

Introduction to Performance Management for Linux on z

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

- **Performance Management Overview**
- **Systems Management Features**
- **zVPS Objectives (and buzzwords)**
- **End to End Performance Management**
- **zVPS**
 - Data Collection
 - PDB
 - Technology
- **Applications**
- **zVPS Release Updates**

“z” Performance Management Level Set

- **SHARED resource environment,**
 - z/VM Performance critical
 - Any server or application can impact other servers or applications
- **Linux is not z/OS**
 - This is a less mature environment, even after 15 years
 - Metrics are becoming more available (fcp disk response time)
- **This is not distributed Environment**
 - **We do not have cycles to waste**
 - “agent” Adds up to 8 IFLs on our DEV z/13. We're seeing 1-2% cpu per guest.
 - We DO have capacity planning, chargeback requirements
 - **We DO expect to run at very high utilization!**
- **Tools are needed specific to the environment**
 - “end to end”

Performance Management “vendor” Requirements

- **Performance Management User Requirements**
 - **Performance Analysis**
 - **Operational Alerts**
 - **Capacity Planning**
 - **Accounting/Charge back**
- **Correct data (Virtual Linux CPU data wrong)**
- **Capture ratios (is the data valid?)**
- **Instrumentation can NOT be the performance problem**

Infrastructure Requirements: Performance Analysis

• Why Performance Analysis: Service Level Mgmt

- Diagnose problems real time
- Manage Shared resource environment
- Any application may impact other applications

• Infrastructure Requirements

- Analyze all z/VM Subsystems in detail, real time
 - (DASD, Cache, Storage, Paging, Processor, TCPIP)
- Analyze Linux
 - (applications, processes, processor, storage, swap)
- Historical view of same data important
 - Why are things worse today than yesterday?
 - Did adding new workload affect overall throughput?
 - Know who/what is using resource and how to re-allocate

Infrastructure Requirements: Capacity Planning

- **Why Capacity Planning: Future Service Levels**
 - How many more servers can you support with existing z13?
 - What is capacity requirements for an application?
 - **Avoid crises *in advance***
 - Consolidation Planning – Projecting requirements of the next 100 or 1000 servers
- **Infrastructure Requirements**
 - Performance database (long term)
 - z/VM **AND** Linux data
 - Resource requirements by Server, Application, User
 - z/VM and z/Linux data must be usable by existing planners
 - **Interface to MICS, MXG, ~~TUAM~~, ~~TDS~~, IUE (BMC)**

Infrastructure Requirements: Chargeback

- **Why Chargeback?**

- Distributed chargeback model is by server
- Shared chargeback model is by resource utilized
- Convincing customers to move applications to “z”
- Encourages efficient/effective resource use
- Align IT to your business model

- **Infrastructure Requirements**

- Identify Resource by server
- Identify Resource by Linux Application
- **High capture ratio**
- Every site does it differently, so flexible data is key

Infrastructure Requirements: Operations

- **Operational Requirements**

- Operations will manage 100's (1000's) of servers
 - Requires active performance management
- Alerts for processes in loops, disks 90% full, missing processes
- One test server in a loop impacts all other servers
- Requires active performance management

- **Infrastructure Requirements**

- Fast problem detection
- Interface to SNMP management console (NETCOOL, HPOpenView)
- User tailored alerts
- Web based alerts

“End to End” Performance Management

- **Management wants**
 - “single pane of glass” - One tool that does all
- **Complete performance management includes:**
 - z/VM System Level: CEC, LPAR data, ALL SubSystems
 - VSE – partitions, CPU, I/O
 - Linux – Storage, CPU, file system, network
 - Process – applications, performance data
- **Network analysis**
- **Application subsystem analysis**
 - Java, WAS, Oracle, (MQ, DB2)
- **Outside “z” server analysis**
 - Linux on “x”, VMWare, KVM
 - Microsoft servers
 - VPN, gateways, utilities

zVPS Data Sources

- **Standard Interfaces mean less work**
 - Snmp is “Agentless”, non-proprietary
- **CP Monitor – z/VM**
 - LPAR data, CPU data
 - Disk, storage, paging data
 - Virtual machine data
 - Seeks data
- **SNMP – Standard (requires zTCP collector)**
 - Network data, microsoft servers, many appliances
 - VSE data
 - Linux “UCD” mib – high level ram, CPU
- **SNMP – Velocity Software mib**
 - Process details, applications, Java, WAS, Oracle

z/VM Performance monitor architecture

Traditional model (1988)

ESAMON/zMON: Real time analysis

- Uses Standard CP Monitor

Real Time Analysis

ESAMAP/zMAP: Performance Reporting

Post (midnight) Processing

Creates Long Term PDB

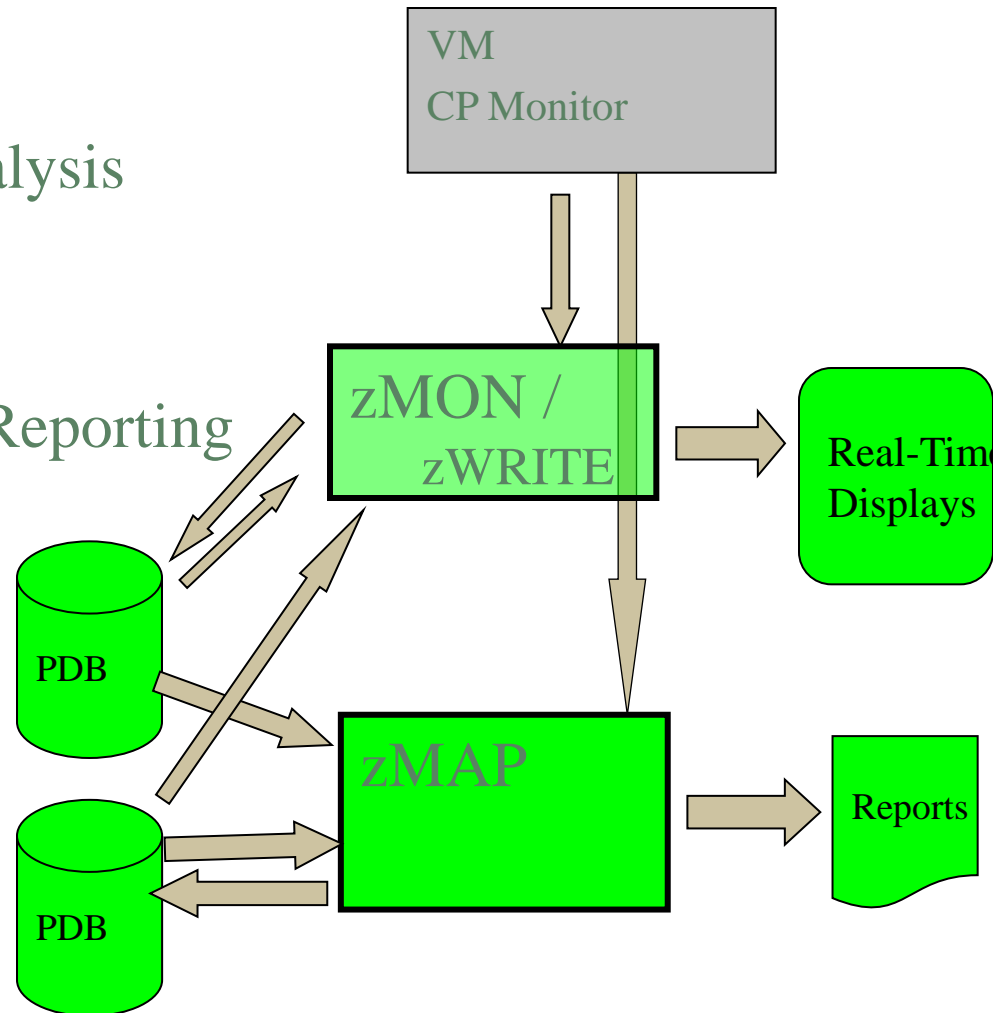
PDB or monwrite data input

PDB (Performance DataBase)

Complete data

By Minute, hour, day

Monthly/Yearly Archive



zMON 3270 Overview

Screen: ESAMAIN Velocity Software - VSIVM4 ESAMON 4.090 01/18 16:32-17:04
 1 of 3 System Overview LIMIT 500 2096 44B42

Time	<---Users--->			Transact.		CPUs	<Processor>		Cap- ture Ratio	<---Storage (MB)-->		
	<-avg number- On	Actv	In Q	per Sec.	Avg. Time		Utilization Total	Virt.		Fixed User	Active Resid.	Stor Load
17:04:00	137	67	17.0	28.5	0.14	1	13.7	12.3	100	60	2608	0.6
17:02:00	137	68	16.0	29.3	0.14	1	19.4	17.2	100	61	2611	0.6
17:01:00	137	71	20.0	28.9	0.17	1	55.5	48.4	100	60	2609	0.6
16:59:00	137	69	18.0	27.6	0.16	1	19.1	16.9	100	60	2598	0.6
16:58:00	137	67	17.0	28.4	0.12	1	16.2	14.7	100	60	2596	0.6
16:57:00	137	70	22.0	27.8	0.14	1	15.2	13.6	100	61	2597	0.6
16:56:00	137	62	22.0	27.9	0.14	1	64.5	62.9	100	60	2600	0.6
16:55:00	137	64	18.0	29.4	0.12	1	17.6	15.8	100	60	2594	0.6
16:54:00	137	62	20.0	28.8	0.13	1	16.3	14.9	100	61	2589	0.6
16:53:00	137	62	19.0	27.8	0.14	1	15.5	13.9	100	61	2592	0.6
16:52:00	137	68	20.0	27.8	0.13	1	18.0	16.3	100	60	2592	0.6
16:51:00	137	65	21.0	28.6	0.13	1	15.2	13.7	100	60	2594	0.6
16:50:00	137	62	17.0	28.2	0.15	1	16.8	15.3	100	61	2597	0.6
16:49:00	137	65	17.0	28.2	0.13	1	14.9	13.4	100	60	2597	0.6
16:48:00	137	62	18.0	28.2	0.12	1	16.2	14.8	100	61	2600	0.6
16:47:00	137	69	19.0	28.4	0.13	1	15.2	13.7	100	61	2598	0.6
16:46:00	137	63	20.0	27.1	0.14	1	63.9	62.2	100	60	2599	0.6
16:45:00	137	65	21.0	27.9	0.14	1	17.0	15.4	100	60	2599	0.6
16:44:00	137	65	25.0	28.6	0.13	1	14.9	13.6	100	60	2605	0.6
16:43:00	137	67	25.0	29.3	0.13	1	14.7	12.9	100	60	2603	0.6
16:42:00	137	70	22.0	28.8	0.14	1	17.3	15.6	100	59	2597	0.6
16:41:00	137	66	23.0	27.9	0.14	1	15.6	14.2	100	61	2611	0.6
16:40:00	136	63	25.0	27.8	0.15	1	16.0	14.7	100	59	2611	0.6
16:39:00	136	64	23.0	28.2	0.13	1	14.6	13.2	100	60	2611	0.6
16:38:00	136	62	21.0	27.8	0.14	1	16.1	14.7	100	61	2609	0.6
16:37:00	136	67	20.0	28.1	0.13	1	15.0	13.6	100	60	2609	0.6
16:36:00	136	65	21.0	27.5	0.15	1	63.4	62.0	100	61	2607	0.6
16:35:00	136	63	22.0	27.5	0.15	1	15.4	14.0	100	60	2605	0.6
16:34:00	136	64	20.0	27.9	0.12	1	16.1	14.7	100	61	2604	0.6
16:33:00	136	64	20.0	28.4	0.15	1	14.9	13.5	100	60	2609	0.6

PF1=Help PF2=Menu PF3=Quit PF4=Select PF5=Plot PF6=TOC PA1=CP
 PF7=Backward PF8=Forward PF9=Sort PF10=Parms PF11=More PF12=Exit PA2=Copy
 ==>

zMON 3270 TOC

```
Screen: ESATOC Velocity Software - VSIVM4 ESAMON 4.090 01/18 17:07-17:08
1 of 1 Screen Table Of Contents 2096 44B42
```

Screen	Description
Management Summary	
ESAMAIN	System Overview
ESAHDR	System Configuration
System Management Summary	
ESAMGMT	System Management
ESAMSLA	Management Service Level Analysis
ESAMTOP	Top Users Management Report
Performance Summary	
ESASUM	System Load Summary
ESASUMCH	Channel Path Summary
ESASUMIO	Input/Output Summary
ESASUMPR	Processor Summary
ESASUMPS	Paging And Spooling Summary
ESASUMSM	Service Machine Summary
ESASUMSR	Scheduler Parameter Summary
ESASUMST	Storage Summary
ESASUMTR	Transaction Analysis Summary
ESASUMMD	Minidisk Cache Summary
Service Level Activity	
ESAUSLA	User Service Level Analysis
ESAXACT	Transaction Analysis
Transaction Activity	
ESARATE	Transaction Rates And Response Times
ESASYSR	Transaction Rates And Response Times
ESACLAS	Transaction Classification
ESAEXCP	Transaction Exception Log
User Activity	
ESAUSR1	User Log Activity
ESASRV1	Server Log Activity (Special)
ESAUSRC	User Configuration Analysis
ESASRVC	Server Configuration Analysis (Special)

PF2=View PF3=Quit PF7=Backward PF8=Forward PF12=Exit
====>

zMON 3270 zoom

```
Screen: ESAUSP2 Velocity Software - VSIVM4 ESAMON 4.090 01/18 17:09-17:10
1 of 3 User Percent Utilization CLASS * 2096 44B42
```

Time	UserID /Class	<Processor>		<-----Main Storage----->		Lock -ed	<-WSSize-->	
		Total	Virt	Total	Actv		Total	Actv
17:10:00	System:	15.32	14.23	667K	665K	5448	675K	665K
	REDHAT	4.58	4.53	281K	281K	1997	284K	284K
	TEST	3.56	2.98	161K	161K	844	161K	160K
	*TheUsrs	3.12	3.02	57661	57645	290	59127	57322
	SUSE	1.63	1.57	109K	109K	839	109K	108K
	ORACLE	0.96	0.96	50503	50503	66	50437	50437
	Velocity	0.93	0.90	4552	3444	28	7385	3401
	KeyUser	0.36	0.15	2973	2973	1379	1898	1573
	Servers	0.17	0.13	943	520	5	1874	495

Hit PF2 to zoom on SUSE class, get:

```
Screen: ESAUSP2 Velocity Software - VSIVM4 ESAMON 4.090 01/18 17:11-17:12
1 of 3 User Percent Utilization CLASS SUSE USER * 2096 44B42
```

Time	UserID /Class	<Processor>		<-----Main Storage----->		Lock -ed	<-WSSize-->	
		Total	Virt	Total	Actv		Total	Actv
17:12:00	SLES11X	0.39	0.39	24223	24223	247	23976	23976
	SLES11	0.32	0.32	12404	12404	181	12199	12199
	SUSELNX2	0.25	0.23	3648	3648	0	3628	3628
	SLES9X	0.21	0.21	14632	14632	35	14597	14597
	SLES10	0.20	0.20	28935	28935	299	28636	28636
	SLES9	0.20	0.20	12722	12722	177	12545	12545
	SLES8	0.06	0.03	11251	11251	0	11201	11201
	SLES8X	0	0	0	0	0	890	0
	SUSELNX1	0	0	0	0	0	219	0

zMAP Operations

zMAP listings and zMON displays SAME names

Report: ESATOC Table Of Contents
Monitor initialized: 12/23/14 at 13:55:
Monitor period: 660 seconds (

Report	Title	Page(s)
ESAHDR	z/VM Monitor Analysis	3- 8
ESATUNE	Tuning Recommendation Report	9- 21
	Performance Summary	
ESASSUM	Subsystem Activity	22
ESASUM	System Summary	23- 28
	Transaction Activity	
ESAUCLA	User Service Level Analysis	29- 31
ESAXACT	Transaction Delay Analysis	32- 40
ESARATE	Transaction Rates And Response Times	41- 46
ESACLAS	Transaction Classification	47
	User Activity	
ESASRVC	Server Configuration	48
ESASRV1	Server Log Activity	49
ESAU SRC	User Configuration	50
ESAU SR1	User Log Activity	51

zMAP Performance Data Base

History data format – long term

- All history in “daily” files, yyymmdd

zMAP, EXTRACT Formats

- ESAMAP yyymmdd
- ESAMAP (WEEK 51
- ESAMAP (MONTH 12
- Same for ESAEXTR

Performance Database “EXTRACT”

- **Performance database language:**
 - ESAEXTR – ZMAP feature
 - HISTORY KEYWORDS – describes variable names (~4000 metrics)
- **ESAEXTR Functions**
 - ESAEXTR filetype* (PARM ucdsys CSV
 - Filetype is history type, as in 201606* for “june”
 - CSV produces CSV format vs column aligned
- **ESAEXTR Statements**
 - EXTRACT:
 - x = 'NODE'
 - y = 'UCDSYS.REALSIZE'
 - y = 'UCDSYS.BUFFER'
 - y = 'UCDSYS.CACHE'
 - y = 'UCDSYS.REALSIZE-UCDSYS.REALAVAIL-UCDSYS.BUFFER-UCDSYS.CACHE' ; anonymous
 - y = 'UCDSYS.SWAPSIZE-UCDSYS.SWAPAVAIL'
 - y = 'UCDSYS.CMM'
 - **criteria = NODE = LNXD01*** ; wild card
 - TITLE = 'Linux Storage Analysis'
 - TITLE = '*Label Available Buffer Cache Anonymous'

Capacity Planning “planning”

- **Monitor data very large**
 - Process it real time, extract information, discard the data
 - All classification and collection done before discard
- **Classification functions**
 - User classes – defined by installation, some predefined
 - “Key users”, class 0 is special
 - DASD and non-DASD Control Units
- **USERCLASS statements**
 - nuserclass = 20
 - class_size = 140
 - nclasses = 1

 - Userclass(03,000) = 'ZVPS '
 - Userclass(03,007) = 'ZMAP'
 - Userclass(03,008) = 'ZMON'
 - Userclass(03,009) = 'ZWRITE'
 - Userclass(03,010) = 'ZSERVE'
 - Userclass(03,011) = 'ZTCP'
 - Userclass(03,016) = 'ZTCP'
 - Userclass(03,017) = 'ZWEB*'

