Performance Analysis Flowchart

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The Analysis Problem

"z" is:

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

The challenge?

- **What challenge, it is all there!**
  - 200 zmon panels (with menus)
  - 150 zmap reports (with table of contents)
  - 3400 unique variables

Very few companies support full time performance analysts.

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The Analysis Flow chart

The challenge:

- Performance problems are visibile,
- “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

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The Challenge z/VM serves many functions (162 reports)

```
ESAHDR ESATUNE

*Performance Summary
ESASSUM ESASUM

*Transaction Activity   (5)
ESAUSLA 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

*TCPIP 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
```


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The Analysis Flow Chart

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

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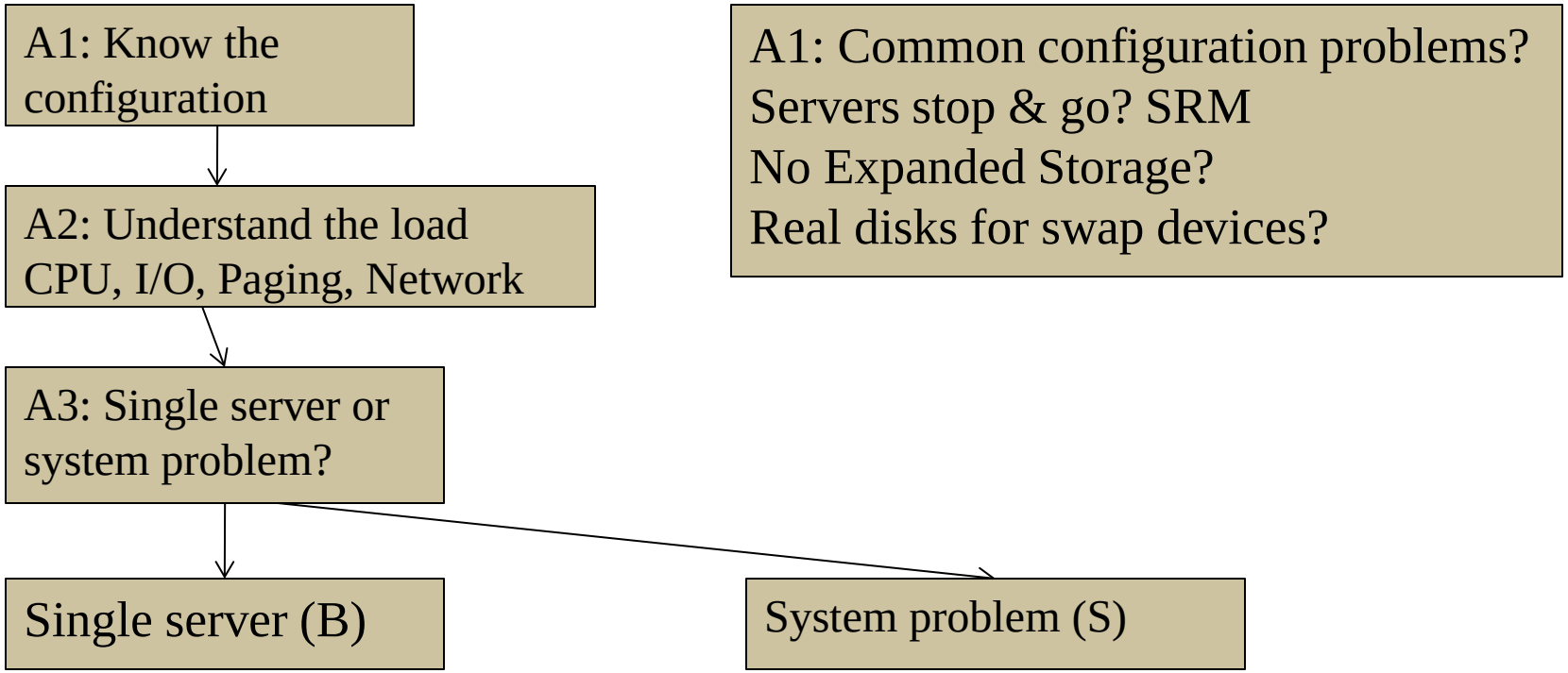
The Analysis Flow Chart



