/VM Version:  7                Release 2.0 SLU 2102
TOD clock at termination                    20:00:00
Abend code of last termination
TOD clock at last IPL:            03/04/22  19:40:57
System Operator:                            OPERATOR
Time zone adjustment from GMT:              -4 hours

System Identifier                           VLXPMW08
Checkpoint/Warmstart Volumes          V51R01/V51R01
Machine Model/Type                     Z15:8561/401
Multithreading Status(SMT): Enabled
  Core Thread count:        2
  Enabled Count:            2
```

Common configuration problems

- IFLs?
- Real Storage
- Release significant
- Master processor significant
- SMT

Know the configuration: ESAHDR (B)

```
Report: ESAHDR       z/VM Monitor Analysis
--------------------------------------------------
Apar installed: VM65918 VSW Aggreg Load Balance
Apar installed: VM65925 NICDEF Security Controls
Apar installed: VM65942 Add user diagnose tables
Apar installed: VM65943 eav minidisks (large)
Apar installed: VM65985 System Hang with mdc on
Apar installed: VM65988 Processor Scalability
Apar installed: VM66026 HYPERPAV/PAV/ZHPF Monitr
Apar installed: VM66063 High PR/SM LPAR Mgt Time
Apar installed: VM66083 Wait, CUWait monitor rec

System Sequence Code                 00000000000469C7
Processor  0 model/serial           8561-401  /111108 Master
Processor  1 model/serial           8561-401  /111108
Processor  2 model/serial           8561-401  /111108
Processor  3 model/serial           8561-401  /111108
Processor  4 model/serial           8561-401  /111108
….
Processor 38 model/serial           8561-401  /111108
Processor 39 model/serial           8561-401  /111108       (z/VM perspective, SMT Enabled)

 CPU(GP) Capability Factor:     3085
 CPU(IFL) Capability Factor:     416
 CPU Cycles/ns:                 5200
 CPU Cycles/ns (GP):             781
 Operating on IFL Processor(s)
 Channel Path Measurement Facility(CPMF) Extended is installed

Totals by Processor type:
<---------CPU--------> <-Shared Processor busy>
Type Count Ded shared total assigned Ovhd Mgmt
---- ----- --- ------ ----- -------- ---- ----
CP       1   0      1   0.4      0.3  0.0  0.1
IFL    108   0    108  1501   1478.6 21.1 22.2
```

Common configuration problems

- IFLs?
- Real Storage
- Release signficant
- Master processor significant

VELOCITY SOFTWARE

Know the configuration: ESAHDR (B)

```
Report: ESAHDR       z/VM Monitor Analysis
Monitor initialized: 04/25/22 at 00:00:00 on 8561 serial
Monitor period:         3600 seconds (   1:00:00)
------------------------------------------------------------

Number of logical partitions defined:            21

Main Storage installed (MB):                2867199
Main Storage Generated (MB):                2867199
Horizontal/Vertical Scheduling Configuration IFL CPUs
------------------------------------------------------------
CPU utilization:      616.6  of  4000%
CPU charged to users: 598.3%
System overhead:       18.4%
Capture ratio:       100.00%
DASD I/O rate:         473.3   per second
MDC effectiveness:       0.0%
DASD paging rate:        0.0   per second
Spool utilization:         2%
Communication rate:    392.1   per second
------------------------------------------------------------------
Top users and user classes by CPU consumption:
                  <-Relative->    <---Absolute Percent CPU--->
     UserID       <-Pct CPU-->    <Out of 100%>  <Out of 4000%>
     /Class        Used   Cum      Util   Cum     Util   Cum
     --------      ----  ----      ----  ----    -----  -----
  1. LINUX3F8      71.6    72      11.0    11    441.4    441
  2. LINUX3FD      13.3    85       2.1    13     82.2    524
  3. System         3.0    88       0.5    14     18.4    542
  4. LINUX3FA       2.2    90       0.3    14     13.7    556
  5. LINUX411       1.7    92       0.3    14     10.2    566
  6. LINUX3B2       0.8    93       0.1    14      4.8    571
  7. LINUX529       0.8    93       0.1    14      4.7    575
  8. LINUX400       0.7    94       0.1    15      4.6    580
```

Common configuration problems

- Real Storage
- High level utilizations
- Top User(s)

VELOCITY SOFTWARE

Know the overall loads: ESASSUM / ESAMAIN (B)

```
Report: ESASSUM      Subsystem Activity                                SOMEgr
Monitor initialized: 04/25/22 at 13:00:00 on 8561 serial 111108        First
-------------------------------------------------------------------------------
<---Users----->  <Processor> Storage (MB) <-Paging--> <-----I/O----->
         <-avg number->  Utilization Fixed Active <pages/sec> <-DASD--> Other
Time       On Actv In Q  Total Virt.  User Resid. XStore DASD Rate Resp  Rate
-------- ---- ---- ----  ----- ----- ----- ------ ------ ---- ---- ---- -----
13:15:00   78   45  191    662   613  74.9  2765K      0    1  165  0.2     0
13:30:00   78   45  190    625   580  74.9  2774K      0    1  168  0.2     0
13:45:00   78   45  196   1303  1248  74.9  2778K      0    0  163  0.2     0
14:00:00   78   46  178    848   811  74.9  2783K      0    0  168  0.2     0
14:15:00   78   45  190    312   287  74.9  2791K      0    0  164  0.2     0
14:30:00   78   45  195    337   308  74.9  2805K      0    0  165  0.2     0
14:45:00   78   45  188    943   891  74.9  2811K      0 2269  187  1.2     0
15:00:00   78   45  189    596   556  74.9  2812K      0  17K  470  2.9     0
15:15:00   78   46  179    374   341  74.9  2812K      0  20K  661  2.4     0
15:30:00   78   45  194    413   381  74.9  2813K      0 8889  489  1.3     0
```

Look for Spikes, dramatic changes, what time? (14:30-14:45)

- Processor
- Storage for users
- Page rates
- DASD I/O rates

Wait states provide options for improvement

- Sample user status once per second, once per minute
- (900 samples per vcpu per 15 minute period)

Wait state (queue) analysis -> where to focus

- Running / CPU Wait -> CPU Subsystem
- Simulation wait (master processor) -> CPU Subsystem
- Page wait -> Paging/Storage subsystems
- Asynchronous i/o, page -> DASD subsystem

Normal idle wait states

- TCPIP, Linux: test idle
- Traditional servers: SVM (service machine wait)
- Traditional users: idle (not in queue)

Two types of Wait states are provided by virtual machine

- Monitor frequency: once per minute (Not interesting)
- High Frequency (Hi-Freq): once per second (Interesting)
  - (60 samples per 1 minute per virtual cpu)

Shown by:

- Summarized for all users (start here)
- Summarized for user classes (grouped by installation)
- Servers
- Top users

User class analysis -> where to focus

- Set up user classes FIRST!
- Group Test vs Product
- Group application by application
- Group support servers vs production

Wait States: ESAXACT (B)

```
Report: ESAXACT      Transaction Delay Analysis                      SOMEg
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 111108      First
-------------------------------------------------------------------------
                     <-----Percent non-dormant (Wait states)------------
UserID   <-Samples->                          E-  D-  T-      Tst <Asynch>
/Class   Total  In Q Run Sim CPU SIO Pag SVM SVM SVM  CF Idl I/O Pag Ldg
-------- ----- ----- --- --- --- --- --- --- --- --- --- --- --- --- ---
14:45:00  1170  2815 7.1 0.1 2.1   0   0   0   0   0   0  90   0   .   .
Hi-Freq:  302K  174K 4.6 0.1 1.2 0.0 0.0   0 1.0 0.0   0  94   0 0.0 0.0
 ***User Class Analysis***
Servers  10800   459   0 0.2 0.4   0   0   0  10 8.9   0  90   0   0   0
Velocity  9000   115 1.7 0.9   0   0   0   0 0.2 8.7   0  89   0   0   0
CATech    4500     1   0   0   0   0   0   0   0   0   0   0   0   0   0
TheUsrs   278K  174K 4.6 0.1 1.2 0.0 0.0   0 0.7 0.0   0  94   0 0.0 0.0
 ***Top User Analysis***
LINUX3F8 28800 25036  24 0.4 3.2   0   0   0   0   0   0  73   0   0   0
LINUX3FD 28800 27916 4.3 0.2 2.5   0 0.0   0   0   0   0  93   0   0   0
LINUX538 28800 15500 1.9 0.0 0.3   0   0   0   0   0   0  98   0   0   0
LINUX3FA 28800 15945 1.1 0.1 0.4   0   0   0   0   0   0  98   0   0   0
LINUX411  3600  3600 2.9 0.1 3.2   0   0   0   0   0   0  94   0 0.0 0.1
-------------------------------------------------------------------------
15:00:00  1170  2840 4.8 0.1 1.3   0 0.2   0   0 0.0   0  93   0   .   .
Hi-Freq:  302K  173K 2.9 0.1 0.6   0 0.1   0 1.0 0.0   0  96 0.0 0.0 0.7
 ***Top User Analysis***
LINUX3F8 28800 21011  11 0.1 1.0   0 0.1   0   0   0   0  88   0   0 0.1
LINUX3FD 28800 27855 4.4 0.3 1.6   0 0.2   0   0   0   0  93   0   0 0.1
LINUX538 28800 17749 4.8 0.0 0.4   0 0.1   0   0   0   0  95   0   0 0.0
LINUX3FA 28800 15107 1.1 0.0 0.4   0   0   0   0   0   0  99   0   0 0.0
```

What is the wait state? Identifiable? A problem? Why so many samples?

- Processor wait trivial?
- Page wait non existent?

VELOCITY SOFTWARE

Wait States: ESAXACT (A)

```
Report: ESAXACT      Transaction Delay Analysis                        Velocity S
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First reco
-------------------------------------------------------------------------------
                     <-----Percent non-dormant (Wait states)-----------------
UserID   <-Samples->                          E-  D-  T-      Tst <Asynch>
/Class    Total  In Q Run Sim CPU SIO Pag SVM SVM SVM  CF Idl I/O Pag Ldg Oth
-------- ----- ----- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
08/29/18
20:01:35    48    35 5.7   0  40   0   0   0   0   0   0  54   0   .   .   0
Hi-Freq:  3720  2114 5.4 0.0  41   0 0.7   0 2.8 0.0   0  52   0 0.2 0.7 0.0
 ***Key User Analysis ***
TCPIP       60    55   0   0 3.6   0   0   0   0   0   0  96   0   0   0   0
 ***User Class Analysis***
Servers    600     3   0  33   0   0   0   0   0   0   0  67   0   0   0   0
Velocity   600    15 6.7   0 6.7   0   0   0   0   0   0  87   0   0   0   0
*Prod     1860  1860 5.8   0  45   0 0.4   0   0   0   0  49   0   0 0.1 0.1
*Util      120   120   0   0  15   0   0   0   0   0   0  85   0   0   0   0
TheUsrs    480    61  10   0  15   0  11   0  21 1.6   0  36   0 6.6  20   0
 ***Top User Analysis***
L24BP      120   120  18   0  77   0   0   0   0   0   0 5.0   0   0   0   0
L233P      120   120  18   0  74   0   0   0   0   0   0 7.5   0   0   0 0.8
L200P      120   120  10   0  80   0 4.2   0   0   0   0 5.8   0   0   0   0
L239P      120   120 6.7   0  51   0   0   0   0   0   0  43   0   0   0   0
L203P      120   120 5.0   0  75   0 0.8   0   0   0   0  19   0   0   0   0
L20BP      120   120 4.2   0  38   0   0   0   0   0   0  58   0   0   0   0
L244P      120   120 3.3   0  28   0   0   0   0   0   0  69   0   0   0   0
L208P      120   120 3.3   0  51   0   0   0   0   0   0  46   0   0   0   0
L20DP      120   120  13   0  44   0   0   0   0   0   0  43   0   0   0   0
L224P      120   120 4.2   0  27   0   0   0   0   0   0  69   0   0   0   0
```

Sometimes it is easy: The primary wait state is CPU, 77% CPU WAIT

VELOCITY SOFTWARE

User Configuration: ESAUSRC (B)

```
Report: ESAUSRC                          SOMEgroup - MAP 5.1.3 0
Monitor initializ 8561 serial 111108     First record 00:00:00
Monitor period:  0:00)                   Last record: 01:00:00
-------------------------------------------------------------------
                        <-------SHARE-------> <---CPU <Storage>
                  > CPU <Normal> <--MAX-> Lim <Count> <VM Size>
UserID   ClassID  Type   Rel Abs Typ Shre -it Def On   Dflt   Max
-------- -------- ---- ---- --- --- ---- --- --- --  ---- ----
LINUX3B2 TheUsrs   IFL 1600   .   .    .   .  16 16  244G 244G
LINUX3FA TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
LINUX3FD TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
LINUX3F5 TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
LINUX3F8 TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
LINUX40A TheUsrs   IFL  400   .   .    .   .   4  4   61G  61G
LINUX40D TheUsrs   IFL  400   .   .    .   .   4  4   61G  61G
LINUX400 TheUsrs   IFL  400   .   .    .   .   4  4   61G  61G
LINUX404 TheUsrs   IFL  200   .   .    .   .   2  2   31G  31G
LINUX408 TheUsrs   IFL  400   .   .    .   .   4  4   61G  61G
LINUX41B TheUsrs   IFL  800   .   .    .   .   8  8  122G 122G
LINUX411 TheUsrs   IFL  400   .   .    .   .   4  4   61G  61G
LINUX51E TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
LINUX529 TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
LINUX538 TheUsrs   IFL 3200   .   .    .   .  32 32  488G 488G
```

Look for "Interesting configurations"

- Large relative shares / absolute shares
- CPU Counts, matching shares (100 Rel / vcpu)
- CPU Type (IFL, CP)
- Virtual machine storage sizes (too large?, largest?)

Very Bad Performance reported by user (B)

Users want virtualized Linux "just like x"

Virtual machines are not waiting – or are they?

- 32 virtual cpus are samples
- 32 * 60 samples per minute * 15 minutes = 28800 samples
- Why are 88% samples "in queue", but not doing anything?
- If 11% are using CPU, how many CPU's needed by workload?

Performance problem is "internal" to Linux

