

Introduction to Performance Management for Linux on z

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

- **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 not a mature environment, even after 15 years
 - Some metrics are not yet available leaving questions
- **This is not distributed Environment**
 - **We do not have cycles to waste**
 - 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 z10?
 - 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

zVPS does “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**
 - Agentless
- **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 (1989)

ESAMON/zMON: Real time analysis

- **Uses Standard CP Monitor**

Real Time Analysis

ESAMAP/zMAP: Performance Reporting

Post (midnight) Processing

Creates Long Term PDB

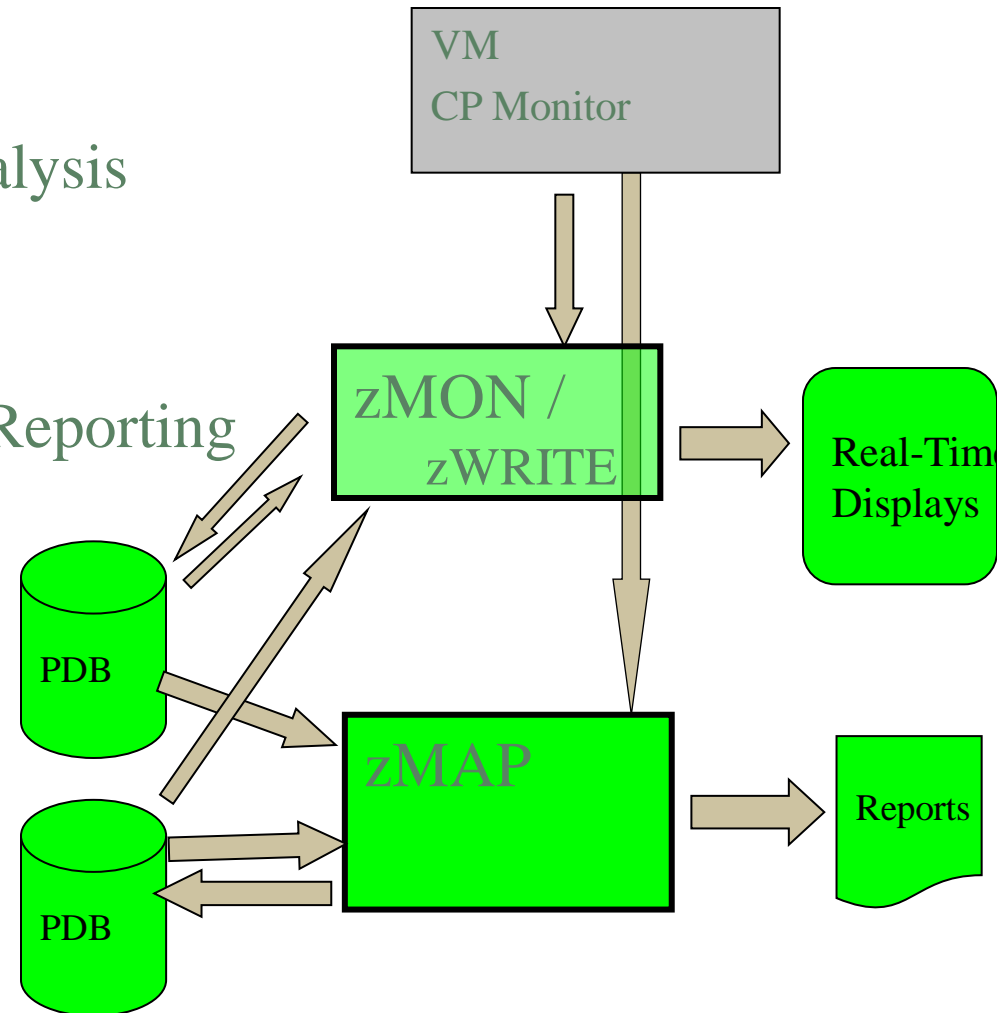
PDB or monwrite data input

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
ESAFACT 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

