

Performance Analysis Flowchart

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“If you can’t Measure it,
I am Just Not Interested™”

“z” is:

- Very large,
- Very complex and
- Very well-instrumented

The challenge?

What challenge, it is all there!

- 200+ zMON panels (with menus)
- 160+ zMAP reports (with table of contents)
- 3400+ unique variables

Very few companies support full-time performance analysts.

The challenge:

- Performance problems are visible,
- “z” applications are often impacted by other applications

My challenge

- Provide a flowchart to resolve problems quickly
- Describe the few panels/reports needed to solve any specific problem

This flowchart is based on decades of analysis

Velocity Tuning Guide – Each web page has more details

The Challenge: z/VM Serves Many Functions (160+ Reports)

ESAHDR ESATUNE

*Performance Summary
ESASSUM ESASUM

*Transaction Activity (5)
ESAUOLA **ESAXACT** ESARATE
ESACLAS ESAEXCP

*User Activity (21)
ESATUNA
ESASRVC ESASRV1 **ESAUSRC** ESAUSR1
ESAUSR2 ESAUSR3 ESAUSR4 ESAUSR5
ESAUSP2 ESAUSP3 ESAUSP4 ESAUSCP
ESAUSTR ESAUSPG ESAUSEK
ESAWKLD ESAUSRQ ESASCED
ESAACCT
ESAPOOL

*Multi-Tasking Users
ESAMTSK

*Web Serving Reports (8)
ESAWEB1 ESAWEB2 ESAWEB3 ESAWEB4
ESAVWS1 ESAVWS2 ESAVWS3 ESAVWS4

*Virtual NETWORK Reporting (7)
ESAQDIO ESAQDI2 **ESANIC**
ESAVSWC ESAVSW ESAVSW2
ESAOSA

*TCP/IP Reporting (15)
ESATCPC ESATCPI **ESATCP1 ESATCP2** ESATCP3 **ESATCP4**
ESATCP5 ESATCP6 ESATCP7 ESATCP8
ESATCPP ESATCPS ESATCPA **ESATCPU** ESATFTP

*LINUX Reporting (20)
ESAUCD1 ESAUCD2 ESAUCD3 ESAUCD4 ESAUCDD ESALNXD
ESAHST1 ESAHST2 ESAHST3 ESAHST4 ESAHSTA
ESALNXS ESALNXR ESALNXP ESALNXA ESALNXC
ESALNXU ESALNXV ESALNXM ESALNXUP

*Linux Application Reporting (4)
ESAJVM ESAORAC ESAORAG ESAORAS ESAORAW

*VSE Reporting (4)
ESAVSEC ESAVSES ESAVSEP ESAVSEJ

*Shared File System (7)
ESASFS1 ESASFS2 ESASFS3 ESASFS4
ESASFS5 ESASFS6 ESASFS7

*Byte File System
ESABFS1 ESABFS2 ESABFS3

*Processor Subsystem (24)
ESACPUU ESACPUA ESACPUS ESASMT
ESADIAG ESAINS ESALCK1 ESALCK2
ESAMFC ESAMFCA ESAMFCC ESACPUV
ESACPU1 ESACPU2
ESAIUCV ESAIUC2 ESAIUER
ESALPARC ESALPAR ESALPARS
ESAPLDV ESAIOP ESACRYPT ESACRY2

*Storage Subsystem (10)
ESASTRC ESASTOR **ESASTR1** ESASTR2 ESASTR3 ESAME
ESAFREE ESADCSS **ESAASPC** ESASXS

*Paging Subsystem (5)
ESAPSPC ESAPAGE ESABLKP ESAXSTO
ESAPSDV

*Input/Output Subsystem (23)
ESADEV1 ESADEV2 ESADSD1 ESADSD2
ESADSD6 ESAIOAS ESACHNC ESACHAN ESACHNH
ESADSDC ESADSD4 ESADSD5 ESAMDC
ESAVDSK ESATAPE ESA3495
ESASCSI ESASCS2
ESASEEK

*
ESAOPER

Analysis starts with “is there a problem?”