```
Report: ESAXACT      Transaction Delay Analysis                      C
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 111108      F
-------------------------------------------------------------------------
                     <-----Percent non-dormant (Wait states)--------
UserID   <-Samples->                        E-  D-  T-      Tst <Asynch
/Class   Total  In Q Run Sim CPU SIO Pag SVM SVM SVM  CF Idl I/O Pag
-------- ----- ----- --- --- --- --- --- --- --- --- --- --- --- ---
15:00:00  1170  2840 4.8 0.1 1.3   0 0.2   0   0 0.0   0  93   0   .
Hi-Freq:  302K  173K 2.9 0.1 0.6   0 0.1   0 1.0 0.0   0  96 0.0 0.0
 ***Top User Analysis***
LINUX3F8 28800 21011  11 0.1 1.0   0 0.1   0   0   0   0  88   0   0
LINUX3FD 28800 27855 4.4 0.3 1.6   0 0.2   0   0   0   0  93   0   0
```

Linux Configuration Guideline Summary

Virtual machine size

- Minimize until some swap

Swapping

- Swap to virtual disk
- Define 2 virtual disks,
  - One to meet the average requirement
  - Second one for overflow - Insurance
- Use DIAG driver instead of FBA
  - Reduces I/O by factor of 8

Virtual processors

- Minimize to meet the workload/application requirement
- Ensure diag 9c, not 44

Infrastructure costs

- Minimize – shared resource architecture

Why Linux Configuration Guidelines?

Reduce Virtual machine size

- Large servers own storage but do not use it.
- 7 servers * 500GB barely fit in 2.7 TB LPAR
- Are they using the storage? (ESAUCD2)
- Use Option to dynamically add to virtual storage instead?

Swapping

- Linux eliminates unused storage
- Intel/x admins do not like swapping.
- Swapping to virtual disk VERY VERY fast

Virtual processors

- Minimize spin locks held by process (that might be paged out?)
- Is there diagnose activity?

Case Study

- Validate storage requirements
- Validate diagnose rates

Linux Storage: ESAUCD2 (B)

```
Report: ESAUCD2      LINUX UCD Memory Analysis Repo
Monitor initialized: 04/25/22 at 00:00:00 on 8561 s
-------------------------------------------------
Node/    <------Storage Sizes (in MegaBytes)-------
Time/    <--Real Storage--> <-----SWAP Storage---->
Date     Total  Avail Used  Total Avail Used  MIN
-------- ------ ----- ----- ----- ----- ----- -----

04/25/22
00:15:00
***Node Groups***
TheUsrs   4044K 2477K 1566K  480K  480K   7.8 234.4
*** Nodes *******
LINUX3B2 245373  172K 69731 32768 32765   2.8  15.6
LINUX3FA 490922  137K  342K 32768 32768     0  15.6
LINUX3FD 490922  9564  470K 32768 32763   4.8  15.6
LINUX3F5 490922  459K 20737 32768 32768     0  15.6
LINUX3F8 490922 22709  457K 32768 32768     0  15.6
LINUX40A  61210 31079 30131 32768 32768     0  15.6
LINUX40D  61210 52677  8533 32768 32768     0  15.6
LINUX400  61210 46124 15086 32768 32768     0  15.6
LINUX404  30516 22208  8309 32768 32768     0  15.6
LINUX408  61210 53121  8089 32768 32768     0  15.6
LINUX41B 122598 99777 22820 32768 32768     0  15.6
LINUX411  61210 21646 39564 32768 32768     0  15.6
LINUX51E 490861  465K 15172 32768 32768     0  15.6
LINUX529 490861  429K 51239 32768 32768     0  15.6
LINUX538 490861  465K 14472 32768 32768     0  15.6
```

Available storage

- Not used for cache
- Backed by z/VM
- Because that is what they do on x

Linux Storage from z/VM Virtualized (FreeFall): ESAUSPG (B)

```
Report: ESAUSPG      User Storage Analysis
Monitor initialized: 04/25/22 at 14:00:00 on 8561 seri
-----------------------------------------------------
          <Storage Occupancy (MegaBytes)> <-Page I/O-->
UserID    <---Main Storage--->       Paged Page   Page
/Class    Total   >2gb   <2GB         Out Writes Reads
-------- ------ ------ ------    -------- ------ ------
14:45:00  2811K  2809K   1698        1241  1548K 102635
 ***User Class Analysis***
Servers       65     40     25          59  17587    347
Velocity      36     36      0          25  10402    665
CATech        15      8      7          10   2403    122
TheUsrs    2811K  2809K   1668        1147  1517K 101501
 ***Top User Analysis***
LINUX3F8 497540 497540      0          69  94026    955
LINUX3FD 497558 497558      0          52  81951  22318
LINUX538 427501 426021   1480          73  97357    183
LINUX3FA 361117 360972    144          73  97493     33
LINUX411  45291  45291      0          50  89325  15935
LINUX51E  24505  24505      0          73  97428     61
LINUX3F5 497536 497536      0          70  96818   5829
LINUX3B2 249007 249007      0          66  99084  15752
LINUX400  24715  24715      0          56  83907   2888
LINUX529  60820  60820      0          73  97236     10
LINUX408  11406  11406      0          54  81802   2281
LINUX40A  62016  62016      0
LINUX41B  25663  25663      0
LINUX40D  10183  10183      0
LINUX404   9460   9460      0
```

User pages

- Are NOT just virtual
- All are Backed by z/VM
- Linux touches all pages over time
- 5 servers each have more than 10%

VELOCITY SOFTWARE

Linux Storage from z/VM Virtualized: ESAUSPG (B)

```
Report: ESAUSPG       User Storage Analysis
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 1111
-------------------------------------------------------------
          <Storage Occupancy (MegaBytes)> <-Page I/O--> Pages
UserID    <---Main Storage--->       Paged Page   Page   Moved
/Class    Total   >2gb   <2GB          Out Writes Reads  <2GB
-------- ------ ------ ------    -------- ------ ------ ------
14:30:00  2806K  2805K    234           0      0      0      0
 ***User Class Analysis***
Servers      124     75     48           0      0      0      0
Velocity      61     61      0           0      0      0      0
CATech        25     19      7           0      0      0      0
TheUsrs    2805K  2805K    181           0      0      0      0
 ***Top User Analysis***
LINUX3FD 497610 497610      0           0      0      0      0
LINUX3F8 497609 497609      0           0      0      0      0
LINUX538 421606 421505    101           0      0      0      0
LINUX3FA 360765 360759      6           0      0      0      0
LINUX411  45343  45343      0
LINUX3B2 249073 249073      0
LINUX529  60893  60893      0
LINUX400  24775  24775      0
```

User pages – Previous interval

- No Paging
- Passed edge of cliff….
- SET AGELIST settings?

```
cp query agelist
Target size   =   37888K (37M)   2.0%  (5%) of
pageable storage
In use        =      20480K
Pending writes =  18452K
Early writes   = Yes
Sizing         = Variable
Keep slot      = Yes
Ready; T=0.01/0.01 17:37:49
```

VELOCITY SOFTWARE

Paging: setting best practices? (B)

cp query agelist (DEFAULT)
Target size = 37888K (37M) 2.0% of pageable storage **(5% option)**
In use = 20480K
Pending writes = 18452K
Early writes = Yes (Write out unused pages early)
Sizing = Variable
Keep slot = Yes

q agelist (installation "B")
Target size = 74562560K (72815M) **2.0%** of pageable storage **(Needed10%)**
In use = 8616968K
Pending writes = 8616928K
Early writes = No (So everything waits until we write out pages)
Sizing = Variable
Keep slot = No (saves disk, but degrades performance of writing)

Storage Process ramp up Analysis: ESALNXP (B)

```
Report: ESALNXP      LINUX HOST Process Statistics Report          Cit
Monitor initialized: 04/25/22 at 10:00:00 on 8561 serial 011108    Fir
-------------------------------------------------------------------------
node/     <Process Ident> Nice PRTY <------CPU Percents----> <STORAGE(MB)
 Name           ID    PPID Valu Valu  Tot  sys user syst usrt  Size RSS
--------- ------- ------- ---- ---- ---- ---- ---- ---- ---- ---- ----
LINUX538        0       0    0    0 2.82 0.57 1.56 0.08 0.61  13K  487
LINUX538        0       0    0    0 12.4 0.67 7.85 0.40 3.44  14K  533
LINUX538        0       0    0    0 61.8 5.48 52.7 0.16 3.45  46K  31K
LINUX538        0       0    0    0 21.8 2.24 19.5 0.01 0.02  94K  80K
LINUX538        0       0    0    0 53.4 5.06 47.6 0.08 0.64 126K 112K
LINUX538        0       0    0    0 28.0 2.81 24.9 0.04 0.28  96K  81K
LINUX538        0       0    0    0 17.2 1.63 15.5 0.01 0.02 149K 134K
LINUX538        0       0    0    0 54.7 5.39 49.3 0.01 0.00 173K 159K
LINUX538        0       0    0    0 62.1 4.18 57.2 0.07 0.58 204K 189K
LINUX538        0       0    0    0 69.5 4.50 65.0 0.00 0.00 207K 193K
LINUX538        0       0    0    0 50.9 3.93 46.8 0.03 0.15 183K 169K
LINUX538        0       0    0    0 27.2 2.10 24.4 0.08 0.63 208K 193K
14:45:00
LINUX538        0       0    0    0 23.6 1.76 21.2 0.08 0.55 208K 193K
 chef-cli    2808       1    0   20 0.61    0    0 0.07 0.55  200   51
 BESClien    2887       1    0   20 1.65 0.21 1.44    0    0  669   34
 mongod-g   45390       1    0   20 20.6 1.16 19.4    0    0 195K 193K
LINUX538        0       0    0    0  102 4.96   97 0.01 0.00 208K 194K
 BESClien    2887       1    0   20 1.66 0.19 1.47    0    0  669   34
 mongod-g   45390       1    0   20   99 4.45 94.8    0    0 195K 193K <--
```

One large serve ramped up (one application)

- No storage available, system responded

z/VM 6.3 Invalid but Resident Storage CLIFF Analysis (B)

```
Report: ESAUSTR      User Storage Analysis
Monitor period:         3600 seconds (   1:00:00)                    Last record:
-------------------------------------------------------------------------------
         <--------Virtual Server Storage (MB)----------->  <Resident> Mbyte <--
UserID   Size  Alloc Resi- UFO   <-----IBR----> <AgeList> <Unreferd> slots Made
/Class                dent Activ TOT  <2gb >2gb <2gb >2gb <2gb >2gb  used  IBR
-------- ----- ----- ----- ----- ---- ---- ---- ---- ---- ---- ---- ----- ----
TheUsrs  4231K 2529K 2529K 2529K    0    0    0    0    0    0    0     0    0
TheUsrs  4231K 2613K 2613K 2613K    0    0    0    0    0    0    0     0    0
TheUsrs  4231K 2654K 2654K 2654K    0    0    0    0    0    0    0     0    0
TheUsrs  4231K 2712K 2712K 2712K    0    0    0    0    0    0    0     0    0
TheUsrs  4231K 2745K 2745K 2745K  3.5  0.5  3.0 21.4  413    0    0     0 33.3 <-2% line
TheUsrs  4231K 2681K 2681K 2681K  0.9  0.1  0.8  5.4  103    0    0     0 31.3
TheUsrs  4231K 2765K 2765K 2763K 10.9  1.5  9.4 64.3 1533    0    0     0  0.8
TheUsrs  4231K 2774K 2774K 2772K 10.9  1.5  9.4 64.3 1532    0    0     0  1.8
TheUsrs  4231K 2778K 2778K 2776K 10.6  1.5  9.1 64.3 1540    0    0     0    0
TheUsrs  4231K 2783K 2783K 2781K 10.6  1.5  9.1 64.3 1536    0    0     0  0.0
TheUsrs  4231K 2775K 2775K 2773K 10.8  1.5  9.3 64.3 1535    0    0     0  2.4
TheUsrs  4231K 2791K 2791K 2789K 10.6  1.5  9.1 64.3 1532    0    0     0    0
TheUsrs  4231K 2805K 2805K 2804K 10.6  1.5  9.1 64.3 1530    0    0     0    0
TheUsrs  4231K 2812K 2811K 2808K 12.9  1.5 11.4 31.5 2023  0.0 37.0  1147  137 <-Fall over cliff
TheUsrs  4231K 2833K 2812K 2810K 36.9  1.5 35.4  0.1 2319  0.0  737 20588  632
TheUsrs  4231K 2810K 2805K 2803K 17.8  1.5 16.3 40.0 1851  0.0  193  5434  720
TheUsrs  4231
TheUsrs  4231
TheUsrs  4231
TheUsrs  4231
TheUsrs  4231
TheUsrs  4231
TheUsrs  4231K 2904K 2813K 2808K 1788  1.5 1786  0.0 2333    0 3695 91340 35.2
```

Invalid but Resident (IBR as of z/VM 6.3)

- Are correct servers losing pages? (NO)
- Same server, LINUX538 is “root cause”

VELOCITY SOFTWARE

Storage Case Study Recap

Virtual machine Storage sizes very high

- Application consumes a lot and builds fast

z/VM configuration parameters

- suited for SMALL
- Change AGELIST

Linux VCPU Count Issue

Virtual machine VCPU count higher than available?

- Determine real requirements?

z/VM With Hiperdispatch parks engines

- 20 Physical LPAR VCPU
- SMT gives 40 threads
- Parking drops

Virtual processors

- Minimize to meet the workload/application requirement
- Ensure diag 9c, not 44

Infrastructure costs

- Minimize – shared resource architecture

Linux CPU Details: ESALNXS (B)