Benefits of Architecture – day one support

- z/VM new releases supported day 1 (Note stg size)**

Report: ESASTR1

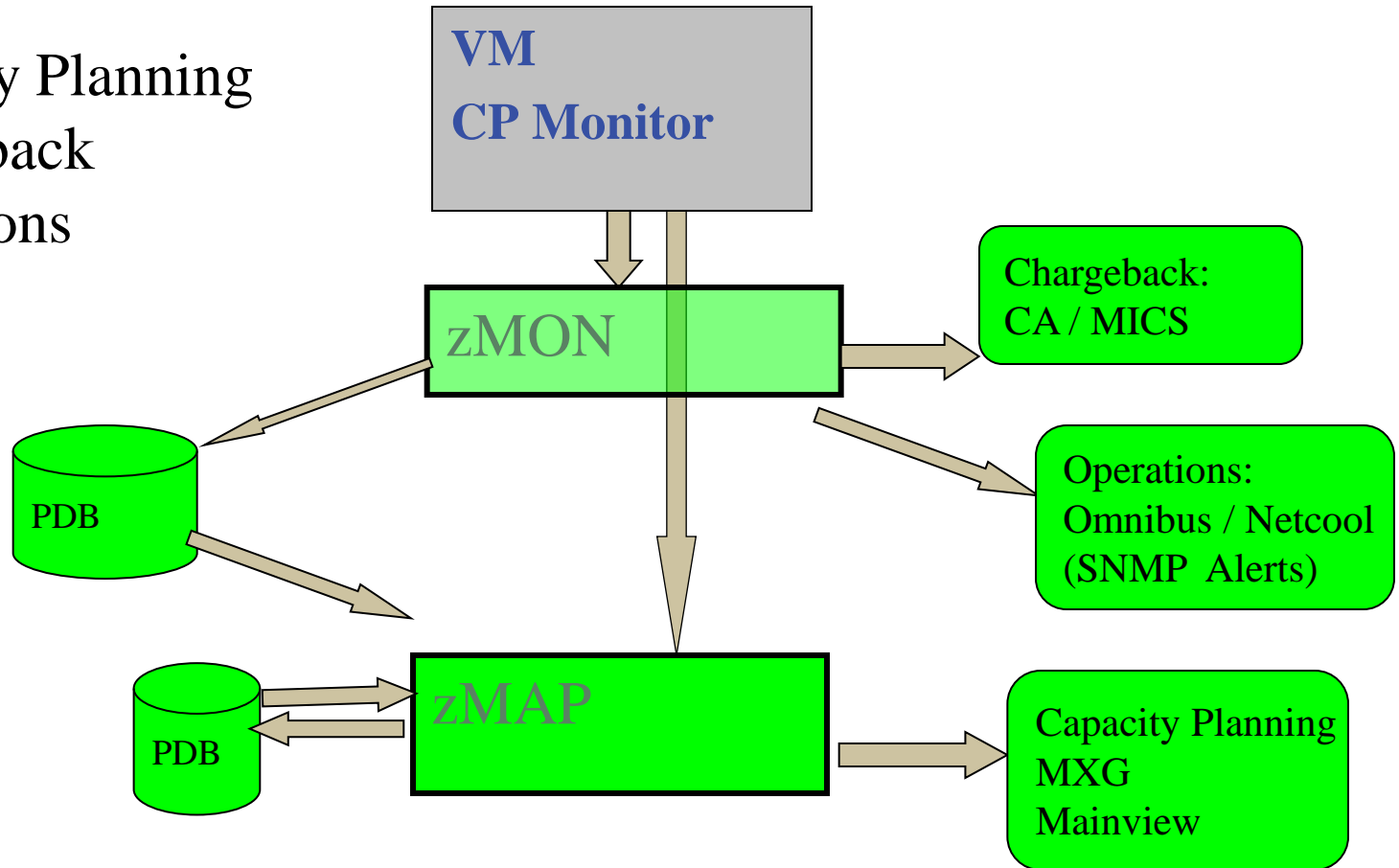
Velocity Software Corporate

```

-----
      Users <-----Pages-----Over
      Loggd System <Available> System  User  <-AddSpace> VDISK Commit  Capt-
Time      On Storage<2gb  >2gb  ExSpc Resdnt  System User  Rsdnt Ratio  Ratio
-----
15:29:00   69 138412K   84 1258K 10296   134M 1641K    0    0 1.915   1.000
15:30:02   69 138412K  109 1649K 10194   134M 1699K    0    0 1.915   1.000
15:31:00   69 138412K  178 1540K 10059   134M 1732K    0    7 1.915   1.000
15:32:00   67 138412K  838 2974K  9869 89040K 1764K    0   21 1.915   0.686
15:33:03   66 138412K 200K   46M  9717 58977K 1064K    0   26 1.915   0.776
15:34:08   66 138412K 390K   77M  9277 23615K  707K    0   22 1.915   0.743
15:36:01   65 138412K 486K  136M  8669 204895 81839    0   10 1.915   0.995
15:37:00   65 138412K 486K  136M  8426 205722 78891    0   10 1.915   0.996
15:38:00   62 138412K 486K  137M  8333 206309 14582    0    0 1.915   1.000
*****Summary*****
Average:    66 138412K 250K   65M  9392 57454K  912K    0   16 1.915   0.903
    
```

Add "Enterprise" Support

Capacity Planning
Chargeback
Operations



Linux Requirements (2000)

- **Linux (and networks) adds requirement**
 - **Correct data (bad assumption)**
 - **Complete data (very difficult)**
 - **Low cost data (extremely difficult)**
- **Support requirements:**
 - SLES 7,8,9,10, 11, 12 (Installations still have 7 and 8)
 - RHEL 3,4,5, 6,7
 - Other distributions (Ubuntu supported)??
 - Other platforms (VSE, VMWare, SUN, P, **MicroSoft**)
- **Must support:**
 - Performance tuning (one minute granularity)
 - Capacity planning (15 minute granularity)
 - Operational alerts (one minute granularity)
 - Chargeback/Accounting (15 minute granularity)

Instrumentation Issues

- **Operational cost of agents**

- Does your agent use 2%? 5%? 95%? of a processor per Linux server?
- Does this matter on distributed servers where agents were created?
- Will local data collection fill up your file system?
- Does turning off performance monitoring solve the performance problem?
- Do you only turn on your agent when you have a problem???
- Diagnostics vs Performance Management?
- **Customer quote: an agent that costs 1% of a processor will cost me 10 IFLs**
- **(standard snmp host mib, about 1%, vsi mib is .1%)**

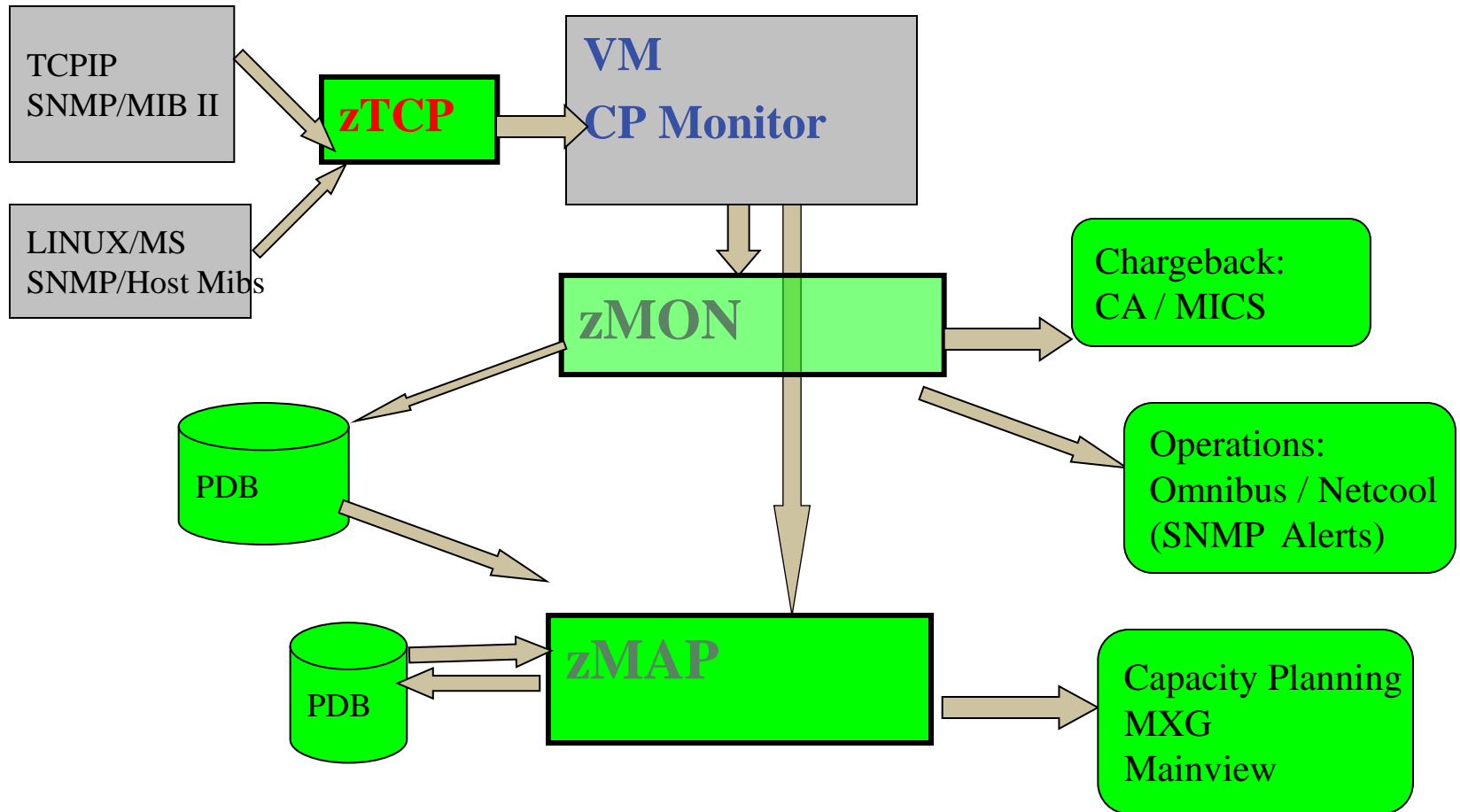
- **Agents must provide correct data**

- Is your data correct? Or wrong by order of magnitude?
- Prior to SLES10/RHEL5, all “Virtual” agents provide wrong data
- **Why collect bad data?**

Network, Linux Instrumentation

- **Performance Data infrastructure existed (zMON/zMAP)**
 - PDB already existed for performance analysis and Capacity Planning
 - Data presentation tools existed
- **Data source needed for Linux and Network:**
 - Passive agent (do not measure idle servers)
 - **Low overhead (want to monitor 100 / 1000 servers under z/VM)**
 - **Agents developed for Intel and Distributed servers did not care about overhead**
 - Open Source (fast development time), instrumentation **MUST** be part of the platform
 - Standard interface
- **SNMP: Standard interface for network and host data**
 - Provided by TCPIP Vendor
 - **Not proprietary agent! – Can't charge for it....**
 - Used to collect network, host data from NT, SUN, HP
 - NETSNMP available for Linux - Meets all requirements
 - (Distributed with RHEL 3,4,5 SLES 7,8,9,10,11)
 - **Platform independent (Intel, P-series, Microsoft, Linux)**
 - **.03% of ONE IFL (z10,sles9) per server, ONE MINUTE COLLECTION**

Add “Network” and “host” Support – Pre Linux



zTCP originally for Full Network Monitor

MibII: Transport layer, IP layer, hardware layer, icmp

- Transport layer data shows connections, TCP rates, UDP rates

```
Report: ESATCP1          TCPIP Transport Layer Data Report
-----
Date/      <-----TCP Connections-----> <-TCP Communications / sec
Time/      Current  <Opens/Second> <Closes/Sec> <----Segments Transmitted-
Node       Connects Active Passive Fails Resets Input Outpt ReTran InError
-----
00:15:00
***Node Groups***
KeyUser    1.1    0.0    0.0    0.0    0    0.04  0.06  0.07  0.00
*TheUsrs   21.9   1.3    1.6    0.2    0  48.74 48.75  0.00   0
VsLPARs    5.3    0.1    0.5    0.1    0.3  8.02 11.95  0.29  0.08
*** Nodes *****
oracle     16.9   0.5    1.0    0      0  24.51 24.52  0.00   0
RH5X161    0      0      0      0      0    0    0    0    0
S11R20RA   5.0    0.8    0.6    0.2    0  24.25 24.26  0    0
TCPIP      0      0.0    0.0    0.0    0    0.02  0.03  0.03  0.00
TCPIP2     0      0      0      0      0    0.01  0.01  0    0.00
TCPIP2     1.1    0.0    0.0    0.0    0    0.02  0.03  0.03  0.00
VSIVM1     2.0    0.0    0.0    0.0    0    0.49  0.59  0.10  0.01
VSIVM2     1.1    0.0    0.0    0.0    0    0.02  0.03  0.03  0.00
VSIVM4     2.2    0.0    0.4    0.0    0.3  7.51 11.33  0.15  0.07
```

Analyzing “distributed” Disks

Standard HOST MIB

data:

Provides disk data

Percent full

Supports WinNT, Unix

Alerts by disk full

Standard data!!!

```
Report: ESAHST2          LINUX HOST Storage Analysis Report
Monitor initialized: 02/05/07 at 10:41:41 on 2084 serial 55BAF
```

```
-----
```

NODE/ Time/ Date	Index	<-Utilization-> <MegaByte> Pct			Errors	<-----Storage-----> Alloc		Description
-----	-----	Size	Used	Full	-----	Units	-----	
10:43:00								
acme								
	1	495	14.2	2.9	0	1024	Memory Buffers	
	2	495	487	98.4	0	1024	Real Memory	
	3	2031	12.8	0.6	0	1024	Swap Space	
	4	2310	775	33.6	0	4096	/	
	6	2310	1293	56.0	0	4096	/usr	
dominoz1								
	1	2002	38.5	1.9	0	1024	Memory Buffers	
	2	2002	1994	100	0	1024	Real Memory	
	3	2031	97.4	4.8	0	1024	Swap Space	
	4	2310	1556	67.4	0	4096	/	
	6	2310	1398	60.5	0	4096	/usr	
	7	984K	238K	24.2	0	4096	/notesdata	
ebiz1								
	1	997	9.0	0.9	0	1024	Memory Buffers	
	2	997	992	99.5	0	1024	Real Memory	
	3	2031	514	25.3	0	1024	Swap Space	
	4	2310	1607	69.6	0	4096	/	
	6	2310	1451	62.8	0	4096	/usr	
	7	101K	10K	10.3	0	4096	/notesdata	

Distributed Systems Process data Windows NT

Screen: **ESAHST1 NT Data** ESAMON V3.2 07/30 14:56-14:57

1 of 1 LINUX HOST Software Analysis Report NODE * LIMIT 500

Time	Node	<--Software Program----->				<CPU Seconds>		CPU	Storage(K)
		Name	ID	Type	Status	Total	Intrval	Pct	Current
14:57:00	ENTWDB	NetTime.	2648	4	1	4259	0.68	1.12	1320
		NetTime.	2452	4	1	982	0.57	0.94	1040
		sqlagent	2408	4	1	100	0.03	0.05	3724
		snmp.exe	2268	4	1	73	0.07	0.12	3888
		taskmgr.	2224	4	1	21076	0.28	0.46	2524
		sqlservr	2136	4	1	50038	9.53	15.72	511624
		NetTime.	1808	4	1	10481	1.47	2.42	1092
		sqlmangr	1660	4	1	189	0.01	0.02	3664
		DLLHOST.	1648	4	1	102	0.02	0.03	4684
		liccheck	1352	4	1	1272	0.04	0.07	1584
		DLLHOST.	1284	4	1	2158	0.09	0.15	6660
		inetinfo	1208	4	1	3063	0.10	0.16	9708
		WinVNC.e	1160	4	1	20742	0.56	0.92	3536
		explorer	788	4	1	2252	0.14	0.23	5336
		SERVICES	272	4	1	6892	1.50	2.47	7480
		msdtc.ex	164	4	1	71	0.02	0.03	5108

Standard
Host
Process
Data....

Linux user cpu by process name by class

Managing applications across many servers....

Report: ESAHSTA LINUX HOST Application Report

```

-----
Node/      Process/      <Application Status Counts> <-----Processor----->
Date      Application          Run-   Res   Load  <---Utilization--->
Time      name              Total Actv ning  Wait  -ed   Percent seconds Avg
-----
07:04:00
***Node Groups***
TheUsers *Totals*      840.0  138  11.0    829    0    88.0    52.7  0.1
  automoun      1.0  1.0    0    1.0    0    0.0    0.0  0.0
  events/0      1.0  1.0    0    1.0    0    0.0    0.0  0.0
  httpd        277.0  106  1.0    276    0    86.0    51.5  0.3
  java         2.0  2.0    0    2.0    0    0.0    0.0  0.0
  ksoftirq     3.0  1.0    0    3.0    0    0.0    0.0  0.0
  rotatelo     72.0  14.0  0    72.0    0    1.0    0.6  0.0
  sendmail     6.0  3.0    0    6.0    0    0.0    0.0  0.0
  sidd         1.0  1.0    0    1.0    0    0.2    0.1  0.2
  snmpd        9.0  9.0  9.0     0    0    0.7    0.4  0.1
  
```

Standard Linux **ucd** mib: Managing Storage (RAM)

Report: ESA**UCD2** LINUX UCD Memory Analysis Report Linux Test
 Monitor initialized: 02/05/07 at 10:41:41 on 2084 serial 55BAF First recor

```
-----Storage Sizes (in MegaBytes)-----
Node/ <-----Real Storage--> <-----SWAP Storage-----> Total <-----Storage in Use-
Time/ <-----Real Storage--> <-----SWAP Storage-----> Total <-----Storage in Use-
Date Total Avail Used Total Avail Used MIN Avail Shared Buffer Cache
-----
```

Node/	Total	Avail	Used	Total	Avail	Used	MIN	Avail	Shared	Buffer	Cache
10:43:00											
acme	494.7	7.7	487.0	2031	2018	12.8	15.6	2026	0	14.2	39.1
dominoz1	2002.1	8.0	1994	2031	1934	97.4	15.6	1942	0	38.6	1417
ebiz1	997.1	5.7	991.4	2031	1517	513.7	15.6	1523	0	8.9	635.8
ebiz2	997.1	13.0	984.2	2031	1878	152.8	15.6	1891	0	26.9	607.8
ibmds1	2002.1	11.6	1990	2031	2029	2.0	15.6	2041	0	84.0	1484
ebizdev2	997.1	6.8	990.4	2031	1980	51.3	15.6	1986	0	63.3	530.9
ebizdev1	997.1	8.0	989.2	2031	1754	277.3	15.6	1762	0	43.8	521.2
ibmedge1	1007.3	497.1	510.2	2031	2031	0	15.6	2528	0	174.9	165.4
ibmds3	8031.8	81.5	7950	2031	2031	0	15.6	2112	0	320.3	6494
ibmedge2	1007.3	492.7	514.6	2031	2031	0	15.6	2524	0	175.3	167.4
ibmred2	997.1	4.5	992.6	2031	2026	4.6	15.6	2031	0	98.4	586.4
ibmred1	997.1	9.7	987.4	2031	2026	4.6	15.6	2036	0	98.7	578.5
tdirdb2	4012.0	31.9	3980	2031	1613	418.1	15.6	1645	0	250.1	3017
tdirtam	4012.0	1294	2718	2031	2031	0	15.6	3325	0	235.1	2106
tdirtds	4012.0	1061	2951	2031	2031	0	15.6	3092	0	324.8	2259
tdirtim	4012.0	1007	3005	2031	2031	0	15.6	3038	0	239.7	1981
tdsds-a1	997.1	124.0	873.1	2031	2031	0	15.6	2155	0	87.1	569.0
ibmds2	8031.8	78.0	7954	2031	2031	0.4	15.6	2109	0	251.7	6546

