

# z/VM and Linux on z Performance Management

## GSE - UK

[www.VelocitySoftware.com](http://www.VelocitySoftware.com)

[www.LinuxVM.com](http://www.LinuxVM.com)

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

- **2019 topics of interest**
- **Who is Velocity Software**
  - Performance Management Overview
- **Technology does not stand still – current topics**
  - What is Velocity Software doing now
- **zOSMON**

# 2019 Topics of Interest

- **Applications**
  - Splunk
  - MongoDB
- **Docker**
  - Secure container,
  - z/OS Container Extensions,
- **Processor Performance**
  - z/VM 7.1, z15
  - SMT
  - LPAR Configuration, parking
- **Enterprise Efficiencies**
  - Cost of performance management in resources
  - Single pane of glass
  - Selling the mainframe to your users!!!

# Who is Velocity Software

Founded 1988, Mission: **Provide software to assist customers in optimizing the VM platform:**

First VM/XA performance product on market (XAMAP/XAMON)

Continuous fully integrated enhancements over 30 years

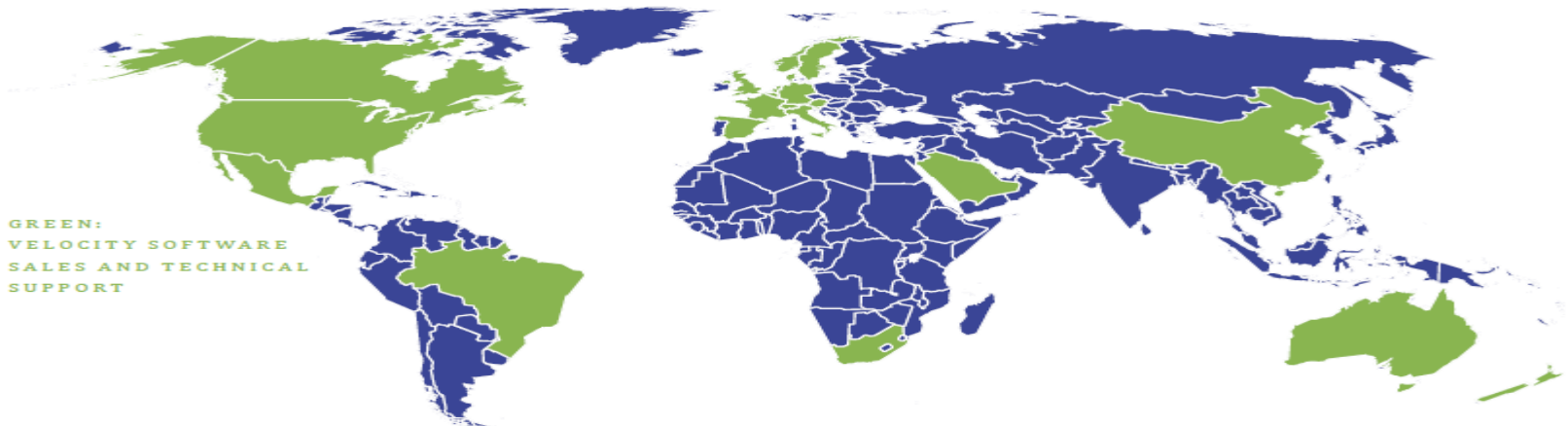
200+ Installations (zVPS) **(more than ½ IFLs world wide)**

22 countries, 6 continents

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## Velocity Software's Sales and Technical Support Map

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# Industries using Linux and Velocity Software

**Banking, Financial:**

**Government / Military:**

**Health Care, Insurance, Retail**

**Manufacturing: Automotive, computing, Oil  
Outsourcing**

# Velocity Software zVPS Provides:

- **z/VM Performance Monitor (for 31 years)**
- **NETWORK Monitoring (for 20 years)**
- **Linux on “Z” Monitoring (for 18 years)**
- **Oracle, Websphere Monitoring (for 10 years)**
- **VSE Monitoring (for 5 years)**
- **No charge features**
  - zOPERATOR for fully INTEGRATED operations management console
  - zALERT for supporting fully INTEGRATED operations
  - Distributed server monitoring (Linux, Microsoft)

## New Technologies

- **Docker (thousands of containers)**
- **MongoDB (see Marriott presentations)**  
<http://VelocitySoftware.com/MongoDB.html>
- **z/VM 7.1 (done, fcp, edev, diagnose, 80 threads)**
- **SPLUNK (done) “<http://VelocitySoftware.com/splunk.html>”**
- **z/OS.... (common request)**
- **VSE CICS too**
- **z/OS: Send link to your z/OS people....**  
<http://demo.velocitysoftware.com/zview/zview.cgi?view=myzos&heading=no&menu=no>
- **See [HTTP://VelocitySoftware.com/zOSMON.HTML](http://VelocitySoftware.com/zOSMON.HTML)”**  
Make it easy, low overhead, amazingly fast...
- **Z15: MFC data supported! (zVPS only consumer)**

# Performance Management Requirements

## Performance Management User Requirements

- Performance Analysis
- Operational Alerts
- Capacity Planning
- Accounting/Charge back

Correct data (Virtual Linux CPU data wrong - SMT)

Capture ratios (is the data valid?)

## Remember, 3 kinds of performance monitors

1. Products Used for performance Management
2. Products Used for Diagnostics
3. Products Turned off when there's a cpu problem

**Management can not be the problem....**



# Infrastructure Requirements: Performance Analysis

## Why Performance Analysis: Service Level Mgmt

- Diagnose problems real time
- PLATFORM SPECIFIC....
- 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
  - SEND IT FOR ANALYSIS.... WE LIKE DOING RESEARCH

# Infrastructure Requirements: Capacity Planning

## Why Capacity Planning: Future Service Levels

- How many more servers can you support with existing z14?
- What is capacity requirements for an application? (on x?)
- **Avoid crises *in advance***

## Why Chargeback?

- Distributed chargeback model is by server (does NOT port to Z!)
- Shared chargeback model is by resource consumption
- **Encourages efficient/effective resource use**
- **Align IT to your business model**

## 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
- **zALERT always needed**
- **zOPERATOR, if no enterprise monitor, or do it anyway**

# zVPS does “End to End” Performance Management

- **Management wants**
  - “single pane of glass” - One tool that does all (and well)
- **Complete performance management includes:**
  - z/VM System Level: CEC, LPAR data, ALL SubSystems
  - Linux – Storage, CPU, file system, network
  - Process – applications, performance data
  - Network monitor
  - VSE: partitions, CPU, I/O, CICS
  - **z/OS: CICS(110), BATCH (30), SYSTEM (70)**
- **Application subsystem analysis**
  - Java, WAS, **Oracle**, MongoDB, Docker (MQ, DB2)
- **Outside “Z” server platform analysis**
  - **Linux on “x”, VMWare**, KVM, Secure Software Container
  - Microsoft servers
  - VPN, gateways, utilities

# z/VM Performance monitor architecture

## Traditional model (1989)

ESAMON/zMON: Real time analysis

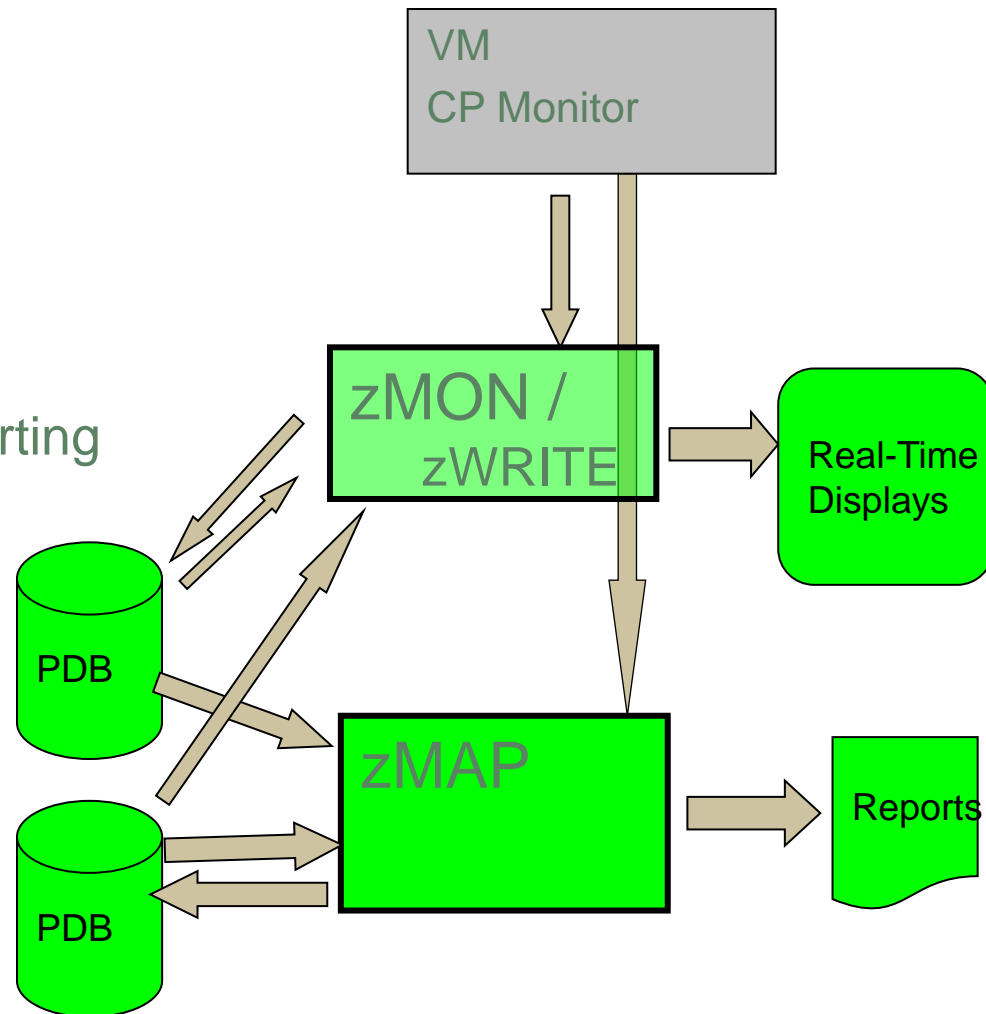
- Uses Standard CP Monitor
- Real Time Analysis