```
Report: ESALNXS      LINUX VSI System Analysis Report
Monitor initialized: 04/25/22 at 14:00:00 on 8561 seri
-----------------------------------------------------

Node/     <---Load Numbers--> CPU <Processor Pct Util>
Time      Users Procs MaxProc NBR Total Syst User Idle
-------- ----- ----- ------- --- ----- ---- ---- ----
LINUX3F8      0   439       0 Tot 651.4 34.7  606 2490
                              1  30.2  3.3 21.2 64.1
                              2  24.6  1.6 22.7 73.3

                             23  17.2  0.8 16.2 81.4
                             24  13.7  0.7 12.9 85.1
                             25  16.5  0.8 15.5 82.1
                             26  21.0  0.7 20.1 77.6
                             27  16.0  0.7 15.2 82.7
                             28  14.1  0.6 13.4 84.8
                             29  16.6  0.9 15.5 81.9
                             30  11.6  0.5 11.1 87.5
                             31  12.0  0.4 11.5 87.1
```

Linux balances across all CPUs

- Spin locks are expensive
- More use of locks with more CPUs
- What if vcpu holds lock, but paged out?

- Is there concurrency with 32 VCPU?

Virtual Machine Diagnose Counts: ESAUSRD (B)

```
Report: ESAUSRD      Virtual Machine Diagnose Analysis(720)
Monitor initialized: 04/25/22 at 12:00:00 on 8561 seri: 04/
-------------------------------------------------------------
UserID  Total <------------diag counts / second
/ClassID rate  000  004  008  00C  010  014  024  044   09C
-------- ---- ---- ---- ---- ---- ---- ---- ---- ----  ----
LINUX3FD 1274    .    .    0    .    .    .    . 98.2  1176
LINUX3F8  304    .    .    0    .    .    .    . 31.3   312
LINUX3F8 1197    .    .    0    .    .    .    . 36.7  1161
LINUX3F8  744    .    .  0.0    .    .    .    . 41.0   703
LINUX3F8 2052    .    .    0    .    .    .    .  164  1888
LINUX3F8 1696    .    .    0    .    .    .    .  112  1584
LINUX3F8 2669    .    .    0    .    .    .    .  397  2273
LINUX3F8  953    .    .    0    .    .    .    .  224   729
LINUX3F8 1843    .    .    0    .    .    .    .  224  1619
LINUX3F8  203    .    .    0    .    .    .    . 12.9   190
LINUX3F8  320    .    .    0    .    .    .    . 20.6   299
14:45:00 3830  0.5  0.0  0.5  0.6  0.0    0  0.1  394  2978
LINUX3F8 1557    .    .    0    .    .    .    .  209  1348
LINUX3F8  453    .    .    0    .    .    .    . 58.3   395
LINUX3F8  633    .    .    0    .    .    .    . 75.2   558
LINUX3F8  242    .    .    0    .    .    .    . 15.6   227
LINUX3F8  269    .    .    0    .    .    .    . 18.6   250
LINUX3F8 2360    .    .    0    .    .    .    . 19.8  2340
LINUX3F8  266    .    .    0    .    .    .    . 15.6   250
LINUX3F8  784    .    .
LINUX3F8  784    .    .
LINUX3F8  287    .    .
```

Spin locks normal when many vcpu

- Spin locks rate did not change
- What changed? Paging started
- Spin lock uses diag 44, 9c to give up control.
- If owning process paged out, long delay

z/VM CPU Details: ESACPUA (B)

Report: ESACPUU CPU Utilization Report Cit
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 011108 Fir

Time	<----Load----> <-Users-> Actv	In Q	Tran /sec	CPU	CPU Type	<---------CPU (percentages)---------> Total util	Emul time	User ovrhd	Sys ovrhd	Idle time	Steal time
14:45:00	45	188	2.3	0	IFL	42.8	39.9	1.2	1.8	55.9	1.3
				1	IFL	43.9	41.5	1.2	1.3	54.7	1.3
				2	IFL	45.1	42.7	1.1	1.3	53.7	1.2
				3	IFL	44.0	41.6	1.1	1.3	54.7	1.3
..											
				14	IFL	45.8	43.3	1.1	1.4	52.9	1.3
				15	IFL	44.3	41.9	1.2	1.3	54.3	1.3
				16	IFL	45.1	42.6	1.2	1.4	53.6	1.3
						44.4	41.9	1.2	1.3	54.2	1.3
						26.7	25.4	0.6	0.7	23.4	49.9
						25.8	24.5	0.6	0.7	24.3	49.9
						14.9	13.8	0.5	0.6	22.1	62.9
						14.7	13.6	0.5	0.5	22.4	62.9
						10.3	9.7	0.3	0.3	12.6	77.1
						10.3	9.7	0.3	0.3	12.6	77.1
						7.3	7.0	0.1	0.2	7.2	85.4
						7.3	7.0	0.1	0.2	7.3	85.4
						4.2	4.1	0.1	0.1	5.0	90.7
						4.2	4.1	0.1	0.1	5.1	90.7
						0.0	0.0	0.0	0.0	0.2	99.8
						0.0	0.0	0.0	0.0	0.2	99.8
						0.0	0	0	0.0	0	100.0
						0.0	0	0	0.0	0	100.0
						0.0	0	0	0.0	0	100.0
				39	IFL	0.0	0	0	0.0	0	100.0
System:						943.1	891.3	23.9	27.9	1125	1932

VM pushes work to High Entitled
Linux balances across all CPUs

- Spin locks are expensive
- More use of locks with more CPUs
- What if vcpu holds lock but paged out?

- Is there concurrency with 32 VCPU?

Linux CPU Details: ESALNXS (B)

```
Report: ESALNXS      LINUX VSI System Analysis Report
Monitor initialized: 04/25/22 at 15:00:00 on 8561 seri
-----------------------------------------------------

Node/    <---Load Numbers--> CPU <Processor Pct Util>
Time     Users Procs MaxProc NBR Total Syst User Idle
-------- ----- ----- ------- --- ----- ---- ---- ----
LINUX538     0   426       0 Tot 129.2  7.7  120 3054
                             1   4.4  0.3  4.0 95.0
                             2   9.3  0.5  8.8 89.8
                             3   8.3  0.5  7.8 90.9
                             4   8.3  0.5  7.7 90.8
                             5   6.3  0.4  5.9 92.9
                             6   5.3  0.3  5.0 93.9
                             7   3.0  0.2  2.8 96.3
                             8   6.4  0.3  6.1 92.9
                             9   3.1  0.2  2.9 96.4
                            10   4.6  0.3  4.2 94.7
                            11   3.7  0.2  3.5 95.8
                            12   5.5  0.3  5.1 93.7
                            13   2.3  0.1  2.1 97.3
                            14   3.7  0.2  3.4 95.7
                            15   2.8  0.2  2.6 96.8
                            16   3.3  0.2  3.1 96.2
                            17   3.8  0.2  3.5 95.7
                            18   4.2  0.2  4.0 95.5
                            19   4.1  0.3  3.8 95.2
                            20   3.9  0.3  3.6 95.7
                            21   3.1  0.1  2.9 96.7
                            22   3.8  0.2  3.5 95.6
                            23   4.2  0.2  3.9 95.3
                            24   2.6  0.2  2.4 97.0
                            25   3.1  0.2  2.9 96.7
                            26   3.0  0.2  2.7 96.6
                            27   2.2  0.1  2.1 97.6
                            28   2.5  0.2  2.3 97.1
                            29   2.4  0.1  2.2 97.3
                            30   2.2  0.2  1.9 97.5
                            31   1.9  0.1  1.8 97.7
```

Linux balances across all CPUs

- To belabor the point, WHY 32 CPUs
- One major process
- Dispatched on cpus sequentially
- How does this help?

VELOCITY SOFTWARE

z/VM CPU Parking Details: ESAOPER (B)

```
14:33:59 CPU Unpark from  18 to  20 CPUUtil= "8.06", Projected= "8.92"
14:34:01 CPU Unpark from  20 to  24 CPUUtil= "9.5", Projected= "10.9"
14:34:03 CPU Park from 24 to  22 CPUUtil= "9.16", Projected= "9.28"
14:34:21 CPU Park from 22 to  20 CPUUtil= "6.95", Projected= "8.77"
14:34:27 CPU Park from 20 to  18 CPUUtil= "6.69", Projected= "7.98"
14:34:39 CPU Unpark from  18 to  22 CPUUtil= "8.10", Projected= "9.39"
14:34:41 CPU Park from 22 to  18 CPUUtil= "7.63", Projected= "7.84"
14:34:49 CPU Unpark from  18 to  20 CPUUtil= "5.63", Projected= "8.00"
14:34:53 CPU Park from 20 to  18 CPUUtil= "6.22", Projected= "7.99"
14:34:59 CPU Unpark from  18 to  20 CPUUtil= "7.36", Projected= "8.26"
14:35:01 CPU Unpark from  20 to  24 CPUUtil= "8.69", Projected= "10.0"
14:35:03 CPU Park from 24 to  20 CPUUtil= "7.44", Projected= "8.12"
14:35:33 CPU Park from 20 to  18 CPUUtil= "6.18", Projected= "7.91"
14:36:01 CPU Unpark from  18 to  20 CPUUtil= "6.92", Projected= "8.63"
14:36:03 CPU Park from 20 to  18 CPUUtil= "5.78", Projected= "6.73"
14:36:05 CPU Unpark from  18 to  20 CPUUtil= "6.98", Projected= "8.19"
14:36:07 CPU Unpark from  20 to  22 CPUUtil= "8.14", Projected= "9.30"
14:36:09 CPU Park from 22 to  20 CPUUtil= "8.42", Projected= "8.70"
14:36:11 CPU Unpark from  20 to  22 CPUUtil= "8.74", Projected= "9.06"
14:36:15 CPU Unpark from  22 to  24 CPUUtil= "9.7", Projected= "10.2"
14:36:19 CPU Park from 24 to  22 CPUUtil= "7.42", Projected= "9.9"
```

Hipervisor makes some projection of requirements

- Every two seconds, monitor record provided
- 20 VCPU = 40 threads.
- If only 18 threads available, why 32 vcpu in linux servers?

Top down - capture ratio 100% at all levels

- CEC / LPAR
- LPAR / z/VM
- Virtual machine
- Linux process (capture ratio still 100%)

```
Report: ESALPARS     Logical Partition Summary

Totals by Processor type:
<---------CPU-------> <-Shared Processor busy->
Type Count Ded shared  Total  Logical Ovhd Mgmt
---- ----- --- ------ ------ -------- ---- ----
CP       1   0      1   21.8     21.7  0.1  0.1
IFL     11   0     11  180.1    167.6  5.4  7.1
ICF      3   2      1  100.0     99.6  0.0  0.3
ZIIP     2   0      2    0.0      0.0  0.0  0.0
```

Look for processor type busy

- IFLs shared between LPARs (4 LPARs)
- TOTAL IFL Busy: 167% out of 1100
- Check overheads – high overhead result of too many vcpu
  - Logical overhead part of LPAR assigned
  - Physical overhead is CEC Management

LPAR Configuration: ESALPARS

Report: ESALPARS Logical Partition Summary SOMEgroup -
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 111108 First record

Time	Name	Nbr	Virt CPUs	CPU Type	<%Assigned> Total	Ovhd	<Assigned Shares---> <---LPAR--> Weight	<VCPU Pct> Pct	/SYS	/CPU	<-Thread-> Idle	cnt
14:45:00	Totals:	00	1	CP	0.3	0.0	10	100				
	Totals:	00	318	IFL	1962	25.9	805	100				
	VLXPMW08	**08**	**20**	**IFL**	**673.2**	**7.3**	**60**	**7.5**	**0.37**	**40.2**	**373.3**	**2**
	VLXPMW03	01	30	IFL	86.5	2.2	60	7.5	0.25	26.8	76.23	2
	VLXPMW04	02	20	IFL	154.2	4.0	60	7.5	0.37	40.2	133.3	2
	VLXPMW05	05	20	IFL	425.1	2.2	60	7.5	0.37	40.2	345.2	2
	VLXPMW06	06	20	IFL	74.5	1.6	60	7.5	0.37	40.2	64.12	2
	VLXPMW07	0B	20	IFL	151.6	1.8	60	7.5	0.37	40.2	128.4	2
	VLXTMW03	0E	4	IFL	36.2	0.6	10	1.2	0.31	33.5	29.94	2
	VLXTMW04	03	22	IFL	151.5	3.8	200	24.8	1.13	122	135.8	2
	VLXTMW05	0F	6	IFL	5.7	0.1	10	1.2	0.21	22.4	4.84	2
	VLXTMW06	04	8	IFL	181.1	1.6	10	1.2	0.16	16.8	102.9	2
	VLXTMW07	07	7	IFL	9.8	0.2	10	1.2	0.18	0.18	0	1

Totals by Processor type:

<---------CPU-------> Type	Count	Ded	**shared**	<-**Shared Processor busy**-> Total	Logical	Ovhd	Mgmt
CP	1	0	1	0.4	0.3	0.0	0.1
IFL	**108**	0	108	**1986.1**	1935.7	25.9	24.5

Look for "Shared processors"

- IFLs shared (all)
- CPU is low utilized

LPAR Overhead: ESALPAR