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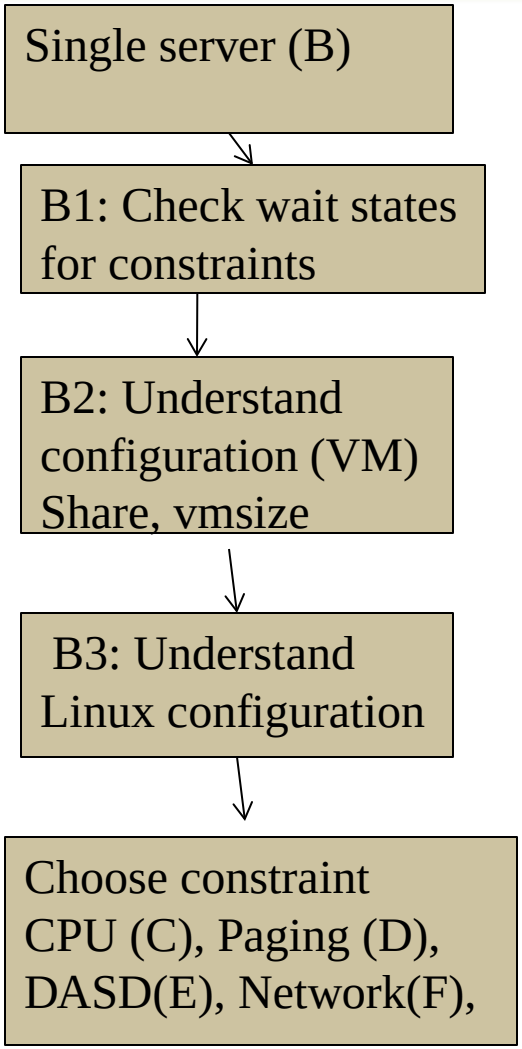
The Analysis Flow Chart



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: Vdisk used for swap?

E1: check data configuration
E2: check DASD Data rates

F1: check network configuration
F2: check network Data rates

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The Analysis Flow Chart

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 vdisk settings
U4: Page space, block paging
U5: 20% Expanded Storage

V1: top dasd, Control units?
V2: dasd cache, fast/write
V3: Device configuration

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The Analysis Flow Chart

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 configuraiton: ESATCPI
F2: Network data rates: ESATCP1/2/4
F3: Vswitch users: ESANIC
F4: Vswitch traffic: ESAVSW
F5: OSA traffice: ESAOSA

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The Analysis Flow Chart

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

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Know the configuration: ESAHDR

```
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 Faclity(CPMF) Extended is inst

Main Storage installed (MB):                 70656
Main Storage Generated (MB):                 70656
Expanded Storage installed (MB):             17152
Expanded Storage for CP (MB):                17152
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 / Expanded
- Release signficant
- Master processor significant

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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
- (Transacations are for traditional workloads)

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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
- Loading – special state, loading in working set (LDUBUF)

Normal idle wait states

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

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Wait States: ESAXACT