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

System Configuration

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

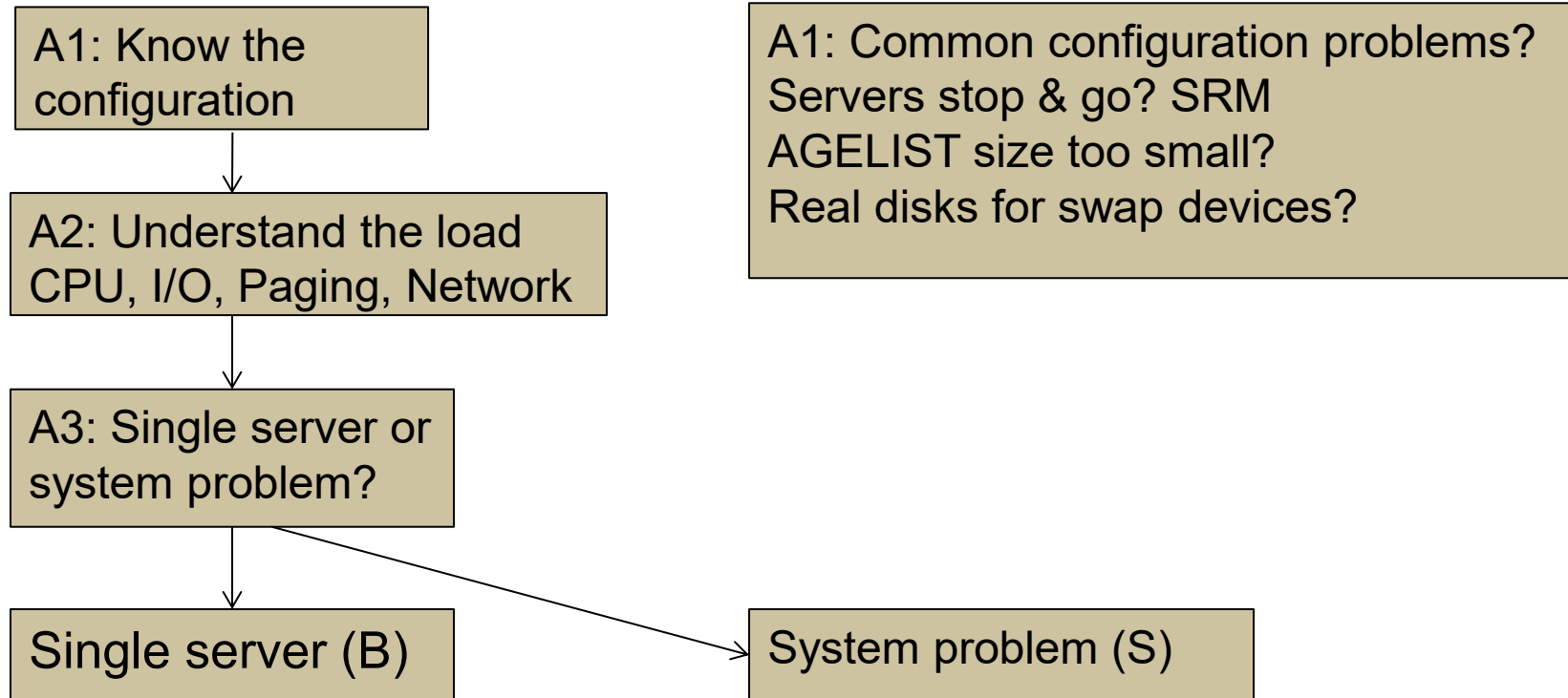
Loads on the system and subsystems

Wait states for those impacted

Subsystem Analysis

- DASD, Storage, Paging, Processor, Network

Tuning Guide – Performance Methodology Tips



Tuning Guide – Flow Chart Analysis

The Analysis Flow Chart

Single server (B)

B1: Check wait states for constraints

B2: Understand configuration (VM) Share, VMSIZE

B3: Understand Linux configuration

Choose constraint
CPU (C), Paging (D),
DASD(E), Network(F)

C1: Check process table, requirements
C2: Check system load (processes)
C3: Validate virtual CPUs
C4: Check “resident/reset”

D1: Check Linux storage/swap sizes
D2: Check paging configuration
D3: Check server page rates
D4: Virtual disk used for swap?

E1: Check data configuration
E2: Check DASD data rates

F1: Check network configuration
F2: Check network data rates

System problem (S)

S1: Check wait
states for constraints

S2: Choose constraint:
CPU(T),
Paging(U),
DASD(V),
NETWORK(W)

T1: LPAR Utilization
T2: LPAR overhead
T2: Abusive servers
T3: Cron across multiple servers

U1: Storage requirements
U2: User storage?
U3: Correct virtual disk settings
U4: Page space, block paging
U5: AGELIST settings

V1: Top DASD, Control units?
V2: DASD cache, fast/write
V3: Device configuration

A1: Configuration: ESAHDR
A2: System Load: ESASSUM / ESAMAIN

B1: Check wait states: ESAXACT
B2: Virtual machine config: ESAUSRC / ESAUSR1
B3: Linux configuration: ESALNXS

C1: Process table: ESALNXC
C2: Process Load: ESALNXP
C3: Validate Virtual CPUs: ESAUSP2

D1: Linux Storage: ESAUCD2
D2: Paging configuration: ESAPSDV
D3: Server Paging Rate: ESAUSPG
D4: VDISK for swap: ESAASPC

E1: Data configuration: ESAUSEK / ESAQDIO
E2: DASD Rates: ESADSD2

F1: Network configuration: ESATCPI
F2: Network data rates: ESATCP1/2/4
F3: VSWITCH users: ESANIC
F4: VSWITCH traffic: ESAVSW
F5: OSA traffic: ESAOSA

S1: Wait states:	ESAXACT
T1: LPAR utilization:	ESALPARS
T2: LPAR overhead:	ESALPAR
T3: Abusive Server:	ESAUSP2 / ESAUSR2
T4: Cron across servers:	ESALNXP
U1: Storage requirements:	ESASTR1
U2: User storage:	ESAUSPG
U3: VDISK storage:	ESAVDSK / ESAASPC
U4: Page configuration:	ESAPSDV
U5: Page space:	ESAPSDV / ESABLKP
U6: Expanded storage:	ESAXSTO
V1: Top DASD control units:	ESADSD2
V2: DASD cache, fast/write:	ESADSD5
V3: Device configuration:	ESADSD1

```

Report: ESAHDR          z/VM Monitor Analysis
Monitor period:          3600 seconds ( 1:00:00)
-----
z/VM Version: 5          Release 4.0 SLU 1002
TOD clock at termination          09:49:16
Abend code of last termination
TOD clock at last IPL:          12/26/10 09:49:40
System Operator:                OPERATOR
Time zone adjustment from GMT:   -7 hours

System Identifier                ZVM2
Checkpoint/Warmstart Volumes    V2RES1/V2RES1
Machine Model/Type          z10E:2097/710
System Sequence Code            00000000000D2655
Processor 0 model/serial    2097-710 /072655 Mast
Processor 1 model/serial    2097-710 /072655
Processor 2 model/serial    2097-710 /072655
Processor 3 model/serial    2097-710 /072655
Processor 4 model/serial    2097-710 /072655

ESAME (Memory Extension) Nucleus in use
Power of processor in terms of service Units: 32989
ESA/370 hardware installed
Operating on IFL Processor(s)
Channel Path Measurement Facility(CPMF) Extended is inst

Main Storage installed (MB):          70656
Main Storage Generated (MB):        70656
Number of users in monitor file:          90
Number of DASD in monitor file:          530
Number of non-DASD in monitor file:       2
  
```

Common configuration problems:

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

Tuning Guide – Configuration

Know the Overall Loads: ESASSUM / ESAMAIN

```

Report: ESASSUM      Subsystem Activity      Veloci
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655      First
-----
      <---Users----> Transactions <Processor> Storage (MB) <-Paging-->
      <-avg number->   Per   Avg. Utilization Fixed Active <pages/sec>
Time      On Actv In Q Minute   Resp Total Virt.  User Resid. XStore DASD
-----
10:15:00   89   63 61.3  145.1 0.613   262   254  14.4  68662   862  289
10:30:00   89   63 61.3  140.3 0.545   270   261  14.4  68726   886  133
10:45:00   89   63 63.3  134.1 0.563   262   253  14.0  68806  1123  281
11:00:00  89   64 67.4  137.8 0.477   275  259 13.5 68156 2218 665
*****Summary*****
Average:   89   63 63.3  139.3 0.550   267   257  14.1  68587  1272  342
  
```

Look for Spikes, dramatic changes, what time?