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



```
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

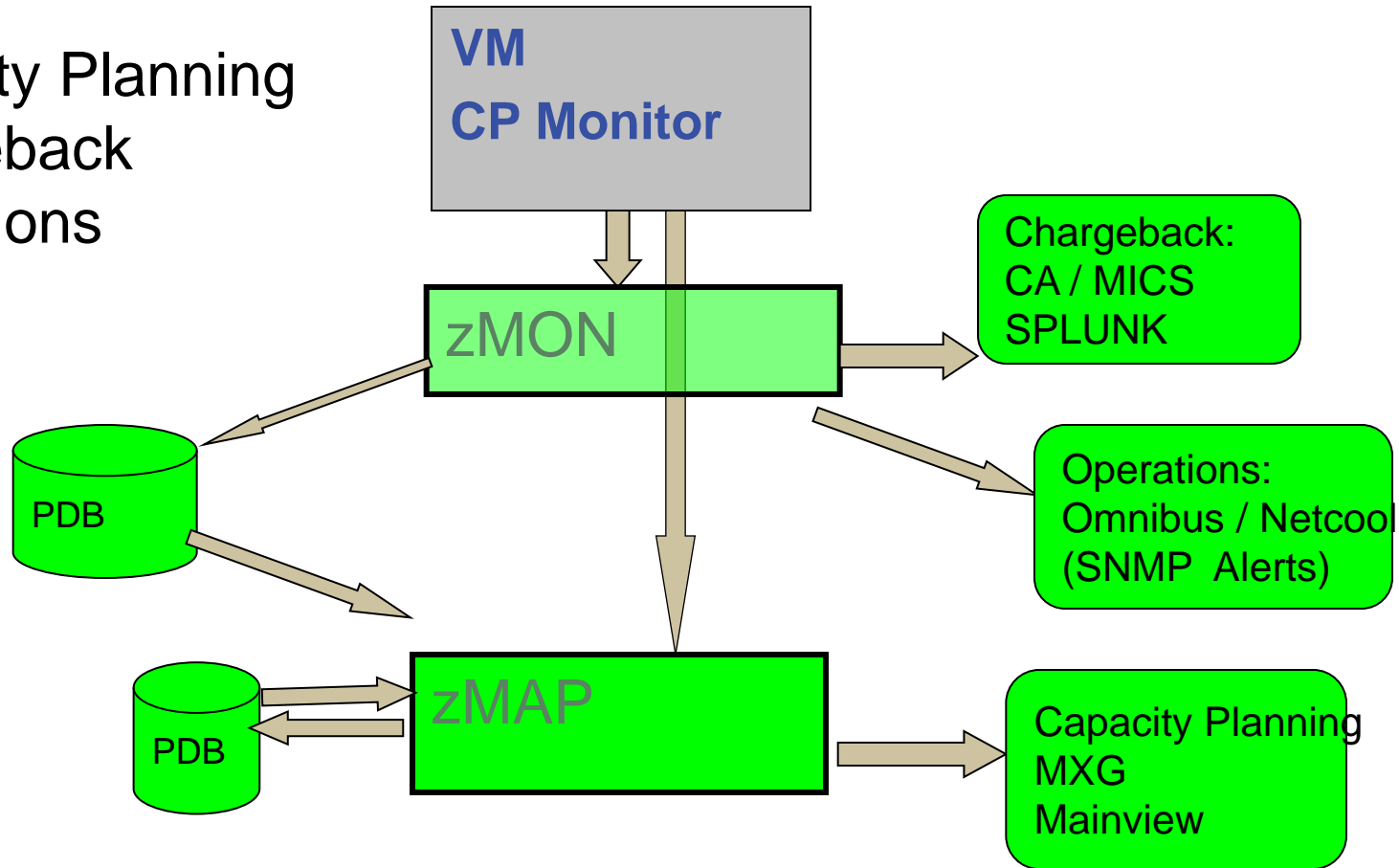
Hit PF2 to zoom on SUSE class, get:

```
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
```

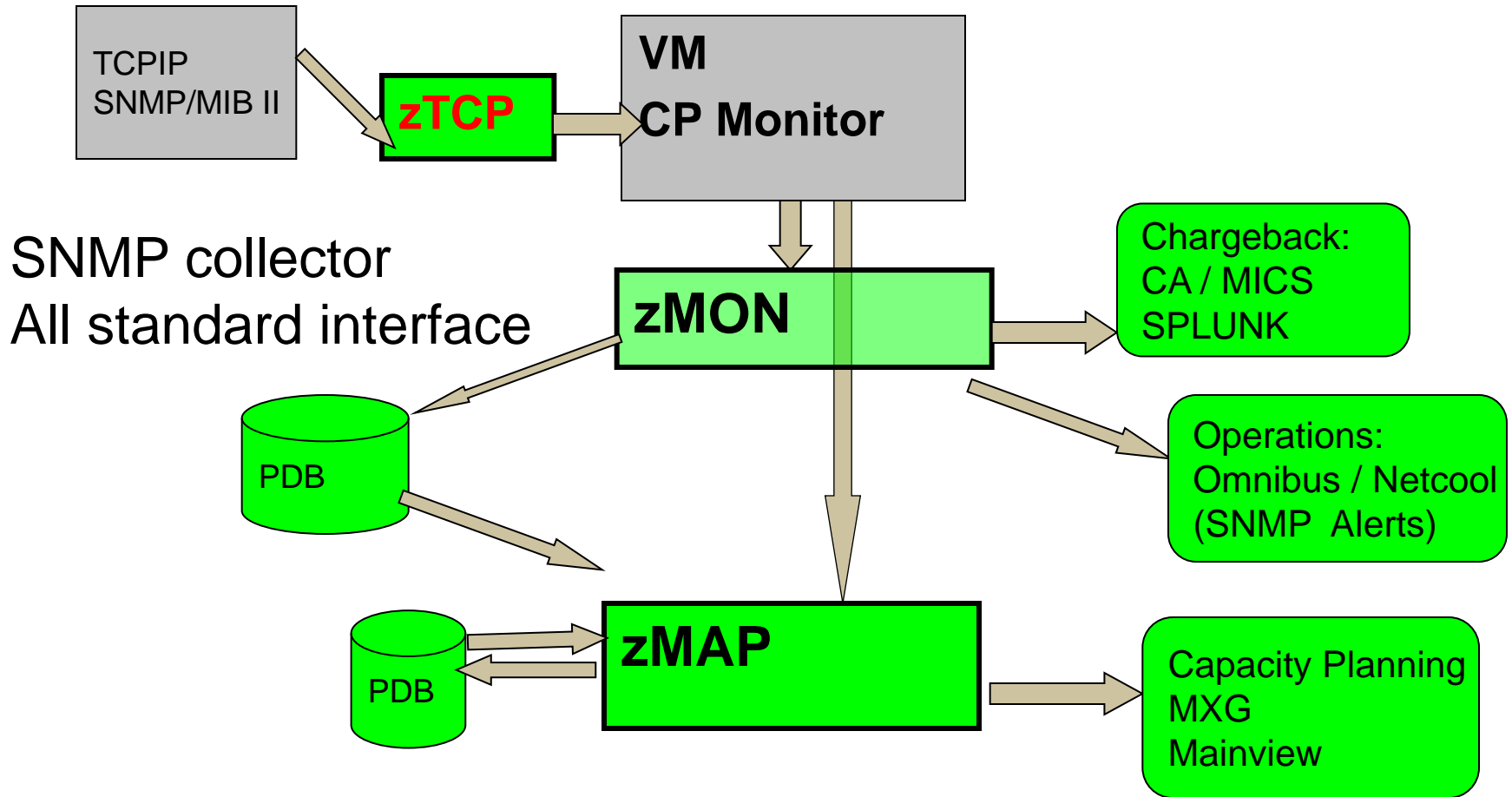
Time	UserID /Class	<Processor>		<-----Main Storage----->		Lock -ed	<-WSSize-->	
		Total	Virt	Total	Actv		Total	Actv
17:12:00	SLES11X	0.39	0.39	24223	24223	247	23976	23976
	SLES11	0.32	0.32	12404	12404	181	12199	12199
	SUSELNX2	0.25	0.23	3648	3648	0	3628	3628
	SLES9X	0.21	0.21	14632	14632	35	14597	14597
	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

# Add "Enterprise" Support

Capacity Planning  
Chargeback  
Operations



# Add "Network" Support – Pre Linux



## MIB II: Transport layer, IP layer, hardware layer, icmp Transport layer data shows connections, TCP rates, UDP rates

Report: ESA**TCP1** TCPIP Transport Layer Data Report

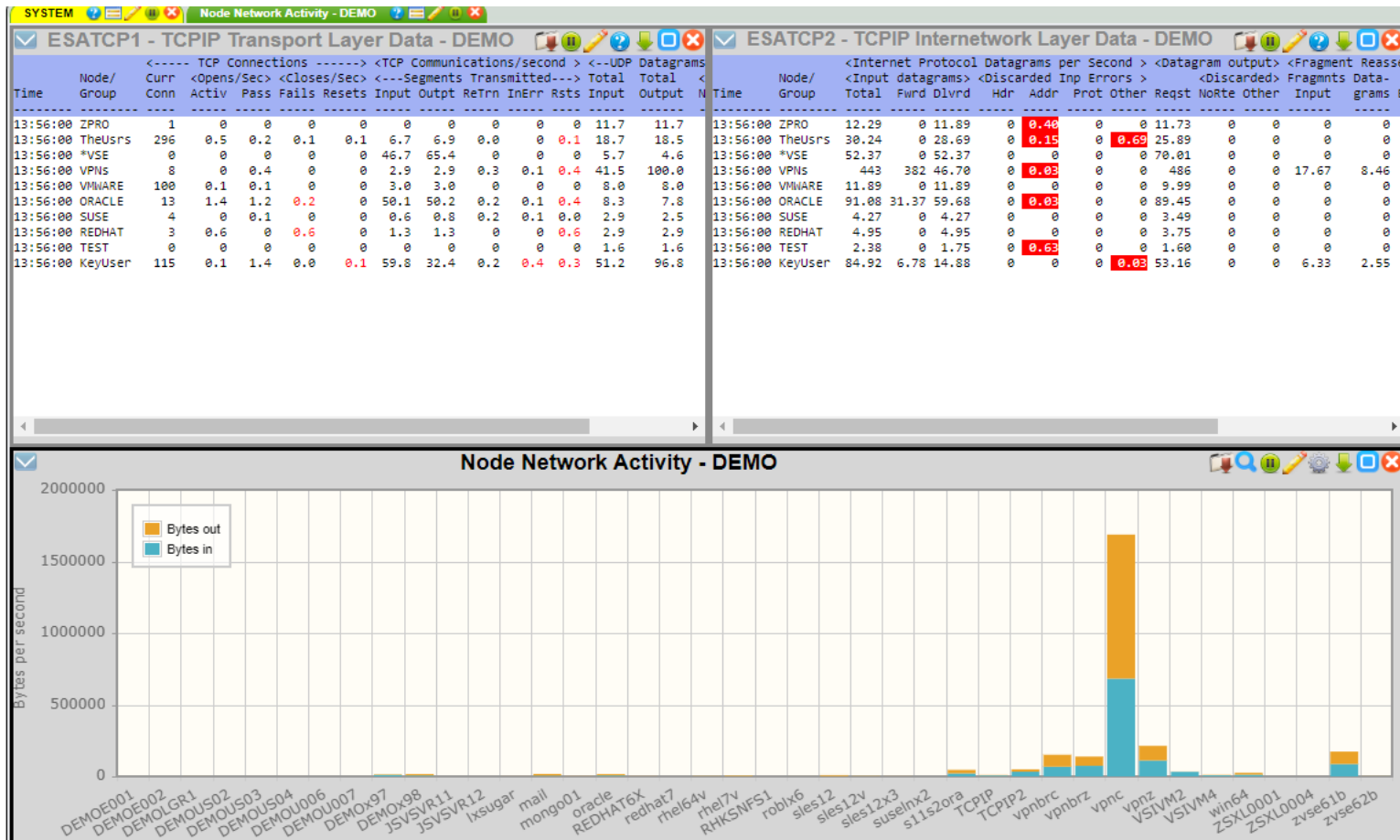
```