```
Report: ESALPAR       Logical Partiti
Monitor initialized: 04/15/11 at 10:
-----------------------------------
Physical CPU Management time
      CPU    Percent Type
      ---    ------- ----
        0      3.838   CP
        1      4.412   CP
        2      3.134   CP
        3      2.222   CP
        4      4.429   CP
        5      3.924   CP
       11      0.132  ZAP
       13      0.068  ZAP
       14      0.311  ZAP
       15      1.070 ZIIP
       17      1.391 ZIIP
       18      0.945 ZIIP
       19      1.298  IFL
       24      0.121  ZAP
       30      3.111   CP
       33      0.408  ZAP
       37      0.293  ZAP
       40      1.903  IFL
       41      1.786  IFL
       42      1.687  IFL
       43      1.161  IFL
       44      1.176  IFL
       45      1.158  IFL
       46      1.178  IFL
```

Look for processor type overhead

- CPs shared between LPARs (13 LPARs)
- TOTAL IFL Busy: 167% out of 1100
- Check overheads – high overhead result of too many vcpu
  - Total CP Utilization 835 / 900 = 93%

```
ESALPARS
Totals by Processor type:
<----------CPU-------> <-Shared Processor busy->
Type Count Ded shared  Total  Logical Ovhd Mgmt
---- ----- --- ------ ------ -------- ---- ----
CP       9   0      9  835.8    779.4 12.5 31.4
ZAP      9   2      7  214.8    208.9  1.5  2.9
IFL     31   0     31 1778.5   1669.4 28.4 52.2
ICF      3   0      3  300.2    292.4  0.2  7.3
ZIIP     6   0      6  328.8    311.5  4.2  9.0
```


VELOCITY SOFTWARE

Consumers within LPAR: ESAUSP2

```
Report: ESAUSP2      User Resource Rate Report                          Velocity Software C
-------------------------------------------------------------------------------------------
         <---CPU time--> <----Main Storage (pages)-----> <------Paging (pages)-----→
UserID   <(Percent)> T:V <Resident> Lock <-----WSS-----> <---Allocated---> <Pgs/Secnd>
/Class    Total  Virt Rat Totl Activ  -ed Totl Activ  Avg Total ExStg  Disk  Read Write
-------- ----- ----- --- ---- ----- ---- ---- ----- ---- ----- ----- ----- ----- -----
08/29/18
20:01:35 196.6 192.8 1.0  37M 36.8M 6065  42M 41.9M 872K   23M     0   23M 454.7 443.1
 ***Key User Analysis ***
TCPIP     0.29  0.14 2.1 1639  1639  671  968 968.0  968  3174     0  3174     0     0
 ***User Class Analysis***
Servers   0.01  0.00 2.2  563 212.0    4  629 211.0   21 14476     0 14476     0     0
Velocity  0.75  0.68 1.1 6491  3705    2 6575  3702  370  9040     0  9040     0     0
*Prod    188.3 185.2 1.0  36M 36.5M 4624  42M 41.6M   2M   22M     0   22M  54.4 395.8
*Util     1.83  1.78 1.0  50K 50484  238  54K 53913  54K  263K     0  263K   0.1   1.6
TheUsrs   5.37  5.07 1.1 235K  235K  526 237K  237K  30K  443K     0  443K 400.3  45.6
 ***Top User Analysis***
L24BP    30.45 30.37 1.0 6.5M 6548K  238 7.1M 7078K   7M 3187K     0 3187K   0.0  46.6
L233P    30.04 29.58 1.0 3.7M 3738K  287 4.5M 4486K   4M 2295K     0 2295K   6.4  18.3
L200P    28.25 28.01 1.0 2.2M 2174K  497 2.6M 2610K   3M 1990K     0 1990K  15.8   3.0
L239P    16.68 16.35 1.0 5.7M 5685K  287 6.8M 6822K   7M 1276K     0 1276K   0.2  57.9
L203P    13.92 13.74 1.0 1.4M 1405K  312 1.6M 1573K   2M  889K     0  889K  11.6   9.2
L20BP    12.91 12.83 1.0 3.1M 3121K  239 3.1M 3146K   3M     1     0     1     0     0
```

Look for consumers, in percent of cpu

- By class (Prod)
- Abusive servers (not really)?
- Correct per expected? Not a performance question

VELOCITY SOFTWARE

Linux Process Load: ESALNXP

```
Report: ESALNXP      LINUX HOST Process Statistics Report          Velocity Software Corporate   ZMAP 4.4.0 08/
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 08/29/18 20:00:35
```

node/ Name	<-Process Ident-> ID	PPID	GRP	Nice Valu	PRTY Valu	<------CPU Percents----> Tot	sys	user	syst	usrt	<---------------Storage Metrics (MB)----------> Size	RSS	Peak	Swap	Data	Stk	EXEC	Lib	Lck	PTbl
L233P	0	0	0	0	0	**29.1**	4.25	21.0	1.08	2.75	3M	559K	3.1M	0.14	7438	94.2	72K	7K	950	1874
init	1	1	1	0	20	2.99	0	0.02	0.55	**2.43**	2	1	2.4	0	0.19	0.1	0.0	2.0	0	0.01
ksoftirq	3	2	0	0	20	0.12	0.12	0	0	0	0	0	0	0	0	0	0	0	0	0
udevd	403	1	403	-4	16	0.13	0.02	0	0.06	0.05	3	1	3.1	0	0.57	0.1	0.1	2.0	0	0.01
timestam	3769	1	2724	0	20	0.26	0.03	0.10	0.08	0.05	4	2	4.3	0	1.23	0.1	0.6	2.2	0	0.01
ohasd.bi	6293	1	6293	0	20	0.27	0.06	0.21	0	0	317	72	381	0	218	0.3	30.8	65	0	0.32
oraroota	7002	1	7002	0	20	0.14	0.03	0.11	0	0	402	57	466	0	323	0.1	10.6	65	0	0.28
oraagent	7065	1	7065	0	20	0.13	0.02	0.11	0	0	268	40	327	0	189	0.2	10.7	65	0	0.22
evmd.bin	7083	1	7083	0	20	0.29	0.03	0.26	0	0	300	30	364	0	221	0.1	1.4	65	0	0.17
gipcd.bi	7126	1	7126	0	20	0.45	0.18	0.27	0	0	239	32	302	0	151	0.1	0.5	65	0	0.16
ocssd.bi	7202	1	7202	0	-100	0.40	0.14	0.26	0	0	286	164	350	0	207	0.1	1.7	65	286	0.34
octssd.b	7638	1	7638	0	20	0.18	0.03	0.14	0	0	236	27	300	0	159	0.1	0.3	65	0	0.15
crsd.bin	7687	1	7687	0	20	0.45	0.06	0.39	0	0	350	74	410	0	241	0.3	30.7	65	0	0.36
oraagent	7743	1	7743	0	20	0.30	0.05	0.19	0.03	0.03	359	56	359	0	280	0.2	10.7	65	0	0.27
oraroota	7752	1	7752	0	20	0.22	0.03	0.19	0	0	321	31	321	0	242	0.1	10.6	65	0	0.18
asm_vktm	8298	1	8298	0	-2	0.13	0.06	0.06	0	0	1348	19	1348	0	3.65	0.1	237	18	0	0.41
asm_dia0	8330	1	8330	0	20	0.13	0.02	0.11	0	0	1363	42	1363	0	18.1	0.2	237	18	0	0.50
oraagent	8997	1	8997	0	20	0.16	0.03	0.13	0	0	249	35	292	0	170	0.2	10.7	65	0	0.20
ora_v																0.1	261	18	0	0.44

Look for processes within Linux, in percent of cpu

- By relevant server (L233P)
- Correct? Relevant? Cron? Init?

VELOCITY SOFTWARE

Top down:

- z/VM
- Virtual machines
- VDISK / MDC / Address Space
- Linux server
- Linux process

CPU Capture ratio 100% down to server

Storage Utilization: ESASTR1

```
Report: ESASTR1      Main Storage Analysis                          Velocity Software Corporate   ESAMAP 4.1.1 01/21/
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655      First record analyzed: 04/15/11 10:00:00
-------------------------------------------------------------------------------------------------------------------
         Users <-----------------------------Pages-------------------------------------------------------------->
         Loggd System  Fixed Non-  Free Frame <Available> Systm  User  NSS/DCSS  <-AddSpace> VDISK <MDC> Diag
Time        On Storage Store Pgble Stor Table <2gb  >2gb  ExSpc Resdnt Resident  Systm User  Rsdnt Rsdnt  98
-------- ----- ------- ----- ----- ---- ----- ----- ----- ----- ------ --------  ----- ----- ----- ----- ----
10:15:00    89  18088K  2252  3691  700  141K    79  1032  4710 17577K     4771   226K     0 26852 81157 1126
10:30:00    89  18088K  2252  3683  700  141K    89  1193  4686 17594K     4769   226K     0 30182 61307 1126
10:45:00    89  18088K  2252  3583  700  141K    78  1050  4681 17614K     4769   225K     0 46189 25812 1126
11:00:00    89  18088K  2252  3455  700  141K    82  1062  4688 17448K     4775   223K     0  237K  1418 1126
```

Total storage analysis (in pages)

- MDC? 300mb? SET MDC MAX/MIN
- VDISK Spike (1gb) ? Which server?
- User resident should be large percent

VELOCITY SOFTWARE

Storage Utilization: ESASTR1

```
Report: ESASTR1      Main Storage Analysis                          Velocity Software Corporate   ZMAP 4.4.0 08/31/18   Pg   4
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 08/29/18 20:00:35
-------------------------------------------------------------------------------------------------------------------------
         Users <-------------------------MegaBytes-------------------------------------------------------> Over
         Loggd System  Fixed Non-  Free Frame <Available> Systm  User  NSS/DCSS  <-AddSpace> VDISK <MDC> Diag Commit    Capt-
Time        On Storage Store Pgble Stor Table <2gb  >2gb  ExSpc Resdnt Resident  Systm User  Rsdnt Rsdnt  98  Ratio     Ratio
-------- ----- ------- ----- ----- ---- ----- ----- ----- ----- ------ --------  ----- ----- ----- ----- ---- -----     -----
08/29/18
20:01:35    48  147456     0   163    4  1152     2   255    43 143720       27   1589     0   395     0   18 1.387     0.998
20:02:35    48  147456     0   163    5  1152     2   256    43 143718       27   1589     0   396     0   18 1.387     0.998
20:03:35    48  147456     0   163    4  1152     2   256    43 143718       27   1589     0   396     0   18 1.387     0.998
```

```
Report: ESASTR1      Main Storage Analysis          Velocity Software Corporate   ZMAP 4.4.0 08/31/18
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 08/29/18
20:00:35
-------------------------------------------------------------------------------------------------------------------------
         Users <-------------------------MegaBytes-------------------------------------------------------->
         Loggd System  Fixed Non-  Free Frame <Available> Systm  User  NSS/DCSS  <-AddSpace> VDISK <MDC>
Time        On Storage Store Pgble Stor Table <2gb  >2gb  ExSpc Resdnt Resident  Systm User  Rsdnt Rsdnt
-------- ----- ------- ----- ----- ---- ----- ----- ----- ----- ------ --------  ----- ----- ----- -----
08/29/18
20:01:35    48  147456     0   163    4  1152     2   255    43 143720       27   1589     0   395     0
20:02:35    48  147456     0   163    5  1152     2   256    43 143718       27   1589     0   396     0
20:03:35    48  147456     0   163    4  1152     2   256    43 143718       27   1589     0   396     0
20:04:35    48  147456     0   163    4  1152     2   259    43 143715       27   1589     0   396     0
20:05:35    48  147456     0   163    4  1152     2   256    43 143718       27   1589     0   396     0
20:06:35    49  147456     0   163    4  1152     2   256    43 143721       27   1589     0   393     0
20:07                                                                             1589     0   393     0
20:08                                                                             1589     0   392     0
20:09                                                                             1589     0   392     0
20:10                                                                             1589     0   392     0
20:11                                                                             1589     0   392     0
```

Total storage analysis (in pages)

- MDC? SET MDC MAX/MIN (ZVPS uses MDC)
- VDISK use? Which server?
- User resident should be large percent

VELOCITY SOFTWARE

Virtual Machine Storage : ESAUSPG

