Oracle Performance Management (with zVPS)

Session 16166

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VELOCITY SOFTWARE

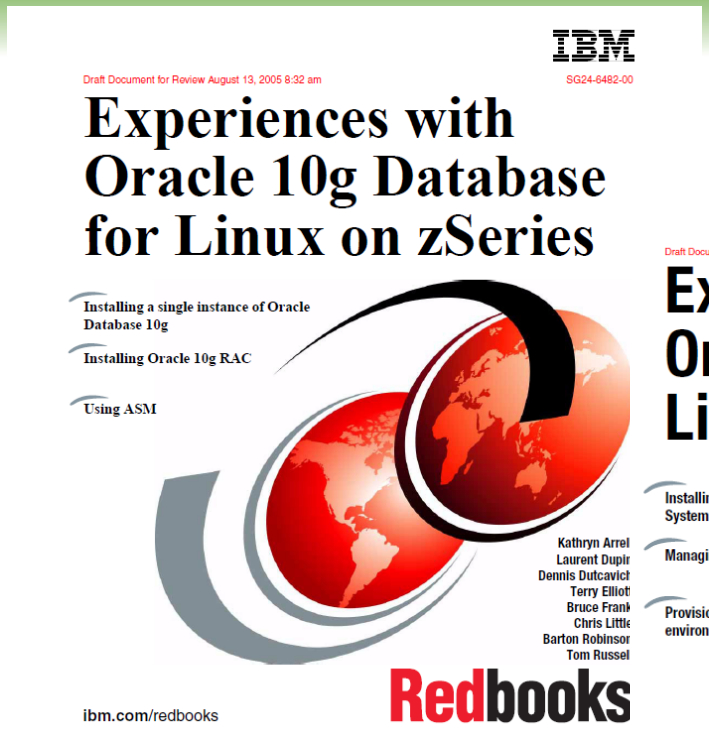
PROVEN PERFORMANCE

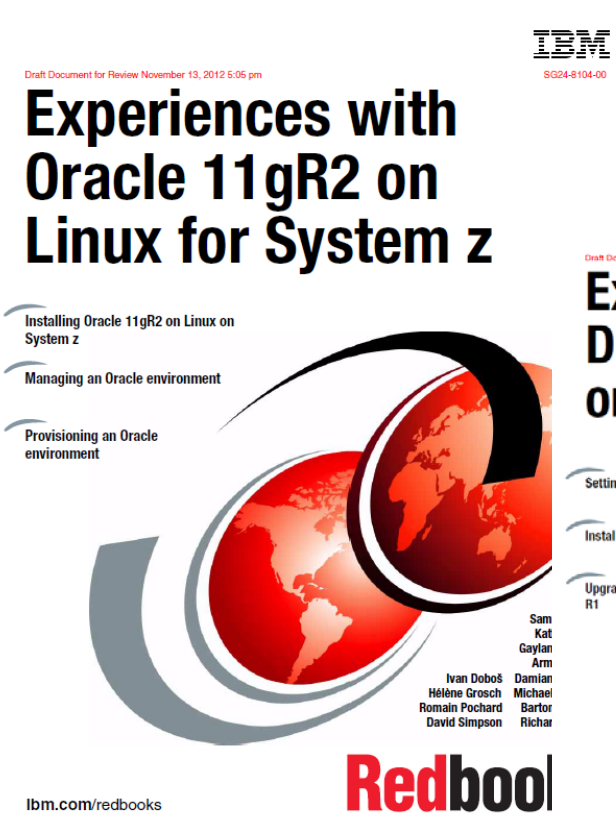
October, 2013, ski tournament
People see things different

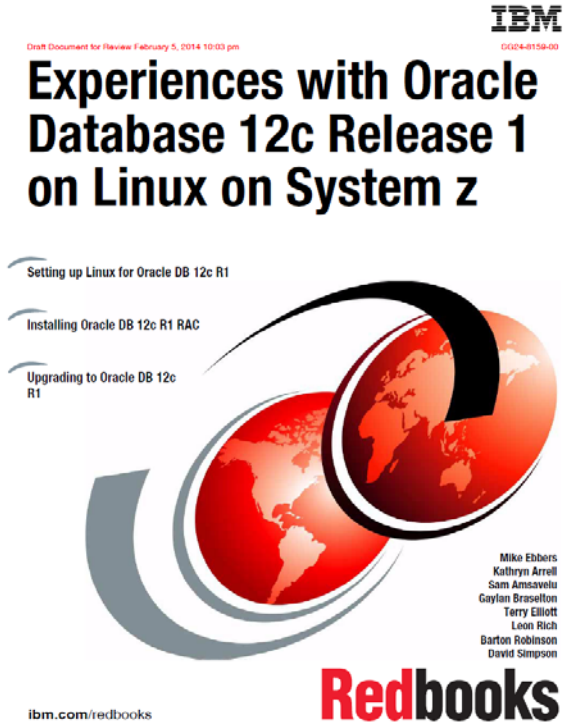
Topics

- Velocity Software
- What is Performance Management
- zVPS – Velocity Performance Suite
- Managing Performance for:
  - z/VM,
  - Linux,
  - Oracle

Velocity Software, zVPS, and IBM Redbooks







Sg24-4862

Sg24-8104

Sg24-8159

Linux Installation Profiles

“large financial”

- **500 IFLs,**
- **4,000 Linux servers under z/VM**
- **4,400 Oracle databases running on Linux on z/VM**

Government

- **98 IFLs,**
- **consolidated MANY LARGE Oracle databases**

Insurance

- **3 CECs, 71 IFLs**
- **SAP, Oracle**

100’s of installations support Oracle on z/Linux

Why Performance Management?

Computers are important part of any organization

- **Increased competitiveness, lowers operating costs**

Running at high utilization reduces cost of ownership

- **90% utilization less than ½ cost of 45% utilization**

Bad performance results in Lost Customers

- **Slow websites drive customers to competitors**
- **Non-responsive costs companies money (and jobs)**

Batch Windows

- **Backups take so long can't start production**
- **(So don't back up?)**

FORMAL Performance Management

Performance Analysis

- **Real time analysis**
- **Service Level Support**

Capacity Planning

- **Long Term service level support**
- **By application, node, system, server, etc**

Operations Support

- **Alerts to detect service issues**

Charge back Support

- **Run your IT as a business (Profit Center)**
- **Required for cloud**

What is NOT Performance Management

Performance Analysis - reactionary

- **Diagnosing yesterday's problem with todays data?**
- **Turn on performance monitor ONLY if a problem**
  - **(Overhead is too high to run all the time)**
  - **PROBLEM: Too many MIPS/IFLs required**

Capacity Planning - reactionary

- **Buy hardware when performance is bad**
- **Problem: Business impact when performance bad?**

Operations Support

- **Alerts by telephone calls from users (or executives?)**

Charge back Support

- **Costs not managed**

Performance management is NOT "TOP", "ps", etc

Oracle Performance Management

Oracle application layer

- **Has performance settings,**
- **Has LRU Algorithms**

Oracle Application runs under Linux layer

- **Dispatching**
- **Storage requirements, LRU algorithm**

Linux servers run under z/VM layer

- **Dispatching,**
- **Storage requirements, LRU algorithm**
- **Subsystems: CPU, RAM, Paging, DASD, Network**

z/VM runs in an LPAR – Sharing IFLs

Why Performance Analysis: Service Level Mgmt

- Diagnose real time service issues
- Manage “large” 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 (What changed?)
  - Why are things worse today than yesterday?
  - Did adding new workload affect overall throughput?