-----
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
  
```

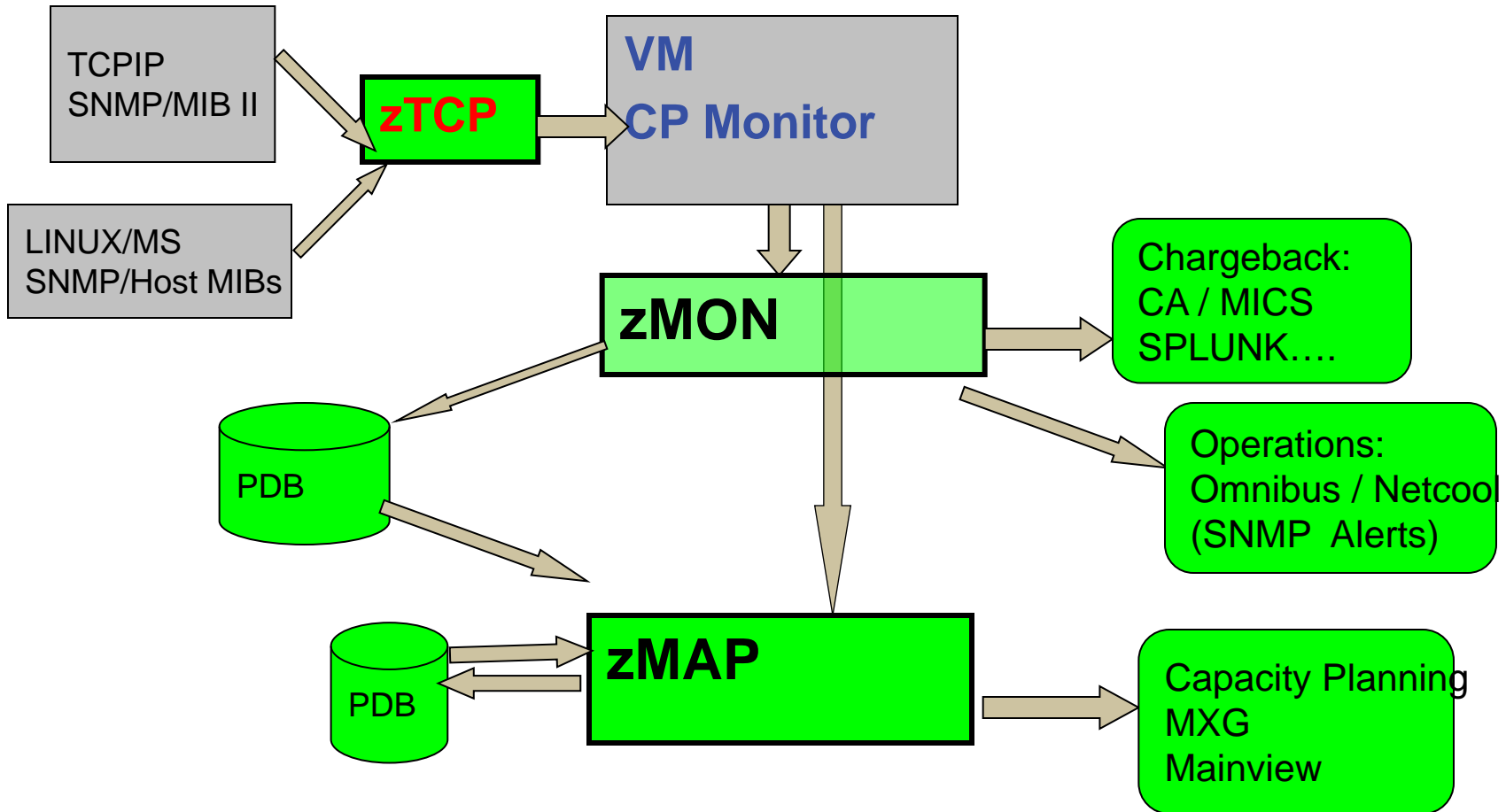


# Full Network Monitor

**MIB II:** Transport layer, IP layer, hardware layer, icmp  
 Transport layer data shows connections, TCP rates, UDP rates



# Add snmp "host" Support



# “Host” support

- **Snmp “host” mib**
  - Process data (expensive, limited)
  - File system data
  - (no system data)
- **ucd “linux” mib**
  - System data
  - Memory data
  - Disk data (expensive)
- **Velocity mib**
  - Designed for efficiency
  - Designed for performance management
  - Process data improvements
  - Disk data improvements
  - VERY Extensible

# Process Capture Ratio with Velocity mib

- High CPU capture ratio

Report: ESALNXV LINUX Virtual Processor Analysis Report

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

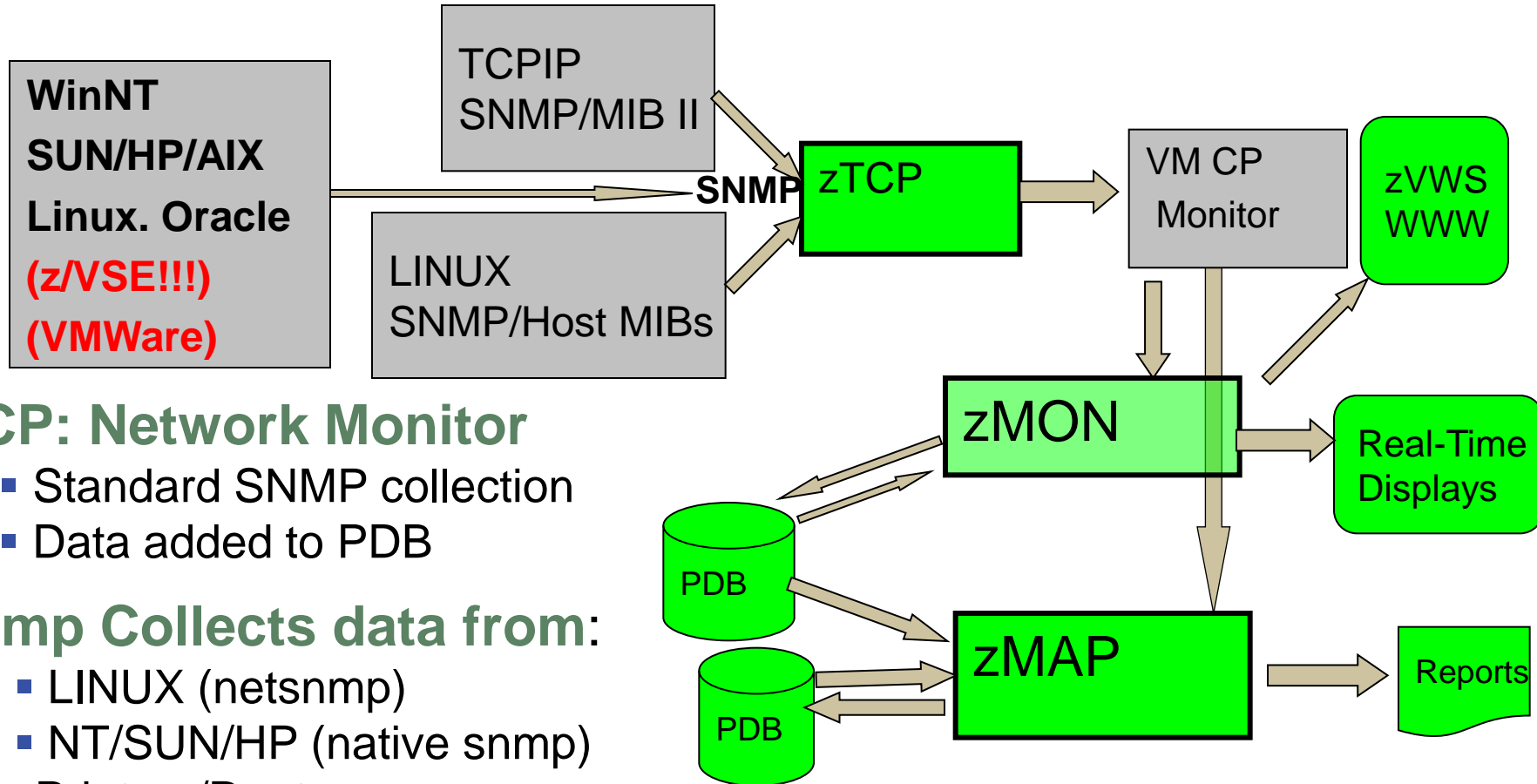
Report: ESALNXP LINUX HOST Process Statistics Report

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

Report: ESALNXC LINUX Process Conf

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

# “SNMP” collector 2018



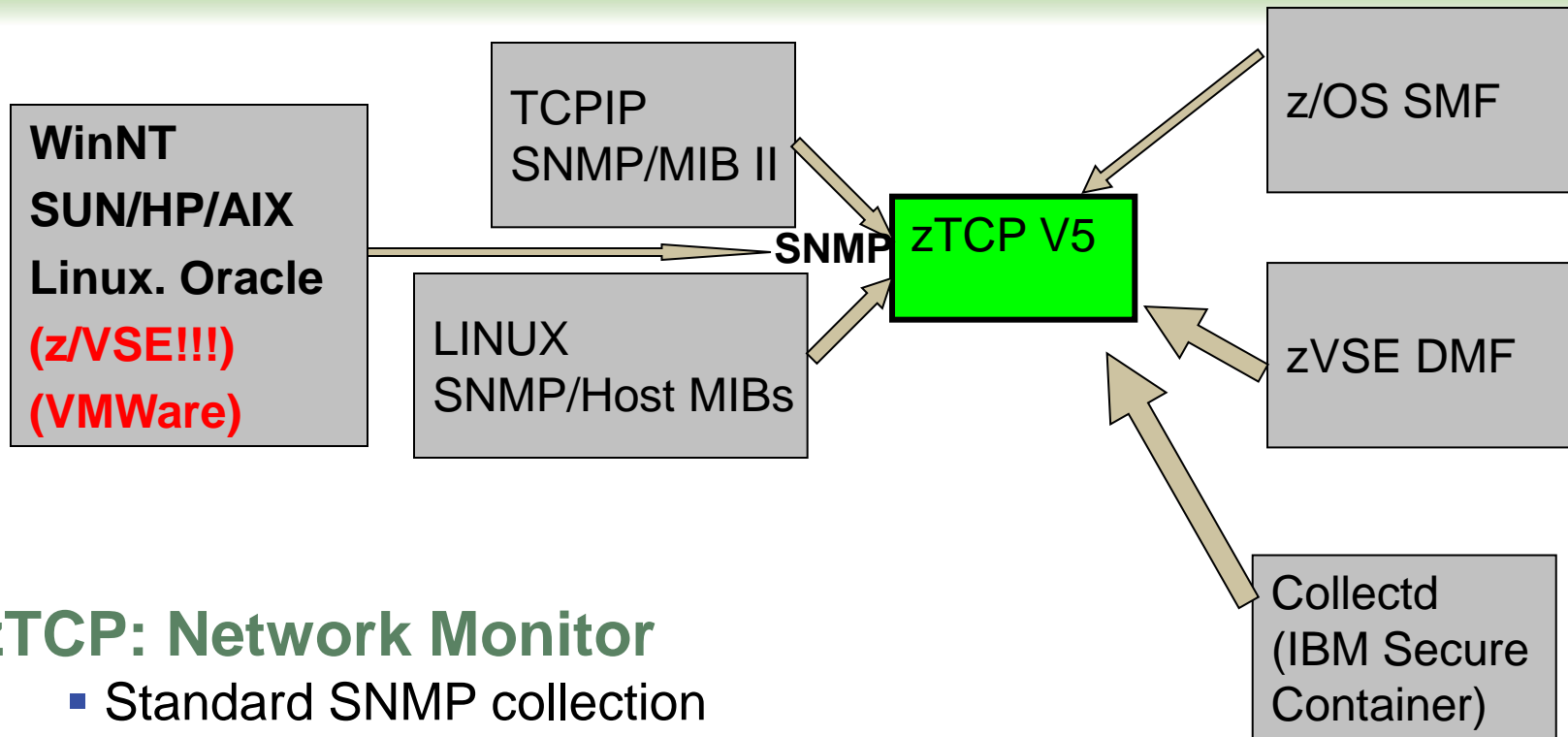
## zTCP: Network Monitor

- Standard SNMP collection
- Data added to PDB

## Snmp Collects data from:

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

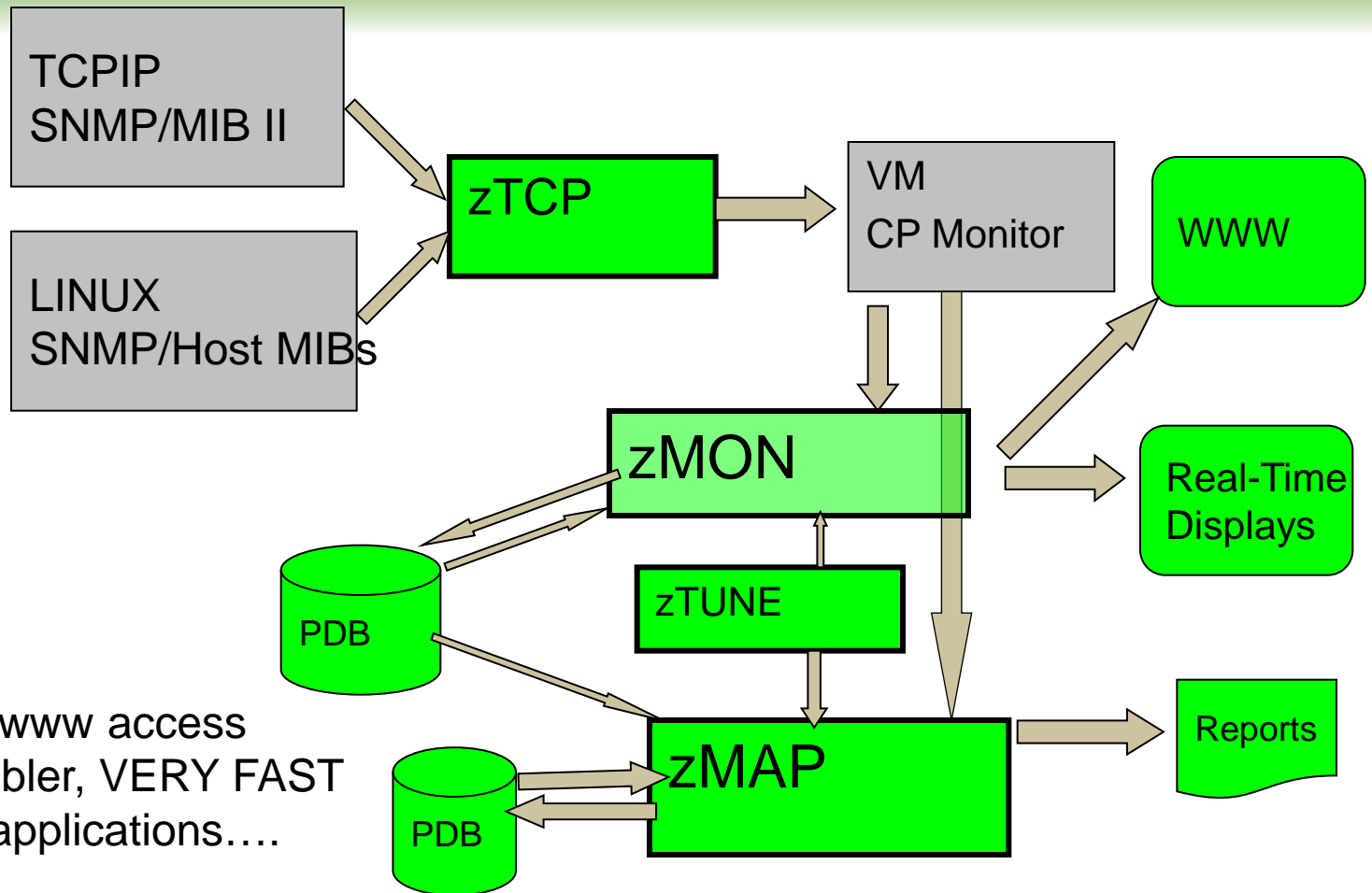
**ZVWS** Provides www access  
Written in assembler, VERY FAST  
Many web based applications....



## zTCP: Network Monitor

- Standard SNMP collection
- Data added to PDB
- Now accepts SMF Records
- Now accepts DMF records
- Now accepts Collectd

# Modernize: Webserving, performance skills



**ZVWS** Provides www access  
Written in assembler, VERY FAST  
Many customer applications....

**zTUNE**: Rules based analysis

# 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
```