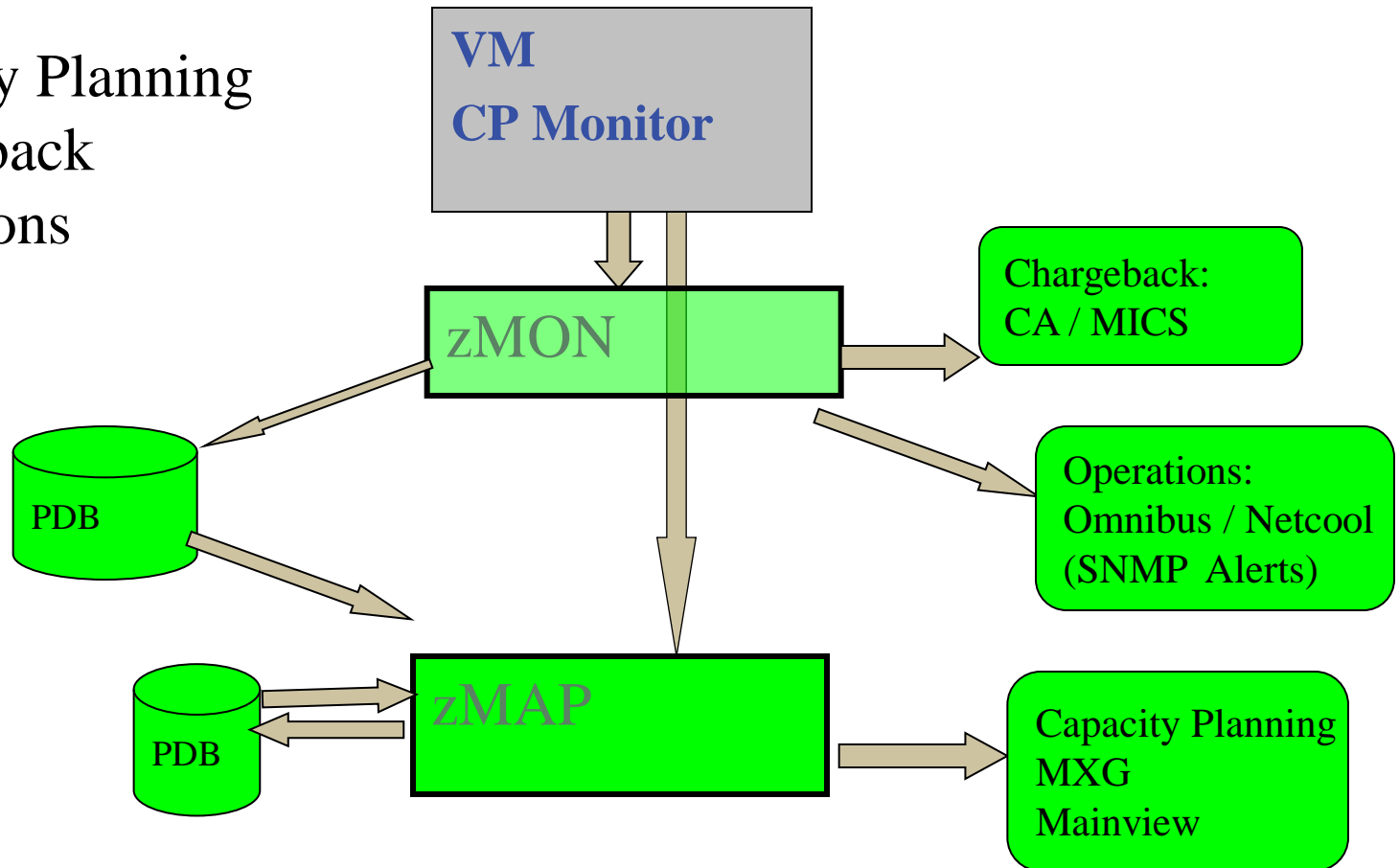
Velocity Software Corporate

```

-----
      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 ??
 - 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%)**

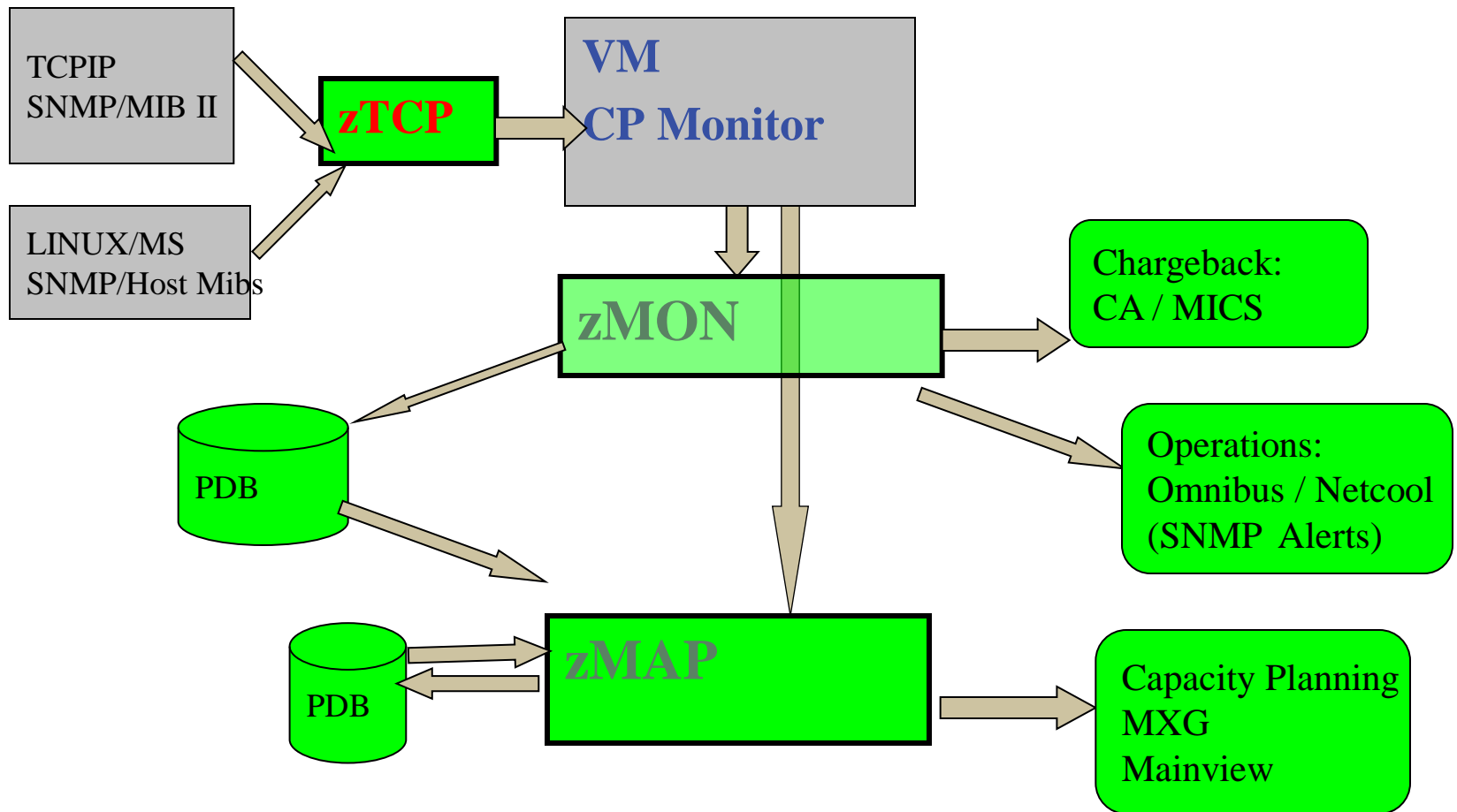
- **Agents must provide correct data**

- 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



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

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/           <-Utilization->           <-----Storage----->
Time/           <MegaByte>  Pct           Alloc
Date           Index  Size  Used  Full  Errors  Units  Description
-----
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

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

| Node/ Time/ Date | -----Storage Sizes (in MegaBytes)----- | | | | | | | | | | |
|------------------------|--|--------------|--------------|--------------------------|-------------|-------------|-------------|----------------------|----------|-------------|-------------|
| | <---Real Storage--> | | | <-----SWAP Storage-----> | | | Total | <----Storage in Use- | | | |
| | 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 |
| ibmnds1 | 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 |
