

Managing Linux on z/VM using ESALPS

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Topics

Velocity Software Performance Management Infrastructure

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

Importance of technology

- Z/VM technology
- Linux (and SUN, NT, AIX, etc) Agent technology



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Velocity Software - Business

Founded 1988 to provide VM Performance Software and Services

- ESAMAP,ESAMON
- ESATCP, ESAWEB
- zTUNE
- zPRO, zVIEW

Performance Workshops, Education

- **Next performance workshop (This week) April, 2009**
- **Performance seminars scheduled often**



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Velocity Software – What we do

IBM Partner in Development since 1989

Participate in IBM's VM Early Support Programs

- Every VM Early Support Program since 1988 (XA, ESA, z)

Relationship with IBM's Linux lab in Boeblingen

Performance research

- Customer problems
- Redbooks

Conference participation to present research

- SHARE
- GSE
- CMG
- Local VM/Linux user groups



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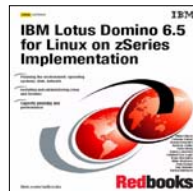
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Performance Resources

- <http://LinuxVM.com>, <http://VelocitySoftware.com>
- zLinux & z/VM Performance Workshops
 - <http://VelocitySoftware.com/workshop.html>



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zLinux Level Set

This is SHARED resource environment,

- z/VM Performance critical
- Any One server can impact all applications

This is not z/OS

- This is not a mature environment
- Some metrics are not yet available

This is not distributed Environment

- We do not have cycles to waste
- We DO have capacity planning, chargeback requirements

Tools are needed that understand the environment

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Linux Infrastructure Requirements

Instrumentation Requirements

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

Correct data (Virtual Linux CPU data wrong)

Capture ratios

Instrumentation can NOT be the performance problem



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Infrastructure Requirements: Performance Analysis

Why Performance Analysis: Service Levels.

- 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?



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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, CIMS, TDS**



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Infrastructure Requirements: Accounting and 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

Infrastructure Requirements

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



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Infrastructure Requirements: Operational Alerts

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 (HP, IBM, CA)
- User tailored alerts
- Web based alerts



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Data Requirement Summary

Performance data requirements

- **Valid, correct – CPU data typically wrong or very wrong.**
 - **Linux getting better with SLES10/RHEL5 (now underreports)**
- z/VM and Linux data integrated?
- Helpful in solving problems?
- Validate benefits of tuning

Historical data requirements

- Capacity Planning input
- Problem Analysis
- Linux
- z/VM

Accounting / Charge back

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

Manage Infrastructure cost

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



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z/VM Performance

Traditional model (1989)

ESAMON: Real time analysis

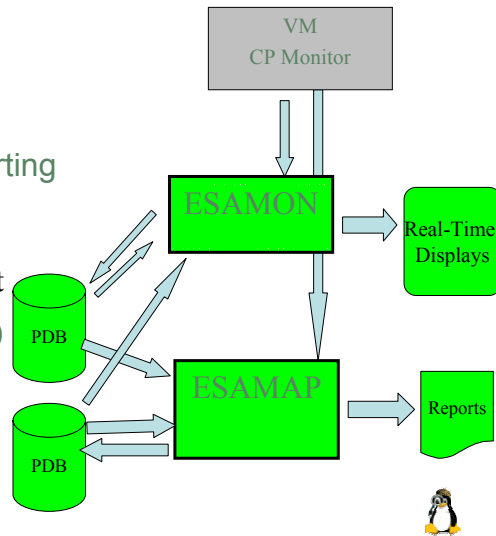
- Uses Standard CP Monitor
- Real Time Analysis

ESAMAP: Performance Reporting

- Post Processing
- Creates Long Term PDB
- PDB or monwrite data input

PDB (Performance DataBase)

- Complete data
- By Minute, hour, day
- Monthly/Yearly Archive



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Linux Performance Data Summary

Linux (and networks) adds requirement

- **Correct data**
- **Complete data**
- **Low cost data**

Support requirements:

- z/VM 3.x, 4.x, 5.1, 5.2, 5.3, 5.4, next....
- SLES 7,8,9,10, 11 (Installations still have 7 and 8)
- RHEL 3,4,5
- Other distributions
- Other platforms

Must support:

- Performance tuning
- Capacity planning
- Operational alerts
- Chargeback/Accounting

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Correct Linux Performance Data?

Valid and Correct?