UCD mib is
standard Linux mib

Linux data shows
Real storage
Swap storage
“cache”

Swapping is “good”

If not swapping,
reduce vm size
Use CMM to
reduce

Snmp, Velocity Software mib

- **Standard mib**

- MIB II: 1.3.6.1.2.1 (Network)
- HOST 1.3.6.1.2.1.25 (process, file system device, memory)

- **Private mibs:**

- Private: 1.3.6.1.4
- **ucd-snmp 1.3.6.1.4.1.2021.**
- **Velocity 1.3.6.1.4.1.F971**
- **VeloJava 1.3.6.1.4.1.F971.100.**
- **VeloOracle 1.3.6.1.4.1.F971.11**
- **VeloVSE 1.3.6.1.4.1.F971.10.1**

- **IBM 1.3.6.1.4.1.2**
- **IBMVSE 1.3.6.1.4.1.2.6.81FD**

- **Why Velocity mib?**

- Performance, ucd takes 1%, host takes 1%+
- **Native Linux Tools not sufficient for “management”**
- **Management takes more data collected on regular basis**

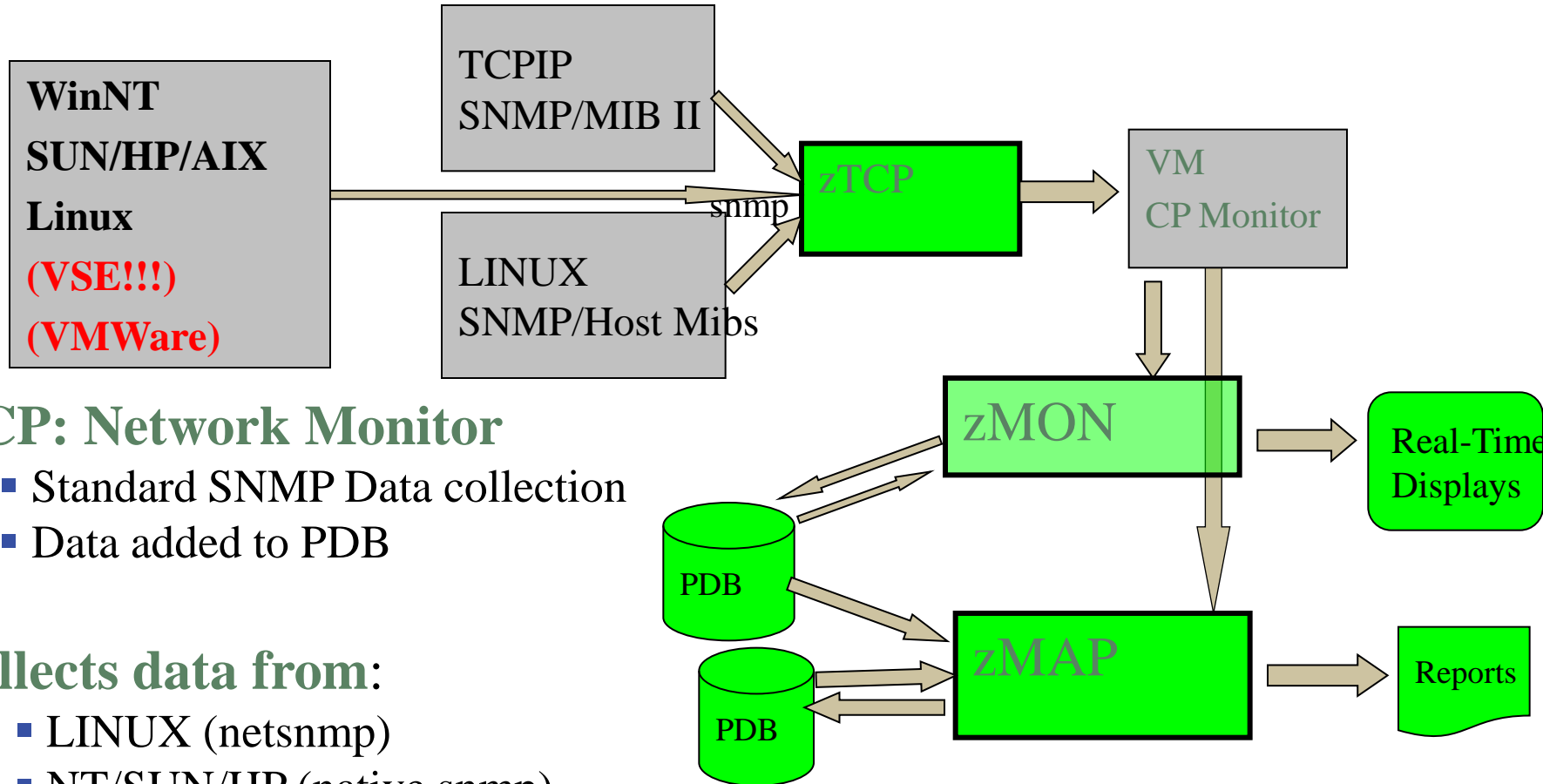
Linux, so many tools, so little time

- pidstat – per process statistics
- slabtop – kernel memory pool consumption
- lsof – check file flags of open files
- blktrace – low level disk I/O analysis
- htop – cross guest cpu consumption monitor
- iptraf - network traffic monitor
- dstat – very configurable live system overview
- irqstats – check irq amount and cpu distribution
- smem – per process/per mapping memory overview
- htop – top on steroids
- strace – system call statistics
- vmstat – virtual memory statistics
- sysstat – full system overview
- iostat – I/O related statistics
- dasdstat – disk statistics
- scsi statistics – disk statistics
- valgrind – in depth memory/cache analysis and leak detection –
- Java Health Java Health Center – high level java overview and monitoring –
- Java Garbage Collection and Memory visualizer – in depth gc analysis –

But wait, there's more

- netstat – network statistics and overview
- Socket Statistics – extended socket statistics
- top / ps – process overview
- icastats / lszcrypt – check usage of crypto hw support
- lsluns / multipath – check multipath setup
- lsqeth – check hw checksumming and buffer count
- ethtool – check offloading functions
- collectl – full system monitoring
- ftrace – kernel function tracing
- ltnng – complex latency tracing infrastructure –
- ziomon – Analyze FCP setup and I/O
- systemtap – another kernel tracing infrastructure
- wireshark / tcpdump – analyze network traffic in de-pth
- iotop – order processes by disk I/O
- iftop - per connection traffic overview
- oprofile – combined system / user space profiling
- lscppu – check CPU location – meminfo – check current memory state

Snmp today....



zTCP: Network Monitor

- Standard SNMP Data collection
- Data added to PDB

Collects data from:

- LINUX (netsnmp)
- NT/SUN/HP (native snmp)
- Printers/Routers....
- **THOUSANDS OF SERVERS?**

Operational Support - SNMP Alerts

Issue with SNMP alerts on linux servers

- How many control points? (one per server?)
- How many configuration files? (one plus per server?)

ZVPS SNMP Alert Architecture

- Centralized alert
- One point of control (ZALERT)

SNMP alerts sent to any SNMP operations console

- Create “SNMP TRAPDEST” file
 - * this file is the list of snmp trap destinations
 - * format is ip address, and community name
- ```
67.100.74.25 velocity
```

## Sending SNMP alerts by other functions:

```
/* authorized user can send alerts */
parse arg msg
'CP MSG ZTCP ALERT' msg
```

# Benefit of using standard interface?

- z/VM new releases supported day 1 (Note stg size)

Report: ESAUCD2

LINUX UCD Memory Analysis Report

Veloc

```

Node/ <-----Storage Sizes (in MegaBytes)-----
Time/ <--Real Storage--> <-----SWAP Storage----> Total <----Storage i
Date Total Avail Used Total Avail Used MIN Avail CMM Buffer

15:29:00
ZLNXT030 994.8 407.7 587.1 256.1 256.1 0 15.6 663.8 0 21.8
ZLNXT006 494.7 388.8 105.9 511.5 511.5 0 15.6 900.3 0 19.3
ZLNXT017 3008.7 2612 396.9 1279 1279 0 15.6 3891 0 29.5
ZLNXT002 2001.3 902.4 1099 512.0 512.0 0 15.6 1414 0 53.9
ZLNXT007 201192 96151 103K 1023 1023 0 15.6 97174 0 18.1
ZLNXT009 201192 165K 32356 640.1 640.1 0 15.6 166K 0 19.9
ZLNXT013 201192 171K 26563 7.9 7.9 0 15.6 171K 0 22.2
ZLNXT010 201192 181K 15917 1535 1535 0 15.6 182K 0 24.3
ZLNXT011 201192 194K 2280 128.9 128.9 0 15.6 194K 0 28.4

```

# Process Capture Ratio with Velocity mib

- High cpu capture ratio

Report: ESALNXV LINUX Virtual Processor Analysis Report

| Node/ Name | VM ServerID | <Linux Pct CPU> |      |      | <Process Data> |      |      | Capture Ratio | Prorate Factor |
|------------|-------------|-----------------|------|------|----------------|------|------|---------------|----------------|
|            |             | Total           | Syst | User | Total          | Syst | User |               |                |
| 10:03:00   |             |                 |      |      |                |      |      |               |                |
| NEALE1     | LNEALE1     | 100.0           | 11.4 | 88.6 | 100.2          | 11.5 | 88.7 | <b>1.002</b>  | 1.000          |

Report: ESALNXP LINUX HOST Process Statistics Report

| node/ Name | <-Process Ident-> |       |       | Nice | <-----CPU Percents-----> |      |      |      |      |     |
|------------|-------------------|-------|-------|------|--------------------------|------|------|------|------|-----|
|            | ID                | PPID  | GRP   | Valu | Tot                      | sys  | user | syst | usr  | usr |
| 10:03:00   |                   |       |       |      |                          |      |      |      |      |     |
| NEALE1     | 0                 | 0     | 0     | 0    | 100                      | 0.43 | 3.35 | 11.0 | 85.4 |     |
| kswapd0    | 100               | 1     | 1     | 0    | 0.12                     | 0.12 | 0    | 0    | 0    |     |
| snmpd      | 1013              | 1     | 1012  | -10  | 0.13                     | 0.03 | 0.10 | 0    | 0    |     |
| sh         | 3653              | 3652  | 30124 | 0    | 52.7                     | 0    | 0    | 9.37 | 43.3 |     |
| gmake      | 9751              | 9750  | 30124 | 0    | 43.4                     | 0.02 | 0.02 | 1.37 | 42.0 |     |
| sh         | 10129             | 9751  | 30124 | 0    | 0.02                     | 0.02 | 0    | 0    | 0    |     |
| sh         | 10130             | 10129 | 30124 | 0    | 0.63                     | 0.03 | 0.23 | 0.28 | 0.08 |     |
| cc1        | 10307             | 10306 | 30124 | 0    | 3.12                     | 0.18 | 2.93 | 0    | 0    |     |
| rpmbuild   | 30124             | 16382 | 30124 | 0    | 0.07                     | 0.03 | 0.03 | 0    | 0    |     |
| sh         | 30125             | 30124 | 30124 | 0    | 0.02                     | 0    | 0.02 | 0    | 0    |     |
| gmake      | 30126             | 30125 | 30124 | 0    | 0.02                     | 0    | 0.02 | 0    | 0    |     |

Report: ESALNXC LINUX Process Conf

| Node/ Name | <-Process ID | Ident-> PPID | GRP   | <-----Pr Path |
|------------|--------------|--------------|-------|---------------|
| NEALE1     |              |              |       |               |
| init       | 1            | 0            | 0     | init [3]      |
| migratio   | 2            | 1            | 0     | migratio      |
| ksoftirq   | 3            | 1            | 0     | ksoftirq      |
| events/0   | 4            | 1            | 0     | events/0      |
| khelper    | 5            | 4            | 0     | khelper       |
| kblockd/   | 6            | 4            | 0     | kblockd/      |
| cio        | 41           | 4            | 0     | cio           |
| cio_noti   | 42           | 4            | 0     | cio_noti      |
| kslowcrw   | 43           | 4            | 0     | kslowcrw      |
| apldata    | 96           | 4            | 0     | apldata       |
| aio/0      | 101          | 4            | 0     | aio/0         |
| pdflush    | 5266         | 4            | 0     | pdflush       |
| pdflush    | 26647        | 4            | 0     | pdflush       |
| kswapd0    | 100          | 1            | 1     | kswapd0       |
| kmcheck    | 158          | 1            | 1     | kmcheck       |
| syslogd    | 976          | 1            | 976   | /sbin/sy      |
| klogd      | 979          | 1            | 979   | /sbin/kl      |
| snmpd      | 1013         | 1            | 1012  | snmpd         |
| portmap    | 1030         | 1            | 1030  | /sbin/po      |
| rpciod     | 1034         | 1            | 1     | rpciod        |
| lockd      | 1035         | 1            | 1     | lockd         |
| sshd       | 1072         | 1            | 1072  | /usr/sbi      |
| sshd       | 16272        | 1072         | 16272 | sshd: bu      |
| sshd       | 16288        | 1072         | 16288 | sshd: bu      |
| sshd       | 16290        | 16288        | 16288 | sshd: bu      |
| bash       | 16291        | 16290        | 16291 | bash          |
| python     | 16312        | 16291        | 16291 | python        |
| do-bui     | 16313        | 16312        | 16291 | /bin/sh       |
| bb_do      | 16382        | 16313        | 16291 | /usr/bin      |
| rpmb       | 16415        | 16382        | 16415 | rpmbuild      |
| rpmb       | 30124        | 16382        | 30124 | rpmbuild      |

# Correct Linux Performance Data?

- **Valid and Correct?**

- **Process data from Linux under z/VM is wrong**

- All process accounting based on timer ticks
    - TOP, ALL other agents “lie” when under z/VM
    - Corrected in SLES10, RHEL5 (now underreports)

- Sample wrong by factor of 10-100 prior to SLES10

- Well known issue since 2001
    - [HTTP://velocitysoftware.com/present/CaseAFS](http://velocitysoftware.com/present/CaseAFS)
    - Mostly corrected by “steal timer”

- **Leads to solving performance problems?**

- z/VM owns the shared resources
  - **“Native” tools will not detect many problems**
  - **“performance was unexplainably bad so we abandoned the project”**
  - Skills, experience and Education help...

# Analyzing Linux CPU (Capacity) by process

Velocity MIB data:  
Provides process data  
Parent/Child relationship

Note ALL application  
processes are owned by  
“24445”.

```
Report: ESALNXP LINUX HOST Process Statistics Report
Monitor initialized: 02/05/07 at 10:41:41 on 2084 serial 5

node/ <-Process Ident-> Nice <-----CPU Percents----->
Name ID PPID GRP Valu Tot sys user syst usrt

10:43:00
dominoz1 0 0 0 0 9.9 3.20 6.69 0 0
ksoftirq 5 1 0 19 0.03 0.03 0 0 0
ksoftirq 7 1 0 19 0.05 0.05 0 0 0
kswapd0 134 1 1 0 0.05 0.05 0 0 0
kjournal 1140 1 1 0 0.08 0.08 0 0 0
snmpd 1775 1 1774 -10 0.27 0.16 0.11 0 0
scontrol 24521 24445 24414 0 0.03 0 0.03 0 0
server 24539 24521 24414 0 1.46 0.41 1.06 0 0
logasio 24553 24539 24414 0 0.14 0.11 0.03 0 0
event 28636 24539 24414 0 0.16 0.03 0.14 0 0
replica 28663 24539 24414 0 1.76 0.27 1.49 0 0
update 28665 24539 24414 0 5.36 1.92 3.44 0 0
amgr 28667 24539 24414 0 0.03 0 0.03 0 0
adminp 28670 24539 24414 0 0.19 0.08 0.11 0 0
sched 28676 24539 24414 0 0.03 0 0.03 0 0
rnrmgr 28686 24539 24414 0 0.03 0 0.03 0 0
clrepl 28920 24539 24414 0 0.22 0 0.22 0 0
```

# Analyzing Linux CPU by Application

## Velocity MIB data:

- Provides process data
- Parent/Child relationship
- Allows combining into “applications”
- Note the “bash/24445” “application”

Define alerts based on application

```
Report: ESALNXA LINUX HOST Application Report
Monitor initialized: 02/05/07 at 10:41:41 on 2084 ser

Node/ Process/ ID <---Processor Percent--->
Date Application <Process><Children>
Time name Total sys user syst usrt

10:43:00
dominoz1 *Totals* 0 9.9 3.2 6.7 0 0
 bash 24445 9.4 2.8 6.6 0 0
 kernel 1 0.2 0.2 0 0 0
 snmpd 1775 0.3 0.2 0.1 0 0
```

# Analyzing Linux CPU by Userid

Velocity MIB data:

Provides process data

Parent/Child relationship

And reporting by Linux userid

Allows alerts by userid

Report: ESALNXU            LINUX USER Analysis Report

Monitor initialized: 02/05/07 at 10:41:41

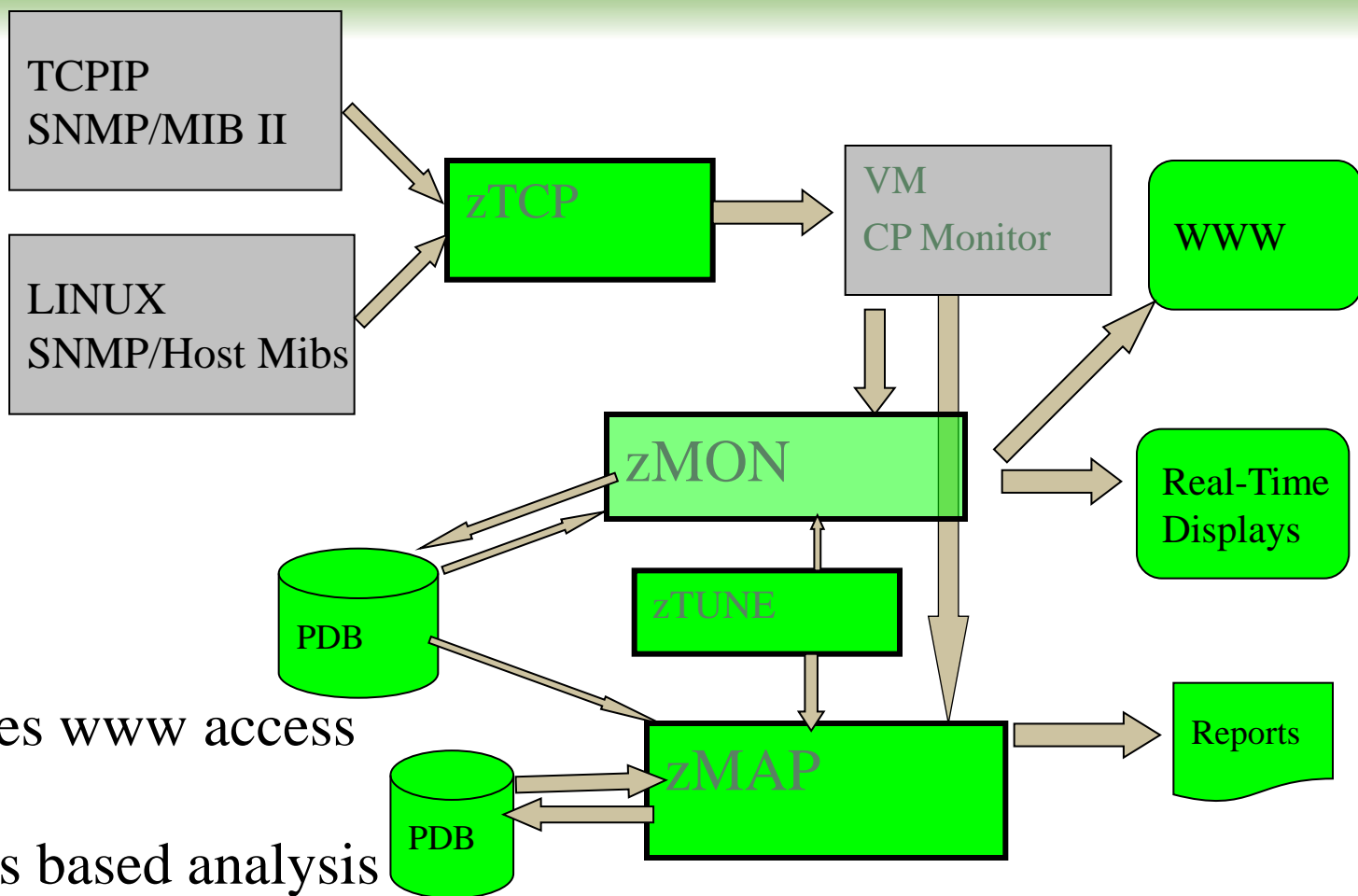
```

Node/ <---Processor Percent--->
Date <-----User and Group Identity-----> <Process><Children>
Time Userid GroupID usrpid grppid Total sys user syst usrt

10:43:00
dominoz1 bin root 1 0 0 0 0 0 0
 daemon daemon 2 2 0 0 0 0 0
 lp lp 4 7 0 0 0 0 0
 notes notes 1001 1001 9.4 2.8 6.6 0 0
 root root 0 0 0.5 0.4 0.1 0 0
```