- Processor
- Storage for users
- Page rates
- DASD I/O rates
- (Transactions are for traditional workloads)

Tuning Guide – System Load

Wait states provide options for improvement

- State Sampling – once per minute per user
- Hi-Frequency State Sampling – once per second per vCPU
- (900 samples per vCPU per 15 minute period)

Waits reported by server, class, top user

- Look for what is impacting the users
- Recognize “running” to wait comparison

Tuning Guide – Wait State Analysis

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, SIO -> DASD subsystem
- Loading – special state, loading in working set (LDUBUF)
 - NOT a wait state but indicates thrashing (paging/storage issue)
- Eligible – SRM Settings – has no value with 6.3 and later

Normal idle wait states

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

Report: **ESAXACT** Transaction Delay Analysis Veloc
 Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655 First

```

-----
<-----Percent non-dormant (Wait states)-----
UserID  <-Samples->
/Class  Total  In Q  Run  Sim  CPU  SIO  Pag  E-  D-  T-  Tst  <Asynch>  Pct
-----  -----  -----  -----  -----  -----  -----  -----  -----  -----  -----  -----  -----  -----
11:00:00  1335  1011  4.0  0.2  0.6   0  0.5   0   0  0.1   0  91  0.1   .   .   0
Hi-Freq: 116K 59208 4.2 0.0 1.9 0.0 0.3 0 7.9 0.1 0.0 89 0.4 0.1 0.2 0
***Key User Analysis***
RSCS      893    1    0    0    0    0    0    0    0    0    0    0    0    0    0    0
RSCSDNS   893    8    0    0    0    0    0    0    0  99 100    0    0    0    0    0
TCPIP     893   285  0.4  0  2.5   0    0    0    0    0    0    0  97    0    0    0
***User Class Analysis***
*Servers  12502   822  0.7  0.1  1.0  0.2    0    0    0  17  4.5    0  93    0    0    0
*System   1786   1437  0.1  0.1  1.1    0  0.2    0    0    0    0  92  0.1    0  0.7  0
*ITM      1786   911  1.5  0.1  2.2    0  0.5    0    0    0    0  78  0.4  0.1  0.2  0
*SOA      35720 31695  7.0  0.0  2.2    0  0.3    0    0    0  0.1  88  0.6  0.0  0.1  0
*ITM      36613 23570  1.1  0.0  1.7    0  0.3    0    0    0    0  91  0.1  0.2  0.4  0
*TheUsrs  24111   480  0.2  0.8  1.3    0  0.6    0    0  26  5.2    0  91  0.2    0  0.2  0
***Top User Analysis***
LN XUWA01  893    893    71    0  2.8  0  0.1    0    0    0    0  24  1.7  0.4    0    0
LN XUWA03 1786   1786    28  0.2  5.5  0  1.2    0    0    0  0.6  57  7.2  0.1  0.1  0
LN XUWA02 1786   1786    27  0.1  3.6  0  0.1    0    0    0  0.4  69  0.1    0  0.1  0
LN XQWA01  1786   1786  4.0    0  2.2    0    0    0    0    0    0  94  0.1    0    0    0
LN XDWA02  1786   1786  6.0    0  2.2    0  0.2    0    0    0    0  91  0.1    0    0    0
LN XDWA04  1786   1786  4.1    0  2.9    0    0    0    0    0    0  93    0    0  0.1  0
V2TPSP02  179    179   35    0  6.1    0    0    0    0    0    0  59    0    0    0    0
  
```

```
Report: ESAUSRC      User Configuration      Velocity Software Corporate  ESAMAP 4
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655  First record analyzed: 04/15/11 10:00:
Monitor period:      3600 seconds ( 1:00:00)  Last record:      04/15/11 11:00
```

UserID	ClassID	Account Code	ACI Grp Name	CPU Type	<-----SHARE----->				CPU <Modes>	SVM	STG	QDSP	<-MDC>		<-Storage->		
					<Normal> Rel	Abs	<--MAX--> Typ	Shre					Lim -it	Cnt	NO FS	NO INS	<-VM Size-> Dflt	Max
LNXDMS2A	*ITM	27482	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	2.0G	2.0G
LNXDPB02	*System	75113	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	512M	512M
LNXDWA01	*SOA	03817	.	IFL	400	.	.	.	.	2	ESA V=V	N	N	N	N	6.0G	6.0G
LNXDWA02	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	4.0G	4.0G
LNXDWA03	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	2.0G	2.0G
LNXDWA04	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	7.0G	7.0G
LNXDWA11	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	8.0G	8.0G
LNXQWA01	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	7.0G	7.0G
LNXQWA02	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	2.0G	2.0G
LNXQWA03	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	2.0G	2.0G
LNXQWA04	*SOA	03817	.	IFL	200	.	.	.	.	2	ESA V=V	N	N	N	N	2.0G	2.0G
LNXTWA04	*SOA	03817	.	IFL	400	.	.	.	.	4	ESA V=V	N	N	N	N	5.0G	5.0G
LN XUWA01	*SOA	03817	.	IFL	100	.	.	.	.	1	ESA V=V	N	N	N	N	12G	12G

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?)