- **Process data from Linux under z/VM is wrong**
 - All process accounting based on timer ticks
 - Corrected in SLES10, RHEL5 (now underreports)
- TOP, ALL other agents “lie” when under z/VM
- Sample of factor of 10 prior to SLES10
 - Well known issue since 2001
 - [HTTP://velocitysoftware.com/present/CaseAFS](http://velocitysoftware.com/present/CaseAFS)

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...



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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???**
 - **Customer quote: an agent that costs 1% of a processor will cost me 10 IFLs**
- **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?**



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Network, Linux Instrumentation

Performance Data infrastructure existed (ESAMON/ESAMAP)

- 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

- TCPIP application provided by TCPIP Vendor
- 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)



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Competing Agent Technologies

NETSNMP

- Default from redhat or Suse uses about 1% CPU
- Velocity Software version uses **less than .1% of ONE z9 IFL, one minute granularity**
- Velocity Software version for idle server: 0.01%
- Currently installed on >10,000 of z/Linux servers
 - (Actually, installed on all of them, but used on >10,000)

RMFPMS (IBM's direction 2003)

- Active agent, writes data to log
- Not recommended because of overhead

New "Monitor Record" (IBM's direction 2005, traditional approach)

- zLinux/VM only, non-standard
- No process data
- CPU data can not be corrected
- What problem are we trying to solve?

Proprietary agents

- Written for Intel or other Unix platforms, CPU cost didn't matter
- Can be Expensive
- **Ask for references for "z"**



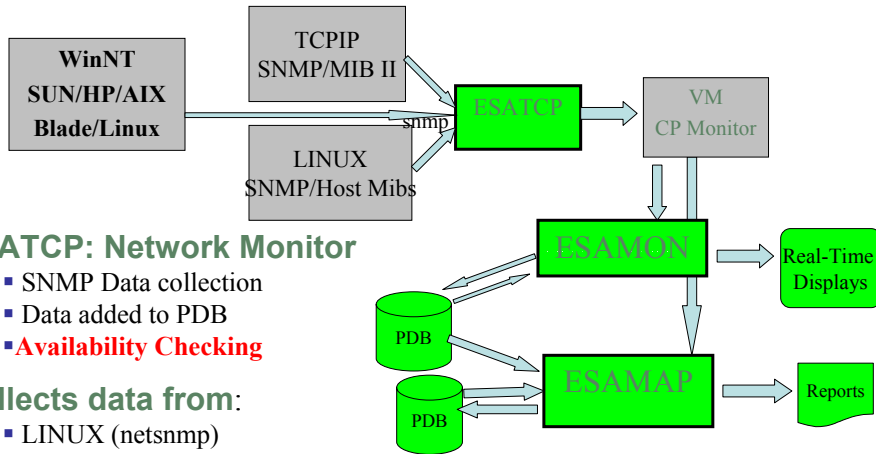
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Linux and Network Data Acquisition



ESATCP: Network Monitor

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

Collects data from:

- LINUX (netsmp)
- NT/SUN/HP (native snmp)
- Printers/Routers....

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Operational Costs

Low cost agent - Cost of snmpd very low (.1%- .4%)
(Objective; Determine what process spikes at 1am Monday morning)
See ["http://velocitysoftware.com/applic.html"](http://velocitysoftware.com/applic.html) for full listing (24 linux servers)

```
Report: ESALNXA      LINUX HOST Application Report
-----
Node/   Process/   ID   <---Processor Percent--->
Date   Application
Time   name      Total sys  user syst  usrt
-----
00:15:57
LINUX16 *Totals*    0  16.9  2.5  11.6  1.9  1.1
      amqpcsea  674  0.4  0.1  0.3  0  0
      amqzma0  600  0.8  0.1  0.7  0.0  0.0
      cron    473  2.1  0.2  0.2  1.7  0.0
      dsmd    838  0.1  0.0  0.0  0.0  0.0
      httpd   31993 2.8  0.2  2.5  0.0  0.1
      java    32066 8.0  1.3  6.7  0  0
      kjournal 85  0.1  0.1  0  0  0
      kswapd  6  0.1  0.1  0  0  0
      qpea    4642 0.1  0.0  0.1  0  0
      qpmon   4674 0.8  0.1  0.7  0  0
      snmpd   361  0.1  0.1  0.0  0  0 <=====
      sshd    370  1.0  0.0  0  0.1  0.9
LINUX13 *Totals*    0  2.7  0.8  0.3  0.6  1.0
      cron    421  1.2  0.0  0.0  0.5  0.7
      init    1  0.2  0.0  0.0  0.0  0.1
      master  394  0.3  0.0  0.1  0.0  0.1
      ntpd    453  0.8  0.6  0.2  0  0
LINUX15 *Totals*    0  1.8  0.3  0.5  1.1  0.0
      amqzma0  844  0.2  0.0  0.1  0  0
      cron    457  1.1  0.0  0.0  1.1  0.0
      qpmon   4726 0.1  0.0  0.1  0  0
      snmpd   354  0.4  0.2  0.2  0  0 <=====
```