# Modernize: Webserving, performance skills



**ZVWS** Provides www access

**zTUNE**: Rules based analysis

- Many installations lack z/VM and Linux on z/VM tuning skills
- Velocity Software's objective is to ensure our customer performance problems are resolved – quickly.
- zTUNE includes configuration guidance, health checks when ever installation requests, and assistance in all areas of Linux on z/VM and z/VM performance
- no more **“performance was unexplainably bad so we abandoned the project”**

# Health Checker for z/VM, Linux: zTUNE

- Focus more now on simplifying problem resolution
- User reports that applications complained about zLinux / WAS performance:

```
Report: ESATUNE Tuning Recommendation Report
Monitor initialized: on 2084 serial 9ABED

```

```
The following changes are suggestions by Velocity Software
to enhance performance of this system.
```

```
However, Velocity Software takes no responsibility -
all tuning is the responsibility of the installations.
Please call 650-964-8867 if you have any questions about
these values, or suggestions on report enhancements.
```

```
USR2 User LINUX160 is paging excessively (75.0 per second)
This user can be protected using SET RESERVED
```

```
SPL5 Spool utilization is 100% full.
Perform Spool file analysis and purge large
spool files, or force users currently writing
excessively to spool.
```

```
*****zTUNE Evaluation *****
```

```
XAC1 User total PROCESSOR WAIT excessive at 33 percent.
Current reporting threshold set to 20.
This is percent of inqueue time waiting for
specific (PROCESSOR)resources to become available.
```

```
LPR3 LPAR share is too low, causing USER CPU Wait
```

```
VM LPAR allocated share: 0.94 percent of total
VM LPAR used 389 percent of allocated share
```

- **Performance Management**
  - VMWare (node grouping)
  - Mixed mode capacity planning
  - Granularity in virtual processor reporting (ESALNXS, ESAUCPU)
  - Disk performance for Linux (ESALNXF)
  - VSE
  - LGR support
  - zVIEW V2
  - zALERT
- **Operational support**
  - Global Installer
  - zPRO Portal
- **Other**
  - Framework for future products and enhancements
  - **Customer enhancement requests - MANY**

- **Added DNS Names capability**

```
community = 'velocity' TCPIP='TCPIP' nodegrp = 'VSILPARs'
```

```
dnsport = 53
```

```
dnsIPADDR = '64.105.172.26'
```

```
node = 'VSIVM1' domain='vsivm1.VelocitySoftware.com'
```

```
node = 'VSIVM2' domain='vsivm2.VelocitySoftware.com'
```

```
node = 'VSIVM3' domain='vsivm3.VelocitySoftware.com'
```

```
node = 'VSIVM4' domain='demo.VelocitySoftware.com'
```

- **Added SSI Support - monitor where operating**

```
TCPIP='TCPIP' peerport = 1998
```

```
peeraddr = '67.218.99.132' peerport = 1998 ;vsivm2
```

```
peeraddr = '67.218.99.134' peerport = 1998 ;vsivm4
```

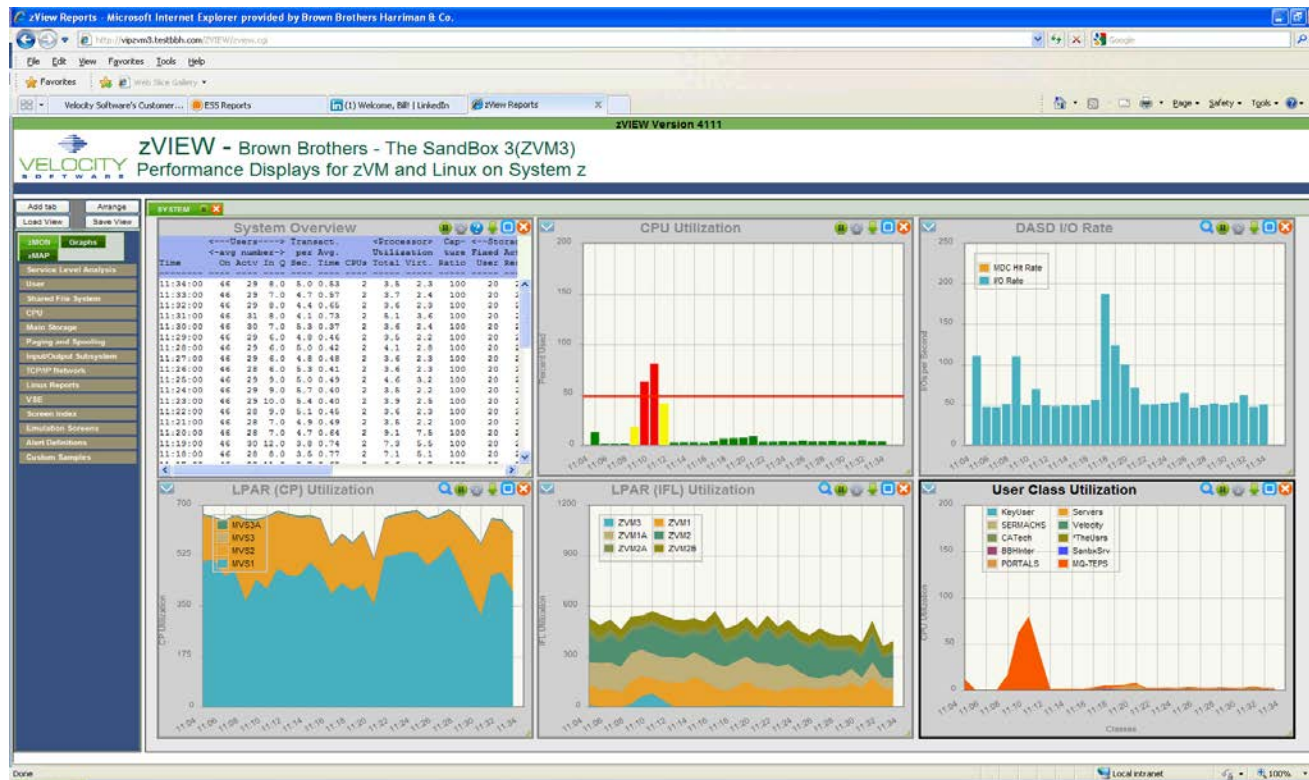
```
peeraddr = '67.218.99.135' peerport = 1998 ;vsivm5
```

```
Ssiflag = '1'b
```

```
Node = 'lnxssl' domain='prod.mylinux.mycompany.com'
```

# zVIEW Version 2 Example

zVIEW V1 written in Java, poor performance, difficult to extend  
zVIEW V2 much better



## Tailorable, expandable, zoomable

Today is Monday 2 Dec 2013 zVIEW Version 4159

**VELOCITY SOFTWARE** **zVIEW**  
Enterprise View - Velocity Software - VSIVM4 (DEMO)

**First level**

| VSIVM1                                        | Expand | VSIVM2                                         | Expand | VSIVM3(old)                                | Expand |
|-----------------------------------------------|--------|------------------------------------------------|--------|--------------------------------------------|--------|
| VM1   13/12/02   18:29   CP Total (2)   6.63% |        | VM2   13/12/02   18:29   IFL Total (1)   0.91% |        | VM3   13/12/02   21:29   024B42-0   99.22% |        |
| Linux Nodes (Distributed Servers)             |        | Linux Nodes (z/VM-Guests)                      |        | Linux Nodes (z/VM-Guests)                  |        |
| LINUX9 (9)   3.93%                            |        | RH5X161   0.43%                                |        | LES11T   2.29%                             |        |
| suselnx3 (9)   2.57%                          |        | RH5Z161   0.37%                                |        | Linux Nodes (Distributed Servers)          |        |
| REDHAT (2)   2.30%                            |        |                                                |        | PENSUSE   7.68%                            |        |

**Demo System V4**

| Demo                              | 13/12/02 | 18:29 | IFL Total (1) | 17.77% |
|-----------------------------------|----------|-------|---------------|--------|
| Linux Nodes (z/VM-Guests)         |          |       |               |        |
| roblx1                            | 2.83%    |       |               |        |
| redhat6                           | 1.18%    |       |               |        |
| oracle                            | 0.82%    |       |               |        |
| redhat56                          | 0.47%    |       |               |        |
| redhat5x                          | 0.43%    |       |               |        |
| lxsugar (2)                       | 0.41%    |       |               |        |
| redhat64                          | 0.31%    |       |               |        |
| sles8 (2)                         | 0.31%    |       |               |        |
| sles10                            | 0.29%    |       |               |        |
| redhat5                           | 0.27%    |       |               |        |
| redhat3                           | 0.25%    |       |               |        |
| redhat6x                          | 0.24%    |       |               |        |
| suselnx2                          | 0.22%    |       |               |        |
| sles11 (2)                        | 0.22%    |       |               |        |
| sles11x                           | 0.20%    |       |               |        |
| sles11x3                          | 0.19%    |       |               |        |
| sles9x                            | 0.18%    |       |               |        |
| scsil0s                           | 0.17%    |       |               |        |
| sles10x4                          | 0.17%    |       |               |        |
| sles9                             | 0.16%    |       |               |        |
| Linux Nodes (Distributed Servers) |          |       |               |        |
| linux93 (2)                       | 100.00%  |       |               |        |
| opensuse (2)                      | 8.97%    |       |               |        |
| JIRA (2)                          | 5.88%    |       |               |        |
| vpnbrz                            | 5.50%    |       |               |        |
| vpnbrc                            | 4.76%    |       |               |        |
| mail (9)                          | 3.42%    |       |               |        |
| vpnz                              | 2.35%    |       |               |        |

**Second level**

**Tims Test System**

| Tim1.2                    | 13/11/27 | 13:09 | IFL Total (1) | 0.10% |
|---------------------------|----------|-------|---------------|-------|
| Linux Nodes (z/VM-Guests) |          |       |               |       |
| redhat56                  | 1.85%    |       |               |       |
|                           | 1.50%    |       |               |       |
|                           | 0.85%    |       |               |       |
| redhat56                  | 0.57%    |       |               |       |

# ZMON Drill down Options

The screenshot shows the ZMON interface with a sidebar on the left and a main data table on the right. The sidebar has a 'User' section with a list of users, including 'ESAUUSPG'. The main table is titled 'User Storage Analysis' and shows storage occupancy in pages for various users and classes. A red arrow points from the 'User' section in the sidebar to the 'ESAUUSPG' user in the table.

| Time     | UserID /Class | <---Storage occupancy in pages--- |        |        | <---Main Storage pages--- |        |       |      |      |
|----------|---------------|-----------------------------------|--------|--------|---------------------------|--------|-------|------|------|
|          |               | Total                             | >2GB   | <2GB   | Xstor                     | DASD   | Xstor | Disk | Migr |
| 17:10:00 | System:       | 664879                            | 197480 | 467399 | 747999                    | 2609K  | 28    | 0    |      |
| 17:10:00 | *TheUsers     | 41674                             | 12525  | 29149  | 22170                     | 199418 | 0     | 0    |      |
| 17:10:00 | KeyUser       | 3430                              | 1901   | 1529   | 349                       | 8276   | 0     | 0    |      |
| 17:10:00 | ORACLE        | 34842                             | 11904  | 22938  | 6711                      | 188759 | 0     | 0    |      |
| 17:10:00 | REDHAT        | 258455                            | 78708  | 179747 | 536580                    | 592520 | 0     | 0    |      |
| 17:10:00 | REDHAT5X      | 87333                             | 33358  | 53975  | 485474                    | 31158  | 0     | 0    |      |
| 17:10:00 | REDHAT5       | 46665                             | 12525  | 34140  | 5737                      | 108832 | 0     | 0    |      |
| 17:10:00 | REDHAT6       | 19821                             | 5939   | 13882  | 23266                     | 105537 | 0     | 0    |      |
| 17:10:00 | Servers       | 1210                              | 810    | 400    | 1978                      | 30403  | 0     | 0    |      |
| 17:10:00 | SUSE          | 176464                            | 48152  | 128312 | 51280                     | 864768 | 0     | 0    |      |
| 17:10:00 | TEST          | 142604                            | 39842  | 102762 | 125496                    | 693779 | 0     | 0    |      |
| 17:10:00 | Velocity      | 4105                              | 2268   | 1837   | 1591                      | 23659  | 0     | 0    |      |
| 17:10:00 | Web           | 2095                              | 1370   | 725    | 1844                      | 7372   | 28    | 0    |      |

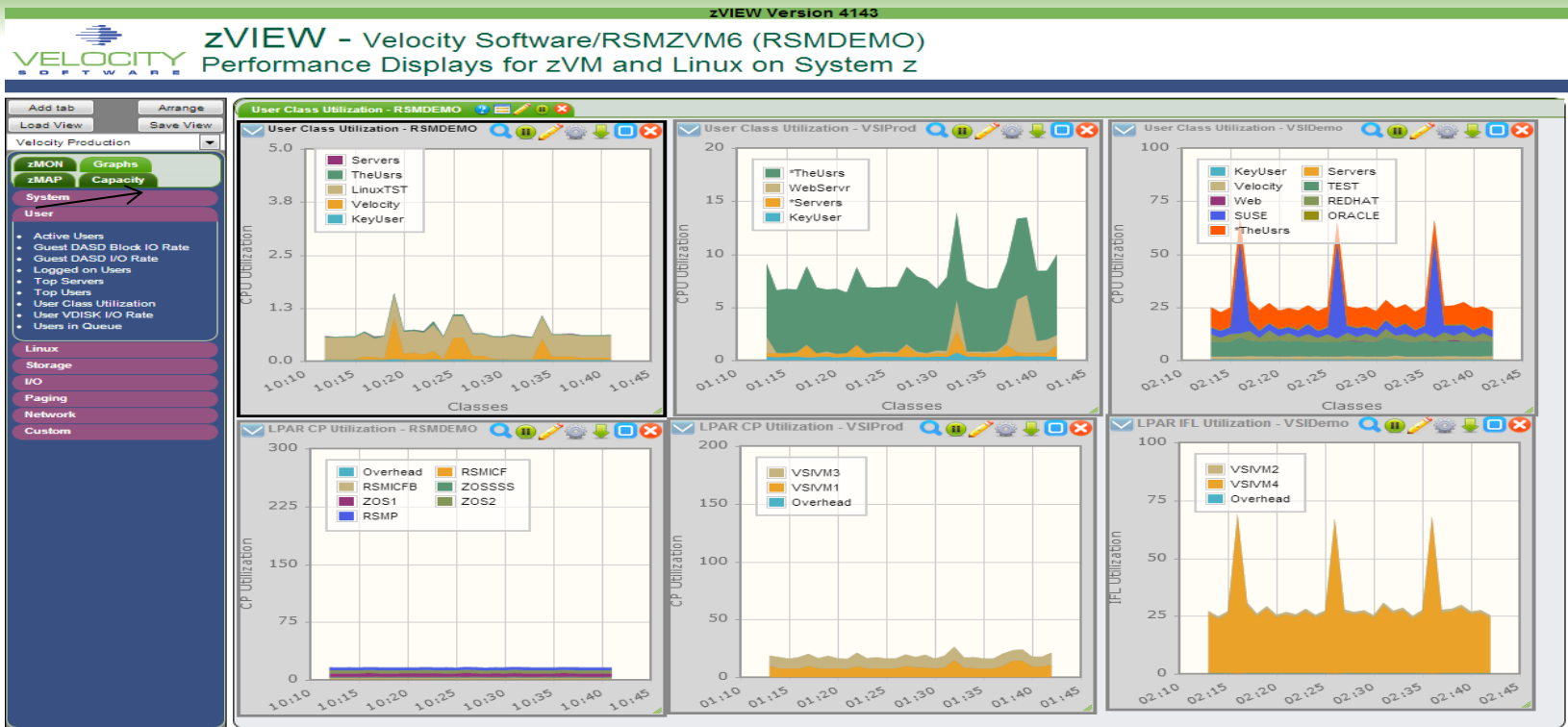
Click on “user” to see user screens

Click on “redhat” class to see “redhat users”