```
Report: ESAUSPG      User Storage Analysis                          Velocity Software Corporate
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655     First record analyzed: 04/1
```

UserID /Class	<---Storage occupancy in pages---> <---Main Storage---> Total	>2gb	<2GB	<--Paging---> Xstor	DASD	<--Main Storage page Writes to:--> Xsto	Disk	Migr	Read/Write--> <Page Reads:> Xstor	Disk	Pages Moved <2GB	<Address <pages R VirtDisk
11:00:00	17448K	16943K	504640	4346K	8891K	1120K	352582	320630	822546	149628	0	**237286**
Top User Analysis												
LNXUWA01	2889K	2798K	90725	65398	258675	10999	112	0	5390	13806	0	0
LNXUWA03	**3848K**	3762K	85186	63975	8378	21875	277	0	221201	6714	0	**223173**
LNXUWA02	685385	648345	37040	296256	84613	36427	2443	0	22943	1983	0	0
LNXQWA01	1246K	1218K	28190	541178	51075	35529	2727	0	14094	2787	0	1428
LNXDWA02	713091	672702	40388	56215	148406	16314	649	0	451	1828	0	0
LNXDWA04	1152K	1120K	31859	592756	96720	13708	63725	63261	1189	942	0	0
LNXDWA03	330601	324021	6581	4194	39207	3926	5601	5345	120	734	0	8
LNXTWA04	883228	860363	22865	90734	129722	7768	31	0	182	66	0	1889
LNXUWA15	693689	664995	28694	53516	137150	10556	1382	0	553	457	0	0

Total storage analysis (in pages, or now default “megabyte” option)

- Largest consumer(s) resident storage
- Largest consumer - which virtual disk?
- VDISK Spike (1gb) ? Which server?

VELOCITY SOFTWARE

Virtual Machine Storage : ESAUSPG

```
Report: ESAUSPG      User Storage Analysis                          Velocity Software Corporate   ZMAP 4.4.0 08
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 08/29/18 20:00:35
```

UserID /Class	<-Storage Occupancy in MegaBytes-> <---Main Storage---> Total	>2gb	<2GB	<--Paging---> Xstor	DASD	<--Main Storage page Read/Write--> <-Page Writes to:--> Xsto	Disk	Migr	<Page Reads:> Xstor	Disk	Pages Moved <2GB	Page Faults	<Address Spaces- <MegaB Resident> VirtDisk	AddSpce
08/29/18														
20:01:35	143720	141862	1857	0	88145	0	26584	0	0	27283	0	41610	395	0
***Key User Analysis ***														
TCPIP	6	6	0	0	12	0	0	0	0	0	0	252	0	0
User Class Analysis														
Servers	2	2	0	0	57	0	0	0	0	0	0	348	0	0
Velocity	25	25	1	0	35	0	0	0	0	0	0	3191	0	0
*Prod	142570	140729	1841	0	85284	0	23749	0	0	3261	0	14196	395	0
*Util	197	195	3	0	1027	0	97	0	0	4	0	846	0	0
TheUsrs	919	906	12	0	1730	0	2738	0	0	24018	0	22777	0	0
Top User Analysis														
L24BP	25578	25247	331	0	12451	0	2798	0	0	1	0	96	1	0
L233P	14602	14413	189	0	8964	0	1097	0	0	383	0	436	0	0
L200P	8491	8382	110	0	7773	0	179	0	0	948	0	2527	0	0

Total storage analysis (in pages, new “megabyte” option)

- Largest consumer(s) resident storage
- Largest consumer - which virtual disk?
- VDISK Spike (1gb) ? Which server?

VELOCITY SOFTWARE

Virtual Machine Storage : ESAUSPG

UserID /Class	<Storage Occupancy in MegaBytes-> <---Main Storage---> Total	>2gb	<2GB	<--Paging---> Xstor	DASD	<--Main Storage page Read/Write--> <-Page Writes to:--> Xsto	Disk	Migr	<Page Reads:> Xstor	Disk	Pages Moved <2GB	Page Faults	<Address Spaces- <MegaB Resident> VirtDisk	AddSpce
**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
						User Summary								
L24BP	25552	25222	330	0	12473	0	11364	0	0	1563	0	1247	1	0
L233P	14568	14380	188	0	8977	0	5845	0	0	1028	0	8267	0	0
L20BP	12266	12110	157	0	0	0	0	0	0	0	0	34054	5	0
L203P	5493	5422	71	0	3468	0	2606	0	0	4670	0	13644	11	0
L23BP	5476	5405	71	0	3485	0	1347	0	0	7885	0	19404	38	0
L200P	8504	8394	110	0	7773	0	1904	0	0	6203	0	17463	0	0
L239P	22283	21995	288	0	5013	0	13806	0	0	4079	0	23939	0	0
L244P	9876	9749	128	0	9853	0	10761	0	0	1526	0	2976	0	0
L20DP	6888	6799	89	0	4310	0	12507	0	0	753	0	7263	0	0
L208P	5687	5614	74	0	2807	0	1094	0	0	1421	0	9855	0	0
L215P	7609	7511	98	0	3799	0	2218	0	0	435	0	14899	11	0
L224P	7199	7105	94	0	9272	0	10286	0	0	10981	0	2699	0	0
L24FP	1988	1962	26	0	518	0	3	0	0	160	0	7482	**324**	0

Total storage analysis (in pages, new “megabyte” option)

- Largest consumer(s) resident storage
- Largest consumer - which virtual disk?
- VDISK Spike (1gb) ? Which server?

VELOCITY SOFTWARE

VDISK for Swap: ESAVDSK

```
Report: ESAVDSK      VDISK Analysis Report                          Velocity Software Corporate
-------------------------------------------------------------------------------------------------
                                  -----<--Size--->  <AddSpce>  Priv   VIO       <--pages---------
                                  AddSpc VDSK Cre-  Del-   or   rate  User  Resi-  Lock-   Sto- DASD
Owner    Space Name               Pages  Blks ates  etes  Shrd /sec  Links  dent     ed    len Read
-------- ------------------------ ----- ----- ---- ----  ---- ----- ----- -----  -----  ----- ----
10:45:00
LNXQWA01 VDISK$LNXQWA01$0206$0530 64256  512K    0     0 Shrd 0.00     1  122      0    0.7  0.0
LNXQWA01 VDISK$LNXQWA01$0207$0531 64256  512K    0     0 Shrd 0.04     1 2565      0    3.5  0.2
LNXTWA04 VDISK$LNXTWA04$0206$051C  131K 1049K    0     0 Shrd 1.28     1  11K      0      0  0.0
LNXUWA03 VDISK$LNXUWA03$0206$051E  250K 2002K    0     0 Shrd 0.65     1  14K      0    1.6  6.7
LNXUWA03 VDISK$LNXUWA03$0207$051F  375K 3002K    0     0 Shrd 0.29     1 4980      0    0.4  0.7
LNXUWA03 VDISK$LNXUWA03$0208$0520  513K 4102K    0     0 Shrd 0.28     1 4751      0    0.4  0.4
-------- ------------------------ ----- ----- ---- ----  ---- ----- ----- -----  -----  ----- ----
System Totals:                    7805K  125M    0     0    . 5.09   204  46K      0    7.3  8.1
-------------------------------------------------------------------------------------------------
11:00:00
LNXQWA01 VDISK$LNXQWA01$0206$0530 64256  512K    0     0 Shrd    0     1 46.9     0    0.1    0
LNXQWA01 VDISK$LNXQWA01$0207$0531 64256  512K    0     0 Shrd    0     1 1381     0    0.3    0
LNXTWA04 VDISK$LNXTWA04$0206$051C  131K 1049K    0     0 Shrd    0     1 3984     0   11.7    0
LNXUWA03 VDISK$LNXUWA03$0206$051E  250K 2002K    0     0 Shrd 10.1     1  46K     0   12.9 58.4
LNXUWA03 VDISK$LNXUWA03$0207$051F  375K 3002K    0     0 Shrd 16.2     1  88K     0    6.1 19.7
LNXUWA03 VDISK$LNXUWA03$0208$0520  513K 4102K    0     0 Shrd 16.1     1  88K     0    5.8 20.2

                                  ----- ----- ---- ----  ---- ----- ----- -----  -----  ----- ----
System Totals:                    7805K  125M    0     0    . 84.6   204 237K     0   37.2 98.3
```

Virtual Disk Analysis

- Which virtual disk spiked?
- Are there multiple vdisks, and PRIORITIZED!!!

VELOCITY SOFTWARE

VDISK for Swap: ESAVDSK

```
Report: ESAVDSK      VDISK Analysis Report                          Velocity Softwar
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record ana
-------------------------------------------------------------------------------
Maximum VDISK:     Blocks  (MB)
 System storage:   --No Limit--
 Storage per user: --No Limit--
                                <--Size---> <AddSpce> Priv  VIO       <--pages-->
                                AddSpc VDSK Cre- Del-  or  rate  User Resi- Lock-
Owner    Space Name             Pages  Blks ates etes Shrd /sec Links  dent    ed
-------- ---------------------- ----- ----- ---- ---- ---- ---- ----- ----- -----
08/29/18
20:01:35
L23BP    VDISK$L23BP$$$$0160$00BB  128K 1024K    0    0 Priv 0.32     1 9903      0
L24FP    VDISK$L24FP$$$$0160$0036  128K 1024K    0    0 Priv 5.57     1  83K      0
                                ----- ----- ---- ---- ---- ---- ----- ----- -----
System Totals:                  2334K   37M    0    0    . 16.0    38 101K       0
-------------------------------------------------------------------------------
```

Virtual Disk Analysis

- Which server is using vdisk?
- Are there multiple vdisks, and PRIORITIZED!!!

Linux Storage: ESAUCD2

Report: ESAUCD2 LINUX UCD Memory Analysis Report Velocity Softwar

Node/	<-Storage Sizes (in MegaBytes)->											
Time/	<--Real Storage-->			<-----SWAP Storage---->			Total	<----Storage in Use----->				
Date	Total	Avail	Used	Total	Avail	Used	MIN	Avail	CMM	Buffer	Cache	Ovrhd
*** Nodes *******												
LINUXVM2	495.2	7.2	488.1	63.5	63.5	0.0	15.6	70.7	0	63.9	283.2	141.0
LNXDPB02	493.0	52.5	440.5	0	0	0	15.6	52.5	0	89.6	278.8	72.1
V2TPSP01	1992.8	28.7	1964	269.5	84.9	**184.6**	16.4	113.6	0	**218.3**	669.7	1076
V2TPSP06	1895.4	**757.1**	1138	256.3	256.3	0	15.6	1013	0	**126.9**	901.2	110.2
V2TPSP04	1895.5	756.9	1139	256.3	256.3	0	15.6	1013	0	127.0	901.1	110.4
V2TPSP05	1895.5	756.8	1139	256.3	256.3	0	15.6	1013	0	126.6	901.3	110.8
V2TPSP03	1895.4	723.4	1172	256.3	201.8	54.5	15.6	925.2	0	109.0	655.7	407.2
V2TMSP04	1501.1	8.3	1493	256.3	256.3	0.0	15.6	264.7	0	82.0	599.3	811.5
V2TMSP05	1501.1	121.7	1379	256.3	256.3	0.0	15.6	378.0	0	84.0	269.2	1026
V2TMSP02	1501.1	65.3	1436	256.3	256.3	0.0	15.6	321.6	0	105.9	599.5	730.3
V2TMSP03	1501.1	64.2	1437	256.3	256.3	0.0	15.6	320.5	0	80.4	270.3	1086

Linux Storage Map

- Opportunities?
  - High available (greater than 5%)
  - High buffer (greater than 20mb)
- Issues? Swap
- If swap used, but also large buffer, CMM?

Linux Storage: ESAUCD2