Why Capacity Planning

Capacity Planning: Future Service Levels

- How many servers can you support with existing EC12?
- 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 (and Oracle)
- Resource requirements by Server, Application, User
- z/VM, z/Linux data must be usable by existing planners
- **Interface to MICS, MXG, TUAM, TDS**

Accounting and Chargeback

Why Chargeback? (run IT competitively)

- Distributed chargeback model is by server
- Shared chargeback model is by resource utilized
- Installations with chargeback models adopt Linux easily
- Encourages efficient/effective resource use
- Align IT to your business model
- Integral part of Cloud architecture

Infrastructure Requirements

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

Operational Alerts

Operational Requirements

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

Infrastructure Requirements

- "Agentless technology", "Centralized reporting"
- Fast problem detection
- Interface to SNMP management console (NETCOOL, etc)
- User tailored alerts
- Web based alerts

Performance Management Data Requirements

Performance data requirements

- **Valid, correct, complete – CPU data wrong or very wrong?**
- z/VM, Linux and Oracle data integrated?
- Helpful in solving problems?
- Validate benefits of tuning

Historical data requirements

- Capacity Planning input – the Performance Data Base
- Problem Analysis
- Linux, z/VM, AND ORACLE

Accounting / Charge back

- By server, by application, by process, by Linux userid

Manage Infrastructure cost (7x24 required)

- **Turning off "performance management" agent solves the performance problem?**

Challenges With Linux Performance Management

Operational cost of infrastructure – simple math

- 2% of a CPU per server costs 1 IFL per 50 servers,
- AWR Reporting 5-10% of an IFL for one database?
- Velocity uses snmp, targets less than .1% of ONE processor with one minute data collection per Linux server (One IFL per 1000 servers)
- Netsnmp enhancements provided by Velocity Software
- **"Managed" installations monitor ALL their linux servers ALL the time!**

Accuracy of data

- Virtualized CPU accounting must be normalized
- Correlate data from Oracle, Linux system, Linux process and z/VM

Capture ratios

- Data must be complete to be useful for full performance management
- Target 100% capture ratio to process level

Skills: **Access to skills critical when there are performance problems.**

Building an Oracle Performance Mgmt Architecture

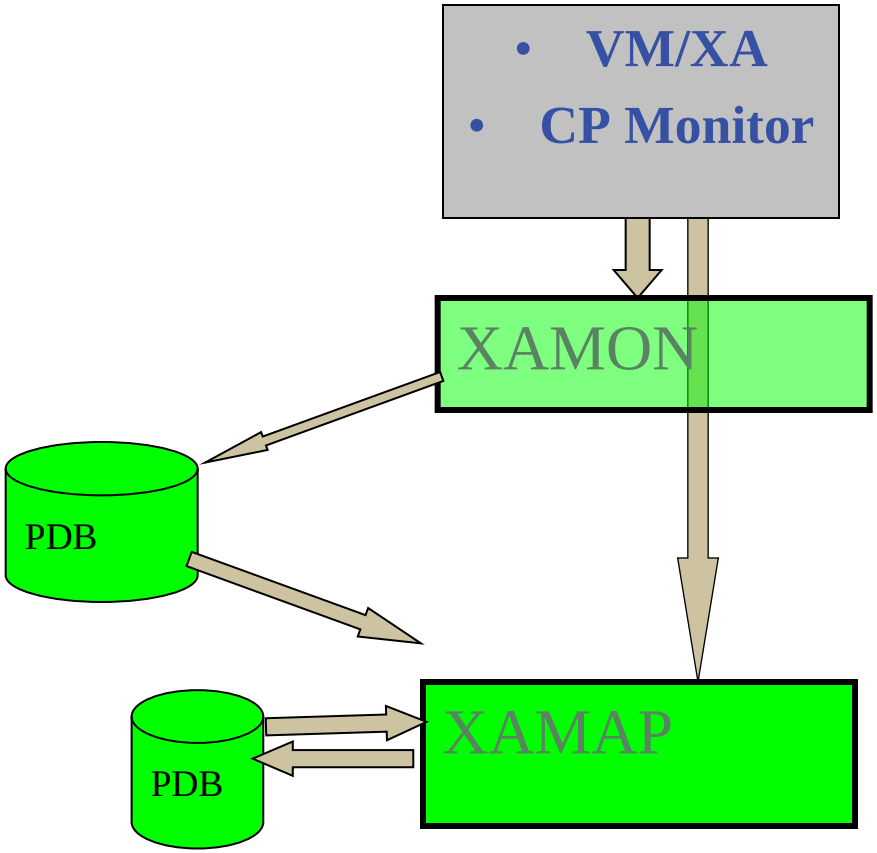
Integrated platform data

- LPAR (virtualization)
- z/VM (virtualization)
- Linux
- Oracle

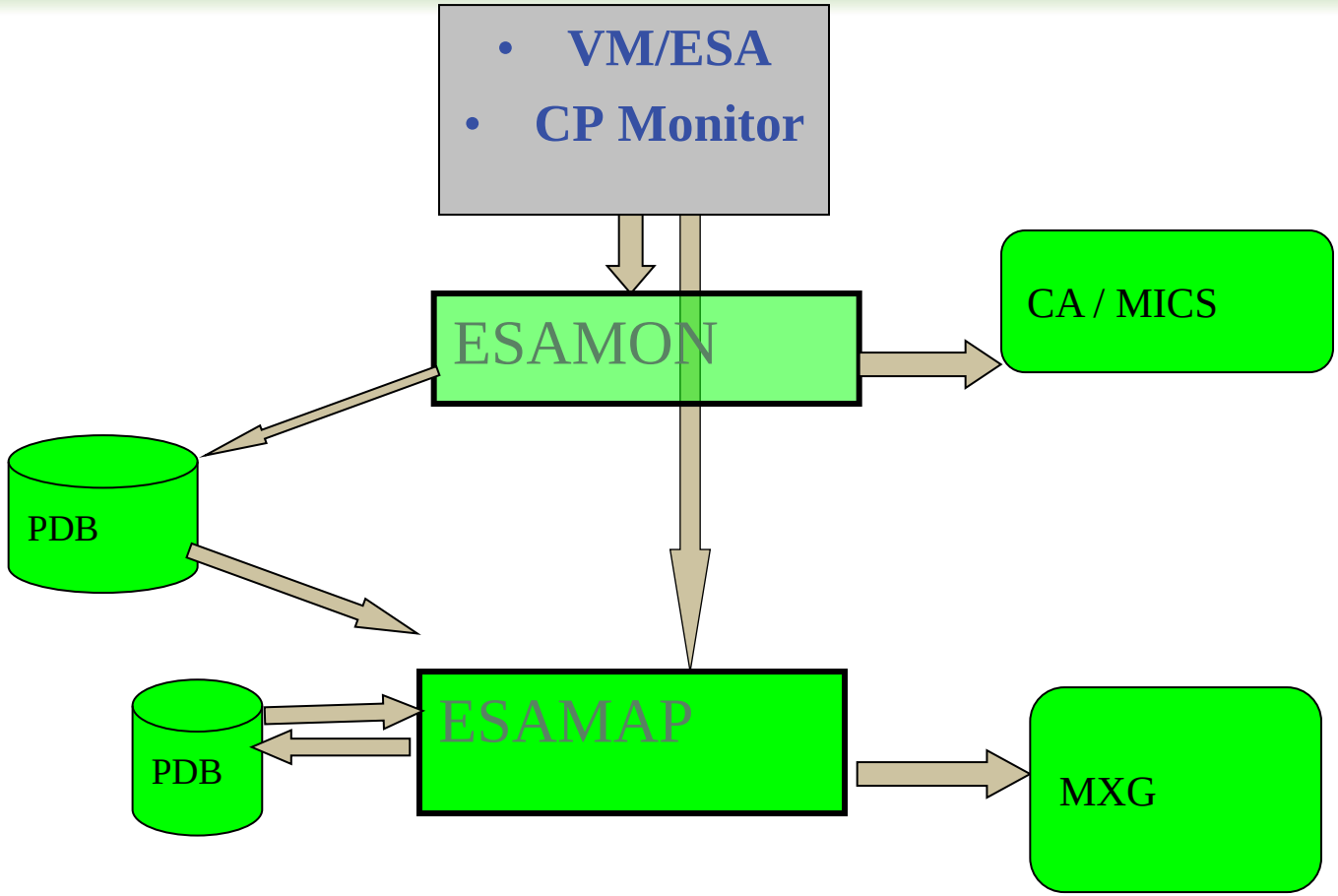
Data acquisition

- Low cost of acquisition (or just won't be utilized)
- Historical data maintained (performance data base)