Oracle data available 4.2

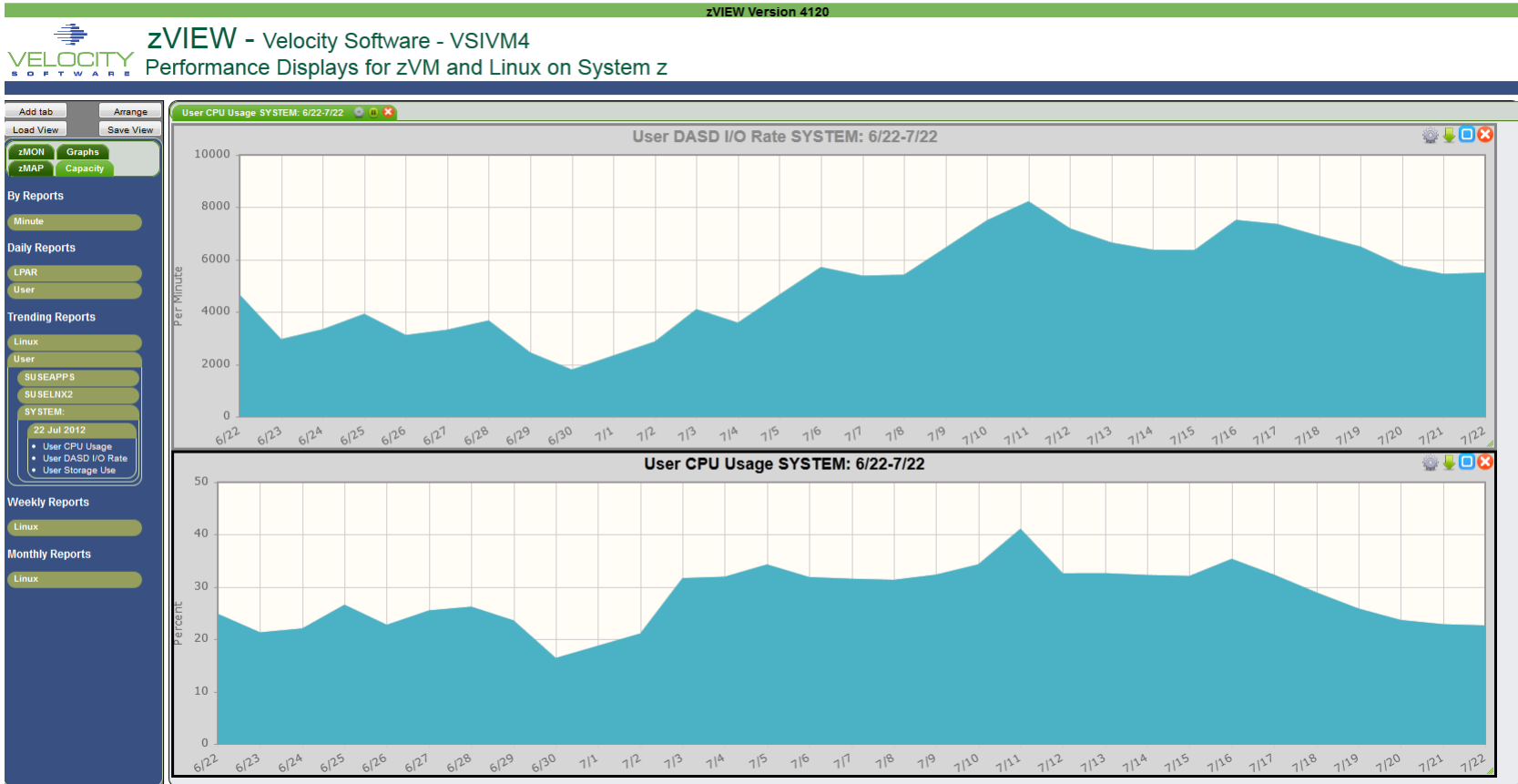


# Multiple System View (3 LPARs - 2012)



Oracle data from multiple lpar's visible on one tab

# zMAP Capacity/Trend Graphs



# zALERT - Operational Support

- **Alerts**
  - User tailorable
  - 3270 based, web based, and / or SNMP
  - Alerts can be set on any variable or calculated variable
- **Linux alert examples:**
  - Disk full
  - Missing processes (requires complete data)
  - **Looping processes (requires correct data)**
- **z/VM alert examples**
  - Page/spool space full (avoid abends)
  - Looping servers
  - DASD service times
- **Network alert examples**
  - Transport errors
  - ICMP rates
  - Bandwidth thresholds

# zALERT – Automate problem detection

## 3270 Style Alerts (50+ sample alerts provided)

```
Screen: LINALERT Velocity Software 25 Mar 2015 06:42:29
----- Exceptions Analysis Alerts -----
Type Description
LNDX / area on oracle is 79.51% full
LNDX /opt area on oracle is 82.24% full
LNDX /home area on oracle is 59.02% full
LNDX / area on RH5X161 is 32.54% full
LNDX / area on S11R20RA is 81.56% full
LNDX /boot area on S11R20RA is 2
LNDX /opt area on S11R20RA is 95
LNDX /mnt/oracle area on S11R20RA is 2
LNSU Swap utilization for Linux
LNSU Swap utilization for Linux
```

Today is Wednesday 25 Mar 2015 zVIEW Version 4174  
zVIEW - Velocity Software - VSIVM4 (DEMO)  
Performance Displays for zVM and Linux on System z

| Code | Alert Description                               |
|------|-------------------------------------------------|
| LNSU | CPU utilization on Linux node BlakeMC is 13.86% |
| LNDX | / area on lxsugar is 90.74% full                |
| LNDX | /usr area on lxsugar is 57.59% full             |
| LNDX | / area on opensuse is 39.71% full               |
| LNDX | /home area on opensuse is 53.23% full           |
| LNDX | /iso/sles11s area on opensuse is 100.00% full   |
| LNDX | /iso/s11sp2 area on opensuse is 100.00% full    |
| LNDX | /iso/s11sp2 area on opensuse is 100.00% full    |
| LNDX | /iso/s11sp3 area on opensuse is 100.00% full    |
| LNDX | /iso/s11sdk area on opensuse is 100.00% full    |
| LNDX | /iso/s10sp2 area on opensuse is 100.00% full    |
| LNDX | /iso/r64 area on opensuse is 100.00% full       |
| LNDX | /iso/r62 area on opensuse is 100.00% full       |
| LNDX | /iso/s10v1 area on opensuse is 100.00% full     |
| LNDX | /iso/r7 area on opensuse is 100.00% full        |
| LNDX | /iso/sles11s area on opensuse is 100.00% full   |
| LNDX | /iso/s12-1 area on opensuse is 100.00% full     |
| LNDX | /iso/s12-2 area on opensuse is 100.00% full     |
| LNDX | /iso/s12sdk1 area on opensuse is 100.00% full   |
| LNDX | /iso/s12sdk2 area on opensuse is 100.00% full   |
| LNDX | / area on oracle is 79.51% full                 |
| LNDX | /opt area on oracle is 82.24% full              |
| LNDX | /home area on oracle is 59.02% full             |
| LNDX | / area on redhat5 is 52.26% full                |
| LNDX | / area on redhat5x is 32.54% full               |
| LNDX | / area on redhat56 is 95.80% full               |
| LNDX | /mnt area on redhat56 is 53.23% full            |
| LNDX | / area on redhat6 is 30.00% full                |
| LNDX | / area on redhat6x is 94.92% full               |
| LNDX | /dev/shm area on redhat6x is 51.42% full        |
| LNDX | / area on redhat64 is 36.09% full               |
| LNDX | /boot area on rhel7v is 23.79% full             |
| LNDX | / area on roblnx2 is 78.74% full                |

Or Browser based  
Click Thru  
or SMS, email...

# zOPERATOR

## Several requests to extend ESAOPER screen

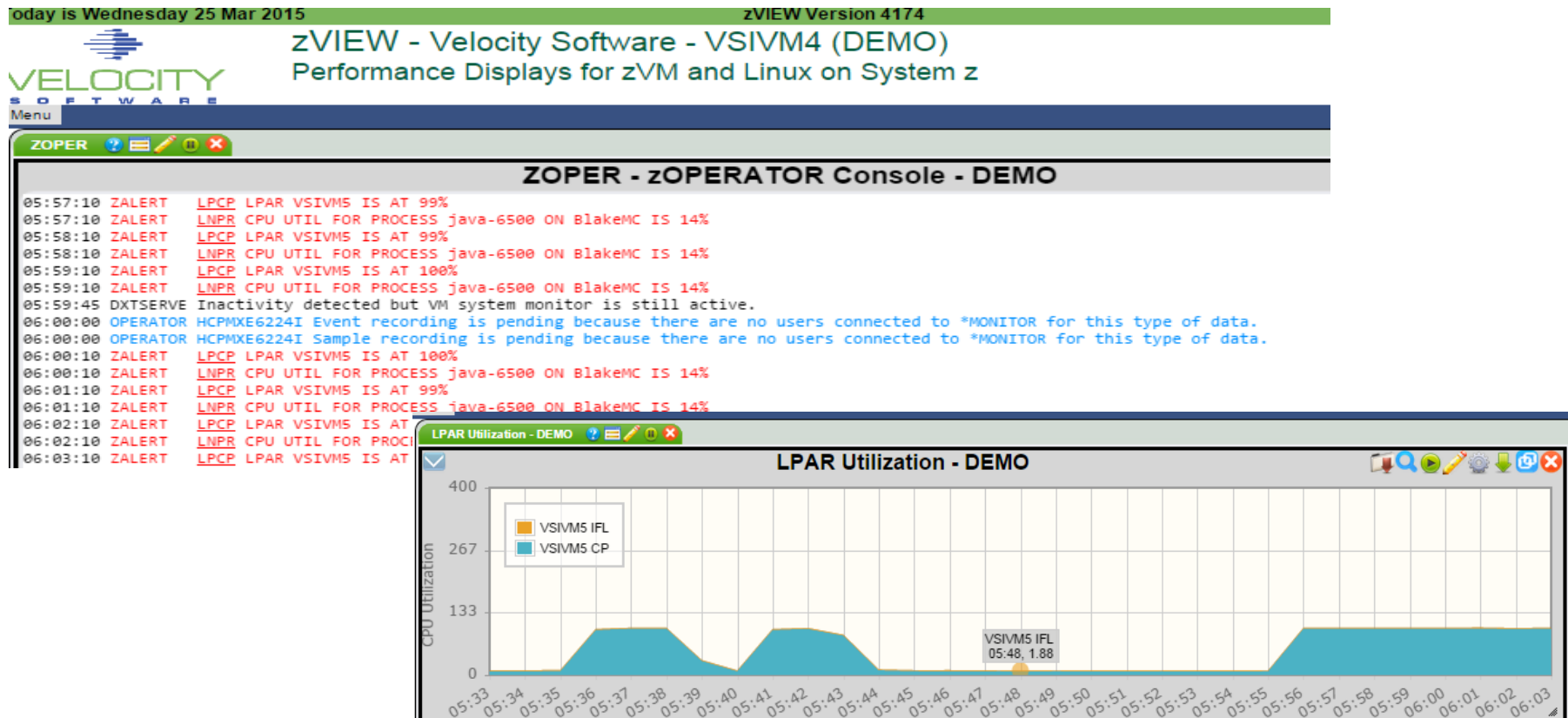
### zOPERATOR:

- Optional **no-charge** application component of zMON
- Uses standard zMON 3270 screen driver, existing function
- Scrollable 3270 console
- Messages can be searched by text, date or time
- All messages logged in daily files
- Actions can be set based on messages received
- Can be viewed from DIALed terminal or **zVIEW (WEB!)**

# zOPERATOR – Management Console

## Operator Function browser based

- Click Thru for problem analysis – LPCP example



# Console Management View

Performance | zVWS administration | zTCP administration | zVPS administration

## Available zVPS Console Logs

### zPRO Available Log Files

Select one or more logfiles that you wish to view or download

Download View Upload Reset

| DXTZMAP                                     |                                            |                                            |                                            |
|---------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> 14 Jun 2013 (4)    | <input type="checkbox"/> 03 Jun 2013 (4)   | <input type="checkbox"/> 23 May 2013 (4)   | <input type="checkbox"/> 12 May 2013 (4)   |
| <input type="checkbox"/> 13 Jun 2013 (4)    | <input type="checkbox"/> 02 Jun 2013 (4)   | <input type="checkbox"/> 22 May 2013 (4)   | <input type="checkbox"/> 11 May 2013 (4)   |
| <input type="checkbox"/> 12 Jun 2013 (4)    | <input type="checkbox"/> 01 Jun 2013 (4)   | <input type="checkbox"/> 21 May 2013 (648) | <input type="checkbox"/> 10 May 2013 (4)   |
| <input type="checkbox"/> 11 Jun 2013 (4)    | <input type="checkbox"/> 31 May 2013 (4)   | <input type="checkbox"/> 20 May 2013 (6)   | <input type="checkbox"/> 09 May 2013 (39)  |
| <input type="checkbox"/> 10 Jun 2013 (4)    | <input type="checkbox"/> 30 May 2013 (4)   | <input type="checkbox"/> 19 May 2013 (6)   | <input type="checkbox"/> 08 May 2013 (4)   |
| <input type="checkbox"/> 09 Jun 2013 (4)    | <input type="checkbox"/> 29 May 2013 (4)   | <input type="checkbox"/> 18 May 2013 (6)   | <input type="checkbox"/> 07 May 2013 (4)   |
| <input type="checkbox"/> 08 Jun 2013 (4)    | <input type="checkbox"/> 28 May 2013 (4)   | <input type="checkbox"/> 17 May 2013 (6)   | <input type="checkbox"/> 06 May 2013 (4)   |
| <input type="checkbox"/> 07 Jun 2013 (4)    | <input type="checkbox"/> 27 May 2013 (4)   | <input type="checkbox"/> 16 May 2013 (6)   | <input type="checkbox"/> 05 May 2013 (4)   |
| <input type="checkbox"/> 06 Jun 2013 (4)    | <input type="checkbox"/> 26 May 2013 (4)   | <input type="checkbox"/> 15 May 2013 (4)   |                                            |
| <input type="checkbox"/> 05 Jun 2013 (4)    | <input type="checkbox"/> 25 May 2013 (4)   | <input type="checkbox"/> 14 May 2013 (4)   |                                            |
| <input type="checkbox"/> 04 Jun 2013 (4)    | <input type="checkbox"/> 24 May 2013 (4)   | <input type="checkbox"/> 13 May 2013 (4)   |                                            |
| INSTALL                                     |                                            |                                            |                                            |
| <input type="checkbox"/> 14 Jun 2013 (263)  | <input type="checkbox"/> 02 Jun 2013 (553) | <input type="checkbox"/> 20 May 2013 (78)  | <input type="checkbox"/> 09 May 2013 (6)   |
| <input type="checkbox"/> 13 Jun 2013 (16)   | <input type="checkbox"/> 31 May 2013 (12)  | <input type="checkbox"/> 17 May 2013 (153) | <input type="checkbox"/> 08 May 2013 (257) |
| <input type="checkbox"/> 12 Jun 2013 (38)   | <input type="checkbox"/> 30 May 2013 (6)   | <input type="checkbox"/> 16 May 2013 (887) | <input type="checkbox"/> 06 May 2013 (5)   |
| <input type="checkbox"/> 10 Jun 2013 (8)    | <input type="checkbox"/> 29 May 2013 (317) | <input type="checkbox"/> 15 May 2013 (494) | <input type="checkbox"/> 05 May 2013 (155) |
| <input type="checkbox"/> 05 Jun 2013 (6)    | <input type="checkbox"/> 28 May 2013 (6)   | <input type="checkbox"/> 14 May 2013 (48)  |                                            |
| <input type="checkbox"/> 04 Jun 2013 (6)    | <input type="checkbox"/> 23 May 2013 (63)  | <input type="checkbox"/> 13 May 2013 (434) |                                            |
| <input type="checkbox"/> 03 Jun 2013 (1050) | <input type="checkbox"/> 22 May 2013 (20)  | <input type="checkbox"/> 10 May 2013 (14)  |                                            |
| SFPURGER                                    |                                            |                                            |                                            |
| <input type="checkbox"/> 14 May 2013 (8)    | <input type="checkbox"/> 11 May 2013 (8)   | <input type="checkbox"/> 08 May 2013 (8)   | <input type="checkbox"/> 05 May 2013 (8)   |
| <input type="checkbox"/> 13 May 2013 (8)    | <input type="checkbox"/> 10 May 2013 (8)   | <input type="checkbox"/> 07 May 2013 (8)   |                                            |
| <input type="checkbox"/> 12 May 2013 (8)    | <input type="checkbox"/> 09 May 2013 (8)   | <input type="checkbox"/> 06 May 2013 (8)   |                                            |
| ZALERT                                      |                                            |                                            |                                            |
| <input type="checkbox"/> 13 Jun 2013 (40)   | <input type="checkbox"/> 03 Jun 2013 (48)  | <input type="checkbox"/> 24 May 2013 (50)  | <input type="checkbox"/> 14 May 2013 (52)  |
| <input type="checkbox"/> 12 Jun 2013 (48)   | <input type="checkbox"/> 02 Jun 2013 (38)  | <input type="checkbox"/> 23 May 2013 (42)  | <input type="checkbox"/> 13 May 2013 (70)  |
| <input type="checkbox"/> 11 Jun 2013 (42)   | <input type="checkbox"/> 01 Jun 2013 (52)  | <input type="checkbox"/> 22 May 2013 (63)  | <input type="checkbox"/> 12 May 2013 (42)  |

VSE 4.3 adds SNMP Interface plus some mibs:

- IBMVSE “vse mib” – system data

Report: ESAVSES            VSE System Configuration Report

```

NODE <---z/VM---> <LogicalPart> <-----CPU model----->
/Time VirtID Lvl Name Nbr <IBM/<model>/CPs/ serial

06:26:00
vse2 ZVSE 1 VSIVM3 0 IBM 2096-A02 02 (14B4202)

06:27:00
vse2 ZVSE 1 VSIVM3 0 IBM 2096-A02 02 (14B4202)
```

```

NODE <---z/VM---> <--Partitions--> <-----CPU Counts----->
/Time VirtID Lvl Max Cur Stat Dyn Tot Actv Quies Inact

06:26:00
vse2 ZVSE 1 120 20 12 8 2 2 0 0

06:27:00
vse2 ZVSE 1 120 20 12 8 2 2 0 0
```



VSE 4.3 adds SNMP Interface plus some mibs:

- IBMVSE “vse mib” adds CPU data for system, and by virtual cpu

| Report: ESAVSEC |           | VSE System Performance Report |            |     |                   |      |      |       | VSIVM3 |         |
|-----------------|-----------|-------------------------------|------------|-----|-------------------|------|------|-------|--------|---------|
| NODE<br>/Time   | Pages/Sec |                               | <Rate/Sec> |     | <CPU Utilization> |      |      | All   | Pct    | Seconds |
|                 | In        | Out                           | SVC        | DSP | Total             | Mstr | Spin | Bound | NP     | OfData  |
| -----           |           |                               |            |     |                   |      |      |       |        |         |
| 06:26:00        |           |                               |            |     |                   |      |      |       |        |         |
| vse2            | 0         | 0                             | 196        | 428 | 83.6              | 4.0  | 0.0  | 0     | 4.8    | 64.6    |
| CPU- 0          |           |                               |            | 270 | 40.5              | 2.7  | 0    | 0     | 6.6    | 64.6    |
| CPU- 1          |           |                               |            | 160 | 43.7              | 1.4  | 0.0  | 0     | 3.2    | 64.6    |
| -----           |           |                               |            |     |                   |      |      |       |        |         |
| 06:27:00        |           |                               |            |     |                   |      |      |       |        |         |
| vse2            | 0         | 0                             | 295        | 597 | 82.5              | 4.2  | 0.0  | 0     | 5.1    | 56.0    |
| CPU- 0          |           |                               |            | 359 | 36.6              | 3.2  | 0.0  | 0     | 8.8    | 56.0    |
| CPU- 1          |           |                               |            | 238 | 45.3              | 1.0  | 0    | 0     | 2.2    | 56.0    |

## Velocity Software proof of concept for “Plug in”

- SNMP Support is “extensible”

Report: ESAVSEP                      VSE Partition Performance

---

| NODE<br>/Time | Part<br>ID | Job<br>Name | Phase<br>Name | <-CPU<br>CPU | Time-><br>Overhd |
|---------------|------------|-------------|---------------|--------------|------------------|
| 06:26:00      |            |             |               |              |                  |
| vse2          |            | Totals      |               | 52.0         | 1.5              |
|               | FB         | SECSERV     | BSTPSTS       | 0            | 0                |
|               | F7         | TCPIP00     | IPNET         | 0.3          | 0.0              |
|               | F6         | TCPIP01     | IPNET         | 0.0          | 0.0              |
|               | F3         | VTAMSTRT    | ISTINCVT      | 0.0          | 0.0              |
|               | F2         | CICSICCF    | DFHSIP        | 0.6          | 0.0              |
|               | F1         | POWSTART    | IPWPOWER      | 0.0          | 0.0              |
|               | R2         | STARTMAS    | IESMASNM      | 0.6          | 0.0              |
|               | R3         | STRTMAS1    | IESMASNM      | 0            | 0                |
|               | S1         | STGPLAY5    | STGPLAY       | 6.6          | 0.4              |
|               | S2         | STGPLAY2    | STGPLAY       | 0.6          | 0.1              |
|               | S3         | STGPLAY4    | STGPLAY       | 11.6         | 0.3              |
|               | S4         | STGPLAY1    | STGPLAY       | 17.3         | 0.3              |
|               | R1         | STARTVCS    | IESVCSRV      | 0.0          | 0.0              |
|               | S5         | STGPLAY3    | STGPLAY       | 14.3         | 0.3              |

## What do customers want?

- TCPIP?
- VSAM?
- CICS?
- DB2
- High Capture ratio?