Tuning Guide - Configuration

Top down:

- CEC / LPAR
- LPAR / z/VM
- Virtual machine
- Linux process

CPU Capture ratio 100% down to process

Tuning Guide – LPAR Analysis

Report: **ESALPARS** Logical Partition Summary Velocity Software Corporate
 Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655 First record analyzed: 04/1

Time	Phys CPUs	Dispatch Slice	<---Complex--> Logical Partition Name	Nbr CPUs	Virt <%Assigned> Total	Ovhd	<-Assigned Shares--> <---LPAR--> Weight	Pct	<VCPU Pct> /SYS /CPU	Cap- ped	Wait Comp	Proce Type
04/15/11												
10:15:00	18	Dynamic	Totals:	0	34 968.7	4.9	1080	88.9				
			SYS4N3	7	5 263.5	1.2	80	6.6	1.32 23.7	No	No	IFL
			SYS4P1	3	3 22.9	0.4	60	4.9	1.65 29.6	No	No	CP
			SYS4N1	1	8 323.3	1.6	590	48.6	6.07 109	No	No	CP
			SYS4N2	2	2 17.1	0.4	60	4.9	2.47 44.4	No	No	CP
			SYS4D1	4	7 98.3	0.8	160	13.2	1.88 33.9	No	No	CP
			SYS4D2	5	5 35.9	0.4	100	8.2	1.65 29.6	No	No	CP
			SYS4D3	6	2 9.0	0.2	30	2.5	1.23 22.2	No	No	CP
			SYS4D4	8	1 100.0	0.0	Ded	5.6	5.56 100	No	Yes	ICF
			SYS4D5	9	1 98.6	0.0	Ded	5.6	5.56 100	No	Yes	ICF

Look for “Shared processors”

- IFLs shared between LPARs (none)
- Check weights
- Assigned Pct/CPU > 100 ??? -> excess share?
- First LPAR is “us”, z/VM where data collected

Tuning Guide – LPAR Analysis

Already Know the Overall Loads: ESASSUM / ESAMAIN

```

Report: ESASSUM      Subsystem Activity      Velocity
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655      First
-----
      <---Users----> Transactions <Processor> Storage (MB) <-Paging-->
      <-avg number->      Per Avg. Utilization Fixed Active <-pages/sec>
Time      On Actv In Q Minute Resp Total Virt. User Resid. XStore DASD
-----
10:15:00   89   63 61.3  145.1 0.613   262   254  14.4  68662   862  289
10:30:00   89   63 61.3  140.3 0.545   270   261  14.4  68726   886  133
10:45:00   89   63 63.3  134.1 0.563   262   253  14.0  68806  1123  281
11:00:00  89   64 67.4  137.8 0.477   275  259  13.5  68156  2218  665
*****Summary*****
Average:   89   63 63.3  139.3 0.550   267   257  14.1  68587  1272  342
  
```

Look for Spikes, dramatic changes, what time? (11:00)

- What else changed at that time?
- Processor (Also, ESACPUU, ESACPUA)

[Tuning Guide – System Load](#)

Report: **ESALPARS** Logical Partition Summary

Totals by Processor type:

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

Tuning Guide – LPAR Analysis

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 - 2: ESALPARS

Report: **ESALPARS** Logical Partition Summary Velocity Softw

```

-----
      <--Complex--> <-----Logical Partition-----> <-Assigned Shares----
      Phys Dispatch  Virt CPU <%Assigned> <---LPAR--> <VCPU Pct
Time   CPUs      Slice Name      Nbr CPUs Type Total  Ovhd  Weight  Pct /SYS /CPU
-----
11:20:00  17  Dynamic Totals:      0    2  CP    21.7  0.1    167  100
          Totals:      0   18  IFL   173.0  5.4    100  100
          VT4         44    7  IFL   112.4  3.2     60  60.0  8.57  94.3
          CFED2       15    1  ICF   100.0  0.0    Ded  5.9   0    0
          CFEH2       13    1  ICF    12.5  0.0     90  9.0   9.00  9.00
          CFEN2       14    1  ICF   100.0  0.0    Ded  5.9   0    0
          CFEA2       31    1  ICF    74.7  0.0   820  82.0  82.0  82.0
          CFEI2       30    1  ICF    12.5  0.0     90  9.0   9.00  9.00
          ITKP        21    1  CP     0.8   0.0     50  29.9  29.9  29.9
          VTT         47    2  IFL     3.0  0.4     2   2.0   1.00  11.0
          VT3         43    2  IFL     2.9  0.3     8   8.0   4.00  44.0
          VT8         45    7  IFL    54.7  1.6    30  30.0  4.29  47.1
          DRITE4      29    1  CP     0     0     50  29.9  29.9  29.9
          DRITE1      28    2  CP    20.9  0.0     50  29.9  15.0  15.0
  
```

Look for “Shared processors”

- IFLs shared between LPARs (4 LPARs)
- Check weights
- Assigned pct/CPU > 100 ??? -> excess share?

Tuning Guide – LPAR Weights/Overhead Analysis

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)
- Check overheads:
 - High overhead result of too many vCPUs
- Total CP Utilization 835 / 900 = 93%

ESALPARS

Totals by Processor type:

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

Report: **ESAUSP2** User Resource Rate Report Velocity Software C

```

-----
UserID      <---CPU time--> <----Main Storage (pages)-----> <-----Paging (pages)----->
/Class     <(Percent)> T:V <Resident> Lock <-----WSS-----> <---Allocated---> <Pgs/Secnd>
          Total  Virt Rat Totl Activ -ed Totl Activ Avg Total ExStg  Disk  Read Write
-----
11:00:00  262.6 259.3 1.0  17M  17M  234  19M  19M 213K  13M 4346K 8891K 166.3 391.8
***Key User Analysis ***
TCPIP      0.12 0.05 2.4 1286 1286 79 316 316 316 5005 736 4269 0.0 0.0
***User Class Analysis***
*Servers   0.40 0.36 1.1 957 951 3 1704 1067 76 16285 2162 14123 0.1 0.5
*SOA      239.2 236.7 1.0 15M 15M 39 17M 17M 843K 5138K 2431K 2707K 79.1 184.0
*ITM      22.47 21.83 1.0 2M 1971K 7 2M 2117K 96K 7686K 1761K 5925K 74.7 126.4
*TheUsrs  0.21 0.18 1.2 2869 2862 17 4372 3688 135 185K 82382 102K 2.5 2.1
***Top User Analysis***
LN XUWA01 67.65 67.32 1.0 3M 2889K 1 3M 3146K 3M 324K 65398 259K 15.3 0.1
LN XUWA03 54.43 53.29 1.0 4M 3848K 1 4M 3855K 4M 72353 63975 8378 7.5 0.3
LN XUWA02 50.18 49.92 1.0 685K 685K 0 855K 855K 855K 381K 296K 84613 2.2 2.7
LN XQWA01 12.23 12.11 1.0 1M 1246K 7 1M 1334K 1M 592K 541K 51075 3.1 3.0
LN XDWA02 11.73 11.64 1.0 713K 713K 6 844K 844K 844K 205K 56215 148K 2.0 0.7
LN XDWA04 10.18 10.10 1.0 1M 1152K 1 1M 1248K 1M 689K 593K 96720 1.0 70.8