zVIEW V2 flexible,

- Web based application
- Supports enterprise data
- Single pane of glass
- VERY fast, (no java)....
- Front end for everything

## Tailorable, expandable, zoomable

Today is Monday 2 Dec 2013 zVIEW Version 4159

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

**First level**

VSIVM1				VSIVM2				VSIVM3(old)			
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%		
redhat56	0.57%		

# Drill down Options – How fast is fast?

Nednesday 7 Nov 2018 00:46

zVIEW Version 4310



zVIEW - Velocity Software - VSIVM4 (DEMO)  
Performance Displays for zVM and Linux on System z

Menu

mylinux

Node	Process Name	ID	P
ZSXL0006	systemd	1	
ZSXL0006	kthreadd	2	
ZSXL0006	kworke/0:0	3	
ZSXL0006	kworke/0:0H	4	
ZSXL0006	mm_percpu_wq	6	
ZSXL0006	ksoftirqd/0	7	
ZSXL0006	rcu_sched	8	
ZSXL0006	rcu_bh	9	
ZSXL0006	migration/0	10	
ZSXL0006	cpuhp/0	11	
ZSXL0006	kdevtmpfs	12	
ZSXL0006	netns	13	
ZSXL0006	khungtaskd	14	
ZSXL0006	oom_reaper	15	
ZSXL0006	writeback	16	
ZSXL0006	kcompactd0	17	
ZSXL0006	ksmd	18	
ZSXL0006	crypto	19	
ZSXL0006	kintegrityd	20	
ZSXL0006	kblockd	21	
ZSXL0006	md	22	
ZSXL0006	cio	23	
ZSXL0006	watchdogd	24	
ZSXL0006	kworke/0:1	26	
ZSXL0006	cmthread	27	
ZSXL0006	kauditd	28	
ZSXL0006	kswapd0	29	
ZSXL0006	ecryptfs-kthrea	30	
ZSXL0006	kthrotld	32	
ZSXL0006	khvcd	73	
ZSXL0006	kmcheck	74	
ZSXL0006	ipv6_addrconf	75	
ZSXL0006	kworke/0:1H	148	
ZSXL0006	kworke/u128:3	150	
ZSXL0006	jbd2/dasda1-8	172	
ZSXL0006	ext4-rsv-conver	173	
ZSXL0006	vfio-ccw	301	
ZSXL0006	qeth_wq	322	
ZSXL0006	kworke/u128:0	7826	
ZSXL0006	systemd-journali	212	
ZSXL0006	systemd-udev	235	
ZSXL0006	systemd-timesyn	272	
ZSXL0006	cron	353	

### ESALNXP - VSI Linux Percent Usage by Process - DEMO

Time	Node	Name	ID	PPID	GRP	Tot	sys	user	syst	usrt	valu	valu	Size	RSS	Peak	Swap	Data	Stk	EXEC	
00:46:00	lxdb2001	*Totals*	0	0	0	0.6	0.1	0.1	0.1	0.3	0	0	4549	322	4557	0	1391	4.8	3.8	1
00:46:00	lxdb2001	init	1	1	1	0.0	0.0	0	0	0	0	20	2.4	0.9	2.4	0	0.2	0.1	0.0	:
00:46:00	lxdb2001	snmpd	2200	1	2199	0.1	0.1	0.1	0	-10	10	29.7	13.4	37.1	0	17.3	0.1	0.0	1:	
00:46:00	lxdb2001	cron	2223	1	2223	0.1	0	0	0.0	0.0	0	20	2.6	0.9	2.7	0	0.2	0.1	0.0	:
00:46:00	lxdb2001	db2fmc	2245	1	2245	0.4	0	0	0.1	0.3	0	20	50.9	13.9	51.0	0	3.5	0.2	0.1	4:
00:46:00	lxdb2001	db2sysc	2833	2831	2833	0.0	0.0	0	0	0	0	20	877	91.6	877	0	262	0.1	0.1	:
00:46:00	lxora12	*Totals*	0	0	0	1.2	0.3	0.9	0.0	0.0	0	0	3970	724	4197	115	1845	6.6	7.4	:
00:46:00	lxora12	amozxma0	1503	1	1503	0.0	0.0	0	0	0	0	20	250	10.1	314	0.9	66.3	0.1	0.4	2:

### ESAHST2 - LINUX HOST Storage Analysis Report - DEMO

Time	Node/Group	Index	Size	Used	Full	Err	Units	R/W	Boot	Storage	Description
00:46:00	ZPRO	0	196K	109K	55.7	0	1K			Totals	
00:46:00	VPNS	0	5376	5376	100	0	1K			Totals	

### ESAUCD2 - LINUX UCD Memory Analysis Report - DEMO

Time	Node/Group	Real Storage (MB)	SWAP Storage (MB)	Total	Storage in Use (MB)														
00:46:00	ZPRO	4600	3	1423	3106	0	107E	207E	10	6	107	E	4250	0	0	353	6	1070	0

### ESAUCD4 - LINUX UCD System Statistics Report - DEMO

Time	Node/Group	Processor Total	Syst User	Pct Util	Idle	Swaps	Disk IO	Switch	Intrpt	Load A				
00:46:00	ZPRO	2.7	1.2	1.4	0	1188	0	0	0	56.7	2080.5	1023.7	0.49	0
00:46:00	VPNS	10.1	4.2	5.9	0	389	0	0	0	180.5	733.9	0.33	0	