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Process Capture Ratio

High cpu capture ratio

Report: ESALNXV LINUX Virtual Processor Analysis Report

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

Report: ESALNXC LINUX Process Conf

Node/Name	<-Process ID>	Ident->	<----Pr ID	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
appdata	96	4	0	appdata
aic/0	101	4	0	aic/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/go
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/s
hb_do	16382	16313	16291	/usr/bi
rpm	16415	16382	16415	rpm
rpm	30124	16382	30124	rpm

Report: ESALNXP LINUX HOST Process Statistics Report

node/Name	<-Process ID	Ident->	Nice	<-----CPU Percents----->	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	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	
ccl	10307	10306	30124	0	3.12	0.18	2.93	0	0	
rpm	30124	16382	30124	0	0.07	0.03	0.03	0	0	
rpm	30125	30124	30124	0	0.02	0	0.02	0	0	
gmake	30126	30125	30124	0	0.02	0	0.02	0	0	

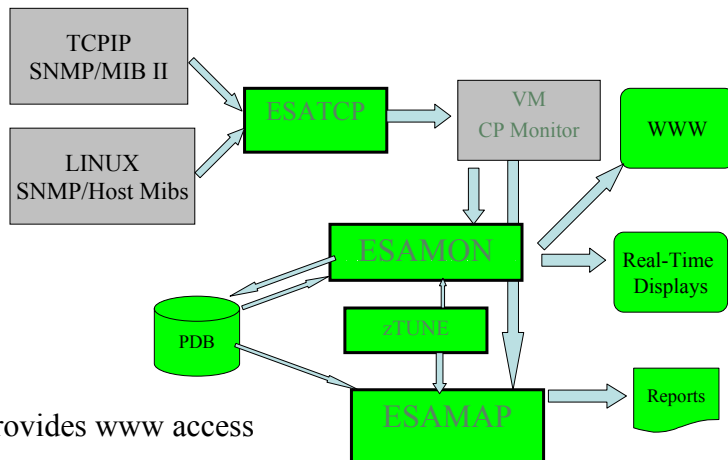


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ESALPS (Linux Performance Suite)



ESAWEB Provides www access

zTUNE: Rules based analysis



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- New 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”



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Health Checker for z/VM, Linux: zTUNE