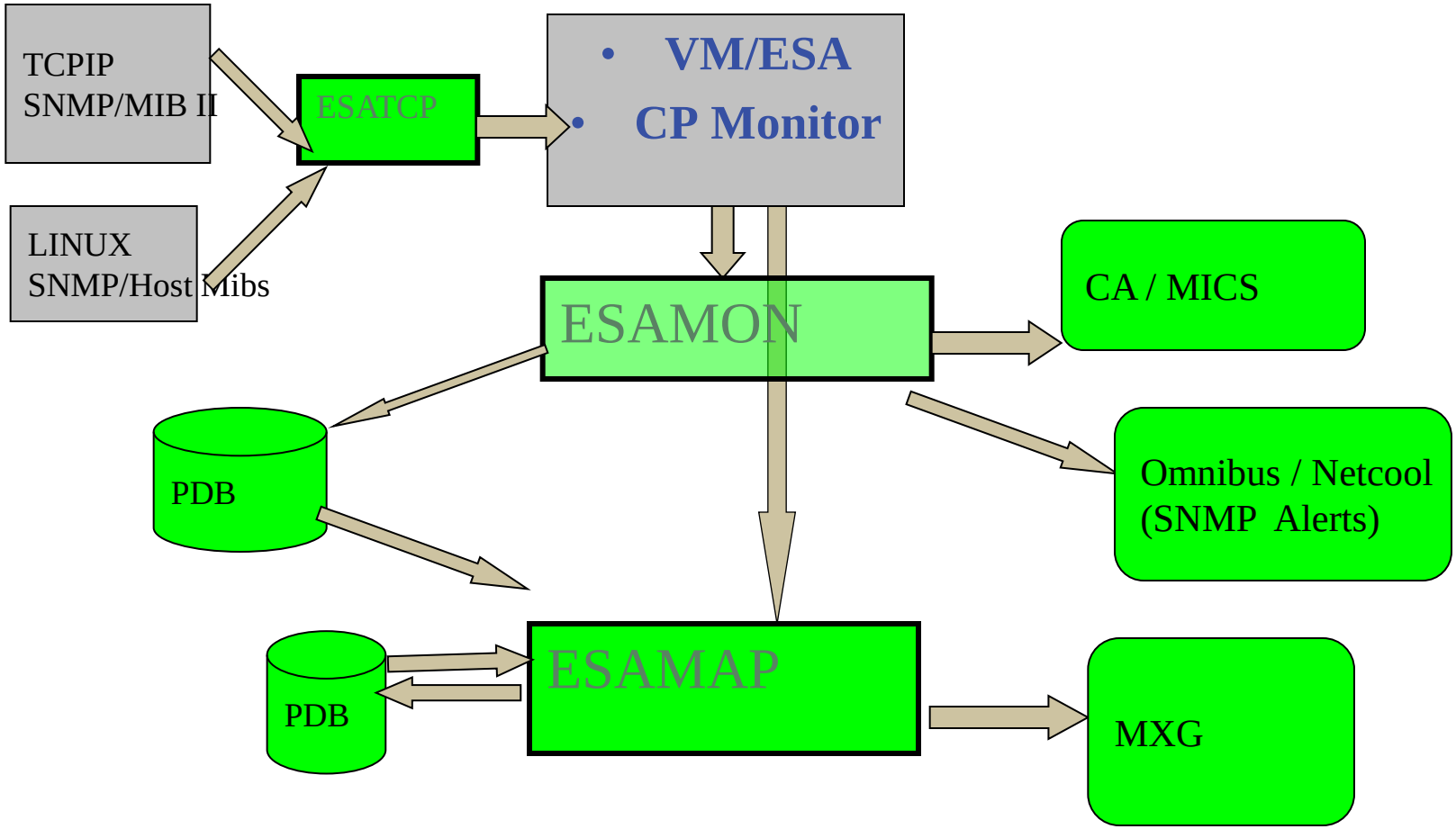
Original (1988) Performance Management Architecture



Add Enterprise Capacity Planning Support (1991)

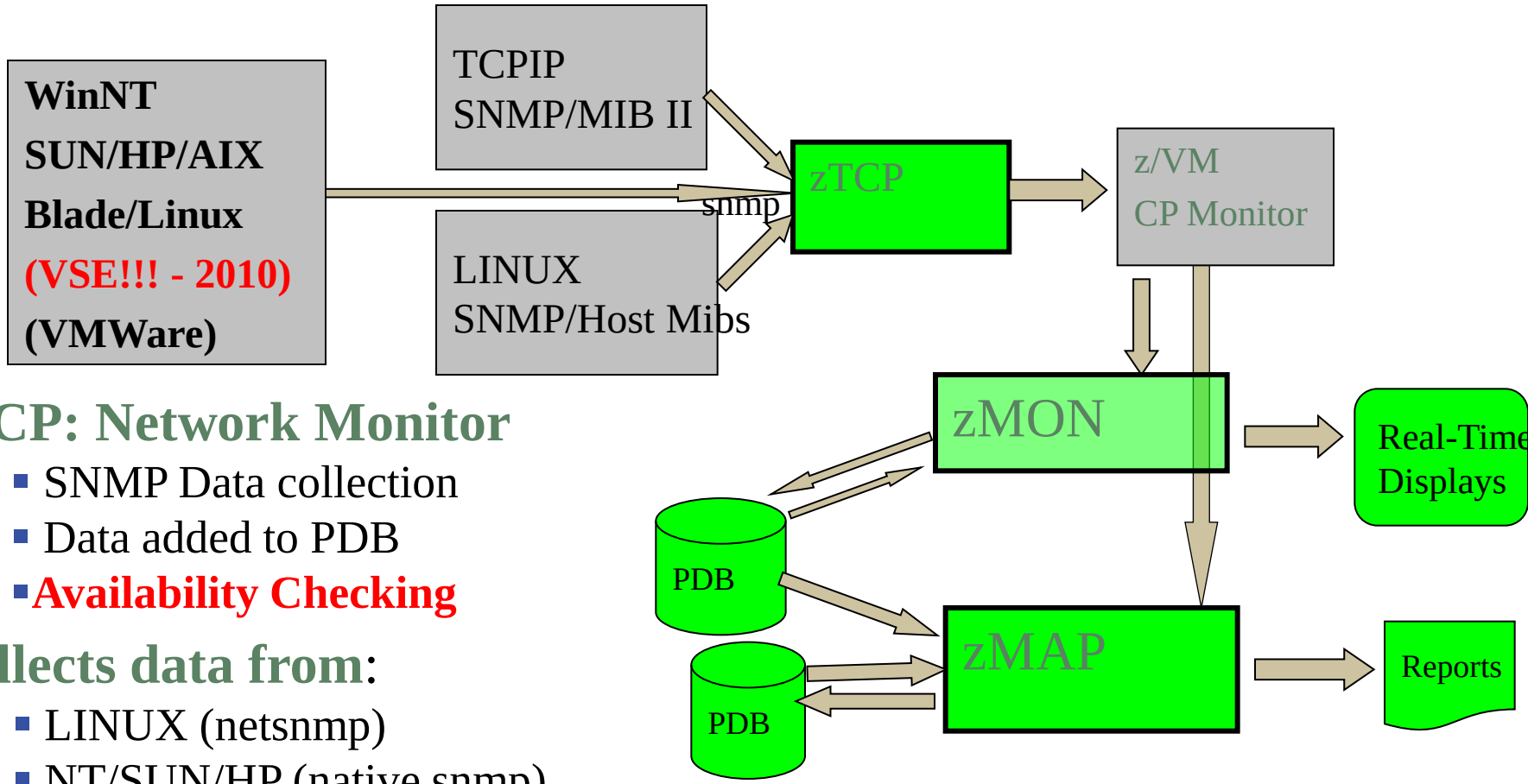


Add Network Management Support (1998)



Full network monitor – Interface, IP, TCP, UDP

Added Linux and Network Data Acquisition (2001)



zTCP: Network Monitor

- SNMP Data collection
- Data added to PDB
- **Availability Checking**

Collects data from:

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

Process Capture Ratio

- **High cpu capture ratio**

```
Report: ESALNXV      LINUX Virtual Processor Analysis Report
-------------------------------------------------------------------
Node/     VM       <Linux Pct CPU> <Process  Data> Capture Prorate
 Name     ServerID Total Syst User Total Syst User   Ratio Factor
--------- -------- ----- ---- ---- ----- ---- ---- ------- ------
10:03:00
NEALE1    LNEALE1  100.0 11.4 88.6 100.2 11.5 88.7   1.002  1.000
```