### ESAHST4 - LINUX HOST System Statistics Report - DEMO

Time	Server	Num Users	Processes Current	Max (MB)	StgSz	Local Date	System Time	System Uptime	System Dev	System Initiali	Parameter
00:46:00	ZSXL0006	0	0	0	0	0	0	0	0	0	0

### LPAR...

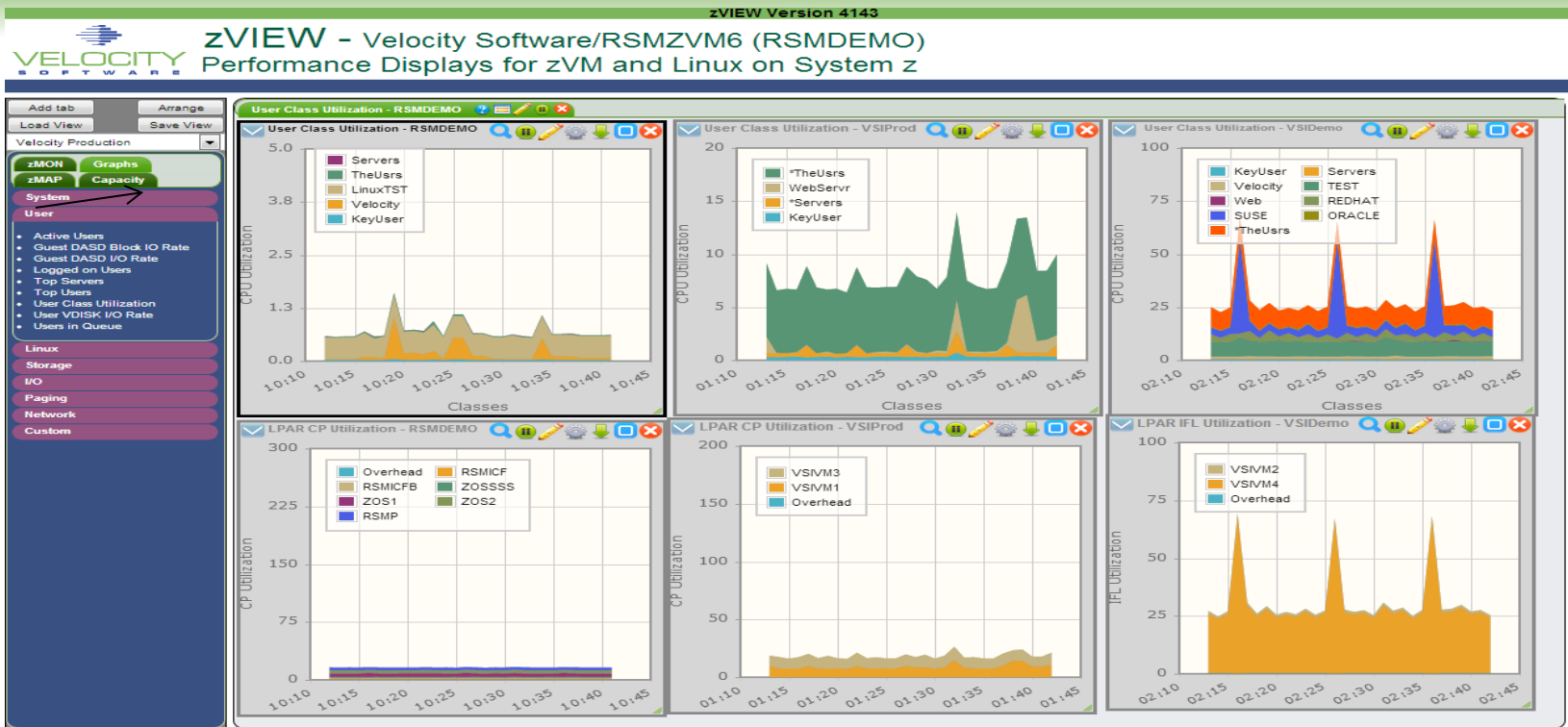
# zVPS Enterprise View

## Did I say scalable? A lot of LPARS....

Enterprise Performance Summary "some installations"

DC1			
V1P1	08:48	IFL Total (48) @ 726.4%	Expand
V1P2	08:48	IFL Total (48) @ 1144.68%	Expand
V1P3	08:48	IFL Total (48) @ 876.67%	Expand
V1P4	08:48	IFL Total (48) @ 1081.58%	Expand
DC2			
V2P1	08:48	IFL Total (48) @ 756.5%	Expand
V2P2	08:48	IFL Total (48) @ 846.3%	Expand
V2P3	08:48	IFL Total (48) @ 812.7%	Expand
V2P4	08:48	IFL Total (48) @ 899.1%	Expand
V2P5	08:48	IFL Total (40) @ 597.3%	Expand
V2P6	08:48	IFL Total (40) @ 854.40%	Expand
P207	08:48	IFL Total (56) @ 1429.15%	Expand
P208	08:48	IFL Total (64) @ 1865.63%	Expand
P209	08:48	IFL Total (56) @ 1872.48%	Expand
P210	08:48	IFL Total (64) @ 1729.40%	Expand
P211	08:48	IFL Total (44) @ 1222.53%	Expand
P212	08:48	IFL Total (44) @ 895.74%	Expand
P213	08:47	IFL Total (40) @ 1173.87%	Expand
P214	08:48	IFL Total (56) @ 1265.42%	Expand
P215	08:48	IFL Total (56) @ 8400.97%	Expand
P216	08:48	IFL Total (40) @ 1202.33%	Expand
P217	08:48	IFL Total (40) @ 775.85%	Expand
P218	08:48	IFL Total (40) @ 768.81%	Expand
P219	08:48	IFL Total (48) @ 656.1%	Expand
P220	08:47	IFL Total (44) @ 699.74%	Expand
CDL			
VLB1	08:48	IFL Total (52) @ 2846.04%	Expand
VLB2	08:48	IFL Total (36) @ 2868.00%	Expand
VLB3	08:48	IFL Total (40) @ 2373.59%	Expand
VLB4	08:48	IFL Total (38) @ 2291.49%	Expand
VLB5	08:48	IFL Total (48) @ 646.22%	Expand
VLB6	08:48	IFL Total (28) @ 2287.44%	Expand
VLB8	08:48	IFL Total (24) @ 1623.21%	Expand
ZS01	08:48	IFL Total (16) @ 13.72%	Expand
ZS02	08:48	IFL Total (16) @ 9.82%	Expand
VLBX	08:48	IFL Total (3) @ 99.90%	Expand
HIL1	08:48	IFL Total (64) @ 85.85%	Expand
HIL2	08:48	IFL Total (60) @ 92.92%	Expand

# Multiple System View (3 LPARs)



Data from multiple lpar's visible on "Single pane of glass"

# zALERT - Operational Support

## zAlert

- User tailorable
- 3270 based, web based, and / or SNMP
- **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), page rates
  - Looping servers
  - DASD service times
- **Network alert examples**
  - Transport errors, ICMP rates, Bandwidth thresholds
- **z/OS (zVSE)**
  - CPU, job utilization, cec (cpu type) utilization,
  - CICS max task, response times, etc

# 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 zVIEW based:  
Click Thru  
or SMS, email...

# Operational Considerations

## Issue with SNMP alerts (or other agents)

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

## zVPS SNMP Alert Architecture

- **Centralized alert**
- One point of control (ZALERT)

## SNMP alerts sent to any SNMP operations console

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

## Sending SNMP alerts by other functions:

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



# Diagnostic vs Management Tools

- **Diagnostic Tools**
  - Turn on when there's a problem (but not if too heavy....)
  - 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

## Operations Tool (many installations!)

- Log analyzer
- Diagnostics tool

## The Problem

- Agent is very high overhead
- Each Linux runs splunk agent, feeds central database
- One installation reports 2-4% of ONE IFL just for splunk agent
  - (Using 20 IFLs just for splunk agent)

## The (VERY efficient) solution

- All (almost all?) data captured by zVPS
- zVPS feeds splunk (no additional charge, big savings in cpu)
- Installation details on Velocity Software website

# MongoDB (zVPS V5)

## Fast DataBase

- Used for real time performance
- “read only”
- Benchmarked at 8,000 hits per second on ONE LPAR
- MongoDB engineers very impressed with “z” !!!

## The Problem

- Black box?

## The requirements: Management

- Marriott corporation offloading 5,000 transactions per second plus
- MongoDB on Linux on z architecture

## The (VERY efficient) management solution

- MongoDB has snmp mib, fully supported by zVPS (real time, alerts...)

# Docker and more (zVPS V5)

## Docker container technology used for many implementations

- Docker/kubernetes
- collectd
- z/os container extensions

## Docker

- Used extensively by a few large customers
- Snmp mib developed by Velocity Software

## IBM Secure Container

- Black box as presented (no management capability if problems)
- Collectd implementation – one way mechanism, open source
- Supported by zvps

## Z/OS container extensions

- Collectd implementation?