Focus more now on simplifying problem resolution

Customer reports that application people complaining 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
```



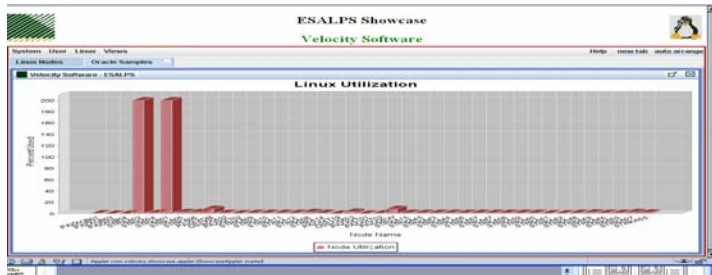
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Point and click Analysis With zVIEW



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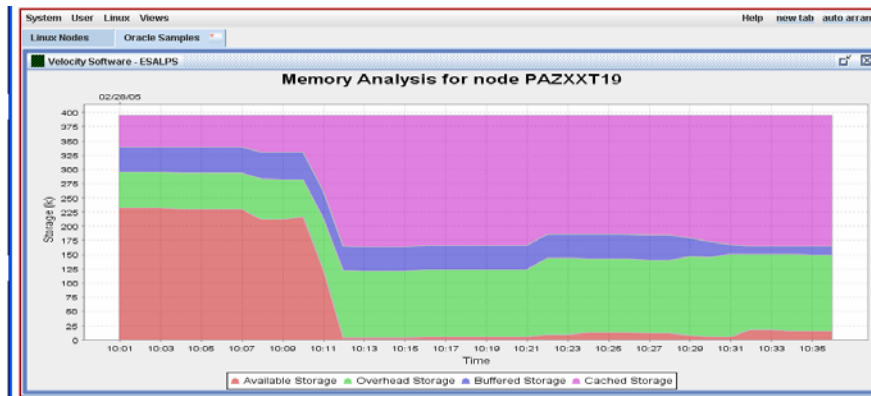
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Linux Storage

Following picture shows available storage as oracle starts



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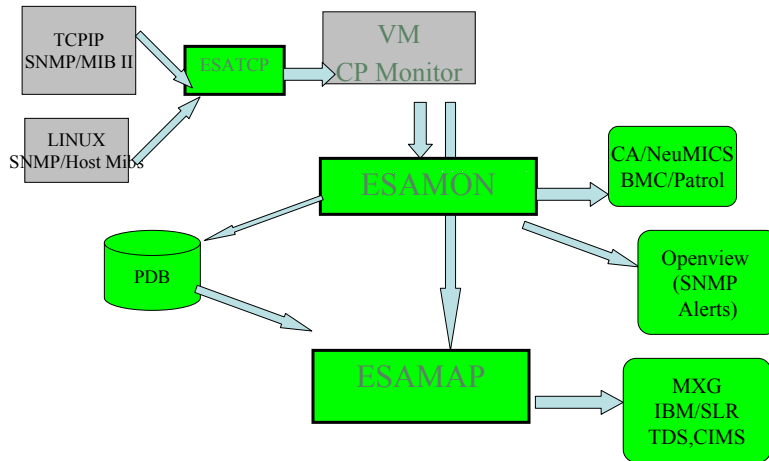
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Add Enterprise Support



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Linux 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



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Linux Storage Case Study

Linux tries to use all real storage

Linux minimizes storage used for swap

- Swap historically was slow SCSI device
- One Vdisk experiment with linux swapped 40,000 per second

First case study:

- Process took hours, system paged significantly
- Reduced size of Linux Virtual Machine, 128mb to 24mb
- Defined 100MB Swap disk
- Linux reduces storage requirement
- Process took minutes

Virtual Disk paged out when not in use

- This works!!! Paging greatly reduced, Linux performance greatly improved!!!

This research critical to using Collaborative Memory Mgmt (CMM)



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LINUX Swapping to VDISK

Change 128MB Server to 24MB with 100MB Swap

Reduction of Overall Storage Requirements of 100MB

- Unused VDISK is paged out

```
Screen: ESAVDSK Velocity Software, Inc. ESAMON V2.2 03/15 12:14-
<--pages--> DASD X-
Resi- Lock- Page Store
dent ed Slots Blks
-----
Time Owner Space Name
-----
12:15:01 LINUX001 VDISK$LINUX001$0202$0009 36 0 50 0
12:16:01 LINUX001 VDISK$LINUX001$0202$0009 36 0 50 0
12:17:01 LINUX001 VDISK$LINUX001$0202$0009 173 0 50 0
12:18:01 LINUX001 VDISK$LINUX001$0202$0009 293 0 35 0
12:19:01 LINUX001 VDISK$LINUX001$0202$0009 293 0 35 0
12:39:01 LINUX001 VDISK$LINUX001$0202$0009 259 0 35 0
12:40:01 LINUX001 VDISK$LINUX001$0202$0009 259 0 35 0
12:41:01 LINUX001 VDISK$LINUX001$0202$0009 207 0 86 0
12:42:01 LINUX001 VDISK$LINUX001$0202$0009 207 0 86 0
12:43:01 LINUX001 VDISK$LINUX001$0202$0009 13 0 280 0
12:44:01 LINUX001 VDISK$LINUX001$0202$0009 13 0 280 0
12:45:01 LINUX001 VDISK$LINUX001$0202$0009 13 0 280 0
```



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Tailoring Linux Storage

Linux data shows
Real storage
Swap storage
“cache”

Some Swapping is “good”

If not swapping,
reduce vm size
Use CMM to reduce

Report: ESAUCD2 LINUX UCD Memory Analysis Report Linux Test
Monitor initialized: 02/05/07 at 10:41:41 on 2084 serial 55BAF First recor

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

10:43:00

Node/	Total	Avail	Used	MIN	Avail	Shared	Buffer	Cache
acme	494.7	7.7	487.0	2031	2018	12.8	15.6	2026
dominoz1	2002.1	8.0	1994	2031	1934	97.4	15.6	1942
ebiz1	997.1	5.7	991.4	2031	1517	513.7	15.6	1523
ebiz2	997.1	13.0	984.2	2031	1878	152.8	15.6	1891
ibmids1	2002.1	11.6	1990	2031	2029	2.0	15.6	2041
ebizdev2	997.1	6.8	990.4	2031	1980	51.3	15.6	1986
ebizdev1	997.1	8.0	989.2	2031	1754	277.3	15.6	1762
ibmedge1	1007.3	497.1	510.2	2031	2031	0	15.6	2528
ibmids3	8031.8	81.5	7950	2031	2031	0	15.6	2112
ibmedge2	1007.3	492.7	514.6	2031	2031	0	15.6	2524
ibmred2	997.1	4.5	992.6	2031	2026	4.6	15.6	2031
ibmred1	997.1	9.7	987.4	2031	2026	4.6	15.6	2036
tdirdb2	4012.0	31.9	3980	2031	1613	418.1	15.6	1645
tdirtam	4012.0	1294	2718	2031	2031	0	15.6	3325
tdirtids	4012.0	1061	2951	2031	2031	0	15.6	3092
tdirtim	4012.0	1007	3005	2031	2031	0	15.6	3038
tdsds-a1	997.1	124.0	873.1	2031	2031	0	15.6	2155
ibmids2	8031.8	78.0	7954	2031	2031	0.4	15.6	2109



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Analyzing Linux CPU

UCD Data provides

- System level CPU
- Kernel time
- IRQ time
- I/O Wait time

Report: ESAUCD4 LINUX UCD SystAP 3.6.2 02/07/07 Page
Monitor initialized: 02/05/07 at 10:42:00