| ibmnds3 | 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 |
| ibmnds2 | 8031.8 | 78.0 | 7954 | 2031 | 2031 | 0.4 | 15.6 | 2109 | 0 | 251.7 | 6546 |

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**

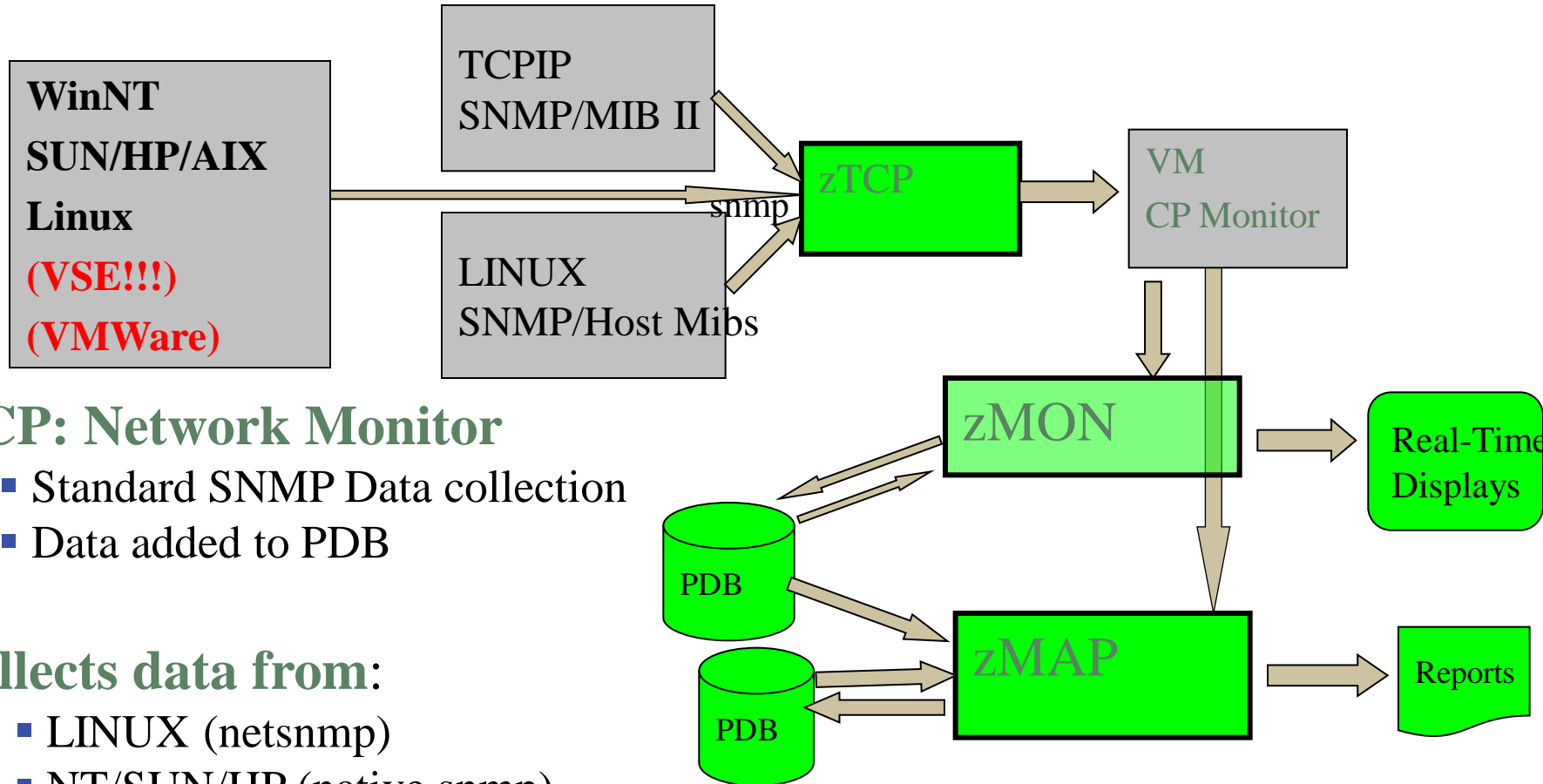
Linux, so many tools, so little time

- 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

- 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 SMSG 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/<br>Name | VM<br>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/<br>Name | <-Process Ident-> |       |       | Nice | <-----CPU Percents-----> |      |      |      |      |  |
|---------------|-------------------|-------|-------|------|--------------------------|------|------|------|------|--|
|               | ID                | PPID  | GRP   | Valu | Tot                      | sys  | user | syst | 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/<br>Name | <-Process ID | Ident-><br>PPID | <-----Pr<br>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 |
| 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 |

PROVEN PERFORMANCE

# 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 by process

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
```