NO “top” or “ps” command required, EVER

```
Report: ESALNXP      LINUX HOST Process Statistics Report
-----------------------------------------------------------
node/     <-Process Ident-> Nice <------CPU Percents---->
 Name     ID    PPID   GRP  Valu  Tot  sys user syst usrt
--------- ----- ----- ----- ---- ---- ---- ---- ---- ----
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/        <-Process Ident-> <-----Pr
 Name        ID    PPID   GRP  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
  appldata     96     4     0 appldata
  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
```

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Linux “performance tools” replaced

Performance database has already captured all the data

- **How do you analyze yesterday’s performance problem?**

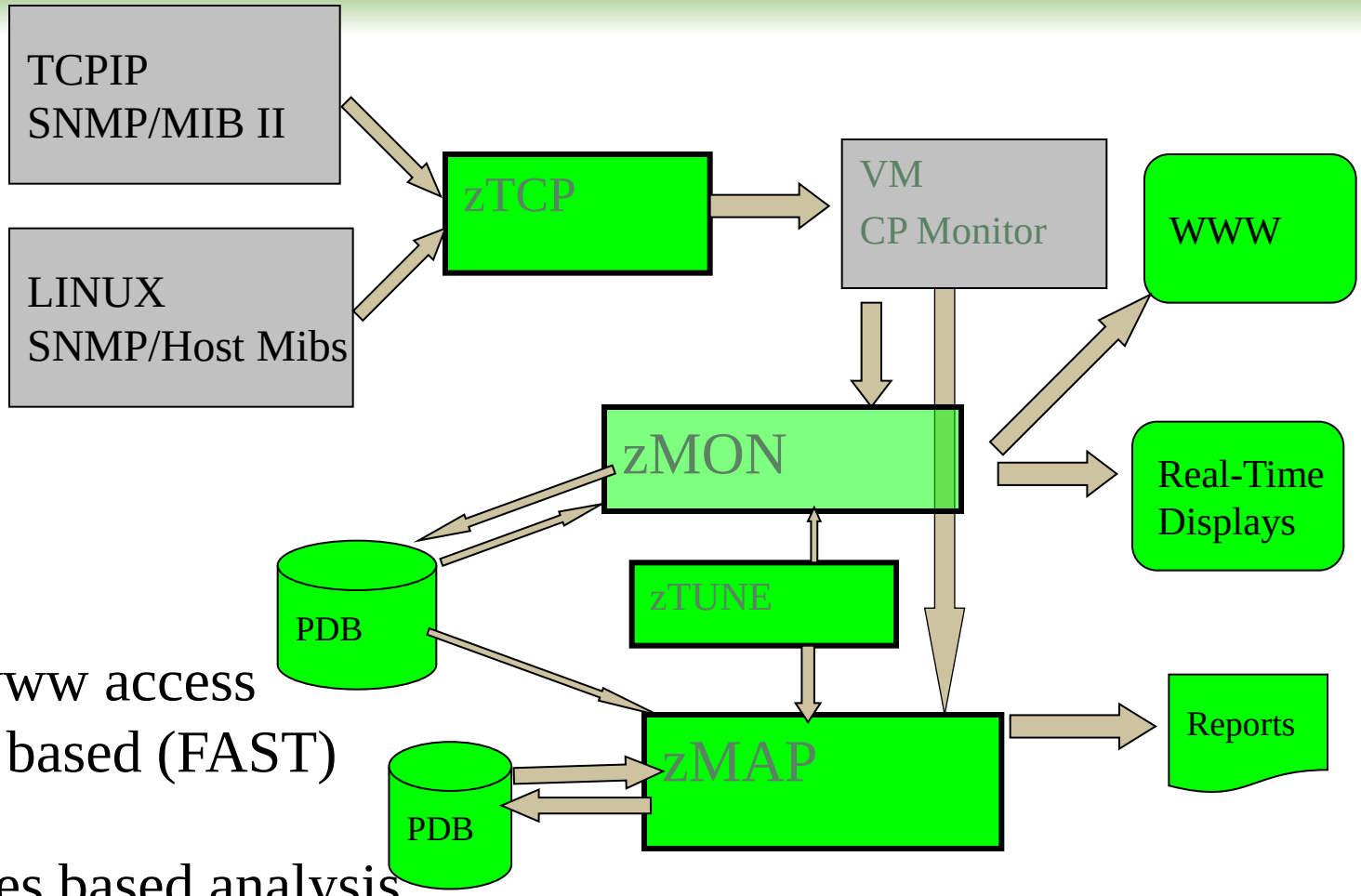
Many linux commands fully replaced

- top
- sar
- vmstat
- ps
- Iostat

Performance Management for 20 or 100’s or 1000’s of servers:

- Logging on just not done to production servers

Add webserving, performance HealthChecks (2002)

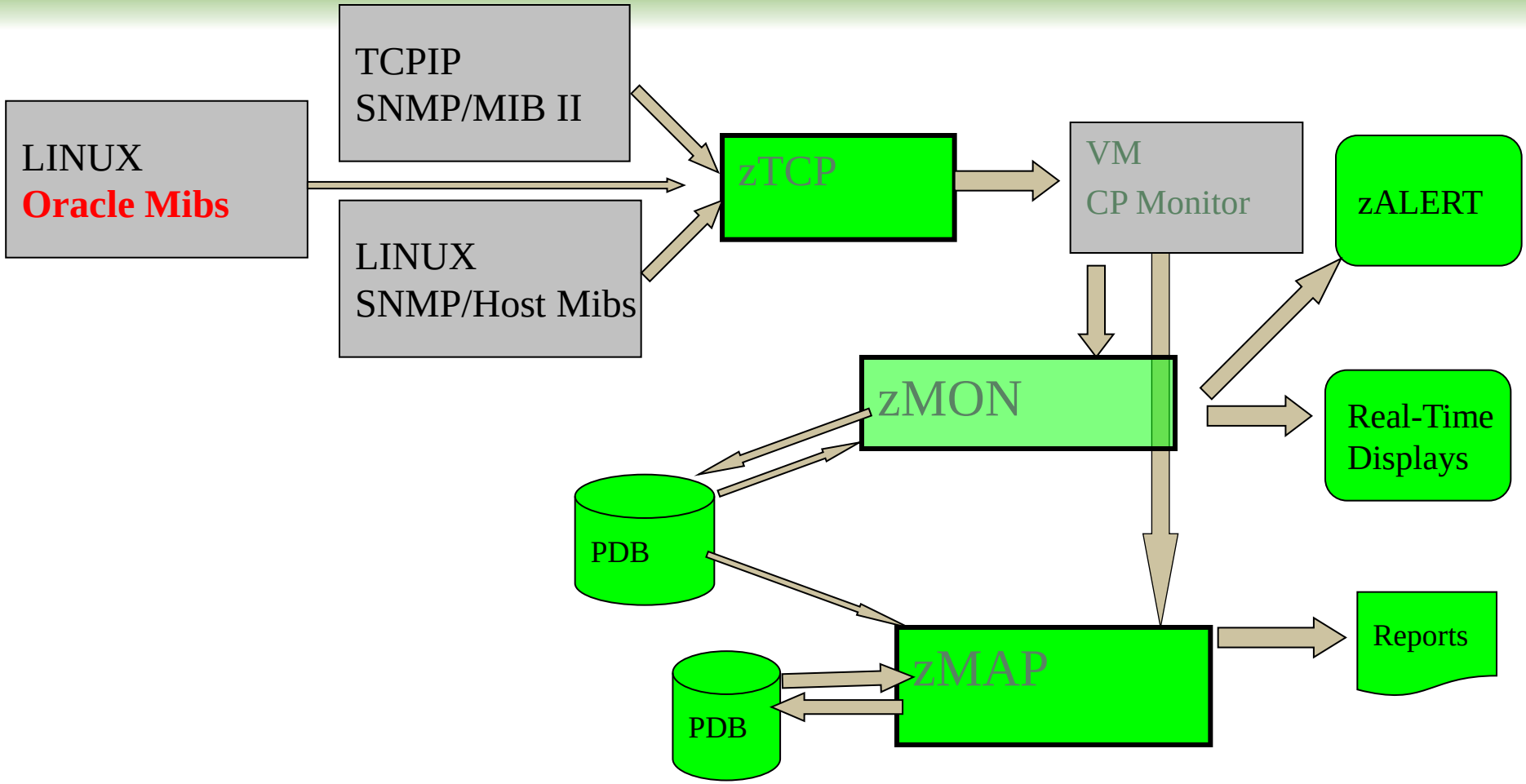


ZVWS

- Provides www access
- Assembler based (FAST)

zTUNE: Rules based analysis

Add Full Enterprise Alerts, Oracle Metrics



Oracle MIB added to Velocity Mib (2014)