```
-----
Node/ <Processor Pct Util> NICE <CPU Overhead%> IO Prora
Date/ Total Syst User Idle Time Krnl IRQ Inrpt Wait Facto
Time
-----
```

10:43:00

Node/	Total	Syst	User	Idle	Time	Krnl	IRQ	Inrpt	Wait	Facto
acme	9.5	2.2	7.3	89.9	0	1.42	0.81	0	0.32	0.97
dominoz1	11.4	4.6	6.7	253	0	2.95	1.03	0	40.2	1.62
ebiz1	50.7	10.6	40.1	105	0	7.78	2.49	0	50.2	1.14
ebiz2	6.0	0.5	5.6	198	0	0.27	0.07	0	0.15	2.72
ibmids1	3.3	1.5	1.8	299	0	0.69	0.29	0	0.02	2.91
ebizdev2	6.0	0.9	5.1	197	0	0.59	0.18	0	0.23	1.88
ebizdev1	6.0	1.4	4.6	196	0	0.82	0.35	0	0.23	1.65
ibmedge1	0.7	0.3	0.5	100	0	0.07	0.05	0	0.10	3.91
ibmids3	16.5	5.9	10.6	294	0	4.56	0.51	0	0.08	2.73
ibmedge2	0.3	0.2	0.1	100	0	0.12	0.03	0	0.10	3.75
ibmred2	2.6	0.4	2.1	98.7	0	0.41	0.02	0	0.08	2.06
ibmred1	3.4	0.7	2.7	97.8	0	0.67	0.03	0	0.13	1.59
tdirdb2	3.7	1.3	2.3	196	0	1.30	0.02	0	0.35	0.94
tdirtam	0.1	0.1	0.0	100	0	0.10	0.02	0	0.03	1.47
tdirtids	8.0	1.0	7.0	92.2	0	0.71	0.25	0	0.10	1.02
tdirtim	0.6	0.4	0.2	98.9	0	0.31	0.10	0	0.03	0.51
tdsds-a1	0.1	0.0	0.1	100	0	0.04	0	0	0	2.17
ibmids2	19.5	7.2	12.3	294	0	6.51	0.20	0	0.12	3.43



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Analyzing Linux CPU

Velocity MIB data:

- Provides process data
- Parent/Child relationship

Note ALL application processes are owned by "24445".

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

node/ Name	<-Process ID	Ident-> PPID	GRP	Nice Valu	<-----CPU Tot	Percents-----> sys	user	syst	usr
10:43:00									
acme	0	0	0	0	9.25	1.76	7.31	0.11	0.06
snmpd	1240	1	1239	-10	0.08	0	0.08	0	0
hobbitla	2661	1	2661	0	0.18	0	0	0.11	0.06
named	4119	1	4119	0	8.99	1.76	7.23	0	0
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



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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/ Date Time	Process/ Application name	ID	<---Processor Percent---> <Process><Children>					
			Total	sys	user	syst	usr	
10:43:00								
acme	*Totals*	0	9.2	1.8	7.3	0.1	0.1	
	hobbitla	2661	0.2	0	0	0.1	0.1	
	named	4119	9.0	1.8	7.2	0	0	
	snmpd	1240	0.1	0	0.1	0	0	
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	



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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 Linux Te
 Monitor initialized: 02/05/07 at 10:41:41 on 2084 serial 55BAF First re

Node/ Date/ Time	<-----User and Group Identity----->				<---Processor Percent--->				
	Userid	GroupID	usrpid	grppid	Total	sys	user	syst	usr
10:43:00									
acme	bin	root	1	0	0	0	0	0	0
	daemon	daemon	2	2	0	0	0	0	0
	hobbit	users	1001	100	0.2	0	0	0.1	0.1
	named	named	44	44	9.0	1.8	7.2	0	0
	postfix	postfix	51	51	0	0	0	0	0
	root	root	0	0	0.1	0	0.1	0	0
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

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Analyzing Linux Disks

HOST MIB data:

- Provides disk data
- Percent full
- Supports WinNT, Unix
- Alerts by disk full

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

NODE/ Time/ Date	<-Utilization->					<-----Storage----->	
	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

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Storage Map, z/VM 5.2

Storage map - **CAPTURE RATIOS** always critical for any instrumentation:

- CP Fixed Storage
- CP Non Pageable
 - Free storage (only VMDBLKs)
 - Frame tables
- Dynamic Paging Area(DPA)
 - System Execution Space
 - User storage, MDC, Address Space, Vdisk
 - Available List (greater/less than 2gb)