```

Look for consumers in percent of CPU

- By class (SOA)
- Abusive servers (LN XUWA*)?
- Correct per expected? Not a performance question

Tuning Guide – User Analysis

Report: **ESALNXP** LINUX HOST Process Statistics Report Velocity Software Corporate ESAMAP 4.1.1 0

node/ Name	<-Process Ident->			Nice Valu	<-----CPU Percents----->					<-----CPU Seconds----->					<Stg (k)>		<-Faults/Second->			
	ID	PPID	GRP		Tot	sys	user	syst	usrt	Total	sys	user	syst	usrt	Size	RSS	min	maj	mint	majt
LNQWA01	0	0	0	0	11.9	1.72	7.91	1.42	0.88	107.4	15.5	71.2	12.8	7.88	11M	6M	21	0	7530	0
java	1235	1	1235	0	1.11	0.19	0.92	0	0	10.0	1.68	8.32	0	0	894K	470K	0	0	0	0
java	7124	1	7124	0	0.86	0.15	0.71	0	0	7.7	1.37	6.36	0	0	720K	415K	0	0	0	0
kcawd	8853	1	4390	0	2.24	0.01	0.02	1.38	0.83	20.1	0.10	0.14	12.4	7.49	38K	5428	2	0	7392	0
java	10522	1	10522	0	1.08	0.17	0.91	0	0	9.8	1.57	8.19	0	0	758K	437K	0	0	0	0
java	15498	1	15498	0	1.09	0.19	0.90	0	0	9.8	1.72	8.07	0	0	763K	523K	0	0	0	0
LNQUWA01	0	0	0	0	67.0	5.98	59.0	1.20	0.81	601.9	53.8	531	10.8	7.29	13M	9M	88	0	7566	0
java	4444	1	4444	0	1.10	0.07	1.03	0	0	9.9	0.65	9.25	0	0	1M	801K	0	0	0	0
kd4agent	5576	1	4362	0	4.71	1.68	3.03	0	0	42.4	15.1	27.3	0	0	99K	64K	0	0	0	0
kynagent	9569	1	4362	0	2.48	0.07	2.41	0	0	22.3	0.63	21.7	0	0	314K	212K	5	0	0	0
kcawd	9634	1	4362	0	1.92	0.01	0.01	1.14	0.75	16.4	0.06	0.13	10.3	6.78	37K	6936	1	0	7200	0
java	10547	1	10547	0	0.82	0.07	0.75	0	0	7.4	0.64	6.74	0	0	870K	743K	1	0	0	0
java	11751	4877	4877	0	0.57	0.07	0.50	0	0	5.2	0.67	4.49	0	0	617K	98K	6	0	0	0
java	11837	1	11837	0	3.28	0.12	3.16	0	0	29.5	1.10	28.4	0	0	3M	1M	1	0	0	0
java	21374	15199	21374	0	46.3	3.07	43.2	0	0	416.9	27.6	389	0	0	3M	3M	34	0	0	0
java	24567	1	24567	0	2.27	0.18	2.09	0	0	20.4	1.59	18.8	0	0	1M	831K	0	0	0	0
java	28060	1	28060	0	1.23	0.09	1.14	0	0	11.1	0.82	10.3	0	0	1M	821K	0	0	0	0
java	32428	1	32428	0	1.17	0.10	1.07	0	0	10.5	0.87	9.7	0	0	810K	538K	5	0	0	0

Look for processes within Linux, in percent of cpu

- By relevant server (LNQUWA01)
- Correct? Relevant? Cron?

Tuning Guide – Linux Process Usage

Top down:

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

CPU Capture ratio 100% down to server

Tuning Guide – Storage Analysis

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

Time	Users <-----Pages----->																
	Loggd On	System Storage	Fixed Store	Non-Pgble	Free Stor	Frame Table	<Available> <2gb >2gb		System ExSpc	User Resdnt	NSS/DCSS Resident	<-AddSpace> System User		VDISK Rsdnt	<MDC> Rsdnt	Diag 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 a large percent

Tuning Guide – System Storage Analysis

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 page			Read/Write-->		Pages	<Address	
	<---Main Storage---> Total	>2gb	<2GB	Xstor	DASD	<-Page Writes to:--> Xsto	Disk	Migr	<Page Reads:> Xstor	Disk	Moved <2GB	<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, new “megabyte” option)

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

**Tuning Guide –
User Storage Analysis**

Report: **ESAVDSK** VDISK Analysis Report Velocity Software Corporate

Owner	Space Name	-----<--Size-->	<AddSpce>	Priv	VIO	<--pages-----							
		AddSpc VDSK Cre- Del- or rate User Resi- Lock- Sto- DASD	Pages Blks ates etes Shrd /sec Links dent ed len Read										
10:45:00													
LNQWA01	VDISK\$LNQWA01\$0206\$0530	64256 512K	0 0 Shrd	0.00	1	122	0	0.7	0.0				
LNQWA01	VDISK\$LNQWA01\$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				
LNQUWA03	VDISK\$LNQUWA03\$0206\$051E	250K 2002K	0 0 Shrd	0.65	1	14K	0	1.6	6.7				
LNQUWA03	VDISK\$LNQUWA03\$0207\$051F	375K 3002K	0 0 Shrd	0.29	1	4980	0	0.4	0.7				
LNQUWA03	VDISK\$LNQUWA03\$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													
LNQWA01	VDISK\$LNQWA01\$0206\$0530	64256 512K	0 0 Shrd	0	1	46.9	0	0.1	0				
LNQWA01	VDISK\$LNQWA01\$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				
LNQUWA03	VDISK\$LNQUWA03\$0206\$051E	250K 2002K	0 0 Shrd	10.1	1	46K	0	12.9	58.4				
LNQUWA03	VDISK\$LNQUWA03\$0207\$051F	375K 3002K	0 0 Shrd	16.2	1	88K	0	6.1	19.7				
LNQUWA03	VDISK\$LNQUWA03\$0208\$0520	513K 4102K	0 0 Shrd	16.1	1	88K	0	5.8	20.2				
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 - PRIORITIZED!!!