# Linux VCPU Analysis

## ESAUSCP – VCPU Analysis, linux needs new mib

- DB2 workload has very strange overhead....

Report: ESAUSCP **Virtual Machine** VCPU Analysis

```

UserID <---CPU time--> <---Percent
CPUvadd <--Percent--> <--SHARE--> CPU <--Samples-->
 Cnt TOT Virt Type Value TYPE Total In Q Run Sim CPU

07:17:00 0 57.73 35.96 . . . 4307 1045 3.2 1.1 1.4
TSTDB2 2 22.88 2.85 ABS 4.0 IFL 118 117 6.0 7.7 1.7
 CPU-00 2.21 2.16 ABS 0 IFL 59 59 5.1 0 1.7
 CPU-01 20.68 0.69 ABS 0 IFL 59 58 6.9 16 1.7

```

Report: ESALNXS **LINUX VSI** System Analysis Report

```

Node/ <---Load Numbers--> CPU <Processor Pct Util> NICE <CPU Overhead%> IO
Time Users Procs MaxProc NBR Total Syst User Idle Time Krnl IRQ Steal Wait

01/16/17
TSTDB2 0 346 0 Tot 0 0 0 0 0 0 0 0 0 0
 1 0 0 0 0 0 0 0 0 0 0 0 0
 2 0 0 0 0 0 0 0 0 0 0 0 0

```

# zVPS Version 4.2 (December 2015)

- **Linux Performance Management**

- Oracle
- Java
- Longer process names/paths
- System real storage metrics
- Process metrics
- 32 bit process IDs (Apple server processes go to 99,999)

- **z/VM Performance Management**

- 6.3 Exploitation (ESAMFC, Diagnose rates)
- Storage report,
- zOPERATOR
- PORTAL V2

# Linux Storage Analysis

## ESAUCD2 – The most useful storage report available

- Note, page tables are “anonymous / overhead”

```

Report: ESAUCD2 LINUX UCD Memory Analysis Report Velocity Softwar
Monitor initialized: 05/13/14 at 00:00:00 on 2828 serial 414C7 First recordana

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

00:15:00
oracle 994.8 18.1 976.7 123.9 74.0 49.9 15.6 92.1 0 240.6 581.4 154.7
redhat5 499.2 17.9 481.3 4095 4095 0.0 15.6 4113 0 140.5 206.6 134.2
redhat5x 497.1 19.8 477.3 4095 4095 0.0 15.6 4114 0 150.0 170.6 156.7
redhat56 497.0 24.3 472.7 1051 1051 0.0 15.6 1075 0 170.1 174.6 128.0
redhat6 492.7 7.8 484.9 4095 4090 5.2 15.6 4098 0 167.9 182.6 134.4
redhat6x 994.8 10.7 984.1 495.8 404.0 91.9 15.6 414.7 0 29.7 785.4 169.0
rhel64v 996.4 70.0 926.4 2047 2047 0 15.6 2117 0 152.0 601.8 172.6
roblx2 241.7 11.1 230.6 0 0 0 15.6 11.1 0 44.2 107.6 78.8
sles10 493.0 19.8 473.2 4219 4219 0 15.6 4238 0 140.9 281.1 51.2
sles11 494.7 172.8 322.0 4087 4087 0 15.6 4260 0 139.3 122.7 59.9
sles11v2 2006.7 85.9 1921 1542 699.6 842.4 15.6 785.5 0 3.0 894.9 1023
sles11v3 868.8 91.2 777.6 2046 1759 287.2 15.6 1850 0 4.2 65.8 707.6
suselnx2 247.3 158.6 88.6 255.8 255.8 0 15.6 414.5 0 29.0 37.3 22.4
slls2ora 996.5 23.7 972.8 743.8 598.2 145.5 15.6 621.9 0 41.2 777.9 153.7

```

# Process Storage metrics (zVPS version 4.2)

## New metrics

- RSS, Size - Same
- Locked: Locked memory size (mlock)
- Peak: peak RSS (high water mark)
- Data: size of data, stack
- **PTBL: page table entries (linux 2.6.10) - Use to evaluate LARGE PAGES**
- EXEC: size of executable (text)
- Lib: shared library code size
- **Swap: Swapped out**
- Stack: size of stack

Report: ESALNXP      LINUX HOST Process Statistics Report      Velocity Software Corporate      ZMAP 4.2.0

---

| node/<br>Name | <-Process Ident-> |      |       | <-----CPU Percents-----> |      |      |      |      |      | <-----Storage Metrics (MB)-----> |      |      |             |      |      |      |     |     |             |
|---------------|-------------------|------|-------|--------------------------|------|------|------|------|------|----------------------------------|------|------|-------------|------|------|------|-----|-----|-------------|
|               | ID                | PPID | GRP   | Valu                     | Tot  | sys  | user | syst | usrt | Size                             | RSS  | Peak | Swap        | Data | Stk  | EXEC | Lib | Lck | PTbl        |
| 00:15:00      |                   |      |       |                          |      |      |      |      |      |                                  |      |      |             |      |      |      |     |     |             |
| oracle        | 0                 | 0    | 0     | 0                        | 1.87 | 0.11 | 1.05 | 0.16 | 0.55 | 7345                             | 845  | 108K | 0           | 1997 | 62.8 | 28K  | 6K  | 0   | <b>130</b>  |
| init          | 1                 | 1    | 0     | 16                       | 0.60 | 0    | 0    | 0.12 | 0.48 | 1                                | 0    | 12.5 | 0           | 2.17 | 1.2  | 8.9  | 0   | 0   | 0.12        |
| oracle        | 21131             | 1    | 21131 | 16                       | 0.88 | 0.00 | 0.87 | 0    | 0    | 403                              | 52   | 3585 | 0           | 18.4 | 1.4  | 965  | 139 | 0   | 5.98        |
| redhat6x      | 0                 | 0    | 0     | 0                        | 1.66 | 0.38 | 0.67 | 0.22 | 0.38 | 19K                              | 1216 | 275K | 462         | 15K  | 103  | 74K  | 18K | 0   | 219         |
| init          | 1                 | 1    | 1     | 20                       | 0.59 | 0.00 | 0    | 0.21 | 0.38 | 3                                | 1    | 46.6 | 0.53        | 3.11 | 1.3  | 2.2  | 38  | 0   | 0.21        |
| sles11v2      | 0                 | 0    | 0     | 0                        | 5.96 | 3.54 | 1.83 | 0.19 | 0.40 | 105K                             | 4321 | 1.5M | <b>6958</b> | 21K  | 517  | 347K | 34K | 0   | <b>1498</b> |
| init          | 1                 | 1    | 1     | 20                       | 0.58 | 0.00 | 0.00 | 0.19 | 0.38 | 11                               | 0    | 135  | 1.27        | 2.34 | 1.7  | 0.5  | 25  | 0   | 0.51        |
| ora_vktm      | 5963              | 1    | 5963  | -2                       | 1.65 | 1.65 | 0    | 0    | 0    | 1137                             | 2    | 17K  | 28.2        | 46.3 | 2.1  | 3546 | 285 | 0   | 7.03        |
| ora_vktm      | 10254             | 1    | 10254 | -2                       | 1.62 | 1.33 | 0.29 | 0    | 0    | 926                              | 2    | 14K  | 27.8        | 46.3 | 2.1  | 3546 | 285 | 0   | 7.27        |
| slls2ora      | 0                 | 0    | 0     | 0                        | 1.86 | 0.42 | 0.68 | 0.26 | 0.50 | 16K                              | 1063 | 238K | 830         | 2353 | 141  | 70K  | 9K  | 0   | <b>207</b>  |
| init          | 1                 | 1    | 1     | 20                       | 0.75 | 0    | 0    | 0.26 | 0.50 | 2                                | 0    | 34.0 | 1.31        | 2.57 | 1.9  | 0.5  | 28  | 0   | 0.14        |

# Process Storage metrics (zVPS version 4.2)

## Benchmark process analysis (2G SGA, oversized)

Report: ESALNXP                      Velocity Software Corporate                      ZMAP 4.2.0

---

| node/<br>Name        | <-Proc<br>ID | <-----<br>Size | RSS | Peak | Swap | Data | Stk | EXEC | Lib | Lck | PTbl |
|----------------------|--------------|----------------|-----|------|------|------|-----|------|-----|-----|------|
| <b>NO HUGE PAGES</b> |              |                |     |      |      |      |     |      |     |     |      |
| oracle               | 43146        | 2303           | 265 | 2249 | 0    | 3.07 | 0.1 | 181  | 13  | 0   | 0.96 |
| oracle               | 43148        | 2310           | 81  | 2256 | 0    | 8.95 | 0.1 | 181  | 13  | 0   | 1.06 |
| oracle               | 43152        | 2303           | 57  | 2249 | 0    | 3.07 | 0.1 | 181  | 13  | 0   | 0.69 |
| oracle               | 43158        | 2308           | 141 | 2254 | 0    | 3.20 | 0.3 | 181  | 14  | 0   | 1.21 |
| oracle               | 43160        | 2303           | 101 | 2249 | 0    | 3.07 | 0.1 | 181  | 13  | 0   | 0.84 |
| <b>HUGE PAGES</b>    |              |                |     |      |      |      |     |      |     |     |      |
| oracle               | 51439        | 2304           | 18  | 2250 | 0    | 4.26 | 0.1 | 181  | 14  | 0   | 0.31 |
| oracle               | 51451        | 2303           | 22  | 2250 | 0    | 3.07 | 0.1 | 181  | 14  | 0   | 0.32 |
| oracle               | 51453        | 2314           | 23  | 2259 | 0    | 3.07 | 0.1 | 181  | 13  | 0   | 0.32 |
| oracle               | 51455        | 2303           | 16  | 2249 | 0    | 3.07 | 0.1 | 181  | 13  | 0   | 0.31 |
| oracle               | 51457        | 2310           | 23  | 2256 | 0    | 8.95 | 0.1 | 181  | 13  | 0   | 0.31 |
| oracle               | 51459        | 2318           | 17  | 2263 | 0    | 3.07 | 0.1 | 181  | 13  | 0   | 0.32 |

# zVPS Application Management

- Requirement to go beyond z/VM and Linux metrics
- z/VPS provides over 4,000 unique metrics
  - z/VM System, storage, paging, dasd metrics (3,000)
  - z/VM Virtual machine metrics (~400)
  - Network metrics (~100)
  - Linux System metrics (~250 VSI, 80 HST, 80 UCD)
  - Linux Process metrics (~40)
- **Application subsystem users:**
  - **Oracle (70 metrics), supports (10G, 11G, 12C)**
  - **Websphere (30 metrics)**



# Diagnostic vs Management Tools

- **Diagnostic Tools**
  - Turn on when there's a problem
  - Significant overhead
  - Oracle and Java have many diagnostic tools
- **z/VPS Objective is to provide “management tools”**
  - Java metrics captured at low cost
  - Oracle metrics captured at low cost
  - Objective is still a .1% agent collecting data every minute

# Java/WebSphere Metrics

Report: ESAJVM                      Java Subsystem Analysis Report                      Velocity Sof

```

```

| Node/    |                         | <JavaClass>  | Memory  | <-----Heap data-----> |       |       |       |        |      |
|----------|-------------------------|--------------|---------|-----------------------|-------|-------|-------|--------|------|
| Date     | <-----Application-----> | <--Loaded--> | pending | <-----sizes----->     |       |       |       |        |      |
| Time     | Name                    | Type         | Curr    | /Sec                  | Final | Init  | Used  | Commit | Max  |
| -----    |                         |              |         |                       |       |       |       |        |      |
| 13:06:00 |                         |              |         |                       |       |       |       |        |      |
| S11R20RA | WAS Server1             | JVM          | 15287   | 0                     | 0     | 52.4M | 100M  | 107.5M | 268M |
|          | WAS Server2longerna     | JVM          | 15312   | 0                     | 0     | 52.4M | 85.4M | 103.3M | 268M |

Report: ESAJVM                      Java Velocity Software Corporate                      ESAMAP 4.2.0 06/19/13

```

```

| Node/    |                                      | <---Non Heap Data----> |        |        |       | <--Thread Count data--> |       |       |      |
|----------|--------------------------------------|------------------------|--------|--------|-------|-------------------------|-------|-------|------|
| Date     | <-----Application- <-----sizes-----> | Curr                   | Daemon | Peak   | start |                         |       |       |      |
| Time     | Name                                 | Init                   | Used   | Commit | Max   | Live                    | Count | thrds | /sec |
| -----    |                                      |                        |        |        |       |                         |       |       |      |
| 13:06:00 |                                      |                        |        |        |       |                         |       |       |      |
| S11R20RA | WAS Server1                          | 0                      | 101M   | 184.7M | 0     | 58.0                    | 55.0  | 55.0  | 0    |
|          | WAS Server2longerna                  | 0                      | 101M   | 171.9M | 0     | 58.0                    | 55.0  | 55.0  | 0    |



# Oracle Database Configuration

## ESAORAC: Oracle Configuration, SGA, PGA High Level information

Report: ESAORAC Oracle Database Configuration Report

```

Node/ <-----Database Description-----> <-----Database----->
Date <-----Start----->
Time DatabaseName Instance Version Date Time Status

PAZXXT10 soedb soedb 12.1.0.1.0 2014/01/27 10:15 OPEN
redhat6x db01 db01 11.2.0.2.0 2013/12/19 14:42 OPEN
sles11v2 db01 db01 12.1.0.1.0 2013/11/08 13:20 OPEN

```

```

Node/ <-----
Date <-----Storage Overview (MB)----->
Time <-----SGA-----> <-----PGA----->
 Database Max Fixed Free Size Max MaxMan

PAZXXT10 soedb 1598 2.3 557K 557.1 293.7 1040.0
redhat6x db01 399.6 2.2 139K 139.3 164.8 529.0
sles11v2 db01 334.4 2.2 32768 106.5 355.2 12950

```

# Measuring Oracle – Linux Process Perspective

Report: **ESALNXA** LINUX HOST Application Report Velocity Software ZMAP 4.2.0

| Node/<br>Date<br>Time | Process/<br>Application<br>name | <---Processor Percent---> |            |             |     |     | <Process->  |             | <---Percent Process Status---> |             |          |             |          |          |
|-----------------------|---------------------------------|---------------------------|------------|-------------|-----|-----|-------------|-------------|--------------------------------|-------------|----------|-------------|----------|----------|
|                       |                                 | Total                     | sys        | user        | sys | usr | Total       | Actv        | Run-                           | Sleep       | Zom      | Disk        | Page     | Stop     |
|                       |                                 |                           |            |             |     |     |             | ing         | -ing                           | bie         | Wait     | Wait        |          |          |
| -----                 |                                 |                           |            |             |     |     |             |             |                                |             |          |             |          |          |
| 08:30:00              |                                 |                           |            |             |     |     |             |             |                                |             |          |             |          |          |
| PAZXXT10              | <b>*Totals*</b>                 | <b>6.6</b>                | 2.0        | 2.6         | 0.7 | 1.3 | 149.0       | 24.5        | 0.7                            | 99.3        | 0        | 0           | 0        | 0        |
|                       | init                            | 1.9                       | 0.0        | 0.0         | 0.6 | 1.3 | 1.0         | 0.3         | 0                              | 100         | 0        | 0           | 0        | 0        |
|                       | ora_vktm                        | 1.9                       | 1.0        | 0.8         | 0   | 0   | 1.0         | 1.0         | 0                              | 100         | 0        | 0           | 0        | 0        |
| -----                 |                                 |                           |            |             |     |     |             |             |                                |             |          |             |          |          |
| 08:45:00              |                                 |                           |            |             |     |     |             |             |                                |             |          |             |          |          |
| PAZXXT10              | <b>*Totals*</b>                 | <b>55.9</b>               | 7.5        | 46.1        | 0.8 | 1.6 | 164.9       | 42.5        | 1.9                            | 94.7        | 0        | 3.4         | 0        | 0        |
|                       | init                            | 2.3                       | 0.0        | 0           | 0.7 | 1.6 | 1.0         | 0.2         | 0                              | 100         | 0        | 0           | 0        | 0        |
|                       | ora_vktm                        | 1.3                       | 0.7        | 0.6         | 0   | 0   | 1.0         | 1.0         | 0                              | 100         | 0        | 0           | 0        | 0        |
|                       | <b>oracle_1</b>                 | <b>19.8</b>               | <b>2.9</b> | <b>16.8</b> | 0   | 0   | <b>12.0</b> | <b>12.0</b> | <b>15.0</b>                    | <b>48.3</b> | <b>0</b> | <b>36.7</b> | <b>0</b> | <b>0</b> |
|                       | xterm                           | 27.8                      | 1.7        | 26.1        | 0   | 0   | 3.3         | 1.0         | 0                              | 100         | 0        | 0           | 0        | 0        |
| -----                 |                                 |                           |            |             |     |     |             |             |                                |             |          |             |          |          |
| 09:00:00              |                                 |                           |            |             |     |     |             |             |                                |             |          |             |          |          |
| PAZXXT10              | <b>*Totals*</b>                 | <b>69.4</b>               | 11.1       | 56.9        | 0.5 | 0.9 | 181.6       | 57.7        | 1.8                            | 95.1        | 0        | 3.1         | 0        | 0        |
|                       | init                            | 1.3                       | 0.0        | 0.0         | 0.5 | 0.8 | 1.0         | 0.3         | 0                              | 100         | 0        | 0           | 0        | 0        |
|                       | ora_dbw0                        | 2.2                       | 1.5        | 0.7         | 0   | 0   | 1.0         | 1.0         | 6.7                            | 0           | 0        | 93.3        | 0        | 0        |
|                       | ora_lg00                        | 0.7                       | 0.4        | 0.2         | 0   | 0   | 1.0         | 1.0         | 0                              | 46.7        | 0        | 53.3        | 0        | 0        |
|                       | ora_vktm                        | 1.2                       | 0.7        | 0.5         | 0   | 0   | 1.0         | 1.0         | 0                              | 100         | 0        | 0           | 0        | 0        |
|                       | <b>oracle_1</b>                 | <b>43.5</b>               | <b>5.0</b> | <b>38.5</b> | 0   | 0   | <b>20.0</b> | <b>20.0</b> | <b>8.0</b>                     | <b>73.7</b> | <b>0</b> | <b>18.3</b> | <b>0</b> | <b>0</b> |
|                       | xterm                           | 15.7                      | 1.6        | 14.2        | 0   | 0   | 5.0         | 1.3         | 0                              | 100         | 0        | 0           | 0        | 0        |
|                       | Xvnc                            | 1.3                       | 0.5        | 0.8         | 0   | 0   | 1.0         | 1.0         | 6.7                            | 93.3        | 0        | 0           | 0        | 0        |