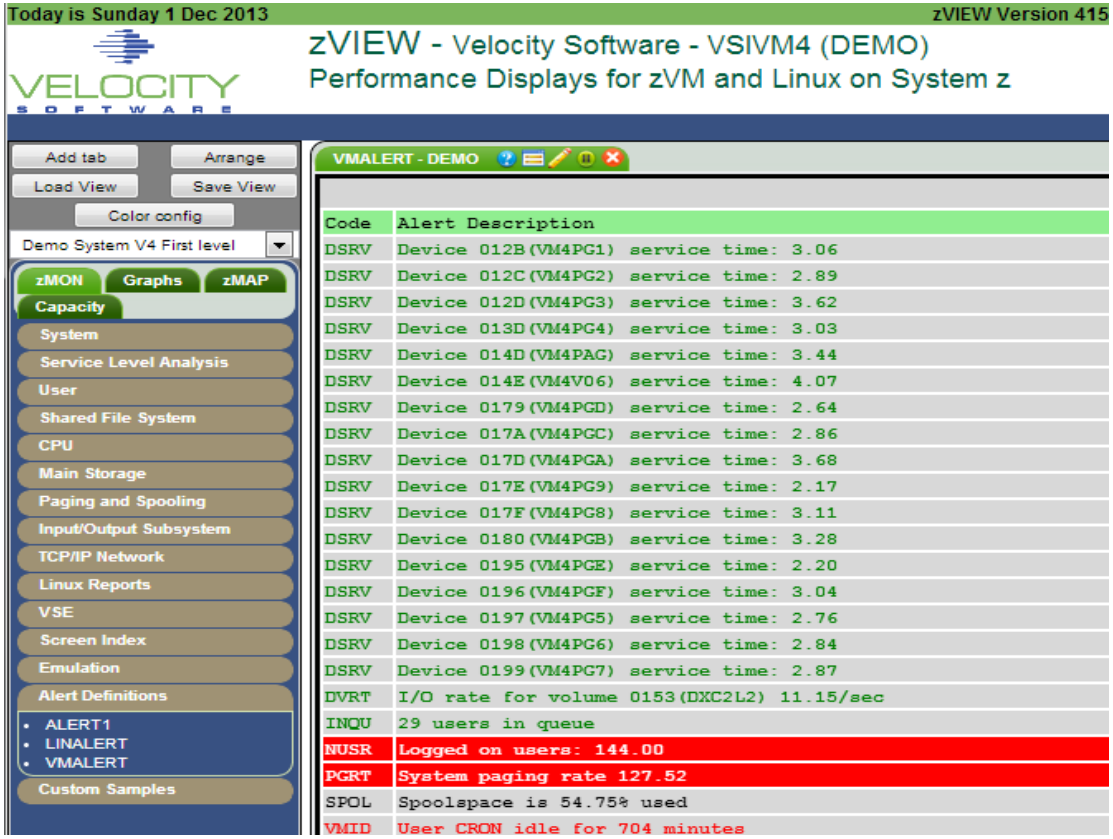
- **One minute granularity, maintain .1% target**

Operations: zALERT

Alert mechanism required if “managing”

Alert function via 3270, browser

- **Multiple definition**
- **Alert machine runs 7x24**
- **Sends alerts via:**
  - MSG, mail, sms, snmp, etc