```
Report: ESAUCD2      LINUX UCD Memory Analysis Report                Velocity Software Corpor
-------------------------------------------------------------------------------------------
Node/    <-------------------------Storage Sizes (in MegaBytes)-------------------------->
Time/    <--Real Storage--> <-----SWAP Storage----> Total <-------Storage in Use--------->
Date     Total  Avail Used  Total Avail Used  MIN   Avail CMM    Buffer Cache Ovrhd Shared
-------- ------ ----- ----- ----- ----- ----- ----- ----- ------ ------ ----- ----- ------
20:01:35
***Node Groups***
*Prod    179728  9206  167K  150K  147K  2314 281.3  156K      0 4769.9  129K 33148      0
*Util     15871 15055 815.9 18828 18828     0  15.6 33883      0  111.9 411.9 292.1      0
TheUsrs  2005.3   6.7  1999  1173  1173     0  15.6  1180      0  282.7  1347 369.2      0
*** Nodes *******
L200P     10064  53.3 10010  1669  1669     0  15.6  1723      0   15.7  6693  3301      0
L203P    6036.0 103.7  5932  1669  1523 145.9  15.6  1627      0   72.1  3944  1916      0
L210P    4022.1  26.9  3995  2843  2525 317.7  15.6  2552      0   96.5  2737  1161      0
L215P    8055.9 488.8  7567  1669  1501 168.1  15.6  1990      0   73.5  5999  1495      0
L23AC    2005.3   6.7  1999  1173  1173     0  15.6  1180      0  282.7  1347 369.2      0
L23BP    6036.0  37.2  5999  2843  2656 186.5  15.6  2693      0    9.8  4825  1164      0
L233P     18119 548.7 17571 35611 35495 116.3  15.6 36043      0  352.0 11915  5304      0
l239p     31753  6101 25653 35611 35611     0  15.6 41711      0  532.8 21944  3176      0
L24BP     27209 289.6 26919  2843  2795  48.1  15.6  3084      0  614.5 23608  2696      0
L24FP    2005.3   8.4  1997  2843  2067 775.4  15.6  2076      0    9.2  1350 637.8      0
```

Linux Storage Map

- Opportunities?
  - High available (greater than 5%)
  - High buffer (greater than 20mb)
- Issues? Swap
- Swap used vs available….

Top down:

- z/VM
- Configuration
- Rates
- Space full
- Device busy

Paging rules change in 6.3

Paging Subsystem: ESAPSDV

```
Report: ESAPSDV      Page And Spool Device Activity                  Veloc
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7      First
-------------------------------------------------------------------------
            <----Paging/Spooling--------->       </Sec><Device->
 Dev        <------Slots-------> <per sec>        SSCH Serv Resp %Alloc
 No. Serial Avail Used %Use  Max Read Writ Queue +RSCH Time Time Select
---- ------ ----- ---- ---- ---- ---- ---- ----- ----- ---- ---- ------
08/29/18
20:01:35
Page Devices
2A9A LV1P0A 1803K 547K   30 547K 10.0  8.3     0   4.9  1.3  1.3  100.0
2AD6 LV1P0B 1803K 551K   31 551K  9.0  8.6     0   4.5  1.3  1.3  100.0
2A23 LV1P0C 1803K 549K   30 549K 11.9  8.9     0   5.8  1.0  1.0  100.0
2A5D LV1P0D 1803K 551K   31 551K 11.4 17.2     0   7.6  0.4  0.4  100.0
2A9B LV1P0E 1803K 549K   30 549K 10.8  8.4     0   5.9  1.7  1.7  100.0
...
2A21 LV1P05 1803K 551K   31 551K 12.0  8.7     0   5.9  0.6  0.6  100.0
2A9F LV1P29 1803K 547K   30 547K 15.4 17.4     0   9.7  0.3  0.3  100.0
            ----- ---- ---- ---- ---- ---- ----- ----- ---- ---- ------
Total Page    78M  24M   31  24M  473  458
Spool Devices
            ----- ---- ---- ---- ---- ---- ----- ----- ---- ---- ------
Total Spl   1803K 986K   55 986K    0    0     0 268.9  395  395  100.0
```

Paging Configuration:

- How many devices (11)
- Equal sizes?
- How full? (70% target?)
- Rates reasonable? Device type dependent

Page Device Busy: ESADSD2

```
Report: ESADSD2      DASD Performance Analysis                      Velocity Software Corporate
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7     First record analyzed: 08/2
-------------------------------------------------------------------------------------------------
                                                          <--------DASD Response times (ms)------>
 Dev         Device <--SSCH--> <%DevBusy> <SSCH/sec->          <--Service times--> <--Queueing->
 No. Serial  Type   Total  ERP  Avg  Peak   avg  peak  Resp  Serv Pend Disc Conn DASD Cntl THR
---- ------ ------ ------ ---  ---- ---- ----- ----- -----  ---- ---- ---- ---- ---- ---- ---

08/29/18
20:01:35
***Top DASD by Device busy***
2A8C LV1P22 3390-9    392   0   1.6  1.6   6.6   6.6   2.5   2.5  0.1  2.2  0.2    0    0   0
2A9D LV1P16 3390-9    434   0   1.6  1.6   7.4   7.4   2.1   2.1  0.1  2.0  0.1    0    0   0
2A89 LV1P19 3390-9    387   0   1.5  1.5   6.6   6.6   2.3   2.3  0.1  2.1  0.1    0    0   0
2ADA LV1P2A 3390-9    298   0   1.5  1.5   5.1   5.1   3.0   3.0  0.1  2.7  0.2    0    0   0
2AC4 LV1P1A 3390-9    343   0   1.4  1.4   5.8   5.8   2.4   2.4  0.1  2.2  0.1    0    0   0
```

Page Device Analysis – DASD Subsystem

- Page Devices are usually in “top ten DASD”
- Device busy > 20% cause for concern
- Device busy > 50% serious
- Minute by minute analysis would show 30% “Peak”

VELOCITY SOFTWARE

Paging Subsystem: ESAPSDV (B)

```
Report: ESAPSDV      Page And Spool Device Activity
Monitor initialized: 04/25/22 at 00:00:00 on 8561 serial 111108
------------------------------------------------------------------------
            <----Paging/Spooling--------->       </Sec><Device->
 Dev        <------Slots-------> <per sec>        SSCH Serv Resp
 No. Serial Avail Used %Use  Max Read Writ Queue +RSCH Time Time
---- ------ ----- ---- ---- ---- ---- ---- ----- ----- ---- ----
04/25/22
00:15:00
*****************************************Summary********
Average:
Page Devices
5D16 V51P0A   12M    0    0    0    0    0     0   0.0    0    0
5D17 V51P0B   12M    0    0
5D18 V51P0C   12M    0    0
5E95 V51P00 5897K    0    0
5EA1 V51P01 5897K    0    0
...
5C03 V51P07   12M    0    0
5D14 V51P08   12M    0    0
5D15 V51P09   12M    0    0
            ----- ---- ---- --
Total Page   130M    0    0
Spool Devices
5E97 V51D00 5897K   6M  100
5A46 V51D01   12M  10M   88
5A47 V51D02   12M    0    0
..
5A4D V51D08   12M    0    0    0    0    0     0   0.0    0    0
5F9B V51S01 5897K 113K    2 114K  0.0  0.1     0   0.8  0.1  0.1
            ----- ---- ---- ---- ---- ---- ----- ----- ---- ----
Total Spl    106M  16M   15  16M  0.0  0.1     0   1.5  0.0  0.0
```

Paging Configuration:

- How many page devices (13)
- Equal sizes?
- How full? (70% target?)
- Rates reasonable? Device type dependent

Spooling Configuration (10 spool devices

VELOCITY SOFTWARE

Paging Subsystem: ESAPSDV (B)

```
Report: ESAPSDV      Page And Spool Device Activity                    SOMEg
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 111108        First
-------------------------------------------------------------------------------
            <----Paging/Spooling--------->       </Sec><Device->
 Dev        <------Slots-------> <per sec>        SSCH Serv Resp %Alloc
 No. Serial Avail Used %Use  Max Read Writ Queue +RSCH Time Time Select
---- ------ ----- ---- ---- ---- ---- ---- ----- ----- ---- ---- ------
15:00:00
Page Devices
5D16 V51P0A   12M 442K    4 698K  351  968  17.3  23.0  0.0  0.6  100.0
5D17 V51P0B   12M 444K    4 699K  352  970  32.3  22.9  0.1  1.1  100.0
5D18 V51P0C   12M 442K    4 700K  355  974   4.3  22.7  0.0  0.0  100.0
5E95 V51P00 5897K 440K    7 694K  358  971   4.3  23.7  0.0  0.0  100.0
5EA1 V51P01 5897K 442K    7 696K  357  971  27.1  25.0  0.0  0.9  100.0
5F90 V51P02 5897K 443K    8 700K  350  966  24.5  23.4  0.0  0.4  100.0
5F91 V51P03 5897K 441K    7 697K  350  966  60.3  23.6  0.1  0.4  100.0
5C00 V51P04   12M 442K    4 698K  349  965  24.9  23.6  0.0  0.4  100.0
5C01 V51P05   12M 444K    4 701K  351  970     0  24.2  0.0  0.0  100.0
5C02 V51P06   12M 443K    4 700K  355  972     0  22.8  0.1  0.1  100.0
5C03 V51P07   12M 440K    4 696K  348  963  34.1  23.5  0.1  6.6  100.0
5D14 V51P08   12M 441K    4 697K  349  963  33.8  23.3  0.1  0.1  100.0
5D15 V51P09   12M 442K    4 699K  352  970  35.9  22.9  0.1  0.1  100.0
            ----- ---- ---- ---- ---- ---- ----- ----- ---- ---- ------
Total Page   130M   6M    4   9M 4577  13K
```

Paging Configuration:

- How many page devices (13)
- Equal sizes?
- How full? (70% target?)
- High queuing, 20 I/O per second (AVG)
- Response time “looks ok”? (avg per page)

Paging Subsystem: ESADSD2 (B)

```
Report: ESADSD2      DASD Performance Analysis                        SOMEgroup -
Monitor initialized: 04/25/22 at 14:00:00 on 8561 serial 111108       First record
-------------------------------------------------------------------------------
<--------DASD Response tim
 Dev          Device <--SSCH--> <%DevBusy> <SSCH/sec->          <--Service times-->
 No. Serial   Type    Total  ERP  Avg  Peak   avg  peak  Resp  Serv Pend Disc Conn
---- ------ ------ ------ ---  ---- ---- ----- ----- -----  ---- ---- ---- ----
15:00:00
***Top DASD by Device busy***
5D17 V51P0B 3390-9  20635   0    5.6  9.7  22.9  39.5   4.5   2.4  0.1  0.6  1.8
5D15 V51P09 3390-9  20630   0    5.5  9.6  22.9  39.0   4.5   2.4  0.1  0.6  1.7
5C02 V51P06 3390-9  20499   0    5.2  8.9  22.8  38.6   5.7   2.3  0.1  0.6  1.6
5D18 V51P0C 3390-9  20447   0    5.0  8.6  22.7  37.6   4.7   2.2  0.1  0.6  1.5
5D16 V51P0A 3390-9  20734   0    5.0  8.3  23.0  39.3   3.7   2.2  0.1  0.5  1.5
5D14 V51P08 3390-9  21009   0    5.0  8.6  23.3  42.7   5.1   2.1  0.1  0.5  1.5
5C01 V51P05 3390-9  21829   0    4.9  8.2  24.3  43.5   4.4   2.0  0.1  0.5  1.4
5C03 V51P07 3390-9  21150   0    4.9  8.5  23.5  41.5   4.5   2.1  0.1  0.5  1.4
5C00 V51P04 3390-9  21269   0    4.7  7.9  23.6  42.2   3.0   2.0  0.1  0.5  1.4
```

DASD Rates, Performance ESADSD2

- average service/response time
- Pend, disconnect low -> Else dasd cache
- Connect low -> Else faster channels
- Disconnect, get solid state
- Response = service, else queueing
- Peak busy for device (1 minute peak)
- Service time of 2.4 is high by today's standards

Paging Subsystem: ESADSD2 (B)

Dev No.	Serial	Device Type	<--SSCH--> Total	ERP	<%DevBusy> Avg	Peak	<SSCH/sec-> avg	peak	<-PAV/HiperPAV> <-Rate/Second-> Q-d	SSCH	Alias
Top DASD by Device busy											
5D17	V51P0B	3390-9	20635	0	5.6	9.7	22.9	39.5	0	0	0
5D15	V51P09	3390-9	20630	0	5.5	9.6	22.9	39.0	0	0	0
5C02	V51P06	3390-9	20499	0	5.2	8.9	22.8	38.6	0	0	0
5D18	V51P0C	3390-9	20447	0	5.0	8.6	22.7	37.6	0	0	0
5D16	V51P0A	3390-9	20734	0	5.0	8.3	23.0	39.3	0	0	0
5D14	V51P08	3390-9	21009	0	5.0	8.6	23.3	42.7	0	0	0
5C01	V51P05	3390-9	21829	0	4.9	8.2	24.3	43.5	0	0	0
5C03	V51P07	3390-9	21150	0	4.9	8.5	23.5	41.5	0	0	0

Paging I/O Response times (ESADSD2)

- Service time of 2.4 is high by today's standards
- Disconnect time high
- **Why is there a queue? (hiperpav?) – NOT ON!**

Paging Analysis: ESABLKP (B)