```
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->                          E-  D-  T-      Tst <Asynch>
/Class   Total  In Q Run Sim CPU SIO Pag SVM SVM SVM  CF Idl I/O Pag Ldg
-------- ----- ----- --- --- --- --- --- --- --- --- --- --- --- --- ---
04/15/11
11:00:00  1335  1011 4.0 0.2 0.6   0 0.5   0   0 0.1   0  91 0.1   .   .
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
 ***Key User Analysis ***
RSCS       893     1   0   0   0   0   0   0   0   0   0   0   0   0   0
RSCSDNS    893     8   0   0   0   0   0  99 100   0   0   0   0   0   0
TCPIP      893   285 0.4   0 2.5   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  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
*ITM      1786   911 1.5 0.1 2.2   0 0.5   0   0   0   0  78 0.4 0.1 0.2
*SOA     35720 31695 7.0 0.0 2.2   0 0.3   0   0   0 0.1  88 0.6 0.0 0.1
*ITM     36613 23570 1.1 0.0 1.7   0 0.3   0   0   0   0  91 0.1 0.2 0.4
*TheUsrs 24111   480 0.2 0.8 1.3   0 0.6   0  26 5.2   0  91 0.2   0 0.2
 ***Top User Analysis***
LNXUWA01   893   893  71   0 2.8   0 0.1   0   0   0   0  24 1.7 0.4   0
LNXUWA03  1786  1786  28 0.2 5.5   0 1.2   0   0   0 0.6  57 7.2 0.1 0.1
LNXUWA02  1786  1786  27 0.1 3.6   0 0.1   0   0   0 0.4  69 0.1   0 0.1
LNXQWA01  1786  1786 4.0   0 2.2   0   0   0   0   0   0  94 0.1   0   0
LNXDWA02  1786  1786 6.0   0 2.2   0 0.2   0   0   0   0  91 0.1   0   0
LNXDWA04  1786  1786 4.1   0 2.9   0   0   0   0   0   0  93   0   0 0.1
V2TPSP02   179   179  35   0 6.1   0   0   0   0   0   0  59   0   0   0
LNXDWA03  1192  1192 2.0   0 1.8   0   0   0   0   0   0  95 0.6 0.1   0
LNXTWA04  2864  2818 1.6   0 1.6   0   0   0   0   0   0  97   0   0   0
LNXUWA15  1190  1165 2.1 0.1 1.4   0   0   0   0   0   0  96   0   0   0
```


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Eligible list? ESAUSRQ

```
Report: ESAUSRQ s                    TEST MAP                          ZMAP 4.2.3 1
Monitor initiali7 serial 42556     First record analyzed: 01/10/14 13:00:00
------------------------------------------------------------------------------
         <------ <-----------Average Number of Users in Queue----------------
UserID   Logged  <-------Dispatch List-------> Limit  <-------Eligible List--
/Class       on     Q0    Q1    Q2    Q3  Ldng List      E0    E1    E2    E3
-------- ------  ----- ----- ----- ----- ----- -----  ----- ----- ----- -----
13:15:00   48.0    0.9   0.3   0.3  18.1   0.7     0      .     0     0     0
Hi-Freq:   48.0    0.8   0.4   0.2  17.9   0.4     0      0     0     0     0
 ***Key User Analysis
TCPIP       1.0    0.6     0     0     0     0     0      0     0     0     0
TCPIP1      1.0    0.0     0     0     0     0     0      0     0     0     0
 ***User Class Analysis
Servers     9.0      0   0.1   0.1   0.0   0.0     0      0     0     0     0
Velocity    9.0    0.1   0.1   0.0   0.0   0.0     0      0     0     0     0
CATech      2.0      0   0.0     0     0     0     0      0     0     0     0
*TheUsrs   22.0    0.0   0.1   0.0  17.9   0.4     0      0     0     0     0
 ***Top User Analysis
LNXEDM02    1.0      0     0     0   2.0     0     0      0     0     0     0
LNXCOG1     1.0      0   0.0   0.0   7.9   0.1     0      0     0     0     0
LNXEDM04    1.0      0   0.0   0.0   2.0   0.1     0      0     0     0     0
LNXEDM01    1.0      0   0.0   0.0   2.0   0.0     0      0     0     0     0
VMALERT     1.0    0.0     0     0     0     0     0      0     0     0     0
LNXEDM03    1.0      0   0.0   0.0   2.0   0.0     0      0     0     0     0
ZWRITE      1.0    0.1     0     0     0     0     0      0     0     0     0
ZTCP        1.0    0.0   0.1   0.0   0.0     0     0      0     0     0     0
```

Look for “Non zero eligible”

- SRM Settings?
- Check STORBUF
- Loading is percent of paging devices busy

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Special Condition, server "stops": ESAUSR4