# Measuring Oracle Database Storage

## ESAORAG: General Storage Areas – SGA, no changes

Report: ESAORAG SGA/PGA Analysis Report Velocity Software  
 Monitor initializ/14 at 08:00:00 on 2094 serial 53E5D First record anal

| Node/    |         | <-----Shared Global Area (SGA) in Megabytes-----> |       |       |        |                        |      |       |      |        |       |
|----------|---------|---------------------------------------------------|-------|-------|--------|------------------------|------|-------|------|--------|-------|
| Date     | <--Data | Max                                               | Fixed | Redo  | Buffer | <-----Pool sizes-----> |      |       |      |        |       |
| Time     | Name    | Size                                              | Size  | Buffr | Cache  | Free                   | Shrd | Large | Java | Stream | ShrIO |
| -----    |         |                                                   |       |       |        |                        |      |       |      |        |       |
| 08:30:00 |         |                                                   |       |       |        |                        |      |       |      |        |       |
| PAZXXT10 | soedb   | 1598                                              | 2.3   | 6.9   | 655.4  | 557K                   | 295  | 32.8  | 16.4 | 32.8   | 49.2  |
| -----    |         |                                                   |       |       |        |                        |      |       |      |        |       |
| 08:45:00 |         |                                                   |       |       |        |                        |      |       |      |        |       |
| PAZXXT10 | soedb   | 1598                                              | 2.3   | 6.9   | 658.6  | 557K                   | 295  | 32.8  | 16.4 | 29.5   | 49.2  |
| -----    |         |                                                   |       |       |        |                        |      |       |      |        |       |
| 09:00:00 |         |                                                   |       |       |        |                        |      |       |      |        |       |
| PAZXXT10 | soedb   | 1598                                              | 2.3   | 6.9   | 671.7  | 557K                   | 295  | 32.8  | 16.4 | 16.4   | 49.2  |

# Measuring Oracle PGA

## ESAORAG: General Storage Areas – PGA Grows with workload

Report: ESAORAG

```

Node/ <--PGA Data (in Megabytes)-->
Date <--Data <-Target-> InUse Alloc Free
Time Name Parm Auto -able

01/28/14
08:30:00
PAZXXT10 soedb 557 451 56.8 84.1 17.5

08:45:00
PAZXXT10 soedb 557 426 84.2 128.9 30.4

09:00:00
PAZXXT10 soedb 557 404 109.4 170.3 43.6
```

# Measuring Oracle Workloads

## ESAORAS: User Committs/Rollbacks, Session CPU, Recursive CPU

Report: ESAORAS Oracle Subsystem Analysis Report

```

```

| Node/<br>Date<br>Time | <---Database----><br>Name | <---User Activity--><br>Instance | <Rate per second> |       |        | <--CPU----><br>Sess Re-<br>-ion Cur |      |
|-----------------------|---------------------------|----------------------------------|-------------------|-------|--------|-------------------------------------|------|
|                       |                           |                                  | Calls             | Comm  | Rollbk |                                     |      |
| 08:30:00              |                           |                                  |                   |       |        |                                     |      |
| PAZXXT10              | soedb                     | soedb                            | 0.2               | 2.3   | 3.8    | 0.0                                 | 0    |
| 08:45:00              |                           |                                  |                   |       |        |                                     |      |
| PAZXXT10              | soedb                     | soedb                            | 0.2               | 241.2 | 73.1   | 22.0                                | 0.0  |
| 09:00:00              |                           |                                  |                   |       |        |                                     |      |
| PAZXXT10              | soedb                     | soedb                            | 0.2               | 569.5 | 168.2  | 52.4                                | 0.11 |

```

```

# Oracle Database I/O

## ESAORAS: Oracle Subsystem

Report: ESAORAS                      Velocity Software Corporate ZMAP 4.2.0 12/21/13

```

```

| Node/    |       | <----Physical Reads Activty----> |      |        |       |       | <-Physical Write Activity--> |       |       |       |       |
|----------|-------|----------------------------------|------|--------|-------|-------|------------------------------|-------|-------|-------|-------|
| Date     |       | <-----Rate per second----->      |      |        |       |       | <-----Rate per second----->  |       |       |       |       |
| Time     | Name  | Rds                              | Hits | Direct | I/O   | Bytes | Writs                        | CHits | Dirct | I/O   | Bytes |
| -----    |       |                                  |      |        |       |       |                              |       |       |       |       |
| 08:30:00 |       |                                  |      |        |       |       |                              |       |       |       |       |
| PAZXXT10 | soedb | 0.8                              | 0.2  | 0.2    | 0.2   | 0     | 0.1                          | 1415  | 0.3   | 0.2   | 0.1   |
| -----    |       |                                  |      |        |       |       |                              |       |       |       |       |
| 08:45:00 |       |                                  |      |        |       |       |                              |       |       |       |       |
| PAZXXT10 | soedb | 18.1                             | 8.3  | 172.8  | 172.8 | 0     | 172.2                        | 715K  | 42.8  | 42.3  | 0.5   |
| -----    |       |                                  |      |        |       |       |                              |       |       |       |       |
| 09:00:00 |       |                                  |      |        |       |       |                              |       |       |       |       |
| PAZXXT10 | soedb | 36.5                             | 13.8 | 279.9  | 279.9 | 0     | 276.6                        | 9733K | 178.6 | 178.6 | 0.1   |



# Performance analysis vs “averages”

## Average over 15 minute hides performance changes

- How to alert on the spikes?
- Capacity Planning vis Performance Analysis

Report: ESAORAS      Oracle Subsystem Analysis Report      Velocity Software Corporate      ZMAP 4.2.0 0  
 Monitor initialized: 08/04/14 at 00:00:00 on 2828 serial 414C7      First record analyzed: 08/04/14 00:00:00

```

```

| Node/<br>Activit | <---Database---> |          | <-User Activity-> |      |        | <--CPU---> |                             | <----Physical Reads Activty---> |      |        |                        | <-Physical Write |       |       |     |     |
|------------------|------------------|----------|-------------------|------|--------|------------|-----------------------------|---------------------------------|------|--------|------------------------|------------------|-------|-------|-----|-----|
| Date<br>Time     | Name             | Instance | <Rate per second> |      |        | Sess Re-   | <-----Rate per second-----> |                                 |      |        | <----Rate per second-- |                  |       |       |     |     |
|                  |                  |          | Calls             | Comm | Rollbk | -ion       | Cur                         | Rds                             | Hits | Direct | I/O Bytes              | Wrts             | CHits | Dirct | I/O |     |
| -----            |                  |          |                   |      |        |            |                             |                                 |      |        |                        |                  |       |       |     |     |
| 00:15:00         | oracle           | orcl     | 0.4               | 3.9  | 6.3    | 0.1        | 0                           | 1.6                             | 1.5  | 0.8    | 0.8                    | 0                | 0.7   | 6176  | 0.5 | 0.5 |
|                  | roblx1           | orcl     | 0.2               | 42.1 | 11.8   | 0.8        | 0.0                         | 16.8                            | 10.1 | 3353   | 1728                   | 1625             | 171.2 | 9355K | 5.5 | 5.4 |
|                  | s11s2ora         | db01     | 0.4               | 7.2  | 5.7    | 0.1        | 0                           | 0.7                             | 0.2  | 4.3    | 4.3                    | 0                | 2.7   | 35455 | 0.9 | 0.9 |

```

```

# Performance analysis vs “averages”

| Report: ESAORAS                                                |                  | Oracle Subsystem Analysis Report         |                   |       |        |            |     | Velocity Software Corporate    |      |        |           | ZMAP 4.2.0             |       |       |      |      |
|----------------------------------------------------------------|------------------|------------------------------------------|-------------------|-------|--------|------------|-----|--------------------------------|------|--------|-----------|------------------------|-------|-------|------|------|
| Monitor initialized: 08/04/14 at 00:00:00 on 2828 serial 414C7 |                  | First record analyzed: 08/04/14 00:00:00 |                   |       |        |            |     |                                |      |        |           |                        |       |       |      |      |
| Node/                                                          | <---Database---> |                                          | <-User Activity-> |       |        | <--CPU---> |     | <----Physical Reads Activy---> |      |        |           | <-Physical Write Actv  |       |       |      |      |
| Date                                                           |                  |                                          | <Rate per second> |       |        | Sess Re-   |     | <-----Rate per second----->    |      |        |           | <----Rate per second-- |       |       |      |      |
| Time                                                           | Name             | Instance                                 | Calls             | Comm  | Rollbk | -ion       | Cur | Rds                            | Hits | Direct | I/O Bytes | Writs                  | CHits | Dirct | I/O  |      |
| 00:01:00                                                       | roblx1           | orcl                                     | 0.3               | 302.3 | 10.9   | 2.0        | 0   | 10.0                           | 4.9  | 6.9    | 6.9       | 0                      | 6.7   | 56361 | 1.0  | 1.0  |
| 00:02:00                                                       | roblx1           | orcl                                     | 0.2               | 26.7  | 10.4   | 0.2        | 0   | 6.9                            | 2.0  | 0      | 0         | 0                      | 0     | 0     | 1.7  | 1.7  |
| 00:03:00                                                       | roblx1           | orcl                                     | 0.2               | 40.3  | 9.5    | 0.3        | 0   | 5.7                            | 0.8  | 0      | 0         | 0                      | 0     | 0     | 1.5  | 1.5  |
| 00:04:00                                                       | roblx1           | orcl                                     | 0.2               | 7.6   | 9.6    | 0.2        | 0   | 5.2                            | 0.2  | 0      | 0         | 0                      | 0     | 0     | 1.9  | 1.9  |
| 00:05:00                                                       | roblx1           | orcl                                     | 0.2               | 23.3  | 9.3    | 0.4        | 0   | 4.9                            | 0.3  | 0      | 0         | 0                      | 0     | 0     | 0.8  | 0.8  |
| 00:06:00                                                       | roblx1           | orcl                                     | 0.2               | 16.6  | 10.2   | 0.2        | 0   | 5.8                            | 0.6  | 0      | 0         | 0                      | 0     | 0     | 43.6 | 43.6 |
| 00:07:00                                                       | roblx1           | orcl                                     | 0.2               | 37.3  | 10.3   | 0.2        | 0   | 5.1                            | 0.0  | 0      | 0         | 0                      | 0     | 0     | 1.3  | 1.3  |
| 00:08:00                                                       | roblx1           | orcl                                     | 0.5               | 26.7  | 15.0   | 0.9        | 0   | 6.9                            | 0.7  | 4221   | 122.2     | 4099                   | 267.7 | 2499K | 1.6  | 1.6  |
| 00:09:00                                                       | roblx1           | orcl                                     | 0.3               | 25.5  | 16.1   | 1.3        | 0   | 36.9                           | 41.5 | 6781   | 4202      | 2579                   | 333.9 | 60.6M | 9.7  | 9.7  |
| 00:10:00                                                       | roblx1           | orcl                                     | 0.2               | 26.4  | 14.3   | 1.7        | 0.0 | 45.0                           | 18.6 | 6489   | 645       | 38.6                   | 248.9 | 3648K | 1.9  | 1.9  |

# Setting Alerts for Oracle?

## Possible metrics for alerting:

- For server, by database:
- SGA size > x
- PGA allocated > x
- Users?
- I/O
- Cache hits?

# Websphere Linux applications by Group

Report: ESALNXA          LINUX HOST Application Report  
 Monitor initialized: 21/01/11 at 07:03:00 on

```

Node/ Process/ ID <---Processor Percent--->
Date Application
Time name Total sys user syst usrt

07:04:00
Node Groups
WASApps *Totals* 0 90.8 9.4 78.6 0.5 2.2
 automoun 0 0.0 0 0.0 0 0
 httpd 0 5.4 1.8 3.6 0 0
 httpd1 0 44.4 4.0 40.5 0 0
 httpd18 0 8.8 0.2 8.6 0 0
 httpd19 0 2.8 0.2 2.6 0 0
 httpd2 0 2.5 0.2 2.3 0 0
 httpd3 0 4.1 0.7 1.3 0.3 1.8
 httpd4 0 6.0 0.9 5.1 0 0
 httpd5 0 1.1 0.1 1.1 0 0
 httpd6 0 2.7 0.2 2.5 0 0
 httpd7 0 6.4 0.3 6.1 0 0
 httpd9 0 4.3 0.0 4.2 0 0
 kernel 0 0.6 0.0 0 0.2 0.4
 snmpd 0 0.7 0.4 0.2 0 0

```

# Linux Application Management

- Defining applications

```

appname = 'PIDFILE' ' appstring = 'PidFile'
appname = 'MineCrft' ' appstring = 'minecraft'
appname = 'HVC' ' appstring = 'hvc'
appname = 'DESKTOP' ' appstring = 'desktop'
appname = 'oracle' ' appstring = 'oracle'

```

```

Screen: ESALNXA Velocity Software - VSIVM4 ESAMON 4.201 02/25
1 of 3 LINUX VSI Host Application Report CLASS * NODE BLAKEMC

```

| Time     | Node/<br>Group | Process/<br>Application<br>name | ID    | <---Processor Percent---> |     |      |      |      |
|----------|----------------|---------------------------------|-------|---------------------------|-----|------|------|------|
|          |                |                                 |       | Total                     | sys | user | syst | usrt |
| 21:20:00 | BLAKEMC        | *Totals*                        | 0     | 15.6                      | 0.1 | 15.5 | 0    | 0    |
|          |                | kernel                          | 2097K | 0.0                       | 0.0 | 0    | 0    | 0    |
|          |                | snmpd                           | 98934 | 0.1                       | 0.1 | 0.0  | 0    | 0    |
|          |                | MineCrft                        | 81176 | 15.5                      | 0.0 | 15.5 | 0    | 0    |
| 21:19:00 | BLAKEMC        | *Totals*                        | 0     | 14.5                      | 0.1 | 14.4 | 0    | 0    |
|          |                | snmpd                           | 98934 | 0.1                       | 0.0 | 0.0  | 0    | 0    |
|          |                | MineCrft                        | 81176 | 14.4                      | 0.0 | 14.4 | 0    | 0    |
| 21:18:00 | BLAKEMC        | *Totals*                        | 0     | 14.4                      | 0.1 | 14.3 | 0    | 0    |
|          |                | snmpd                           | 98934 | 0.1                       | 0.0 | 0.0  | 0    | 0    |
|          |                | MineCrft                        | 81176 | 14.3                      | 0.0 | 14.3 | 0    | 0    |

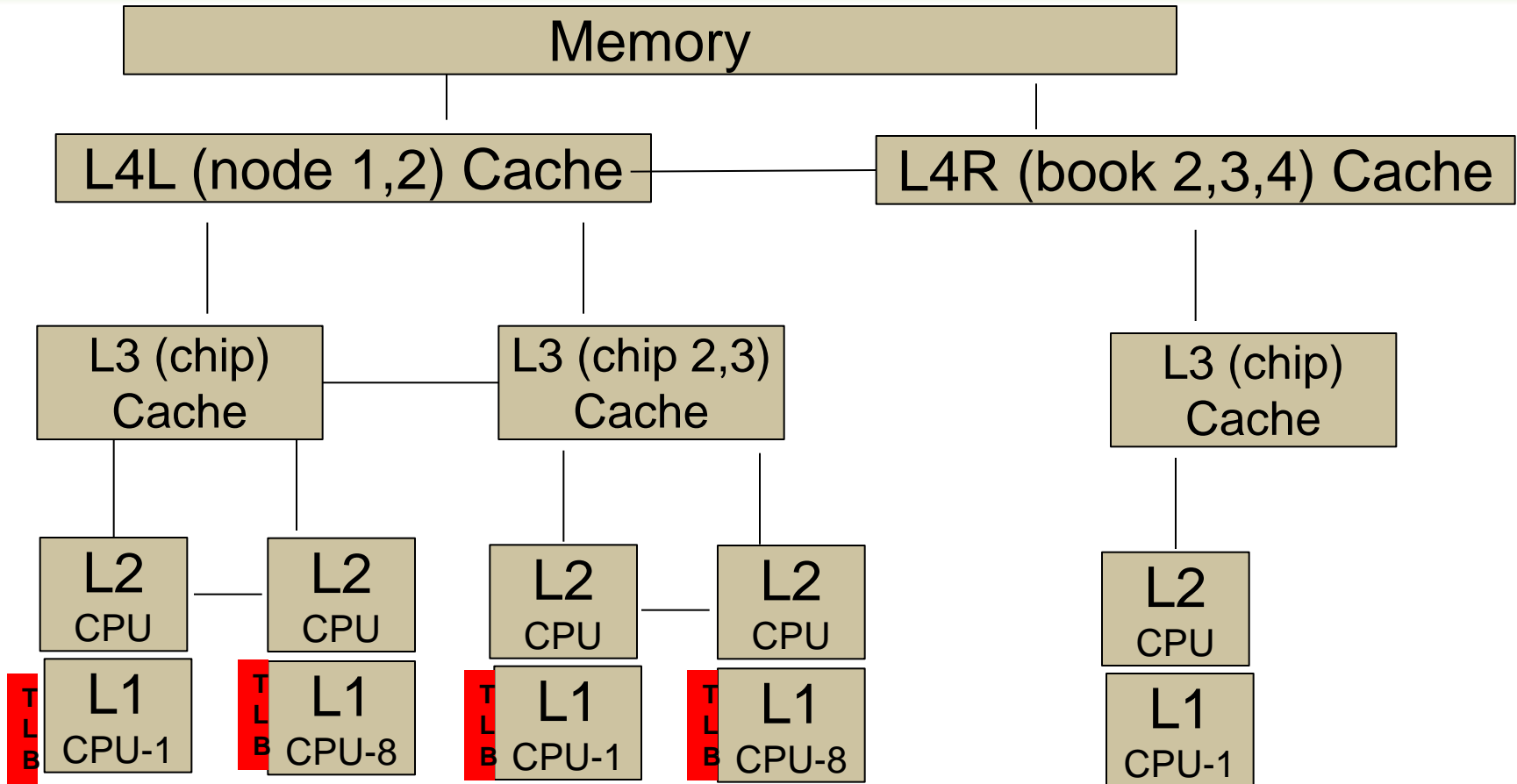
# Linux Application Accounting

- **Websphere argument string used for accounting**
- `wasadmin 27144 6846 0 Feb06 ? 00:43:13 /u01/was61/java/bin/java -  
Declipse.security -Dwas.status.socket=34229 -Dosgi.install.area=/u01/was61 -  
Dosgi.configuration.area=/u01/was61/profiles/appsrv/configuration -  
Dosgi.framework.extensions=com.ibm.cds -  
Xshareclasses:name=webspherev61_%g,groupAccess,nonFatal -Xscmx50M -  
Xbootclasspath/p:/u01/was61/java/jre/lib/ext/ibmorb.jar:/u01/was61/java/jre/lib/ext/  
ibmext.jar:/u01/J2EEProbe/DiagnosticsAgent/classes/IBM/1.5.0/instr.jre:/u01/J2EE  
Probe/DiagnosticsAgent/classes/boot -classpath  
/u01/was61/profiles/appsrv/properties:/u01/was61/properties:/u01/was61/lib/startu  
p.jar:/u01/was61/lib/bootstrap.jar:/u01/was61/lib/j2ee.jar:/u01/was61/lib/Improxy.ja  
r:/u01/was61/lib/urlprotocols.jar:/u01/was61/deploytool/itp/batchboot.jar:/u01/was  
61/deploytool/itp/batch2.jar:/u01/was61/java/lib/tools.jar -  
Dibm.websphere.internalClassAccessMode=allow -verbose:gc -Xms1024m -  
Xmx1200m -  
Dws.ext.dirs=/u01/was61/java/lib:/u01/was61/profiles/appsrv/classes:/u01/was61/c  
lasses:/u01/was61/lib:/u01/was61/installedChannels:/u01/was61/lib/ext:/u01/was61  
/web/help:/u01/was61/deploytool/itp/plugins/com.ibm.ertools.ejbdeploy/runtime -  
Dderby.system.home=/u01/was61/derby -Dcom.ibm.itp.location=/u01/was61/bin -  
Djava.util.logging.configureByServer=true -  
Duser.install.root=/u01/was61/profiles/appsrv -`