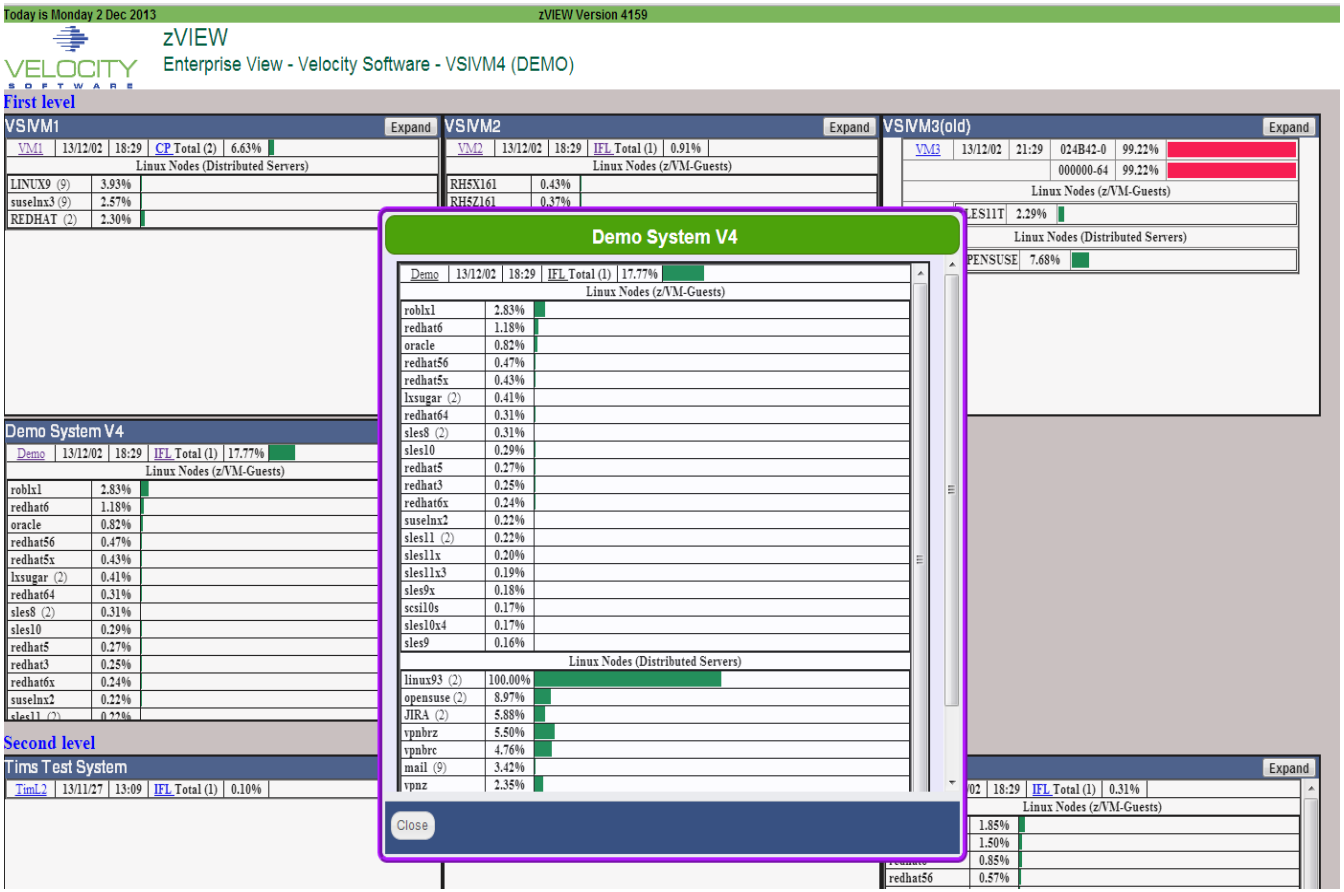
zVPS “is” zVIEW

- zVIEW is the “face” of zVPS, browser based

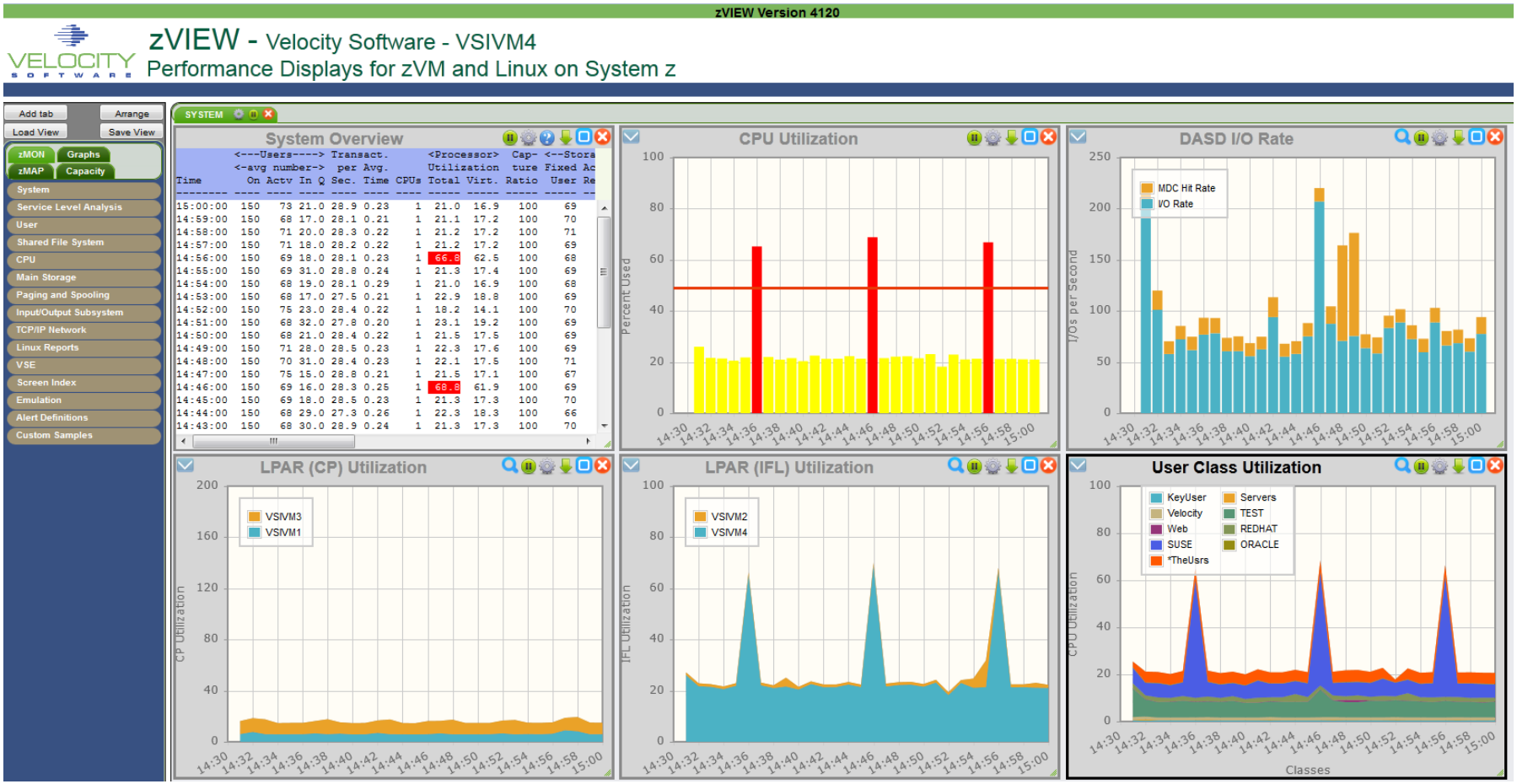
- zVIEW:
  - Web application
  - Integrated with zVPS
  - No charge feature of zVPS
- CEC List / Enterprise View
  - Feature of zVIEW
  - “CECLIST” Renamed to match function
  - High level view of any LPAR in enterprise

zVPS Enterprise View

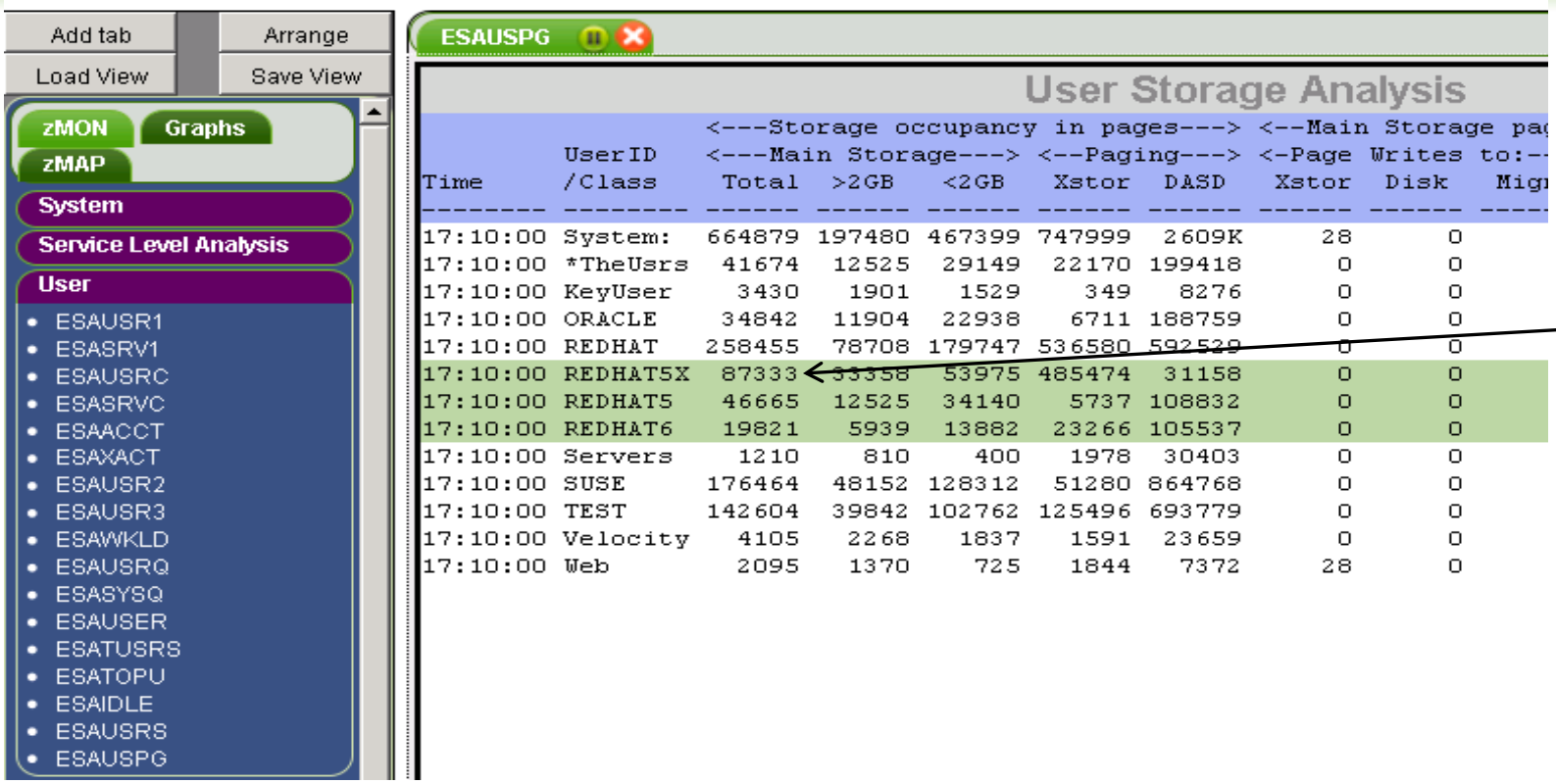
Tailorable, expandable, zoomable



zVIEWs Integrated “System Display”