Velocity MIB data:

Provides process data

Parent/Child relationship

Note ALL application processes are owned by “24445”.

# 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

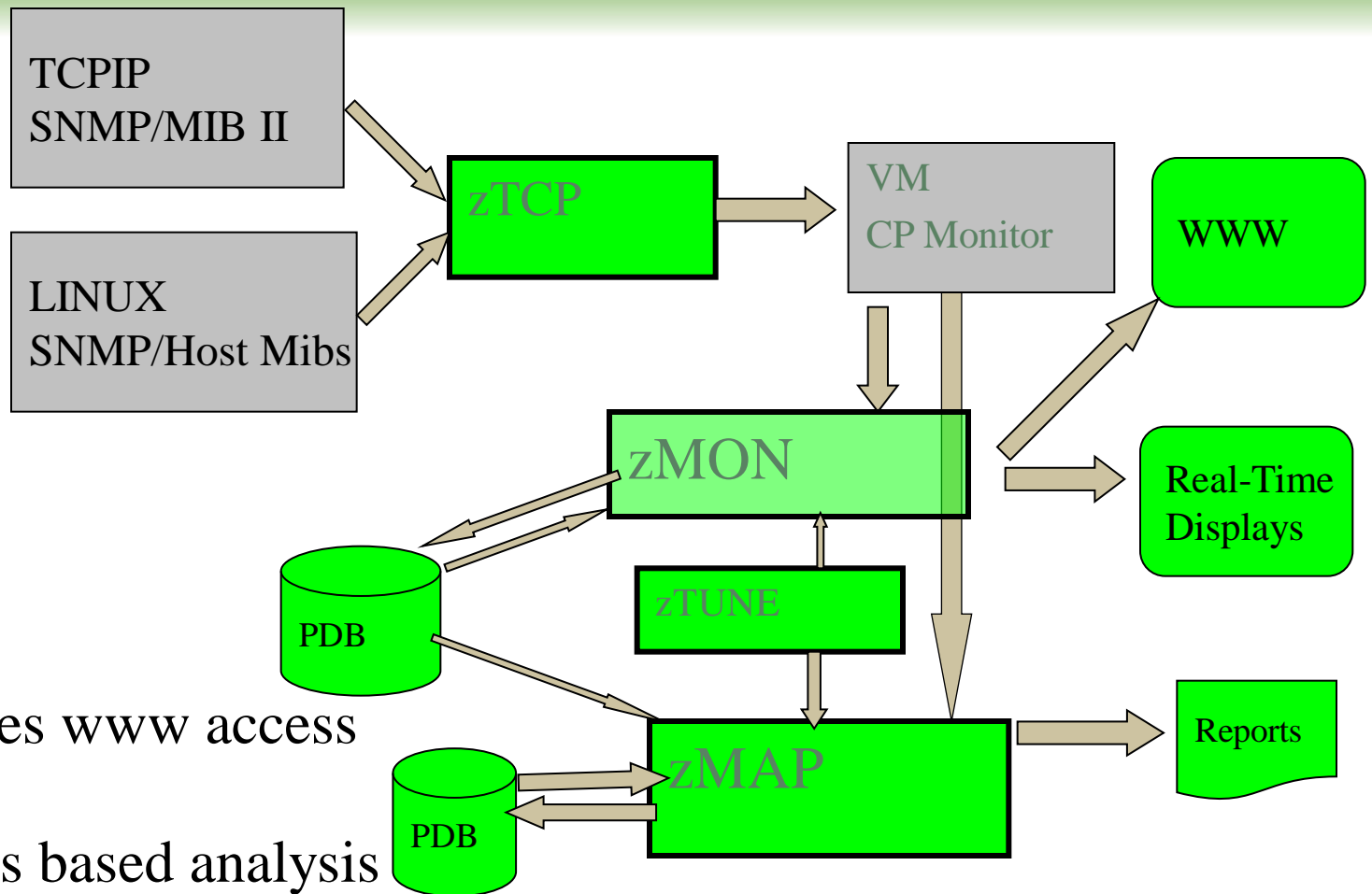
```

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
```