Tuning Guide – VDISK Analysis

Storage Utilization (By Megabyte): ESASTR1

Report: **ESASTR1** Main Storage Analysis Velocity Software Corporate ZMAP 4.2.3
 Monitor initialized: 01/24/14 at 00:00:00 on 2827 serial 55AB7 First record analyzed: 01/24/14 00:00:00

```

-----
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 System User Rsdnt Rsdnt
-----
00:05:00 114 10240 11 55 1 80 1993 2656 22 4474 97 93 0 362 241
00:10:00 115 10240 11 55 1 80 1993 2649 22 4484 97 96 0 362 242
00:15:00 114 10240 11 56 1 80 1992 2644 22 4480 103 97 0 362 243
00:20:00 113 10240 11 56 1 80 1992 2658 22 4474 98 97 0 362 242
  
```

Total storage analysis (“megabyte” option)

- uspg_byMB = '1'b (Impacts ESASTR1, ESAUSPG) – now default
- MDC? 240mb? SET MDC MAX/MIN
- VDISK normal?
- User resident should be a large percent
- System “oversized”

Invalid but Resident Storage Analysis

Report: **ESAUSTR** User Storage Analysis
Monitor initialized: 07/07/15 at 13:03:48 on 2964 serial 5C2A7

```

-----
<-----Virtual Server Storage (Pages)-----> <Resident>
UserID  Size  Alloc Resi- UFO  <-----IBR-----> <AgeList> <Unreferd>
/Class   Size  Alloc dent Activ TOT  <2gb >2gb <2gb >2gb <2gb >2gb
-----
13:08:00 109M 93.1M  93M 93.0M 4405 1368 3037  316 123K  0  0
***User Class Analysis***
Servers  186K 33583 33583  8730  568  107  461 54.0  24K  0  0
ZVPS    420K 27906 27906 27906  0  0  0  0  0  0  0
TheUsers 108M 93.0M  93M 92.9M 3530 1135 2395  241  95K  0  0
***Top User Analysis***
LINXA195 1311K 1310K 1310K 1309K  3.0  3.0  0  3.0 1066  0  0
LINXA203 1311K 1310K 1310K 1309K  2.0  2.0  0  3.0 1072  0  0
LINXA204 1311K 1310K 1310K 1309K  3.0  1.0  2.0  3.0 1072  0  0
LINXA198 1311K 1310K 1310K 1309K  4.0  4.0  0  3.0 1072  0  0
LINXA199 1311K 1310K 1310K 1309K  4.0  4.0  0  3.0 1072  0  0
LINXA197 1311K 1310K 1310K 1309K 49.0 49.0  0  3.0 1069  0  0
LINXA155 1573K 1572K 1572K 1571K 23.0 12.0 11.0  3.0 1076  0  0
LINXA146 1573K 1572K 1572K 1571K  6.0  5.0  1.0  3.0 1073  0  0
LINXA148 1573K 1572K 1572K 1571K 17.0  3.0 14.0  3.0 1094  0  0
LINXA150 1573K 1572K 1572K 1571K  158  128 30.0  3.0 1075  0  0

```

Invalid but Resident (IBR)

- Are correct servers losing pages? (Yes)

Tuning Guide – IBR Analysis

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
LNXDPO2   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 a large buffer, CMM?

Tuning Guide – Linux Storage Analysis

Top down:

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

Paging rules change in 6.3

Tuning Guide – Storage Analysis

Report: **ESAPSDV** Page And Spool Device Activity Velo

```

-----
          <-----Paging-----> <-----Spooli
Dev      <-----Slots-----> <-per sec-> <-----Slots----->
No. Serial Avail Used %Use Max Read Write Avail Used %Use
-----
11:00:00
E92F V2PAG1 1803K 1121K 62 1129K 25.2 35.1 . . .
E93F V2PAG2 1803K 1114K 62 1122K 24.1 35.2 . . .
E930 V2PAG3 1803K 1117K 62 1123K 22.5 31.2 . . .
E940 V2PAG4 1803K 1081K 60 1089K 21.0 35.8 . . .
E933 V2PAG5 1803K 904950 50 913775 23.2 37.2 . . .
E934 V2PAG6 1803K 894360 50 903958 23.7 39.4 . . .
E935 V2PAG7 1803K 840048 47 848995 23.8 37.2 . . .
E937 V2PAG8 1803K 709086 39 718015 24.4 37.1 . . .
E93C V2PAG9 1803K 726428 40 734888 24.8 36.1 . . .
E938 V2PA10 1803K 596028 33 604582 25.0 37.4 . . .
E93B V2PA11 1803K 594606 33 603738 26.7 38.9 . . .
EA4A V2SPL1 . . . . 0 0 5897K 546231 9 54
-----
Total: 19832K 9697K 49 9791K 264.6 400.5 5897K 546231 9 54

```

Paging Configuration:

- How many devices (11)
- Equal sizes?
- How full? (50%)
- Rates reasonable? Device type dependent

Tuning Guide – System Page Analysis

Report: **ESADSD2** DASD Performance Analysis Velocity Sof

Dev No.	Device Serial	Type	<--SSCH-->		<%DevBusy>		<SSCH/sec-->		<-----DASD Response tim				
			Total	ERP	Avg	Peak	avg	peak	Resp	<--Service times-->			
										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
E92F	V2PAG1	3390-9	10137	0	5.7	15.6	11.5	31.4	5.0	5.0	0.3	0.0	4.6
E940	V2PAG4	3390-9	8869	0	5.2	14.8	10.0	29.9	5.2	5.2	0.3	0.0	4.8
E933	V2PAG5	3390-9	8418	0	5.1	12.8	9.5	28.9	5.3	5.3	0.3	0.0	5.0
E934	V2PAG6	3390-9	7858	0	5.0	13.4	8.9	26.9	5.6	5.6	0.3	0.0	5.3
E937	V2PAG8	3390-9	7568	0	5.0	13.3	8.6	28.9	5.8	5.8	0.3	0.0	5.5
E935	V2PAG7	3390-9	8284	0	4.9	13.1	9.4	30.8	5.2	5.2	0.3	0.0	4.9
End Top DASD by Device busy													