```
Report: ESABLKP      Block Paging Analysis              SOMEgroup - VLXPM
Monitor initialized: 04/25/22 at 14:00:00 on 8561 s     First record anal
-------------------------------------------------------------------------
          <----Load---->  Serv  <-Block->  <-Blocks  Block  <--Block Exce
          <-Users-> Tran  Time  <-Reads->  <-Steal-> Fault  <Single Read>
Time      Actv In Q /sec  (ms)  /sec Size  /sec Size  /sec    User System
-------- ---- ---- ----  ----  ---- ----  ---- ---- -----  ------ ------
14:15:00   45  190  2.3     .     0    0     0    0     0       0    0.0
14:30:00   45  195  2.3     .     0    0     0    0     0       0    0.0
14:45:00   45  188  2.3   0.0   4.4 18.7  64.5 26.9   4.4     0.1    0.2
15:00:00   45  189  2.3   1.2 123.8 18.9 391.3 27.8 123.8    73.3    7.7
15:15:00   46  179  2.4   3.0 148.2 18.7 434.4 27.5 148.2   207.3   18.5
15:30:00   45  194  2.3   2.6  99.3 18.3 111.7 30.0  99.3   173.4   11.2
15:45:00   47  193  2.4   3.3 128.7 17.6 329.3 28.7 128.7   185.4   41.2
16:00:00   48  191  2.2   4.1  59.9 19.1  53.6 31.3  59.9    78.3    7.5
```

Block Paging Analysis

- Block page read – optimal 10 pages
- Service time is from scheduler, time to “read page”
- Pages stolen, unreferenced – Storage stress
- Single page read – goes up with 6.3
- As space fills, block size drops.

Top down:

- Configuration
- DASD I/O for system
- Rates by control unit
- Rates by device
- Rates by minidisk (by user)
- Cache

DASD Configuration: ESADSD1

Report: ESADSD1 DASD Configuration Velocity Software Corporate

Dev No.	Sys ID	Serial	Device Type	SHR	<CHPIDS OnLn> 01	02	03	04	MDisk Links	<----Extent----> Type	Start	Size	<--MDC St Elig	Def
E92F	1B89	V2PAG1	3390-9	NO	**7A**	**7B**	**78**	**79**	0	Page	1	10K	Yes	On
E930	1B8A	V2PAG3	3390-9	NO	7A	7B	78	79	**0**	Page	1	10K	Yes	On
E931	1B8B	540RES	3390-9	NO	7A	7B	78	79	0	.	.	.	No	On
E933	1B8D	V2PAG5	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E934	1B8E	V2PAG6	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E935	1B8F	V2PAG7	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E936	1B90	V4SPL2	3390-9	NO	7A	7B	78	79	0	.	.	.	No	On
E937	1B91	V2PAG8	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E938	1B92	V2PA10	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E939	1B93	VME939	3390-9	NO	7A	7B	78	79	0	.	.	.	No	On
E93B	1B95	V2PA11	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E93C	1B96	V2PAG9	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E93E	1B98	VME93E	3390-9	NO	7A	7B	78	79	0	.	.	.	No	On
E93F	1B99	V2PAG2	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E940	1B9A	V2PAG4	3390-9	NO	7A	7B	78	79	0	Page	1	10K	Yes	On
E958	1BB2	V2U011	3390-9	NO	7A	7B	78	79	113	.	.	.	**Yes**	On
E959	1BB3	V2U013	3390-9	NO	7A	7B	78	79	15	.	.	.	Yes	On
E95A	1BB4	V2U015	3390-9	NO	7A	7B	78	79	39	.	.	.	Yes	On
E95B	1BB5	V2U017	3390-9	NO	7A	7B	78	79	29	.	.	.	Yes	On

DASD Configuration

- Multi channels to devices
- No minidisks on page devices
- MDC enabled appropriately

DASD Configuration: ESADSD1

```
Report: ESADSD1      DASD Configuration                              Velocity Software Corporate   ZMAP 4.4.0 08/31
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 08/29/18 20:00:35
Monitor period:         3600 seconds (   1:00:00)                  Last record:           08/29/18 21:00:35
-------------------------------------------------------------------------------------------------------------------
 Dev Sys          Device    <CHPIDS OnLn><-Cntrl Unit-> UserID   MDisk Cyl/Blk <----Extent----> <MDC Status>  STG
 No. ID   Serial Type   SHR 01 02 03 04 OBR/CU Model   (if ded) Links   Count Type  Start Size Elig Now Shr   ID
---- ---- ------ ------ --- -- -- -- -- ------ ------- -------- ----- ------- ----- ----- ---- ---- --- --- --- -
----
2A20 17A9 LV1P00 3390-9 NO  58 53 40 55  3C/00 2107                0   10017 Page      1  10K  Yes  On  No 2A00
                           42 39 4C 43
2A21 17AA LV1P05 3390-9 NO  58 53 40 55  3C/00 2107                0   10017 Page      1  10K  Yes  On  No 2A00
                           42 39 4C 43
```

DASD Configuration

- Multi channels to devices
- No minidisks on page devices
- MDC enabled appropriately

Control Unit Data Rates: ESADSD2

```
Report: ESADSD2      DASD Performance Analysis                        Velocity Sof
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655        First record
-------------------------------------------------------------------------------
                                                      <--------DASD Response tim
 Dev         Device <--SSCH--> <%DevBusy> <SSCH/sec->          <--Service times-->
 No. Serial  Type   Total  ERP  Avg  Peak   avg  peak  Resp   Serv Pend Disc Conn
---- ------ ------ ------ ---  ---- ---- ----- ----- -----   ---- ---- ---- ----
11:00:00

1800 Control Unit    3000   0   0.0  0.0   3.4   3.4   0.3    0.3  0.3    0  0.0

1880 Control Unit    3000   0   0.0  0.0   3.4   3.4   0.3    0.3  0.2    0  0.0

E900 Control Unit  186192   0   0.7  1.8 210.4 530.4   3.9    3.8  0.3  0.4  3.1

E980 Control Unit    1500   0   0.0  0.0   1.7   1.7   0.4    0.4  0.4    0  0.1

EA00 Control Unit   42722   0   0.1  0.5  48.3  93.2   2.1    2.1  0.3  0.2  1.5

EA80 Control Unit    1500   0   0.0  0.0   1.7   1.7   0.4    0.4  0.3    0  0.1
                   ------ ---  ---- ---- ----- ----- -----   ---- ---- ---- ----
System:            237914   0   0.2  0.5 268.8 633.7   3.4    3.4  0.3  0.3  2.7
```

DASD Control Units Rates, Performance ESADSD2

- By control unit shows where activity is
- Pend, indication of cache problems
- Compare control units to determine normality

Data Rates, Device Performance: ESADSD2

```
Report: ESADSD2      DASD Performance Analysis                         Velocity Sof
--------------------------------------------------------------------------------
                                                        <--------DASD Response tim
 Dev         Device <--SSCH--> <%DevBusy> <SSCH/sec->          <--Service times-->
 No. Serial Type   Total  ERP   Avg  Peak   avg  peak  Resp    Serv Pend Disc Conn
---- ------ ------ ------ ---  ---- ---- ----- ----- -----    ---- ---- ---- ----
11:00:00
***Top DASD by Device busy***
E95C V2U019 3390-9  23344   0  10.6 44.6  26.4 116.6   4.8     4.0  0.3  1.4  2.2
E930 V2PAG3 3390-9   9170   0   6.2 19.5  10.4  29.3   5.9     5.9  0.3  0.0  5.6
E93F V2PAG2 3390-9   9759   0   5.9 15.8  11.0  31.7   5.3     5.3  0.3  0.0  5.0
E93C V2PAG9 3390-9   8101   0   5.8 17.1   9.2  29.3   6.3     6.3  0.3  0.0  6.0

***End Top DASD by Device busy***
1880 Control Unit    3000   0   0.0  0.0   3.4   3.4   0.3     0.3  0.2    0  0.0
E900 Control Unit  186192   0   0.7  1.8 210.4 530.4   3.9     3.8  0.3  0.4  3.1
E980 Control Unit    1500   0   0.0  0.0   1.7   1.7   0.4     0.4  0.4    0  0.1
EA00 Control Unit   42722   0   0.1  0.5  48.3  93.2   2.1     2.1  0.3  0.2  1.5
                   ------ ---  ---- ---- ----- ----- -----    ---- ---- ---- ----
System:            237914   0   0.2  0.5 268.8 633.7   3.4     3.4  0.3  0.3  2.7
```

DASD Rates, Performance ESADSD2

- System: rate, average service/response time
- Pend, disconnect low -> Else dasd cache
- Connect low -> Else faster channels
- Response = service, else queueing
- Peak busy for device (1 minute peak)

VELOCITY SOFTWARE

V2: DASD Cache: ESADSD5

```
Report: ESADSD5      3990-3 Cache Analysis                          Velocity Software Corporate   ZM
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 08/29/18
-------------------------------------------------------------------------------------------------
             Pct. <-------------------per second------------------> <--------Write activity per se
 Dev         Actv <------Total-------> <----Read----> <--Seq Read--> Total  DFW  DFW SEQ        NVS
 No.  Serial Samp  I/O Hits Hit% Read%  I/O Hits Hit%  I/O Hits Hit%   I/O  I/O Hits  I/O Hit% Full
---- ------ ---- ---- ---- ---- ----- ---- ---- ---- ---- ---- ---- ----- ---- ---- ---- ---- ----
08/29/18
20:01:35
***Top DASD by Device busy***
2A8C  LV1P22  100  9.0  5.3 58.7  88.6  8.0  4.3 53.3    0    0    0   1.0  1.0  1.0  0.2  100    0
2A9D  LV1P16  100  8.7  4.6 52.1  95.4  8.3  4.2 49.8    0    0    0   0.4  0.4  0.4  0.1  100    0
2A89  LV1P19  100  8.1  4.1 50.1  91.0  7.4  3.3 45.1    0    0    0   0.7  0.7  0.7  0.1  100    0
***End Top DASD by Device busy***

---- ------ ---- ---- ---- ---- ----- ---- ---- ---- ---- ---- ---- ----- ---- ---- ---- ---- ----
2200 CtlUnit  100 17.5 14.6 83.7  49.0  5.3  2.7 51.1  3.3  3.0 91.5   8.9  8.9  8.9  2.8  100    0

2479  L20804  100  4.9  3.3 67.5  92.2  2.6  1.1 44.2  2.0  1.8 91.5   0.4  0.4  0.4  0.0  100    0
---- ------ ---- ---- ---- ---- ----- ---- ---- ---- ---- ---- ---- ----- ---- ---- ---- ---- ----
2400 CtlUnit  100 19.8 16.5 83.4  65.8  9.7  6.7 68.8  3.3  3.0 92.3   6.8  6.8  6.8  2.3  100    0
```

DASD Cache: ESADSD5

- Hit percent (read, write)
- Low hit% -> need more cache or batch (backups)
- NVS full -> fast write stops
- Data shows activity from all lpars to device/ctl unit

VELOCITY SOFTWARE

Data activity by user: ESASEEK, ESAUSEK

```
Report: ESAUSEK      User DASD Seeks Report                              Velocity
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655           First re
Monitor period:         3600 seconds (   1:00:00)                        Last rec
-------------------------------------------------------------------------------
 Userid    Dev Volume <--Minidisk-> <Cylinder-> Total <---Non-zero---> Read
 /Time     No. Serial Ownerid  Addr Start Stop  Seeks Seeks Pct. Dist. Pct.
--------  ---- ------ -------- ---- ----- ----- ----- ----- ---- ----- ----
**********************************************Summary*********************
Average:
LNXUWA01  E95C V2U019 LNXUWA01 0233 40591 40722  2389  1699 71.1  9685    0
          EA59 V2U016 LNXUWA01 0210     1 16698 14762  9854 66.8  2220    0
          E903 V2U034 LNXUWA01 021F 15207 32689  7542  4394 58.3  1578 16.6
          E903 V2U034 LNXUWA01 0220 32986 33350    63    63  100 10459    0
          E95A V2U015 LNXUWA01 0209     1 12084 10345  4849 46.9  4981 28.4
          E95A V2U015 LNXUWA01 020A 12085 19617  2608  2024 77.6  8521    0
          E95A V2U015 LNXUWA01 020F 52329 53478    24    16 66.7 33363    0
          E926 V2U041 LNXUWA01 0232  6062  7598  2239  1544 69.0  4294    0
          E95B V2U017 LNXUWA01 021E 26231 28597    42    36 85.7 10207    0
          E95E V2U023 LNXUWA01 0204 63268 63850   675   327 48.4 21376    0
          EA58 V2U014 LNXUWA01 0205  3029  3033     3     2 66.7 31999    0
```

DASD activity by virtual machine: ESAUSEK

DASD activity by minidisk/volume: ESASEEK

- Correlate activity to poor performing disks
- Note read percent for Linux minidisks

VELOCITY SOFTWARE

Network Activity

- Configuration
- Rates
- Errors
- Vswitch/guest lan

Network Configuration: ESATCPI

```
Report: ESATCPI      TCPIP Interface Configuration Report          Velocity Sof
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655     First record
Monitor period:         3600 seconds (   1:00:00)                  Last record:
-------------------------------------------------------------------------------
NODE      Idx       Speed <-Status-> Up   <-------------------Interface---------
          Nbr MTU   (Est) Oper Admin Time MACAddress        Description Type
--------  --- ----- ----- ---- ----- ---- ----------------- ----------- --------

**********************************************Summary**********************
Average:
TCPIP       1  1500 1000M    .     .    .                   . ETHERNET viETHERNET-
VMLOCAL     1  1500 1000M   UP    UP    0 00:20:20:20:20:20 ETHERNET viETHERNET-
LINUXVM2    2  1500  100M   UP    UP    0 02:00:00:00:00:30 eth0        ETHERNET-
LNXDPB02    3  1492  100M   UP    UP    0 02:00:00:00:00:04 eth0        ETHERNET-
V2TPSP01    1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software
            2  1500  100M   UP    UP    0 02:00:00:00:00:15 eth0        ETHERNET-
V2TMSP05    1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software
            2  1500  100M   UP    UP    0 02:00:00:00:00:09 eth0        ETHERNET-
V2TMSP02    1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software
            2  1500  100M   UP    UP    0 02:00:00:00:00:06 eth0        ETHERNET-
V2TMSP03    1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software
            2  1500  100M   UP    UP    0 02:00:00:00:00:07 eth0        ETHERNET-
LNXUWA01    1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo
            4  1492  100M   UP    UP    0 02:00:00:00:00:22 eth0
```

Interface configuration

- Ethernet adapter
- Loop back
- MTU check

VELOCITY SOFTWARE

Network Configuration: ESATCPI