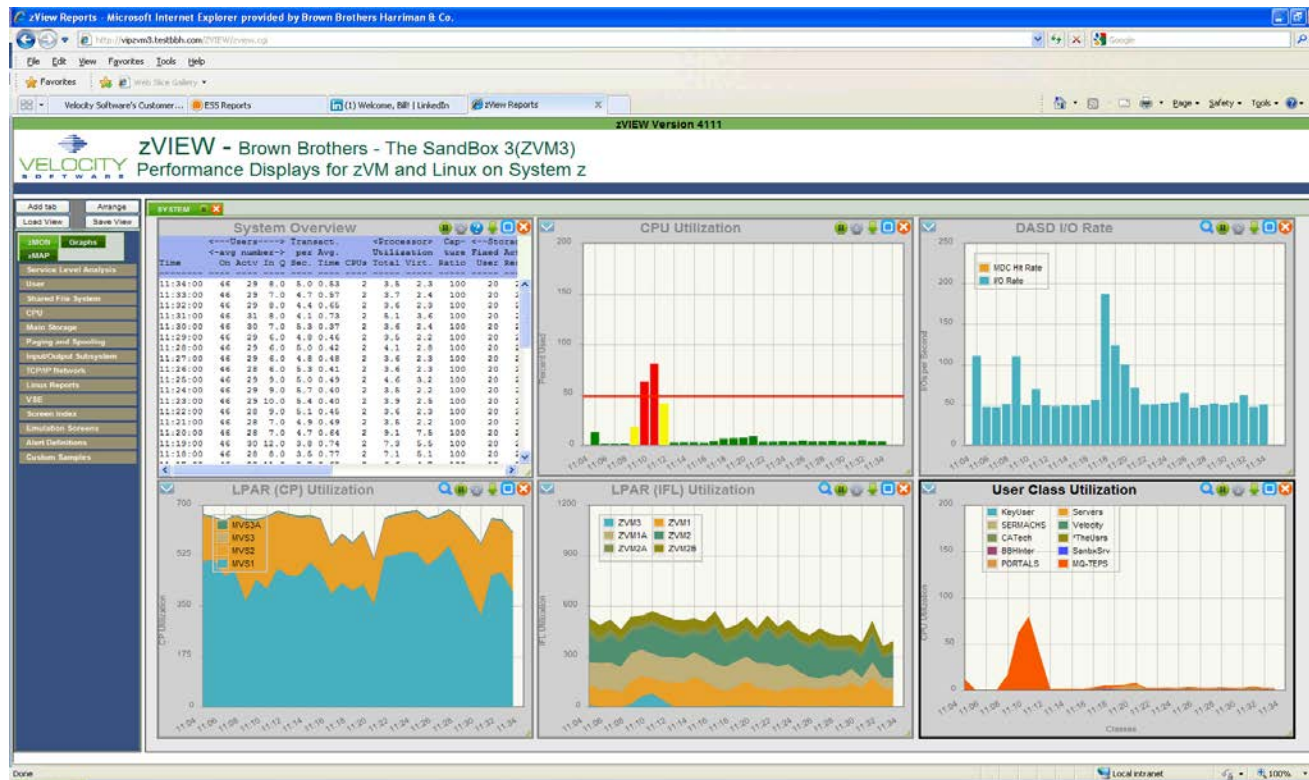
```
peeraddr = '67.218.99.135' peerport = 1998 ;vsivm5
```

```
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



# zVPS Enterprise View

## 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%                                |        | 000000-64   99.22%                         |        |
| suselnx3 (9)   2.57%                          |        | RH5Z161   0.37%                                |        |                                            |        |
| REDHAT (2)   2.30%                            |        |                                                |        |                                            |        |

| 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) |          |       |               |       |  |
|                           |          |       | 1.85%         |       |  |
|                           |          |       | 1.50%         |       |  |
|                           |          |       | 0.85%         |       |  |
|                           |          |       | 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 data for various users and classes. A red arrow points from the 'redhat' class in the table to the 'redhat' class in the sidebar.

| Time     | UserID /Class | 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    |      |

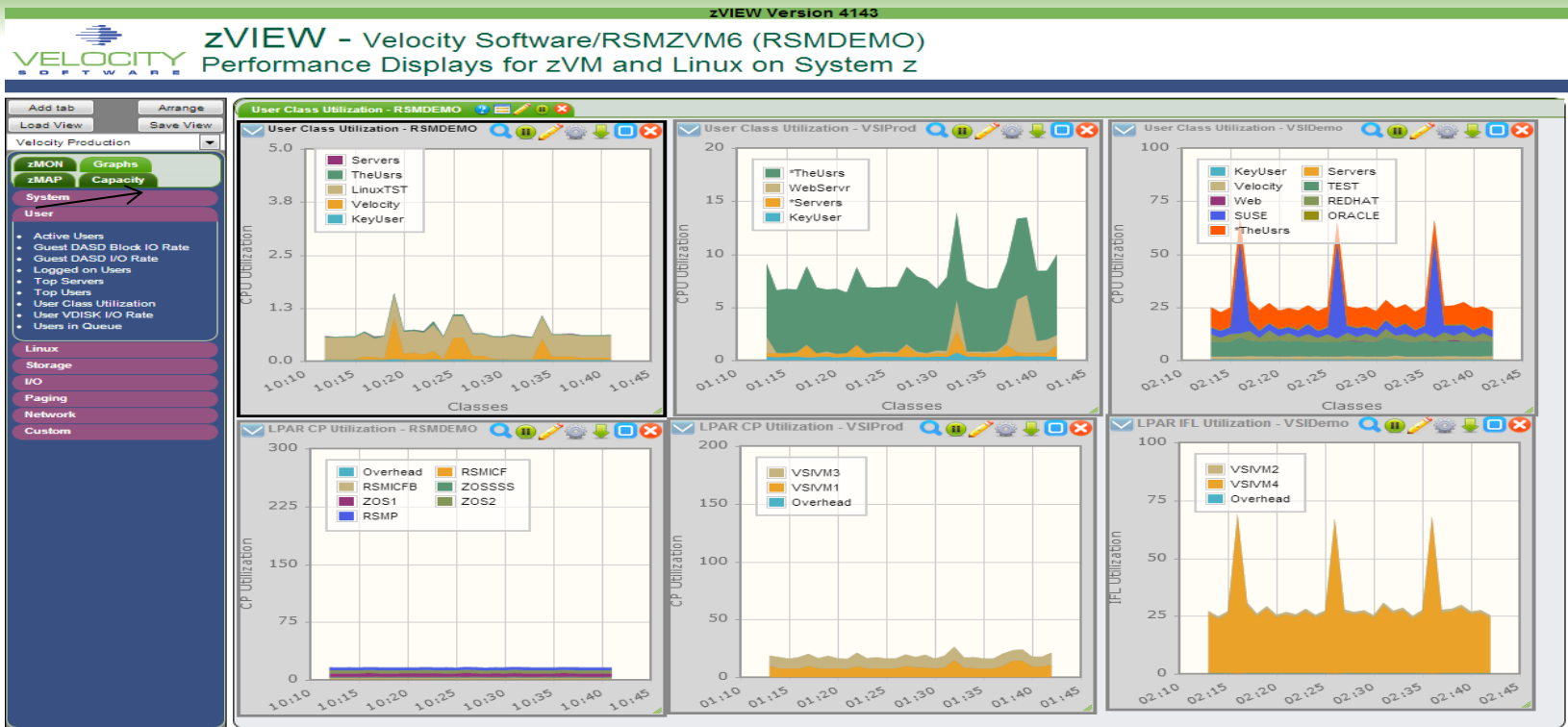
Click on “user” to see user screens

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

Oracle data available 4.2

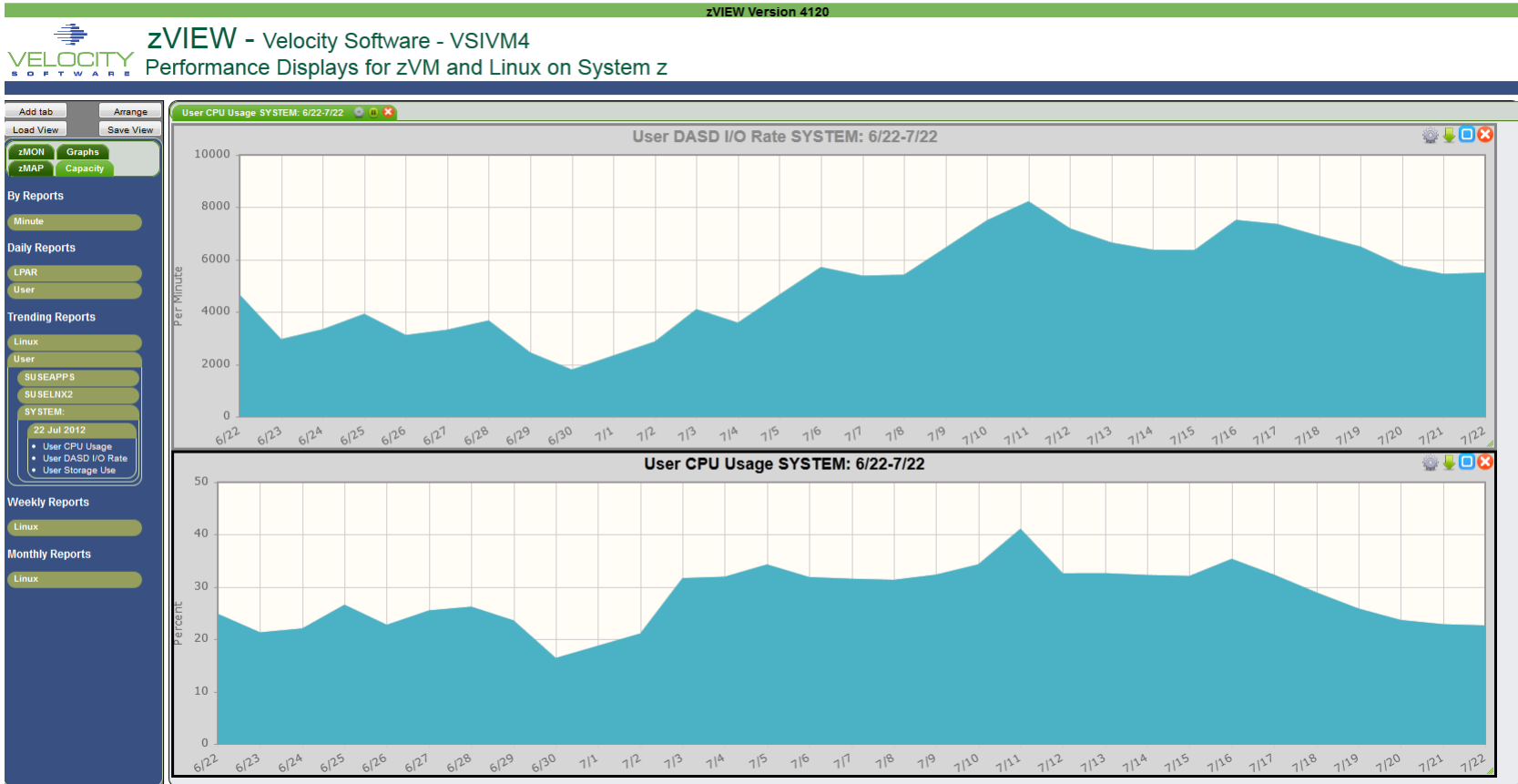


# Multiple System View (3 LPARs - 2012)



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 S11R20R
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                   |
|------|-------------------------------------|
| 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 S11R20R         |
| LNSU | Swap utilization for Linux          |
| LNSU | Swap utilization for Linux          |

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

# zOPERATOR

## Several requests to extend ESAOPER screen

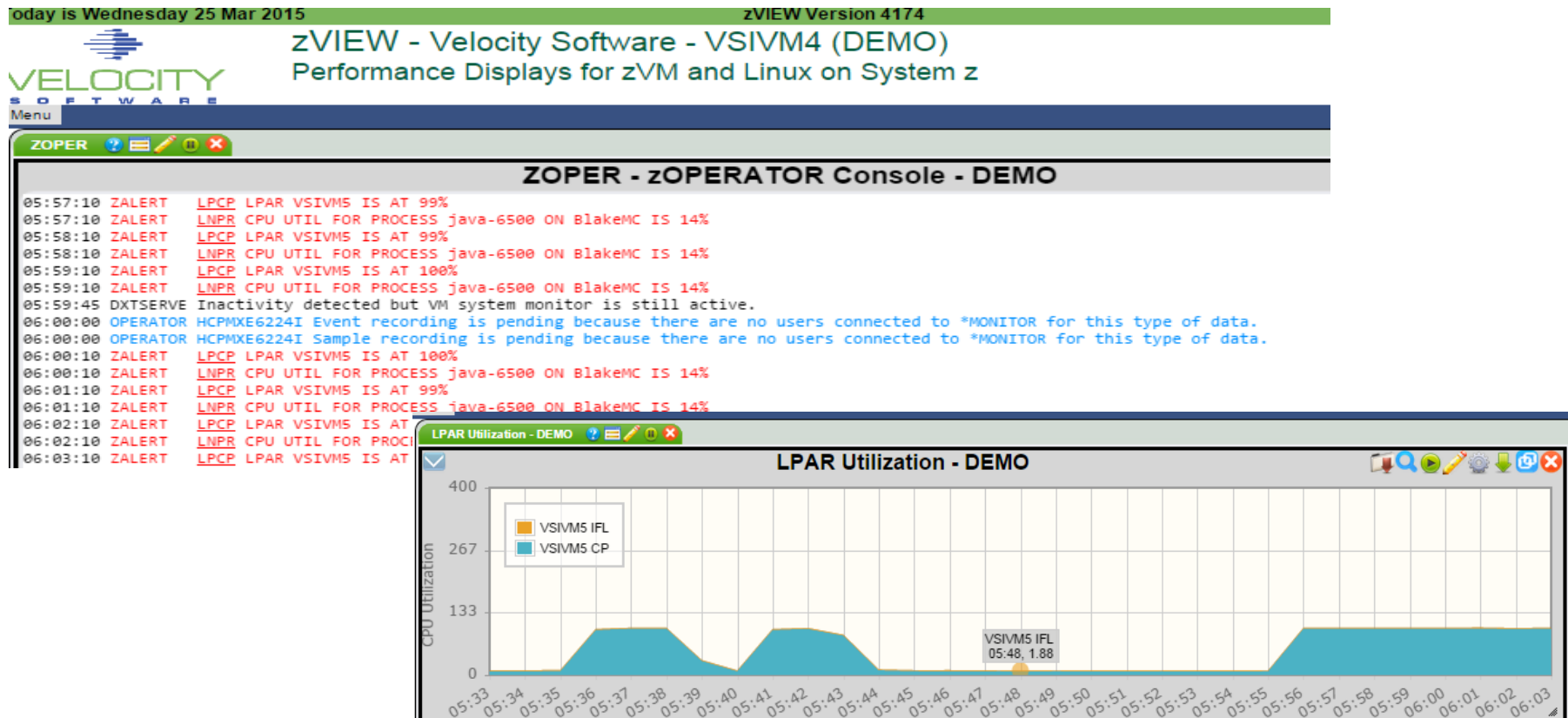
### zOPERATOR:

- 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”