ZMON Drill down Options



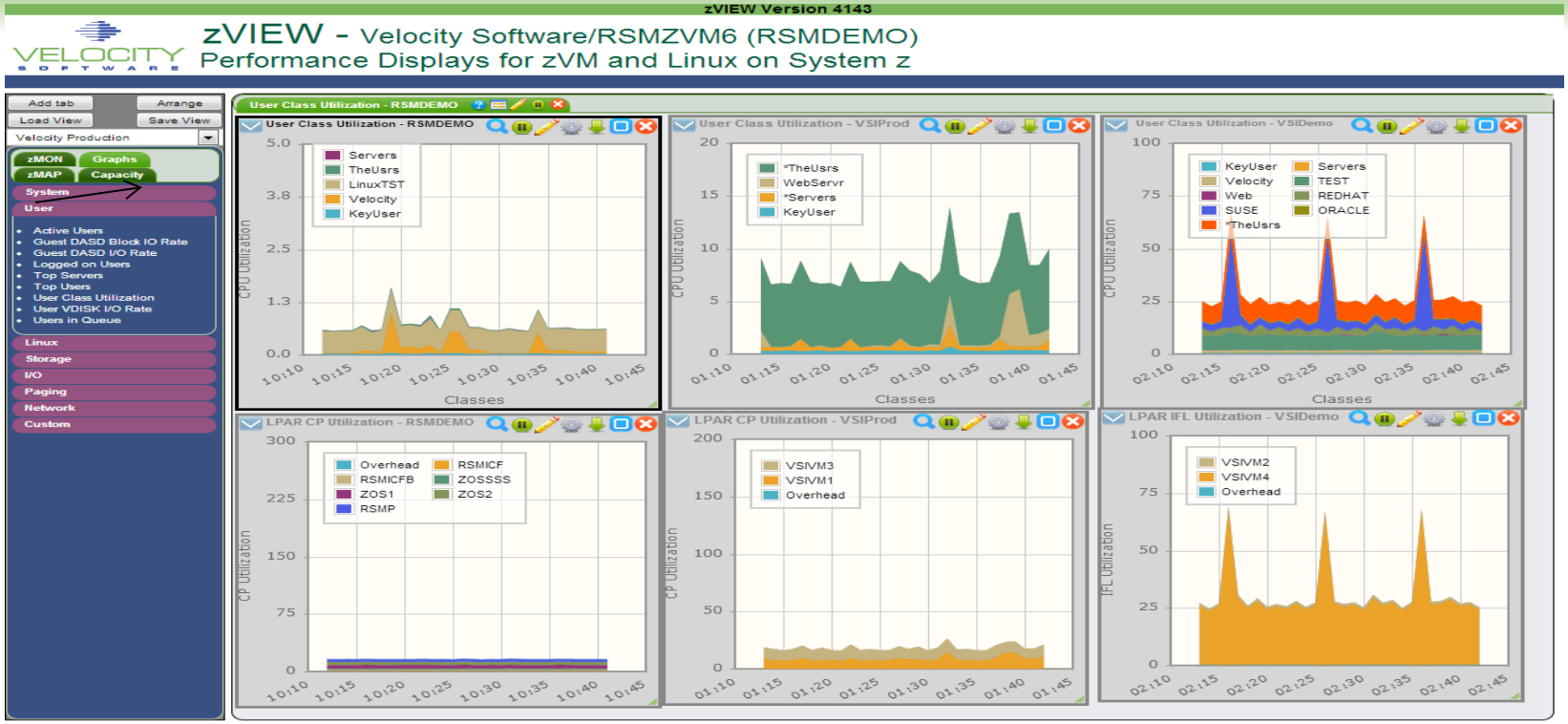
Time	UserID /Class	<---Storage occupancy in pages---> <---Main Storage---> Total	>2GB	<2GB	<--Paging---> Xstor	DASD	<--Main Storage pa <-Page Writes to: Xstor	Disk	Mig
17:10:00	System:	664879	197480	467399	747999	2609K	28	0	
17:10:00	*TheUsrs	41674	12525	29149	22170	199418	0	0	
17:10:00	KeyUser	3430	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	592529	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”

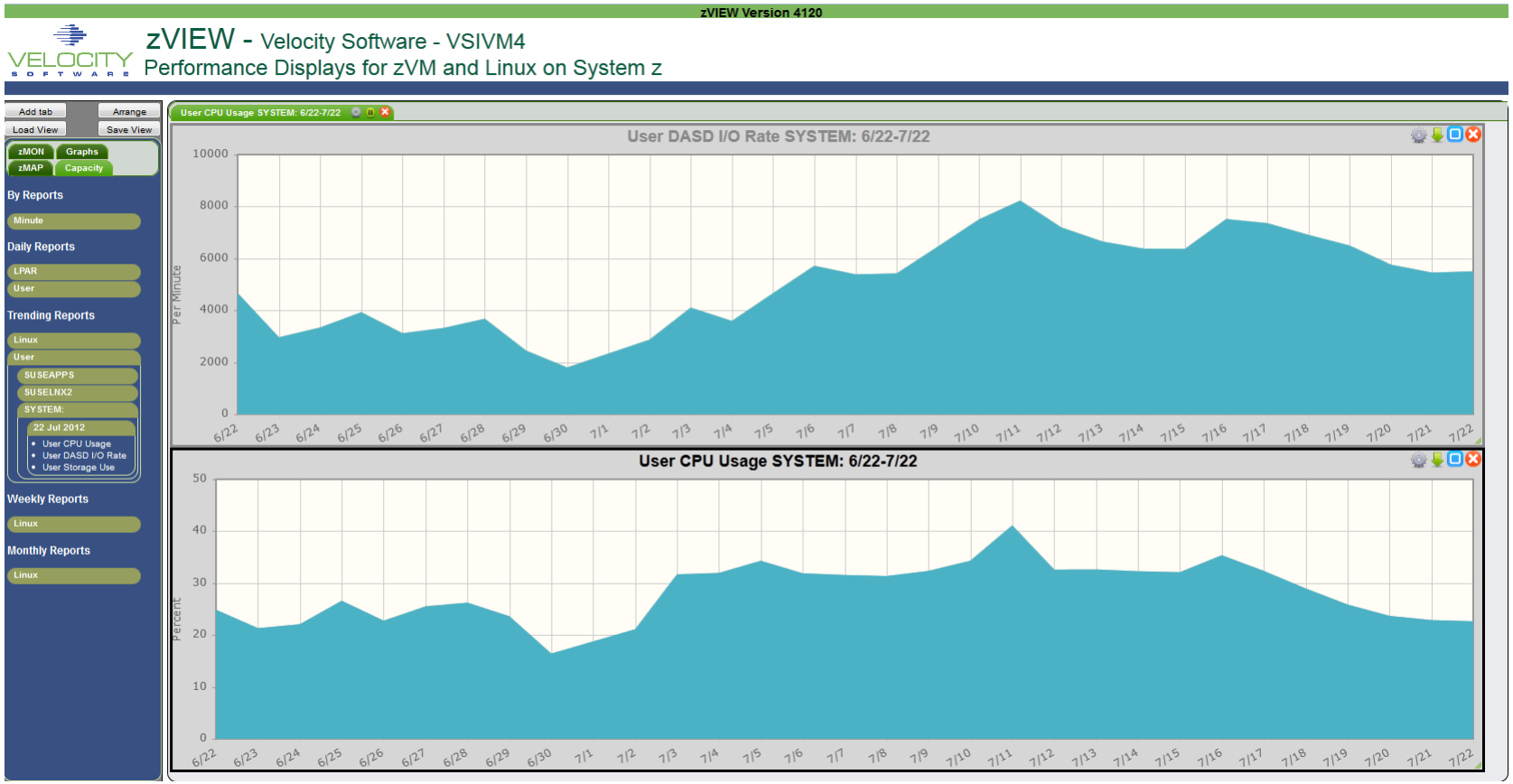
Oracle data available 4.2

Multiple System View (3 LPARs - 2012)



Oracle data from multiple lpars visible on one tab

zMAP Capacity/Trend Graphs



Oracle Analysis

LPAR data

- ESALPARS – Lpar overview

z/VM data

- ESASSUM/ESAMAIN – z/VM subsystem overview
- ESAUSP2 – virtual machine data

Linux data (new metrics)

- ESAUCD2 – Linux system storage
- ESALNXR – Linux system storage
- ESALNXP – process data

Oracle data (new)

- ESAORAC – Oracle configuration
- ESAORAG – SGA/PGA
- ESAORAW – Oracle waits
- ESAORAS – Oracle subsystems

ESAUCD2 – The most useful storage report available

```
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
s11s2ora  996.5  23.7 972.8 743.8 598.2 145.5  15.6 621.9      0   41.2 777.9 153.7
```

System Storage metrics (zVPS version 4.2)

Linux now provides 40 new **system level** metrics, (ESALNXR)