```
Report: ESATCPI      TCPIP Interface Configuration Report          Velocity Software Corpo
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed:
Monitor period:         3600 seconds (   1:00:00)                 Last record:
-------------------------------------------------------------------------------------------
NODE     Idx       Speed <-Status-> Up   <-------------------Interface--------------------
         Nbr MTU   (Est) Oper Admin Time MACAddress        Description Type
-------- --- ----- ----- ---- ----- ---- ----------------- ----------- -------------------

*********************************************Summary*********************************
Average:
L10CU      1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software LoopBack
           2  1492   10G   UP    UP    0 02:78:C1:01:0C:00 eth0        ETHERNET-CSMACD
           3  1492   10G   UP    UP    0 02:78:C1:01:0C:01 eth1        ETHERNET-CSMACD
L20BP      1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software LoopBack
           2  1492   10G   UP    UP    0 02:78:C1:02:0B:00 eth0        ETHERNET-CSMACD
           3  1492   10G   UP    UP    0 02:78:C1:02:0B:01 eth1        ETHERNET-CSMACD
L20DP      1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software LoopBack
           2  1492   10G   UP    UP    0 02:78:C1:02:0D:00 eth0        ETHERNET-CSMACD
           3  1492   10G   UP    UP    0 02:78:C1:02:0D:01 eth1        ETHERNET-CSMACD
L24BP      1 16436   10M   UP    UP    0 00:20:20:20:20:20 lo          Software LoopBack
           2  1492   10G   UP    UP    0 02:78:C1:02:4B:00 eth0        ETHERNET-CSMACD
           3  1492   10G   UP    UP    0 02:78:C1:02:4B:01 eth1        ETHERNET-CSMACD
```

Interface configuration

- Ethernet adapter
- Loop back
- MTU check

Network Data Rates: ESATCP4

```
Report: ESATCP4      TCPIP Hardware Layer/Interfaces Report        Velocity Software Corp
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed:
-------------------------------------------------------------------------------------
Date/         <Total Octets> Avg  <-Subnet packets / Sec-> <-----Packets Discarded------>
Time          <-Per second->   Q  <-Unicast-> <NonUnicast> <In Error> <NonError> Unknown
Node      IFT Input  Output  Len  Input Outpt Input Output Inpt Outpt Inpt Outpt Protocol
-------- ---- -----  ------  ---- ----- ----- ----- ------ ---- ----- ---- ----- --------
08/29/18
20:01:35
***Node Groups***
KeyUser  -  0 61803   12635     0 100.0  58.7     0   1.25    0  1.33    0     0        0
*Prod    -  0  728K  829279     0  1267  1221 520.4      0    0     0 9.19     0        0
*Util    -  0  3884  1851.0     0 11.70   2.7 36.43      0    0     0    0     0        0
TheUsrs  -  0  3537  1911.6     0  2.91   3.6 37.01      0    0     0    0     0        0
*** Nodes *******
L24BP    -  1 96.61   96.61     0  0.63   0.6     0      0    0     0    0     0        0
         -  2  5210   14818     0 24.11  29.3     0      0    0     0    0     0        0
         -  3  2874       0     0     0     0 34.08      0    0     0    0     0        0
```

Network activity, server, by interface
Understand rates
Check for errors

VELOCITY SOFTWARE

Network Data Rates: ESATCP4

```
Report: ESATCP4      TCPIP Hardware Layer/Interfaces Report         Ve
-------------------------------------------------------------------------
Date/          <Total Octets> Avg  <-Subnet packets / Sec-> <-----Pack
Time           <-Per second->   Q  <-Unicast-> <NonUnicast> <In Error>
Node       IFT Input  Output  Len  Input Outpt Input Output Inpt Outpt
-------- ---- -----  ------  ---- ----- ----- ----- ------ ---- -----
11:00:00
*** Nodes *******
TCPIP    -   1 16897  6231.9    0 25.74  21.3     0      0    0     0
VMLOCAL  -   1 16859  6223.3    0 25.70  21.3     0      0    0     0
LINUXVM2 -   2 93.06  208.92    0  0.38   0.4     0      0    0     0
LNXDPB02 -   3 293.8  590.32    0  2.25   2.4     0      0    0     0
V2TPSP01 -   1 418.3  418.26    0  1.54   1.5     0      0    0     0
         -   2 188.6  666.61    0  0.95   1.2     0      0    0     0
V2TMSP05 -   1 323.6  323.61    0  6.16   6.2     0      0    0     0
         -   2  1517  2481.8    0  4.70   4.5     0      0    0     0
LNXDMS2A -   3 103.4  299.74    0  0.47   0.6     0      0    0     0
LNXUWA01 -   1 21167   21167    0 57.81  57.8     0      0    0     0
         -   4  109K    122K    0 236.9 268.5     0      0    0     0
LNXDWA02 -   1 920.2  920.23    0  5.03   5.0     0      0    0     0
         -   4  9112   10306    0 25.84  24.3     0      0    0     0
```

Network activity, server, by interface
Understand rates
Check for errors

VELOCITY SOFTWARE

QDIO Data Rates: ESAQDIO

```
Report: ESAQDIO      Queued I/O Report                                  Velocity Software Corpor
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655     First record analyzed: 0
-------------------------------------------------------------------------------------------------
                                    Number <QDIO SIGA Instructions/Sec-> <-Throughtput / sec->
Date/    Dev.           Virt QDIO Queues <---Guest----> <----CP------> <Buffers> <--Bytes→
Time     Nmbr owner     DevN Fmt  In Out Read Writ "s"  Read Writ "s"  Sent From  Sent  From
-------- ---- --------- ---- ---- -- --- ---- ---- ---- ---- ---- ---- ---- ---- ----- -----
-------------------------------------------------------------------------------------------------
11:00:00 0000 Totals    0000 QDIO  0   0    0    0    0    0  693    0 1066  676  644K  422K
         F3D8 VSWCTRL2  F3D8 QDIO  1   1    0    0    0    0  573    0  895  535  527K  306K
         F3E0 VSWCTRL2  F3E0 QDIO  1   1    0    0    0    0  119    0  171  141  118K  117K
         F53E LNXUWA02  7002 HPER  1   4    0    0    0    0  0.6    0    1    0    89     0
*************************************************Summary*************************************
Average: 0000 Totals    0000 QDIO  0   0    0    0    0    0  639    0 1040  621  615K  441K
         F3C8 VSWCTRL1  F3C8 QDIO  1   1    0    0    0    0    0    0    0    0     0     0
         F3D8 VSWCTRL2  F3D8 QDIO  1   1    0    0    0    0  530    0  891  491  529K  322K
         F3E0 VSWCTRL2  F3E0 QDIO  1   1    0    0    0    0  108    0  149  130 85716  119K
         F3F0 VSWCTRL1  F3F0 QDIO  1   1    0    0    0    0    0    0    0    0     0     0
         F515 LNXDPB02  7002 HPER  1   4    0    0    0    0    0    0    0    0     0     0
         F518 LNXDWA01  7002 HPER  1   4    0    0    0    0    0    0    0    0     0     0
         F53B LNXUWA01  7002 HPER  1   4    0    0    0    0    0    0    0    0     0     0
         F53E LNXUWA02  7002 HPER  1   4    0    0    0    0  0.6    0    1    0    92     0
         F542 LNXUWA03  7002 HPER  1   4    0    0    0    0    0    0    0    0     0     0
         F545 LNXUWA04  7002 HPER  1   4    0    0    0    0    0    0    0    0     0     0
         F548 LNXDMS2A  7002 HPER  1   4    0    0    0    0    0    0    0    0     0     0
```

QDIO activity

- Hipersockets
- Virtual switch

VELOCITY SOFTWARE

QDIO Data Rates: ESAQDIO

```
Report: ESAQDIO      Queued I/O Report                                  Velocity Software Corpor
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7    First record analyzed: 0
-------------------------------------------------------------------------------------------
                                    Number <QDIO SIGA Instructions/Sec-> <-Throughtput / sec->
Date/    Dev.           Virt QDIO Queues <---Guest----> <----CP------> <Buffers> <--Bytes-->
Time     Nmbr owner     DevN Fmt  In Out Read Writ "s"  Read Writ "s"  Sent From  Sent  From
-------- ---- -------- ---- ---- -- --- ---- ---- ---- ---- ---- ---- ---- ---- ----- -----
08/29/18
20:01:35 0000 Totals   0000 QDIO  0   0    0    0    0    0  815    0 3511 1711  101M  842K
         1790 DTCVSW1  0600 QDIO  1   1    0    0    0    0  130    0  195  117  150K  150K
         7584 L24BP    7584  FCP  1   1    0    0    0    0    0    0    4    4 51939     0
         7588 L24FP    7588  FCP  1   1    0    0    0    0    0    0   57   28 2212K     0
         758E L10CU    758E  FCP  1   1    0    0    0    0    0    0    2    2  3519     0
         759D L25FP    759D  FCP  1   1    0    0    0    0    0    0    3    3 78867     0
         75C4 L24BP    75C4  FCP  1   1    0    0    0    0    0    0    4    4 48033     0
```

QDIO activity

- Hipersockets
- Virtual switch

Guest Lan / Virtual Switch Data Rates: ESANIC / ESATCP4

```
Report: ESANIC       Virtual NIC Activity Report                    Velocity Software Corporate
Monitor initialized: 08/29/18 at 20:00:35 on 2827 serial 0669C7     First record analyzed: 08/29/
-------------------------------------------------------------------------------------------------
Date/Time           Virt NIC  Tranp <---network lock requests----> <-stack-> <-bytes-> <-----Pack
          Virtual   Devc BASE /type <--Per Second-> waits/sec wait </second> </Second> <-Rate-->
 Userid   LanName   ADDR ADDR       Ntwrk send recv send recv time rqst dfrd Sent Rcvd Sent Rcvd
 -------- -------- ---- ---- ----- ----- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----
08/29/18

20:01:35
 L233P    VSW4     0340 0340 02/02 579.8  580  175    0    0  0.1  595    0 497K 474K  598  595
 L233P    VSW4     0360 0360 02/02  98.4 98.4 60.2    0    0  0.0 82.8    0  24K  25K  100 82.8
 L24BP    VSW5     0360 0360 02/02  12.8 12.8  8.2    0    0    0 10.5    0 6699 2580 12.9 10.5
```

```
Screen: ESATCP4  Velocity Software - VSIVM4
1 of 2  TCPIP Hardware Layer / Interfaces

                                <Total Octets>
          Node/                 <-Per second->
Time      Group     Interface     Input Output
--------- --------- ---------   ------ ------
15:24:00 redhat71  enccw0.0.    390.87 584.07
          redhat71 lo               0      0
          redhat64 eth0         918.03   1908
          redhat64 lo               0      0
          redhat6x eth0         818.33   1900
          redhat6x eth1           0.47      0
          redhat6x lo             3059   3059
          redhat6  eth0          1862   4660
          redhat6  lo               0      0
```

Guest lan / virtual switch activity

- ESANIC: CP Monitor data
- ESATCP4: SNMP data
- Compare “received to input”

- Redhat7 renamed eth0

OSA Adapter: ESAOSA

```
Report: ESAOSA        OSA System Configuration Report
Monitor initialized: 06/15/16 at 00:00:00 on 2828 seria
-----------------------------------------------------
Collector <---------OSA Configuration--> MacAddress
Node      Idx  Name  Nbr  Type Level Shrd Active
--------  ---  ----  ---  ---- ----- ---- ------------
06/15/16
00:15:00
OSA178      2  OSA1    0 1G Eth 6.00  Yes 6CAE8B483FD4



redhat6x    3  OSA1    0 1G Eth 6.00  Yes 6CAE8B483FD4
```

OSA data collected via snmp

- Configuration data
- Total data
- Data by LPAR if shared
- (New with 4.3)

```
   Report: ESAOSA                    Velocity Software Corporate   Z
   Monitor initializedal 314C7       First record analyzed: 06/15/16
   ------------------------------------------------------------------
   Collector <-------- LPAR Bus  CPHID  KBytes/Sec Packets/sec
   Node      Idx  Name   NBR Util Util    IN   OUT    In   OUT
   --------  ---  ------  --- ---- ----  ----- ----- ----- -----

   OSA178      2  OSA1   Tot    0   15    4.0   8.1  25.5  16.7
                         2    0    .     53    15
                         4    0    .    288   291
                         5    0    .     59    55

   redhat6x    3  OSA1   Tot    0   15   12.7   5.3  26.8  16.8
                         1    0    .      2    56
                         2    0    .     61    15
                         4    0    .    312   400
                         5    0    .     59    55
```


VELOCITY SOFTWARE

There IS logic to doing performance analysis

- Check ESATUNE if available
- Follow the flow chart
- See the tuning guide
- Call Velocity Software for help