```
Report: ESAUSR4      User Resource Utilizatio
Monitor initialized: 04/15/11 at 10:00:00 on
-----------------------------------------------
         Resid Frame Address Expanded Storage
UserID     At  List  Spaces  <-----pages---->
/Class   Reset Reord Avg Max  Read Write Migr
-------- ----- ----- --- --- ----- ----- ----
04/15/11
11:00:00   37M    86 975  65  823K 1120K 321K
***User Class Analysis***
*Servers   853     3   0   0 37047 37565  629
*System  26044     1   0   0  3016 10025  72K
*ITM      4757     1   0   0 67004 71769    0
*SOA       35M    54   0   0  289K  306K 154K
*ITM     2081K    25   0   0  307K  574K  94K
*TheUsrs     0     1 975  65 99800  100K   48
 ***Top User Analysis***
LNXUWA01   15M    13   0   0  5390 10999    0
LNXUWA03   11M    10   0   0  221K 21875    0
LNXUWA02 3619K     8   0   0 22943 36427    0
LNXQWA01 1620K     2   0   0 14094 35529    0
LNXDWA02  633K     2   0   0   451 16314    0
LNXDWA04  727K     2   0   0  1189 13708  63K
LNXUWA15  164K     1   0   0   553 10556    0
```

Prior to 6.3….

Look for "resident at reset"

- CP Sorts pages, server stops for duration
- Option to disable reorder (sort) function

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User Configuration: ESAUSRC

```
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
```

					<---------SHARE--------->						<Status>		<-MDC>		<-Storage->	
		Account	ACI Grp	CPU	<Normal>	<--MAX->		Lim	CPU	<Modes>			NO	NO	<-VM Size->	
UserID	ClassID	Code	Name	Type	Rel	Abs	Typ	Shre	-it	Cnt	VM	STG	SVM	QDSP	FS	INS	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
LNXUWA01	*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?)

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Top down:

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

CPU Capture ratio 100% down to process

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LPAR Configuration: ESALPARS

```
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
-------------------------------------------------------------------------------------------------
          <--Complex--> <-------Logical Partition--->  <-Assigned Shares---->             Proce
          Phys Dispatch              Virt <%Assigned>  <---LPAR--> <VCPU Pct> Cap-  Wait Type
Time      CPUs    Slice Name     Nbr CPUs Total  Ovhd  Weight  Pct /SYS /CPU  ped   Comp
--------  ---- -------- -------- --- ---- -----  ----  ------ ---- ---- ----  ----  ---- -----
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

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Already 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 (Also, ESACPUU, ESACPUA)

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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
                    DRITNB    27    0
                    IKNDC2    26    0
```

Look for “Shared processors”

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

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LPAR Overhead - 2: ESALPARS

```
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

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LPAR Overhead - 3: 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
```


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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
-------- ----- ----- --- ---- ----- ---- ---- ----- ---- ----- ----- ----- ----- -----
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***
LNXUWA01 67.65 67.32 1.0   3M 2889K    1   3M 3146K   3M  324K 65398  259K  15.3   0.1
LNXUWA03 54.43 53.29 1.0   4M 3848K    1   4M 3855K   4M 72353 63975  8378   7.5   0.3
LNXUWA02 50.18 49.92 1.0 685K  685K    0 855K  855K 855K  381K  296K 84613   2.2   2.7
LNXQWA01 12.23 12.11 1.0   1M 1246K    7   1M 1334K   1M  592K  541K 51075   3.1   3.0
LNXDWA02 11.73 11.64 1.0 713K  713K    6 844K  844K 844K  205K 56215  148K   2.0   0.7
LNXDWA04 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 (LNXUWA*)?
- Correct per expected? Not a performance question

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Linux Process Load: ESALNXP