What do customers want?

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

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              |

# 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/<br>Time/<br>Date | -----Storage Sizes (in MegaBytes)-----> |             |              |                          |             |              |             |                        |          |              |              |              |
|------------------------|-----------------------------------------|-------------|--------------|--------------------------|-------------|--------------|-------------|------------------------|----------|--------------|--------------|--------------|
|                        | <--Real Storage-->                      |             |              | <-----SWAP Storage-----> |             |              | Total       | <---Storage in Use---> |          |              |              |              |
|                        | Total                                   | Avail       | Used         | Total                    | Avail       | Used         | MIN         | Avail                  | CMM      | Buffer       | Cache        | Ovrhd        |
| 00:15:00               |                                         |             |              |                          |             |              |             |                        |          |              |              |              |
| <b>oracle</b>          | <b>994.8</b>                            | <b>18.1</b> | <b>976.7</b> | <b>123.9</b>             | <b>74.0</b> | <b>49.9</b>  | <b>15.6</b> | <b>92.1</b>            | <b>0</b> | <b>240.6</b> | <b>581.4</b> | <b>154.7</b> |
| 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       | <b>842.4</b> | 15.6        | 785.5                  | 0        | <b>3.0</b>   | 894.9        | <b>1023</b>  |
| 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 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><br>Calls Comm Rollbk |       |       | <--CPU----><br>Sess<br>-ion | Re-<br>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       |