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 a 30% “Peak”

Report: **ESABLKP** Block Paging Analysis Velocity Software Corporate
 Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655 First record analyzed: 04/15/1

Time	<----Load---->			Serv Time (ms)	<-Block->			<-Blocks Formed By->			Block Fault /sec	<--Block Exceptions/sec-->			
	<-Users-> Actv	In Q	Tran /sec		<-Reads-> /sec	Size	<-Steal-> /sec	Size	<Migrate> /sec	Size		<Single Read> User	System	<No Refers> Migr	Steal
10:15:00	63	61.3	2.4	45.9	19.9	7.0	0.0	31.0	10.2	13.2	9.0	8.8	0.0	0.8	50.0
10:30:00	63	61.3	2.3	47.1	10.3	7.0	0.0	25.1	3.7	13.7	4.7	5.6	0.0	0	45.1
10:45:00	63	63.3	2.2	33.0	18.8	7.0	0.0	29.4	6.0	20.9	8.4	11.1	0.0	0	57.2
11:00:00	64	67.4	2.3	57.8	27.1	7.7	1.0	33.3	26.0	13.6	11.0	34.6	0.1	12.9	176.8

Block Paging Analysis

- Block page read – optimal 10 pages
- Steal should be zero prior to 6.3
- **Migrate should be zero with 6.3 and beyond**
- Pages stolen, unreferenced – Storage stress
- Single page read – goes up with 6.3

Report: **ESABLKP** Block Paging Analysis TEST MAP

Time	<----Load---->			Serv Time (ms)	<-Block->		<-Blocks Formed By->			Block Fault /sec	<--Block Exceptions/sec-->				
	<-Users-> Actv	In Q	Tran /sec		<-Reads-> /sec	Size	<-Steal-> /sec	Size	<Migrate> /sec		Size	<Single Read> User	System	<No Refers> Migr	Steal
07:49:00	83	262	0.7	.	65.6	5.6	31.4	18.8	0	0	25.4	291.2	1.7	0	0

Block Paging Analysis for 6.3+

- Block page read – optimal 5 pages??
- Migrate should be zero (No expanded storage)
- Pages stolen, unreferenced – zero with 6.3
- Single page read – goes up with 6.3
- Faster paging devices? (new market for SSD)

Top down:

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

Tuning Guide – DASD Analysis

Report: **ESADSD1** DASD Configuration Velocity Software Corporate

Dev No.	Sys ID	Serial	Device Type	SHR	<CHPIDS OnLn>				MDisk Links	<----Extent---->	<--MDC St			
					01	02	03	04	Type	Start	Size	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

Tuning Guide – DASD Configuration Analysis

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:

- Shows activity by control unit
- Pend - indication of cache problems
- Compare control units to determine normality

Tuning Guide – DASD Utilization Analysis

Data Rates, Device Performance: ESADSD2

Report: **ESADSD2** DASD Performance Analysis Velocity Sof

```

Dev          Device <--SSCH--> <%DevBusy> <SSCH/sec-> <-----DASD Response tim
No. Serial  Type   Total  ERP   Avg  Peak   avg  peak   <--Service times-->
                               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:**
- 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)

Report: **ESADSD5** 3990-3 Cache Analysis Velocity Software Corporate ES
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655 First record analyzed: 04/15/11

```

-----
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
-----
11:00:00
***Top DASD by Device busy***
E95C V2U019 100 25.9 21.3 82.0 62.5 16.2 11.5 71.3 0 0 0 9.7 9.7 9.7 0 100 0
E930 V2PAG3 100 10.1 7.6 75.9 58.6 5.9 3.5 58.9 0 0 0 4.2 4.2 4.2 0 100 0
E93F V2PAG2 100 10.9 8.5 77.3 58.2 6.4 3.9 61.1 0 0 0 4.6 4.6 4.6 0 100 0
E93C V2PAG9 100 8.9 6.3 70.0 65.8 5.9 3.2 54.5 0 0 0 3.1 3.1 3.1 0 100 0
E92F V2PAG1 100 11.2 8.5 76.3 59.2 6.6 4.0 60.1 0 0 0 4.6 4.6 4.6 0 100 0
***End Top DASD by Device busy***

1800 CtlUnit 100 220 219 100 4.6 10.1 9.7 96.7 0 0 0 209.6 210 210 0 100 0
1880 CtlUnit 100 1.8 1.8 100 100.0 1.8 1.8 100 0 0 0 0 0 0 0 0 0
E900 CtlUnit 100 368 331 89.8 27.3 101 63.3 62.9 0 0 0 267.8 268 268 0 100 0
EA00 CtlUnit 100 73.0 72.3 99.1 6.9 5.0 4.4 86.8 0 0 0 68.0 68.0 68.0 0 100 0
-----
System:      100 663 624 94.2 17.7 118 79.2 67.4 0 0 0 545.3 545 545 0 100 0

```

DASD Cache:

- 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

Tuning Guide – DASD Cache Analysis

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

Network Activity

- Configuration
- Rates
- Errors
- vSwitch/Guest LAN

Tuning Guide – Network Analysis

Report: **ESATCPI** TCPIP Interface Configuration Report Velocity Sof

```
-----
NODE      Idx      Speed <-Status-> Up    <-----Interface----->
           Nbr MTU   (Est) Oper Admin Time MACAddress      Description Type
-----
```

*****Summary*****