# Linux Capacity Planning “planning”

- **Node Classes (installation defined)**
  - By application (capacity planning)
  - By VMWare/ESX box
  - By department (chargeback)
- **Other grouping (automatic)**
  - Process by user (ESALNXU)
  - Process by process name (ESAHSTA)
  - Process by application (ESALNXA)
    - Requires Parent/Child relationship
  - Disk storage by NODE class
- **Define alerts (Operational support)**
  - based on application
  - Based on node group
  - Based on linux user

# z13 Architecture



Question, If 10,000 dispatch / second / cpu, impact?



# CPU Measurement Facility

- What is the CPU Measurement Facility (Basic)
- CPI: Cycles per Instruction

Report: ESAMFCA MainFrame Cache Hit Analysis  
Monitor initialized: 12/10/14 at 07:44:37 on 282

| Time     | CPU | <CPU Busy><br><percent> |      | <-----Processor-----><br>Speed/<--Rate/Sec--> |        |       | CPI<br>Ratio |
|----------|-----|-------------------------|------|-----------------------------------------------|--------|-------|--------------|
|          |     | Totl                    | User | Hertz                                         | Cycles | Instr |              |
| 07:48:35 | 0   | 20.8                    | 18.4 | 5504M                                         | 1121M  | 193M  | 5.807        |
|          | 1   | 21.6                    | 19.6 | 5504M                                         | 1161M  | 221M  | 5.264        |
|          | 2   | 24.4                    | 22.5 | 5504M                                         | 1300M  | 319M  | 4.078        |
|          | 3   | 22.4                    | 19.7 | 5504M                                         | 1248M  | 265M  | 4.711        |
|          | 4   | 19.6                    | 17.6 | 5504M                                         | 1102M  | 194M  | 5.683        |
|          | 5   | 20.4                    | 18.6 | 5504M                                         | 1144M  | 225M  | 5.087        |
|          | 6   | 23.9                    | 22.0 | 5504M                                         | 1341M  | 341M  | 3.935        |
|          | 7   | 17.6                    | 15.4 | 5504M                                         | 949M   | 160M  | 5.927        |
|          | 8   | 18.5                    | 16.5 | 5504M                                         | 1005M  | 194M  | 5.195        |
|          | 9   | 22.5                    | 20.6 | 5504M                                         | 1259M  | 347M  | 3.629        |
| System:  |     | 212                     | 191  | 5504M                                         | 10.8G  | 2457M | 4.733        |



EC12...

# Why you should be interested – what is a MIP?

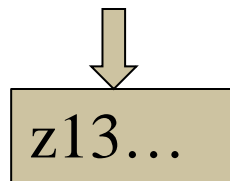
Report: ESAMFC MainFrame Cache Analysis Rep

| Time     | CPU | <CPU Busy> |      | <-----Processor-----> |                        |              |              |
|----------|-----|------------|------|-----------------------|------------------------|--------------|--------------|
|          |     | Totl       | User | Speed/<br>Hertz       | <-Rate/Sec-><br>Cycles | Instr        | Ratio        |
| 14:05:32 | 0   | 92.9       | 64.6 | 5000M                 | 4642M                  | 1818M        | 2.554        |
|          | 1   | 92.7       | 64.5 | 5000M                 | 4630M                  | 1817M        | 2.548        |
|          | 2   | 93.0       | 64.7 | 5000M                 | 4646M                  | 1827M        | 2.544        |
|          | 3   | 93.1       | 64.9 | 5000M                 | 4654M                  | 1831M        | 2.541        |
|          | 4   | 92.9       | 64.8 | 5000M                 | 4641M                  | 1836M        | 2.528        |
|          | 5   | 92.6       | 64.6 | 5000M                 | 4630M                  | 1826M        | 2.536        |
| System:  |     | <b>557</b> | 388  | 5000M                 | 25.9G                  | <b>10.2G</b> | <b>2.542</b> |

**1830 mips  
per ifl  
(at 100%)**

|          |   |            |      |       |       |              |              |
|----------|---|------------|------|-------|-------|--------------|--------------|
| 14:06:02 | 0 | 67.7       | 50.9 | 5000M | 3389M | 2052M        | 1.652        |
|          | 1 | 67.8       | 51.4 | 5000M | 3389M | 2111M        | 1.605        |
|          | 2 | 69.0       | 52.4 | 5000M | 3450M | 2150M        | 1.605        |
|          | 3 | 67.2       | 50.6 | 5000M | 3359M | 2018M        | 1.664        |
|          | 4 | 60.8       | 44.5 | 5000M | 3042M | 1625M        | 1.872        |
|          | 5 | 70.1       | 53.8 | 5000M | 3506M | 2325M        | 1.508        |
| System:  |   | <b>403</b> | 304  | 5000M | 18.8G | <b>11.4G</b> | <b>1.640</b> |

**2828 Mips  
(at 100%)  
Doing 10%  
more work**



# TLB Analysis P – z13 data SMT Enabled

Why working sets, dispatch rates are important

Why we need large pages?

DAT Translation consumes 30% of the cycles for both threads

Report: ESAMFC MainFrame Cache Magnitudes Report ZMAP 4.2.4

| Time     | CPU | <CPU Busy> |      | <----->         |       | <-Translation Lookaside buffer(TLB)-> |                     |       |       | CPU Cycles |       |
|----------|-----|------------|------|-----------------|-------|---------------------------------------|---------------------|-------|-------|------------|-------|
|          |     | Totl       | User | Speed/<br>Hertz | Ratio | <cycles/miss><br>Instr                | <Writs/Sec><br>Data | Instr | Data  | Cost       | Lost  |
| 07:45:01 | 0   | 25.9       | 24.4 | 5000M           | 1.704 | 159                                   | 742                 | 473K  | 244K  | 19.77      | 257M  |
|          | 1   | 35.9       | 34.7 | 5000M           | 1.491 | 138                                   | 731                 | 530K  | 249K  | 14.17      | 255M  |
|          | 2   | 15.8       | 13.9 | 5000M           | 2.868 | 206                                   | 826                 | 419K  | 245K  | 36.30      | 289M  |
|          | 3   | 16.6       | 15.4 | 5000M           | 2.508 | 212                                   | 825                 | 411K  | 247K  | 34.90      | 291M  |
|          | 23  | 18.1       | 17.0 | 5000M           | 2.144 | 197                                   | 815                 | 412K  | 229K  | 29.44      | 268M  |
|          | 24  | 21.4       | 19.9 | 5000M           | 1.865 | 114                                   | 533                 | 598K  | 302K  | 21.35      | 229M  |
|          | 25  | 26.2       | 24.9 | 5000M           | 1.742 | 98                                    | 503                 | 736K  | 346K  | 18.71      | 246M  |
|          | 26  | 12.9       | 11.6 | 5000M           | 2.050 | 154                                   | 631                 | 378K  | 214K  | 29.92      | 194M  |
|          | 27  | 13.1       | 11.9 | 5000M           | 1.987 | 156                                   | 630                 | 378K  | 217K  | 29.64      | 195M  |
| System:  |     | 514        | 476  | 5000M           | 2.257 | 176                                   | 724                 | 14M   | 7641K | 30.69      | 7917M |

One Thread

## z/VM 6.4 Support

- HyperPav

## Linux

- FCP Disk performance data (ESALNXF)

## Applications

- Java threads (ESAJVMT)

## Major clean up

- Office vision removal
- 3880-23 removal
- Better internal support of vcpu

- Hyperpav has additional metrics in 6.4

```

Report: ESAHPP HyperPav Device Pool Analysis Velocity S
Monitor initialized: 09/27/16 at 14:12:32 on 2964 serial 0FE8C7 First reco

Time/ <Storage>
Date <Director><HPP Device Counts> <Alias Rate> <----Data Type Analysis
 ID Pool Base Alias min max <-Acquires-> <-Threshold
 ID Pool Base Alias min max Tries Fails Type Shr Below Empty

14:14:00 C901 0 3 2 0 2 17.6 8.0 MDISK 0 0 0
 C701 1 4 2 0 2 12.7 6.9 MDISK 0 0 0
 PAGING 0 0 0
 PAGING 0 0 0

14:15:00 C901 0 3 2 0 2 8.2 2.2 MDISK 0 0 0
 C701 1 4 2 0 2 6.3 2.5 MDISK 0 0 0
 PAGING 0 0 0
 PAGING 0 0 0

```

# FCP Disk Measurements

- New Linux metrics exposed by VSI MIB

Report: ESALNXF      LINUX VSI Filesystem Performance      Velocity  
 Monitor initialized: 01/21/17 at 05:00:00 on 2828 serial 0314C7      First rec

| NODE/<br>Time/                 | Disk<br>Name | <-----Read I/O-----> |                 |             | <-----Write I/O-----> |                  |             | IO In<br>Prog-<br>ress | <Time(ms)> |     |     |
|--------------------------------|--------------|----------------------|-----------------|-------------|-----------------------|------------------|-------------|------------------------|------------|-----|-----|
|                                |              | /Second<br>I/O Mrgd  | Sectrs<br>/RdIO | (ms)<br>/IO | /Second<br>I/O Mrgd   | Sectrs<br>/WrtIO | (ms)<br>/IO |                        | IOQ        | I/O |     |
| 01/21/17<br>05:15:00<br>OSA178 | dasda        | 0                    | 0               | 0           | 0                     | 0                | 0           | 0                      | 0          | 0   |     |
|                                | dasda1       | 0                    | 0               | 0           | 0                     | 0                | 0           | 0                      | 0          | 0   |     |
|                                | sda          | 0                    | 0               | 0           | 1.8                   | 0.5              | 52.5        | 0.3                    | 0          | 0.2 | 0.3 |
|                                | sda1         | 0                    | 0               | 0           | 0                     | 0                | 0           | 0                      | 0          | 0   |     |
|                                | sda2         | 0                    | 0               | 0           | 0.3                   | 0.5              | 264.8       | 1.0                    | 0          | 0.6 | 1.0 |
| sles12                         | dasda        | 0                    | 0               | 0           | 0                     | 0                | 0           | 0                      | 0          | 0   |     |
|                                | dasda1       | 0                    | 0               | 0           | 0                     | 0                | 0           | 0                      | 0          | 0   |     |
|                                | sda          | 0                    | 0               | 0           | 1.8                   | 0.5              | 52.5        | 0.3                    | 0          | 0.2 | 0.3 |
|                                | sda1         | 0                    | 0               | 0           | 0                     | 0                | 0           | 0                      | 0          | 0   |     |
|                                | sda2         | 0                    | 0               | 0           | 0.3                   | 0.5              | 264.8       | 1.0                    | 0          | 0.6 | 1.0 |

| NODE/<br>Time/                 | Disk<br>Name | ><br><--Device Path-->                               |
|--------------------------------|--------------|------------------------------------------------------|
| 01/21/17<br>05:15:00<br>OSA178 | dasda        | ccw-0.0.0203                                         |
|                                | dasda1       | ccw-0.0.0203-part1                                   |
|                                | sda          | ccw-0.0.0201-zfcp-0x500507630718d02a:0x4012405c00000 |
|                                | sda1         | ccw-0.0.0201-zfcp-0x500507630718d02a:0x4012405c00000 |
|                                | sda2         | ccw-0.0.0201-zfcp-0x500507630718d02a:0x4012405c00000 |

# Java Threads

- The Velocity Software mib extracts threads

Report: ESAJVMT                      Java Subsystem Analysis Report                      Velocity Sof  
 Monitor initialized: 12/05/16 at 14:35:40 on 2828 serial 0314C7                      First record

```

```

| Node/<br>Date<br>Time | <-----Thread ID-----><br>Name | nr  | <--Blocks--><br>/Second | Time | <Thread<br>/Sec | Waits><br>Time | CPU<br>(ms) |
|-----------------------|-------------------------------|-----|-------------------------|------|-----------------|----------------|-------------|
| -----                 |                               |     |                         |      |                 |                |             |
| 14:37:00              | Totals: AppSrv01-server1      | 0   | 0.2                     | 0    | 73.1            | 0              | 170.8       |
| lxora12               | CommunicatorServer            | 7   | 0                       | 0    | 0               | 0              | 7.8         |
|                       | Thread-11                     | 17  | 0                       | 0    | 0.0             | 0              | 1.1         |
|                       | Deferred Alarm Manager        | 30  | 0                       | 0    | 2.2             | 0              | 4.0         |
|                       | Non-Deferred Alarm Manager    | 31  | 0                       | 0    | 2.0             | 0              | 2.9         |
|                       | Deferrable Alarm : 0          | 43  | 0                       | 0    | 1.0             | 0              | 3.1         |
|                       | LT=0:P=315710:O=0:port=9100   | 49  | 0                       | 0    | 0               | 0              | 1.4         |
|                       | LT=1:P=315710:O=0:port=9403   | 50  | 0                       | 0    | 0               | 0              | 1.8         |
|                       | ThreadService-0               | 90  | 0.0                     | 0    | 1.6             | 0              | 19.2        |
|                       | Deferrable Alarm : 1          | 99  | 0                       | 0    | 1.0             | 0              | 3.9         |
|                       | Deferrable Alarm : 2          | 135 | 0                       | 0    | 1.0             | 0              | 3.8         |
|                       | Thread-79                     | 140 | 0                       | 0    | 0.3             | 0              | 1.1         |
|                       | ThreadService-1               | 148 | 0.0                     | 0    | 1.8             | 0              | 16.7        |
|                       | Deferrable Alarm : 3          | 149 | 0                       | 0    | 1.0             | 0              | 3.4         |
|                       | ThreadService-2               | 150 | 0.0                     | 0    | 1.7             | 0              | 11.7        |
|                       | ThreadService-3               | 151 | 0.0                     | 0    | 1.6             | 0              | 14.5        |
|                       | ThreadService-4               | 153 | 0.1                     | 0    | 1.5             | 0              | 16.1        |
|                       | ThreadService-5               | 154 | 0.0                     | 0    | 1.5             | 0              | 25.8        |
|                       | AIO Timer Thread 1            | 183 | 0                       | 0    | 1.0             | 0              | 1.7         |
|                       | WebContainer : 2              | 186 | 0                       | 0    | 1.0             | 0              | 1.5         |
|                       | WebContainer : 15             | 226 | 0                       | 0    | 1.0             | 0              | 1.0         |
|                       | WebContainer : 17             | 228 | 0                       | 0    | 1.0             | 0              | 1.6         |

- For z/VM, OSA MIB installs on a Linux Server
- Two sources, Shows configuration, totals, by LPAR
- Not sure which source is accurate or why discrepancy

```
Report: ESAOSA OSA System Configuration Report
Monitor initialized: 05/14/16 at 06:02:00 on

Collector <-----OSA Configuration--> MacAddress
Node Idx Name Nbr Type Level Shrd Active

06:03:00
OSA178 2 OSA1 0 1G Eth 6.00 Yes 6CAE8B483FD4
```

```
Report: ESAOSA OSA Velocity Software Corporate
Monitor initialized: 05/14/16 at 06:02:00 on First record analyzed: 05/14/16

Collector <-----OSA LPAR Bus CPHID KBytes/Sec Packets/sec
Node Idx Name Nbr NBR Util Util IN OUT In OUT

06:03:00
OSA178 2 OSA1 0 Tot 0 0 7.0 8.2 30.1 23.2
 2 0 . 3 1
 4 0 . 17 17
 5 0 . 4 4
```



## New technologies

- **Docker**
- **SPLUNK**
- **Oracle**
- **MQ**
- **DB2**

## Enhancements

- **Enterprise view – Applications**
- **Extend X-Enterprise (SSI) support**

## zPRO

### Open Mainframe Project

- **Openstack to use zPRO APIs,**
  - **NO SMAPI, NO JAVA, NO OVERHEAD....**

# zVPS Measurement Summary

- **zVPS Meets Performance Management Requirements:**
  - Sufficient for performance, capacity planning, accounting, Operations
  - Linux and z/VM data – Integrated
  - Complete and correct data
- **zVPS Meets Infrastructural requirements**
  - Support all releases (SLES7,8,9,10,11 RHEL 3,4,5,6, 7 z/VM V3,4,5,6 ...)
  - Standard interfaces
  - Low resource requirements
- **zVPS References (many):**
  - Many installations instrument hundreds of servers today on single LPARs
- **zTUNE (Health Check for z/VM, Linux)**
  - zTUNE <http://velocitysoftware.com/products.html>
- **Performance Education:**
  - Performance education, see: “<http://velocitysoftware.com/workshop.html>”