```

```

# 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             | 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/<br>Date<br>Time | <---Database---><br>Name | <-User Activity-><br>Instance | <---CPU---><br><Rate per second><br>Calls | <---CPU---><br>Sess Re-<br>Comm | <---CPU---><br>Rollbk | <---CPU---><br>-ion | Cur | <---Physical Reads Actvty---><br><-----Rate per second-----><br>Rds | <---Physical Reads Actvty---><br>Hits | <---Physical Reads Actvty---><br>Direct | <---Physical Write Actvty---><br><-----Rate per second-----><br>I/O Bytes | <---Physical Write Actvty---><br>Wrts | <---Physical Write Actvty---><br>CHits | <---Physical Write Actvty---><br>Dirct | <---Physical Write Actvty---><br>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?

# zMAP Capacity Charts

## Daily/Weekly/Monthly CSV files created, zview exposed....

```
; Chart Syntax: type days strt stop extr parm
; Where type is DAILY/WEEK/MONTH
; "days" is the previous "n" days
; TimesT is called with these parms
```

```
; type days strttime stop extractname parm
CHART DAILY 1 00:00 24:00 CPULPAR
CHART DAILY 1 00:00 24:00 USERCPU

CHART MONTHLY 31 00:00 24:00 CPULPAR
CHART MONTHLY 31 07:00 17:00 USERCPU
CHART MONTHLY 31 * * USERWAIT SUSELNX1

CHART WEEKLY 7 07:00 17:00 USERCPU
CHART WEEKLY 7 00:00 24:00 CPULPAR
```

```
; Charts will be kept up to 12 months,52 weeks, 31 days
; format of chartcnt is "chartcnt mm ww dd"
CHARTCNT 2 2 2
```

```
ESAMAP FILELIST A0 V 1
Filename Filetype Fm
TOTAL CSVDC348 A1
TOTAL CSVDU348 A1
TOTAL CSVWC049 A1
TOTAL CSVWU049 A1
TOTAL CSVDC347 A1
TOTAL CSVDU347 A1
TOTAL CSVDC346 A1
TOTAL CSVDU346 A1
```

```
;LPAR Utilization over time
"STARTTIME","STOPTIME","LPARNAME","CPUUTIL"
"2010/12/13","02:00:00","Totals:","79.64"
"2010/12/13","02:00:00","VSIVM4","34.72"
"2010/12/13","02:00:00","VSIVM1","3.87"
"2010/12/13","02:00:00","VSIVM2","0.41"
```

# 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

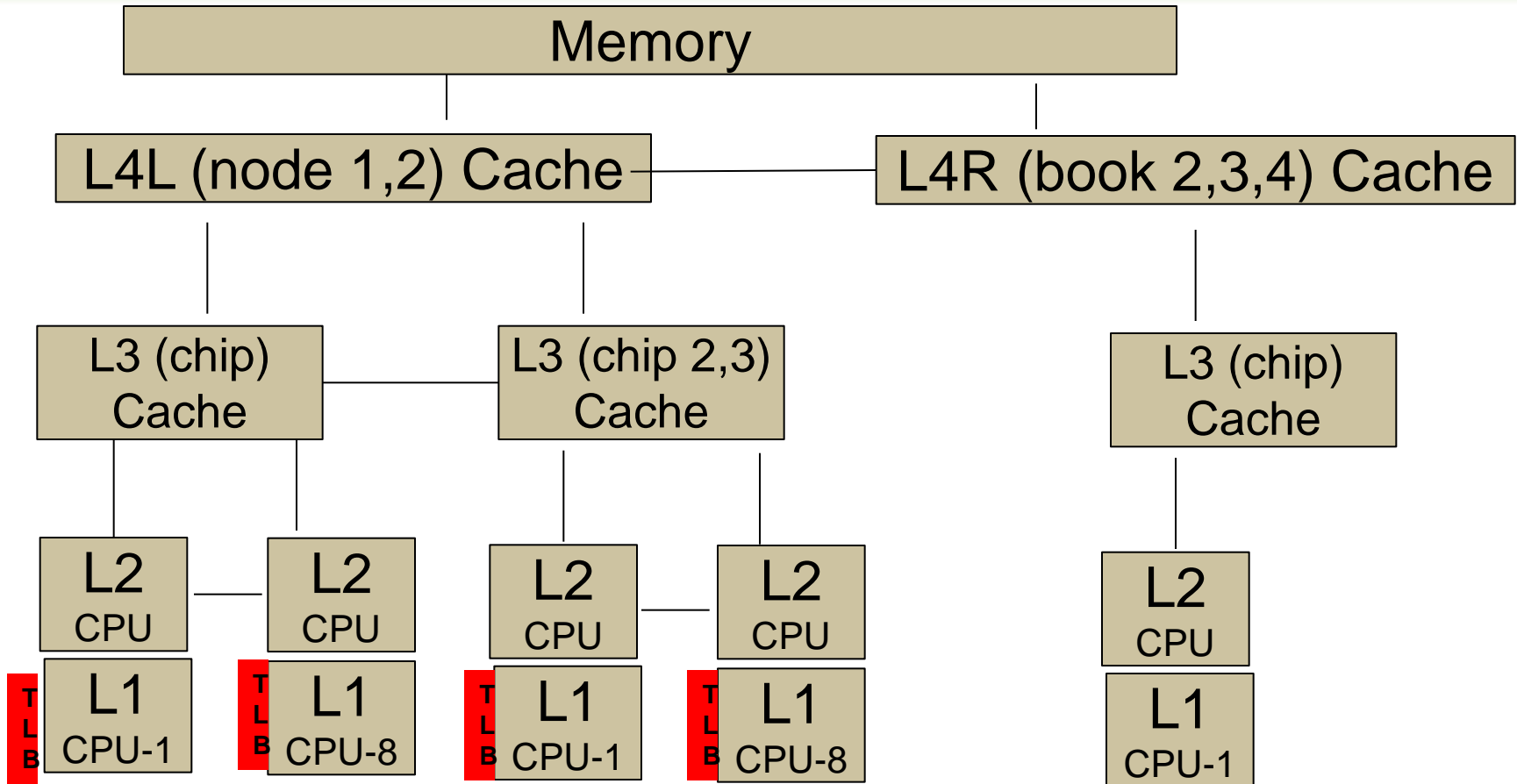
- **Websphere argument string used for accounting**
- `wasadmin 27144 6846 0 Feb06 ? 00:43:13 /u01/was61/java/bin/java - Declipse.security -Dwas.status.socket=34229 -Dosgi.install.area=/u01/was61 - Dosgi.configuration.area=/u01/was61/profiles/appsrv/configuration - Dosgi.framework.extensions=com.ibm.cds - 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/startup.jar:/u01/was61/lib/bootstrap.jar:/u01/was61/lib/j2ee.jar:/u01/was61/lib/Improxy.jar:/u01/was61/lib/urlprotocols.jar:/u01/was61/deploytool/itp/batchboot.jar:/u01/was61/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/classes:/u01/was61/lib:/u01/was61/installedChannels:/u01/was61/lib/ext:/u01/was61/web/help:/u01/was61/deploytool/itp/plugins/com.ibm.etools.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

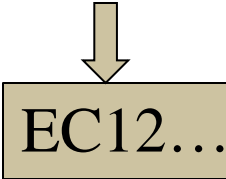
```