```
Report: ESASTR1      Main Storage Analysis      Velocity Software, Inc.      ESAMAP 3.6.0 05/15/06 Page 57
Monitor initialized: 06/06/05 at 08:42:16 on 2064 serial 11542      First record analyzed: 06/06/05 08:42:42
-----
Users <-----Pages----->
Loggd System Fixed Non- Free Frame <Avail System User NSS/DCSS <-AddSpace> VDISK <MDC> Diag
Time On Storage Store Pgble Stor Table <2gb >2gb ExSpC Resdnt Resident System User Resdnt Rsdnt 98
-----
08:45:42 22 7864304 2907 3816 5 61440 513K 6292K 33150 78370 8408 1090 6235 0 133K 333 0.995
-----
Average: 22 7864304 2907 3816 5 61440 513K 6292K 33150 78370 8408 1090 6235 0 133K 333 0.995
```

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ESALPS Measurement Summary

ESALPS Meets Data Requirements:

- Sufficient for performance, capacity planning, accounting, Operations
- Linux and z/VM data – Integrated
- Complete and correct data

ESALPS Meets Infrastructural requirements

- Support all releases (SLES7,8,9,10,11 RHEL 3,4,5, z/VM V3,4,5...)
- Standard interfaces
- Low resource requirements

ESALPS 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>”

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zVIEW example

ESALPS - Fratelli Carli (ZVMLINUX)
Graphical Performance Displays

The screenshot displays the zVIEW interface for monitoring ESALPS. The left sidebar shows a tree view of system components. The main area contains four performance charts:

- User Classes:** A pie chart showing the distribution of user classes. Data points include: TEST_EVS = 84.19, TESTSYS = 0.14, TESTJOB = 0, and PROCD_019 = 35.97.
- Top Users:** A pie chart showing the top users. Data points include: ESASERVE = 0.01, ESASBCT = 0.01, ESASBTE = 0.01, ESASATP = 0.01, ESASBCK = 0.01, PROCD0 = 0, PROCDP = 4.95, SVRDS = 5.13, and PROCD5 = 30.05.
- Top Servers:** A pie chart showing the top servers. Data points include: TCPDP = 0.01, ESASBCT = 0.01, ESASBTE = 0.01, TESTTOP = 0.01, ESASBCK = 0.01, PROCD0 = 0.11, PROCDP = 4.95, SVRDS = 5.13, and PROCD5 = 30.05.
- CPU Utilization:** A bar chart showing CPU utilization over time. A red bar at the bottom indicates "CPU Utilization exceeds established limits".

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