## New Technologies

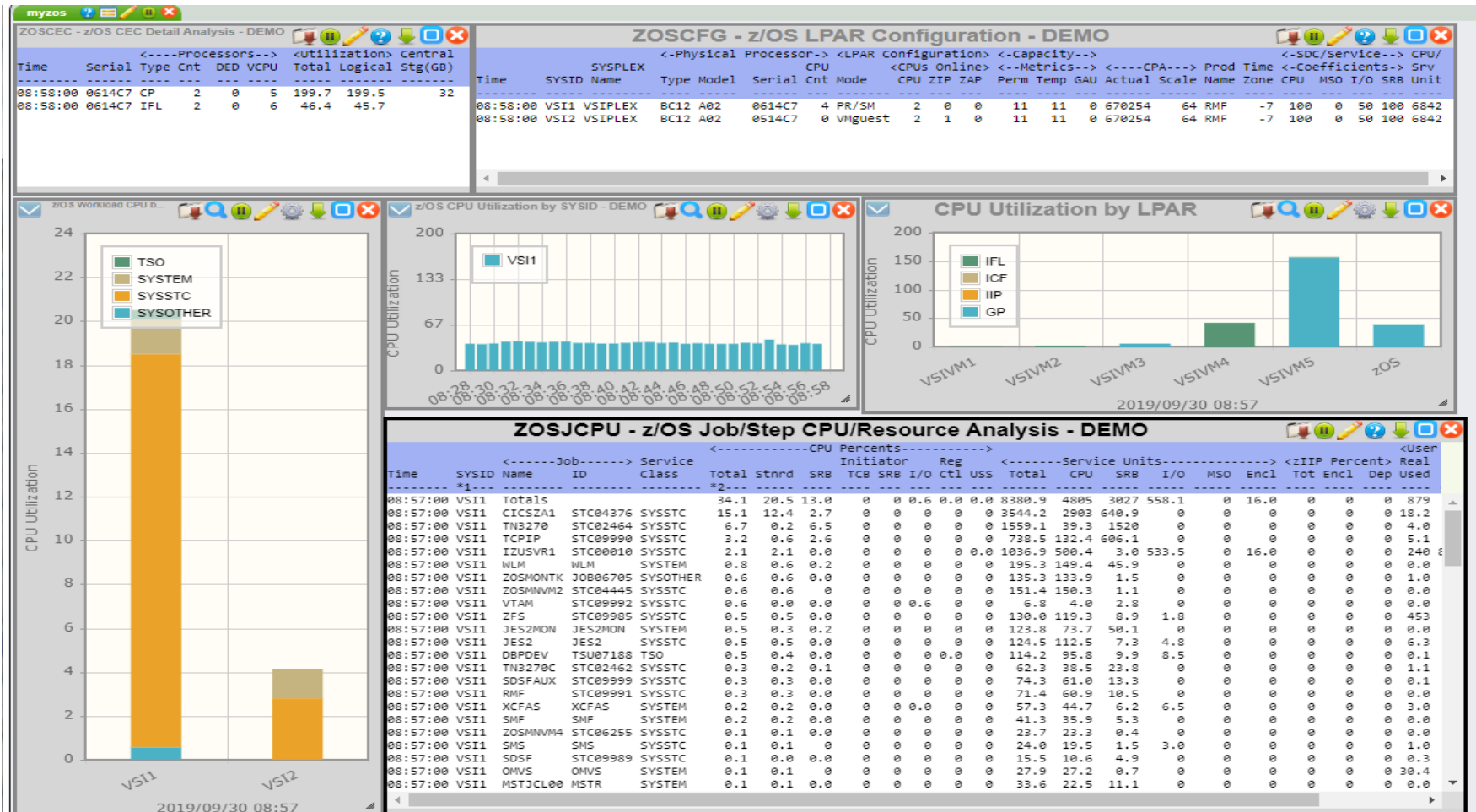
- z/OS.... (common request)
- VSE CICS too
- z/OS: Send link to your z/OS people....

<http://demo.velocitysoftware.com/zview/zview.cgi?view=myzos&heading=no&menu=no>

Make it easy, low overhead, amazingly fast...

# zOSMON fully integrated

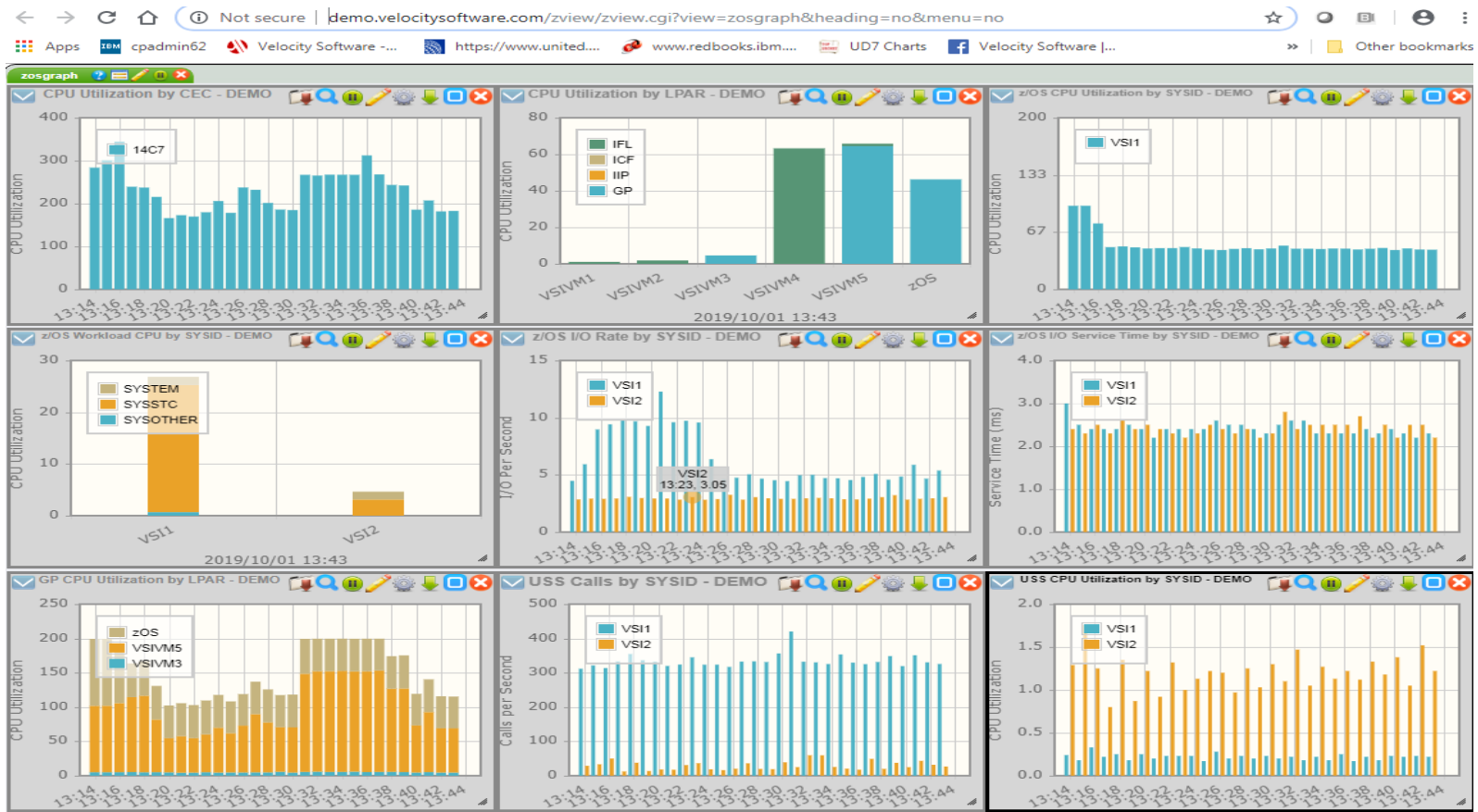
Instant z/os system, cpu, jobs, configuration. (Tailorable)



# zOSMON fully integrated

## Instant z/os Graphs. (Tailorable)

<http://demo.velocitysoftware.com/zview/zview.cgi?view=zosgraph&heading=no&menu=no>



# CICS Configuration

Work in progress... z/OS, VSE, no limit...