 <CPU Busy> <-----Processor----->
 <percent> Speed/<Rate/Sec-> CPI
Time CPU Totl User Hertz Cycles Instr Ratio

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

```



# 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:  |     | 557        | 388  | 5000M                 | 25.9G                  | 10.2G | 2.542 |

1830 mips  
(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:  |   | 403  | 304  | 5000M | 18.8G | 11.4G | 1.640 |

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

↓  
z13...

# TLB Analysis P – z13 data SMT Enabled

Why working sets 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><br><percent> |      | <-----><br>Speed/<br>Hertz Ratio |       | <-Translation Lookaside buffer(TLB)-<br><cycles/Miss><Writs/Sec> |      |       |       | CPU Cycles |       |
|----------|-----|-------------------------|------|----------------------------------|-------|------------------------------------------------------------------|------|-------|-------|------------|-------|
|          |     | Totl                    | User |                                  |       | Instr                                                            | 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/<br>Date | <Storage>        |            |               |                           | <Alias Rate>          |               | <----Data Type Analysis |     |                            |
|---------------|------------------|------------|---------------|---------------------------|-----------------------|---------------|-------------------------|-----|----------------------------|
|               | <Director><br>ID | <HPP Pool> | <Device Base> | <Counts><br>Alias min max | <-Acquires-><br>Tries | Rate<br>Fails | Type                    | Shr | <-Threshold<br>Below Empty |
| 14:14:00      | C901             | 0          | 3             | 2 0 2                     | 17.6                  | 8.0           | MDISK                   | 0   | 0                          |
|               |                  |            |               |                           |                       |               | PAGING                  | 0   | 0                          |
|               | C701             | 1          | 4             | 2 0 2                     | 12.7                  | 6.9           | MDISK                   | 0   | 0                          |
|               |                  |            |               |                           |                       |               | PAGING                  | 0   | 0                          |
| 14:15:00      | C901             | 0          | 3             | 2 0 2                     | 8.2                   | 2.2           | MDISK                   | 0   | 0                          |
|               |                  |            |               |                           |                       |               | PAGING                  | 0   | 0                          |
|               | C701             | 1          | 4             | 2 0 2                     | 6.3                   | 2.5           | MDISK                   | 0   | 0                          |
|               |                  |            |               |                           |                       |               | PAGING                  | 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/ Disk <-----Read I/O-----> <-----Write I/O-----> IO In <Time(ms)>
Time/ Name /Second Sectrs (ms) /Second Sectrs (ms) Prog- <Per I/O>
 I/O Mrgd /RdIO /IO I/O Mrgd /WrtIO /IO ress IOQ I/O

01/21/17
05:15:00
OSA178
 dasda 0 0 0 0 0 0 0 0 0 0 0
 dasda1 0 0 0 0 0 0 0 0 0 0 0
 sda 0 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 0 0
 sda2 0 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 0 0
 dasda1 0 0 0 0 0 0 0 0 0 0 0
 sda 0 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 0 0
 sda2 0 0 0 0 0.3 0.5 264.8 1.0 0 0.6 1.0

NODE/ Disk >
Time/ Name <--Device Path-->

01/21/17
05:15:00
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/
Date <-----Thread ID-----> <--Blocks--> <Thread <Waits> CPU
Time Name nbr /Second Time /Sec Time (ms)

14:37:00
lxora12 Totals: AppSrv01-server1 0 0.2 0 73.1 0 170.8
 CommunicatorServer 7 0 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 z/VM V3,4,5,6,7 ...)
  - 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>”