- SwapCached Both in swap and ram
- Active Recently referenced
- **Inactive Not recently referenced**
- ActiveAnon Anonymous storage NOT file backed
- **InactiveAnon**
- ActiveFile page cache active
- HugePages
- **PageTable Page tables in use, (4K page table)**
- WriteBack Write operations in progress, should be small or zero - **ALERT?**

```
Report: ESALNXR      LINUX RAM/Storage Analysis Report            Velocity SoftwaZMAP 4.2.0 08/03/14   Page
Monitor initialized: 08/03/14 at 13:00:00 on 2828 serial 414C7    First record an4 13:00:00
--------------------------------------------------------------------------------------------------------------
Node/    <--------Memory in megabytes-------------> <-Kernel(MB)-> <-Buffers(MB)->
                  <---Cache----><---Anonymous---> Stack<-Slab-->           Write Page <----Huge pages---->
Time     Total Free Size Actv Swap Total Actv Inact Size Size SRec Size Dirty Back Tbls Totl Free Rsvd Size
-------- ----- ---- ---- ---- ---- ----- ---- ----- ---- ---- ---- ---- ----- ---- ---- ---- ---- ---- ----
13:33:00
roblx1    8040 3573 1246  212    0  2198 2196 771.5 18.3  110 38.8  148   0.7    0 582K    0    0    0 1024
--------------------------------------------------------------------------------------------------------------
```

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
Monitor initialized: 05/13/14 at 00:00:00 on 2828 serial 414C7     First record analyzed: 05/13/14 00:00:00
-------------------------------------------------------------------------------------------------------------
node/     <-Process Ident-> Nice PRTY <------CPU Percents----> <--------------Storage Metrics (MB)---------->
 Name     ID    PPID   GRP  Valu Valu  Tot  sys user syst usrt  Size RSS Peak Swap Data Stk  EXEC Lib Lck PTbl
--------- ----- ----- ----- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ---- --- --- ----
00:15:00
oracle        0     0     0    0    0 1.87 0.11 1.05 0.16 0.55 7345  845 108K    0 1997 62.8  28K  6K   0  130
 init         1     1     0    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    0   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    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    0   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    0 5.96 3.54 1.83 0.19 0.40 105K 4321 1.5M 6958  21K  517 347K 34K   0 1498
 init         1     1     1    0   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    0   -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    0   -2 1.62 1.33 0.29    0    0  926    2  14K 27.8 46.3  2.1 3546 285   0 7.27
s11s2ora      0     0     0    0    0 1.86 0.42 0.68 0.26 0.50  16K 1063 238K  830 2353  141  70K  9K   0  207
 init         1     1     1    0   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 08/
Monitor initiali     First record analyzed: 08/03/14 13:00:00
-------------------------------------------------------------------
node/     <-Proc <---------------Storage Metrics (MB)---------->
 Name     ID      Size RSS Peak Swap Data Stk  EXEC Lib Lck PTbl
--------- -----  ---- ---- ---- ---- ---- ---- ---- --- --- ----
 oracle   43146  2303  265 2249    0 3.07  0.1  181  13   0 0.96       (WITHOUT  HUGE  PAGES)
 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
 oracle   43190  2318  101 2263    0 3.07  0.2  181  13   0 1.04
 oracle   43193  2303   28 2249    0 3.07  0.1  181  13   0 0.44
 oracle   43229  2308  108 2254    0 3.20  0.2  181  14   0 1.04
 oracle   43231  2308  117 2254    0 3.20  0.2  181  13   0 1.20
 oracle   43235  2306  124 2252    0 3.20  0.2  181  13   0 0.96
 oracle   43271  2308  100 2256    0 3.20  0.2  181  14   0 1.10
 oracle   45550  2303   23 2249    0 3.07  0.1  181  13   0 0.43


 oracle   51439  2304   18 2250    0 4.26  0.1  181  14   0 0.31       (WITH HUGE PAGES)
 oracle   51441  2303   16 2249    0 3.07  0.1  181  13   0 0.30
 oracle   51443  2303   16 2249    0 3.07  0.1  181  13   0 0.30
 oracle   51447  2303   16 2249    0 3.07  0.1  181  13   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 Feature

- **Requirement to go beyond z/VM and Linux metrics**
- **z/VPS provides over 4,000 unique metrics**
  - z/VM System metrics
  - z/VM Virtual machine metrics (~400)
  - Network metrics (~100)
  - Linux System metrics (~100)
  - Linux Process metrics (~40)
- **Development to target the application subsystem users:**
  - **Oracle**
  - **Websphere**
  - **MQ**

zVPS Application Feature

REAL Performance Management for Oracle:

- **Oracle (10G, 11G, 12C)**
- **Supports both "Z" and "X"**

New Reports:

- **ESAJVM: Java Subsystem Analysis**
- **ESAORAS: Oracle System Overview**
- **ESAORAG: Oracle SGA, PGA Analysis**
- **ESAORAS: Oracle Subsystem, Disk I/O Data**
- **ESAORAW: Oracle Database Waits Analysis**

Snmpd still less than .1% !!!!

Performance Analysis starts with looking for changes…

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
```

Measuring Oracle Workloads – Linux Perspective

Report: ESALNXA LINUX HOST Application Report Velocity Software ZMAP 4.2.0

Node/ Date Time	Process/ Application name	<---Processor Percent---> Total	sys	user	<Process><Children> syst	usrt	<Process-> <-Counts-> Total	Actv	<---Percent Process Status--> Run- ing	Sleep -ing	Zom bie	Disk Wait	Page Wait	Stop
08:30:00														
PAZXXT10	*Totals*	6.6	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	*Totals*	55.9	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
	oracle_1	19.8	2.9	16.8	0	0	12.0	12.0	15.0	48.3	0	36.7	0	0
	xterm	27.8	1.7	26.1	0	0	3.3	1.0	0	100	0	0	0	0
09:00:00														
PAZXXT10	*Totals*	69.4	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
	oracle_1	43.5	5.0	38.5	0	0	20.0	20.0	8.0	73.7	0	18.3	0	0
	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

Oracle Database Configuration

ESAORAC: Oracle Configuration, SGA, PGA High Level information

Report: ESAORAC Oracle Database Configuration Report

Node/ Date Time	<-Database Description-> DatabaseName	Instance	Version	<-Database-> <-Start-> 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 Time	<- Database	<-Storage Overview (MB)-> <-SGA-> Max	Fixed	Free Size	<-PGA-> 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 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/    <---Database----> <-User Activity-> <--CPU--->
Date                       <Rate per second>  Sess  Re-
Time     Name     Instance Calls Comm Rollbk  -ion  Cur
-------- -------- -------- ----- ----- ----- ----- -----
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
```

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

```
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/    <---Database----> <-User Activity-> <--CPU---> <----Physical Reads Activty---> <-Physical Write
Activit
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
-------- -------- -------- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ------ ----

00:15:00
oracle   orcl     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     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     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 Activty---> <-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     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     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     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     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     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     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     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     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     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     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
```

Next step: Oracle process data (WIP)

Process PGA

				←----PGA---------→			
PID	SPID	Username	Program Name	Used	Alloc	Freeable	PGA Max
00001	-0001	.	PSEUDO	0	0	0	0
00002	03845	oracle	oracle@oracle (PMON)	318189	465189	0	465189
00003	03847	oracle	oracle@oracle (PSP0)	317173	465189	0	465189
00004	03849	oracle	oracle@oracle (MMAN)	317173	465189	0	465189
00005	03851	oracle	oracle@oracle (DBW0)	395973	1559717	851968	2411685
00006	03853	oracle	oracle@oracle (LGWR)	10901429	23319405	196608	23516013
00007	03855	oracle	oracle@oracle (CKPT)	427173	1562069	917504	2414037

Process I/O

				block	CONS	Phys	Block	CONS
SID	PID	Username	Program Name	Gets	Gets	Reads	CHG	chg
00141	01917	SYS	sqlplus@oracle (TNS V1-V3)	28	95	5	30	0
00144	03898	.	oracle@oracle (q001)	0	0	0	0	0
00147	02243	ZVPS	iobyprocess@oracle (TNS V1-V3)	0	13	0	0	0
00148	03896	.	oracle@oracle (q000)	168944	728207	1229	205681	10155
00154	03873	.	oracle@oracle (QMNC)	0	6	0	0	0
00159	02191	.	oracle@oracle (J000)	0	0	0	0	0
00160	03861	.	oracle@oracle (CJQ0)	888	4381314	148	967	1
00161	03865	.	oracle@oracle (MMNL)	10991	43964	0	0	0
00162	03863	.	oracle@oracle (MMON)	520271	438654	4498	520964	28380

Setting Alerts?

Possible metrics for alerting:

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

Questions????

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