```
Report: ESALNXP      LINUX HOST Process Statistics Report          Velocity Software Corporate   ESAMAP 4.1.1 0
-------------------------------------------------------------------------------------------------------------------
node/     <-Process Ident-> Nice <------CPU Percents----> <------CPU Seconds------> <Stg (k)> <-Faults/Second->
 Name     ID    PPID   GRP  Valu  Tot  sys user syst usrt Total sys  user syst usrt  Size RSS min maj mint majt
--------- ----- ----- ----- ---- ---- ---- ---- ---- ---- ----- ---- ---- ---- ---- ---- ---- --- --- ---- ----
LNXQWA01      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
LNXUWA01      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 (LNXUWA01)
- Correct? Relevant? Cron?

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Top down:

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

CPU Capture ratio 100% down to server

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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

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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  Systm 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)
- MDC? 240mb? SET MDC MAX/MIN
- VDISK normal?
- User resident should be large percent
- System “oversized”

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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
-------------------------------------------------------------------------------------------
         <---Storage occupancy in pages---> <--Main Storage page Read/Write--> Pages  <Address
UserID   <---Main Storage---> <--Paging---> <-Page Writes to:--> <Page Reads:> Moved  <pages R
/Class   Total   >2gb   <2GB  Xstor   DASD   Xsto   Disk   Migr  Xstor  Disk   <2GB   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?

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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!!!

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z/VM 6.3 Invalid but Resident Storage Analysis

```
Report: ESAUSTR      User Storage Analysis
Monitor initialized: 07/07/15 at 13:03:48 on 2964 serial 5C2A7     Fi
-------------------------------------------------------------------
         <-------Virtual Server Storage (Pages)----> <Resident> Page
UserID   Size  Alloc Resi- UFO   <-----IBR----> <AgeList> <Unreferd>
/Class                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)

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Linux Storage - 2: 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?

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Top down:

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

Paging rules change in 6.3

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Paging Subsystem: ESAPSDV

```
Report: ESAPSDV      Page And Spool Device Activity                 Velo
Monitor initialized: 04/15/11 at 10:00:00 on 2097 serial 72655      Firs
-------------------------------------------------------------------------
            <---------------Paging--------------> <--------------Spooli
 Dev        <---------Slots---------> <-per sec-> <---------Slots------
 No. Serial  Avail   Used %Use    Max  Read Write  Avail   Used %Use
---- ------ ------ ------ ---- ------ ----- ----- ------ ------ ---- --
04/15/11
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

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Page Device Busy: 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
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 30% “Peak”

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Paging Analysis: ESABLKP

```
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
```

	<----Load---->			Serv	<-Block->		<-Blocks Formed By->				Block	<--Block Exceptions/sec→			
	<-Users->		Tran	Time	<-Reads->		<-Steal->		<Migrate>		Fault	<Single Read>		<No Refers>	
Time	Actv	In Q	/sec	(ms)	/sec	Size	/sec	Size	/sec	Size	/sec	User	System	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

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Paging Analysis: ESABLKP

Report: ESABLKP Block Paging Analysis TEST MAP

	<----Load---->		Serv	<-Block->		<-Blocks Formed By->				Block	<--Block Exceptions/sec-->			
	<-Users->	Tran	Time	<-Reads->		<-Steal->		<Migrate>		Fault	<Single Read>		<No Refers>	
Time	Actv	In Q	/sec	(ms)	/sec	Size	/sec	Size	/sec	Size	/sec	User	System	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)

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DASD Subsystem Analysis

Top down:

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

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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

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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

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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)

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V2: DASD Cache: ESADSD5

```
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: 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

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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

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Network Activity

- Configuration
- Rates
- Errors
- Vswitch/guest lan

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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

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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

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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

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Guest Lan / Virtual Switch Data Rates: ESANIC / ESATCP4

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

                                    <-- Data Th
         VSWITCH/ <Virtual NIC> <Bytes/Sec>
Time     GuestLAN Userid   Addr  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  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

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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
```


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