```
Average:
TCPIP      1    1500 1000M      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
VMLOCAL    1    1500 1000M      UP      UP      0      00:20:20:20:20:20      .      .      .      .      .      .      .      .      .      .      .
LINUXVM2   2    1500  100M      UP      UP      0      02:00:00:00:00:30      eth0      .      .      .      .      .      .      .      .      .      .      .
LNXPDP02   3    1492  100M      UP      UP      0      02:00:00:00:00:04      eth0      .      .      .      .      .      .      .      .      .      .      .
V2TPSP01   1    16436  10M      UP      UP      0      00:20:20:20:20:20      lo      .      .      .      .      .      .      .      .      .      .      .
           2    1500  100M      UP      UP      0      02:00:00:00:00:15      eth0      .      .      .      .      .      .      .      .      .      .      .
V2TMSP05   1    16436  10M      UP      UP      0      00:20:20:20:20:20      lo      .      .      .      .      .      .      .      .      .      .      .
           2    1500  100M      UP      UP      0      02:00:00:00:00:09      eth0      .      .      .      .      .      .      .      .      .      .      .
V2TMSP02   1    16436  10M      UP      UP      0      00:20:20:20:20:20      lo      .      .      .      .      .      .      .      .      .      .      .
           2    1500  100M      UP      UP      0      02:00:00:00:00:06      eth0      .      .      .      .      .      .      .      .      .      .      .
V2TMSP03   1    16436  10M      UP      UP      0      00:20:20:20:20:20      lo      .      .      .      .      .      .      .      .      .      .      .
           2    1500  100M      UP      UP      0      02:00:00:00:00:07      eth0      .      .      .      .      .      .      .      .      .      .      .
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

Tuning Guide – Network Configuration Analysis

Report: **ESATCP4** TCPIP Hardware Layer/Interfaces Report

Date/Time	Node	IFT	<Total Octets> <-Per second-> Input	Output	Avg Q Len	<-Subnet packets / Sec-> <-Unicast-> Input	<NonUnicast> Output	<-----Pack <In Error> Inpt	Output	Ve
11:00:00	*** Nodes *****									
TCPIP	-	1	16897	6231.9	0	25.74	21.3	0	0	0
VMLOCAL	-	1	16859	6223.3	0	25.70	21.3	0	0	0
LINUXVM2	-	2	93.06	208.92	0	0.38	0.4	0	0	0
LNXDPA02	-	3	293.8	590.32	0	2.25	2.4	0	0	0
V2TPSP01	-	1	418.3	418.26	0	1.54	1.5	0	0	0
	-	2	188.6	666.61	0	0.95	1.2	0	0	0
V2TMSP05	-	1	323.6	323.61	0	6.16	6.2	0	0	0
	-	2	1517	2481.8	0	4.70	4.5	0	0	0
LNXDMS2A	-	3	103.4	299.74	0	0.47	0.6	0	0	0
LN XUWA01	-	1	21167	21167	0	57.81	57.8	0	0	0
	-	4	109K	122K	0	236.9	268.5	0	0	0
LN XDWA02	-	1	920.2	920.23	0	5.03	5.0	0	0	0
	-	4	9112	10306	0	25.84	24.3	0	0	0

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

Tuning Guide – Network Data Rate

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

Date/Time	Dev. Nbr	owner	Virt DevN	QDIO Fmt	Queues In	Out	Number <QDIO SIGA Instructions/Sec-> <---Guest---> Read	Writ "s"	CP <---CP---> Read	Writ "s"	<-Throughput / sec-> <Buffers> Sent	From	<--Bytes--> Sent	From	
11:00:00	0000	Totals	0000	QDIO	0	0	0	0	0	693	0	1066	676	644K	422K
	F3D8	VSWCTRL2	F3D8	QDIO	1	1	0	0	0	573	0	895	535	527K	306K
	F3E0	VSWCTRL2	F3E0	QDIO	1	1	0	0	0	119	0	171	141	118K	117K
	F53E	LN XUWA02	7002	HPER	1	4	0	0	0	0.6	0	1	0	89	0
*****Summary*****															
Average:	0000	Totals	0000	QDIO	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
	F3D8	VSWCTRL2	F3D8	QDIO	1	1	0	0	0	530	0	891	491	529K	322K
	F3E0	VSWCTRL2	F3E0	QDIO	1	1	0	0	0	108	0	149	130	85716	119K
	F3F0	VSWCTRL1	F3F0	QDIO	1	1	0	0	0	0	0	0	0	0	0
	F515	LN XDPB02	7002	HPER	1	4	0	0	0	0	0	0	0	0	0
	F518	LN XDWA01	7002	HPER	1	4	0	0	0	0	0	0	0	0	0
	F53B	LN XUWA01	7002	HPER	1	4	0	0	0	0	0	0	0	0	0
	F53E	LN XUWA02	7002	HPER	1	4	0	0	0	0.6	0	1	0	92	0
	F542	LN XUWA03	7002	HPER	1	4	0	0	0	0	0	0	0	0	0
	F545	LN XUWA04	7002	HPER	1	4	0	0	0	0	0	0	0	0	0
	F548	LN XDMS2A	7002	HPER	1	4	0	0	0	0	0	0	0	0	0

QDIO activity

- Hipersockets
- Virtual switch

Tuning Guide – QDIO Utilization Analysis

Guest LAN / Virtual Switch Data Rates: ESANIC / ESATCP4

Screen: **ESANIC** Velocity Software - VSIVM4
1 of 3 Virtual NIC Activity

Time	VSWITCH/ GuestLAN	<Virtual Userid	<Virtual NIC> Addr	<-- Data Th <Bytes/Sec>	
				Sent	Rcvd
15:24:00	VSIINT	TIML2	0600	4048	11059
		SLES11X3	0600	1160	628
		RKS2LV	0600	481	839
		REDHAT71	0600	573	376
		REDHAT64	0600	1818	846
		REDHAT56	0600	2415	964

F1=Help PF3=Quit PF4=S
PF8=Forward PF9=Sort PF10=

Screen: **ESATCP4** Velocity Software - VSIVM4
1 of 2 TCP/IP Hardware Layer / Interfaces

Time	Node/ Group	Interface	<Total Octets> <-Per second->	
			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

Tuning Guide – Network User Data Rate Analysis

```
Report: ESAOSA OSA System Configuration Report
-----
Collector <-----OSA Configuration--> MacAddress
Node      Idx  Name  Nbr  Type Level Shrd Active
-----
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
-----
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
```

Tuning Guide – OSA Utilization Analysis