Monitor initialized: 10/01/19 at 13:15:00 on BC12 serial 0614C7

```
-----  
SYSID <--CICS Program-> <-----Start-----> User      Platform <-----Location---->  
      APPLID   JobName      Date      Time      Identity  O/S   VRM   LPARName VMID  
-----  
13:16:00  
VSI1  CICSZA1   CICSZA1   09/10/19  06:16:53          z/OS  0720  
      CICSZA2   CICSZA2   09/13/19  07:50:26          z/OS  0720  
V61B  CICSP1    CICSP1    09/18/19  10:46:00  PRODCICS  VSE   0420  VSIVM5   ZVSE61B  
V62C  CICSP1    CICSP1    09/14/19  06:13:22  PRODCICS  VSE   0430  VSIVM5   ZVSE62C  
-----  
13:17:00  
VSI1  CICSZA1   CICSZA1   09/10/19  06:16:53          z/OS  0720  
      CICSZA2   CICSZA2   09/13/19  07:50:26          z/OS  0720  
V61B  CICSP1    CICSP1    09/18/19  10:46:00  PRODCICS  VSE   0420  VSIVM5   ZVSE61B  
V62C  CICSP1    CICSP1    09/14/19  06:13:22  PRODCICS  VSE   0430  VSIVM5   ZVSE62C
```



# CICS by transaction id

## Work in progress... Transaction data, waits by tran id

Report: ZOSCIX4 z/OS CICS Transaction ID Analysis Velocity So  
 Monitor initialized: 09/30/19 at 00:00:00 on BC12 serial 0514C7

| Time/<br>SYSID | Transaction<br>ID | Count        | Type<br>R T | Total<br>Resp | Susp<br>Time | Disp<br>Time | CPU<br>Time | DISP<br>Wait | ZIP<br>CPU | CPU<br>Secs | Term | Jrn | Str |
|----------------|-------------------|--------------|-------------|---------------|--------------|--------------|-------------|--------------|------------|-------------|------|-----|-----|
| 05:15:00       |                   |              |             |               |              |              |             |              |            |             |      |     |     |
| VSI1           |                   |              |             |               |              |              |             |              |            |             |      |     |     |
| CICSZA1        | CHCK              | 9            | F TO        | 100.0         | 6554K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CISR              | 9            | F TO        | 100.0         | 6554K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CSHQ              | 9            | F TO        | 100.0         | 6554K        | 0            | 0           | 0.176        | 0          | 0           | 0    | 0   | 0   |
|                | CSNE              | 9            | F TO        | 100.0         | 6554K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CSSY              | 18           | F TO        | 100.0         | 6554K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | <b>CSSY</b>       | <b>121</b>   | <b>T TO</b> | <b>0.183</b>  | 11977        | 0            | 0           | 1.714        | 0          | 0           | 0    | 0   | 0   |
|                | CSTP              | 9            | F TO        | 100.0         | 6102K        | 0            | 0           | 2745         | 0          | 0           | 0    | 0   | 0   |
|                | <b>STRH</b>       | <b>37013</b> | <b>T TO</b> | <b>0.007</b>  | 246.8        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
| CICSZA2        | CHCK              | 14           | F S         | 68.57         | 4494K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CISE              | 13           | F S         | 69.23         | 4537K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CSHQ              | 14           | F S         | 68.57         | 4494K        | 0            | 0           | 0.395        | 0          | 0           | 0    | 0   | 0   |
|                | CSNE              | 14           | F S         | 68.57         | 4494K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CSOL              | 1            | D S         | 1887          | 124M         | 0            | 0           | 26.62        | 0          | 0           | 0    | 0   | 0   |
|                | CSSY              | 28           | F S         | 68.57         | 4494K        | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CSSY              | 4            | T S         | 0.196         | 12735        | 0            | 0           | 1.714        | 0          | 0           | 0    | 0   | 0   |
|                | CSTP              | 14           | F S         | 68.57         | 4493K        | 0            | 0           | 512.0        | 0          | 0           | 0    | 0   | 0   |
| ZV61           |                   |              |             |               |              |              |             |              |            |             |      |     |     |
| CICSP1         | CSNE              | 1            | F TO        | 1800          | 1800         | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | CSPQ              | 1            | T TO        | 0.002         | 0.000        | 0.002        | 0.001       | 0            | 0          | 0.0         | 0    | 0   | 0   |
|                | CSSY              | 5            | F TO        | 1800          | 1800         | 0.000        | 0.000       | 0.000        | 0          | 0.0         | 0    | 0   | 0   |
|                | CSTP              | 1            | F TO        | 1800          | 1672         | 128.1        | 11.31       | 3.713        | 0          | 11.3        | 0    | 0   | 0   |
|                | IESO              | 1            | F TO        | 1800          | 1800         | 0            | 0           | 0            | 0          | 0           | 0    | 0   | 0   |
|                | <b>STRH</b>       | <b>7328</b>  | <b>T TO</b> | <b>0.053</b>  | 0.033        | 0.020        | 0.003       | 0            | 0          | 21.3        | 0    | 0   | 0   |

# CICS by Region

By minute, real time, wrapped up at night to 15 minute

Report: ZOSCIX2          z/OS Region Transaction Analysis  
 Monitor initialized: 09/30/19 at 00:00:00 on BC12 serial 0514C7

| Time/<br>SYSID/ Name/<br>Time |         | Transacton   |             | <-----Response Time (Seconds)-----> total |       |       |       |       |     |      |
|-------------------------------|---------|--------------|-------------|-------------------------------------------|-------|-------|-------|-------|-----|------|
| ID                            |         | Count        | Type        | Total                                     | Susp  | Disp  | CPU   | DISP  | ZIP | CPU  |
|                               |         |              | R T         | Resp                                      | Time  | Time  | Time  | Wait  | CPU | Secs |
| -----                         |         |              |             |                                           |       |       |       |       |     |      |
| 05:15:00                      |         |              |             |                                           |       |       |       |       |     |      |
| VSI1                          | CICSZA1 | 90           | F S         | 100.0                                     | 6509K | 0     | 0     | 274.9 | 0   | 0    |
|                               |         | 121          | T S         | 0.183                                     | 11977 | 0     | 0     | 1.714 | 0   | 0    |
|                               |         | <b>37013</b> | <b>T TO</b> | <b>0.007</b>                              | 246.8 | 0     | 0     | 0     | 0   | 0    |
|                               | CICSZA2 | 1            | D S         | 1887                                      | 124M  | 0     | 0     | 26.62 | 0   | 0    |
|                               |         | 139          | F S         | 68.63                                     | 4498K | 0     | 0     | 52.16 | 0   | 0    |
|                               |         | 4            | T S         | 0.196                                     | 12735 | 0     | 0     | 1.714 | 0   | 0    |
| ZV61                          | CICSP1  | 10           | F S         | 1800                                      | 1787  | 12.81 | 1.131 | 0.371 | 0   | 11.3 |
|                               |         | 1            | T S         | 0.002                                     | 0.000 | 0.002 | 0.001 | 0     | 0   | 0.0  |
|                               |         | <b>7328</b>  | <b>T TO</b> | <b>0.053</b>                              | 0.033 | 0.020 | 0.003 | 0     | 0   | 21.3 |
| -----                         |         |              |             |                                           |       |       |       |       |     |      |
| 05:30:00                      |         |              |             |                                           |       |       |       |       |     |      |
| VSI1                          | CICSZA1 | 1            | D S         | 1887                                      | 124M  | 0     | 0     | 7091  | 0   | 0    |
|                               |         | 90           | F S         | 93.34                                     | 6076K | 0     | 0     | 242.6 | 0   | 0    |
|                               |         | 125          | T S         | 0.205                                     | 13382 | 0     | 0     | 1.722 | 0   | 0    |
|                               |         | 37312        | T TO        | 0.006                                     | 190.5 | 0     | 0     | 0     | 0   | 0    |
|                               | CICSZA2 | 127          | F S         | 69.44                                     | 4551K | 0     | 0     | 57.48 | 0   | 0    |
|                               |         | 1            | T S         | 0.262                                     | 17060 | 0     | 0     | 1.588 | 0   | 0    |
| ZV61                          | CICSP1  | 1            | F S         | 1556                                      | 1556  | 0.000 | 0.000 | 0.000 | 0   | 0.0  |
|                               |         | 9428         | T TO        | 0.012                                     | 0.004 | 0.008 | 0.003 | 0     | 0   | 26.7 |
| -----                         |         |              |             |                                           |       |       |       |       |     |      |

# zOSMON Room for Thought....

- **Processing requirements for 40 CICS transactions/sec**
  - 140,000 transactions per hour
  - z/OS: .6-.7% GP for collector
  - zVPS: <1% of one IFL for everything, including web servers.
- **z/OS processing time**
  - 24 hours records 30/70: 24 cpu seconds on one IFL
- **zOSMON Futures**
  - DB2 (101,102)
  - MFC (113)
  - What customers want
  - Please send SMF data

## Performance management is a business model

- Performance analysis and tuning
- Capacity planning
- Operational support
- Chargeback

## Single pane of glass

Efficiency critical, not just a diagnostic tool

Flexibility important – architecture works....

# Velocity Software thanks you for running Linux on z...

- **Please send data:**

- When you have a problem
- When you have a new machine
- When you would like to see zVPS reporting capability.

- **Velocity Software in 2019 (V5) has added:**

- Collectd support for IBM Secure container, docker, z/OS Container Extensions
- SMF support for z/OS (70, 30, 110, more to come)
- DMF support for z/VSE
- MongoDB support
- Docker mib support

- **zPRO:**

- IBM has failed to provide an on prem cloud solution
- xcat, cma just did not work and have been withdrawn
- zPRO does NOT use SMAPI, JAVA, guest Linux
- zPRO is a native solution that many installations use for on prem cloud