Using your Performance Monitor to Watch z/VM and Linux

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VELOCITY SOFTWARE

PROVEN PERFORMANCE

Agenda

- Challenges
- Using Technology to Address Those Challenges
- Performance Monitoring
- Operational Support
  - zALERT
  - zOPERATOR

Setting correct expectations

This discussion and images contained in this presentation are generated by Velocity Software's zVPS product suite

Specific technology contained in the product suite will be discussed and displayed

Time is not our friend

- There is never enough
- So much more to do

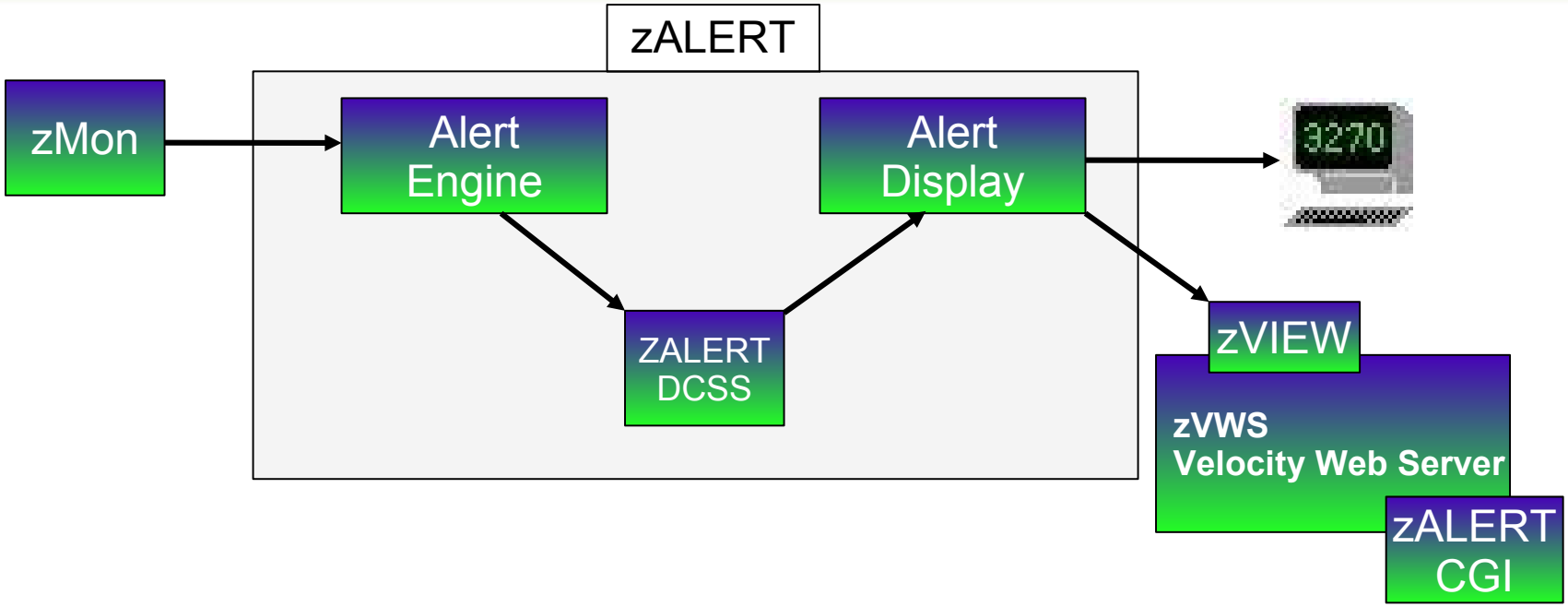
Aging workforce

- None of us are getting younger
- Technology has to step in

zALERT Technology

- **A service virtual machine is used to execute the 'alert engine'**
  - The virtual machine wakes up every minute
  - Installation defined alerts are evaluated
  - Monitor data is extracted
  - Values returned compared against user defined thresholds
  - User defined messages are generated and stored in the DCSS
  - Notifications can be sent to interested parties

zALERT Technology



```
06:53:51 AUTO LOGON  ***       LINUX001 USERS = 35    BY OPERATOR
07:00:40 HCPPGT401I 90 percent of all paging space is in use.
07:03:00 HCPPGT400I All paging space is in use.
07:03:43 HCPPGT401I 90 percent of all spooling space is in use.



07:03:57 HCPDMP908I SYSTEM FAILURE ON CPU 0000, CODE - PGT004
HCPDMP9250E SYSTEM DUMP FAILURE; NO DUMP UNIT - INSUFFICIENT SPOOL SPACE
07:04:06 HCPWRP9277I SYSTEM TERMINATION COMPLETE, ATTEMPTING RESTART

                                                        RUNNING   VM01A
```

Catastrophic event

- **Outages can have a large impact**
  - Unavailability of applications
  - Potential for information loss
  - Disruption of customer service
  - Political ramifications
    - Complex to manage
    - Outage makes the platform appear weak

Maintain availability

- **Critical to success**
- **Reduction or elimination of outages is vital**
- **A well maintained, highly-available system...**
  - Looks good to customers, end-users, shareholders

What are alerts?

- **Proactive monitoring can detect an abnormal situation before it causes trouble**
- **Continually analyzes customer defined conditions**
- **A condition can be**
  - Exceeding a certain threshold
  - Message(s) that require attention
  - An object in a state not conducive to proper operation
    - Volume offline
    - Virtual machine not logged on
    - Incorrect system settings

Alert samples

- **Alert samples are delivered with the package**
  - ALERT1 MONALERT is a generic set of samples
  - Older sample files are shipped with the filetype MONSAMP
    - VMALERT, LINALERT, HEALTH and HEALTH2
  - Samples ship with alerts to check various conditions that can potentially occur
    - LPAR, System, User, Linux node, Devices

- **Additional samples available on our web site**

Notifications

- **A notification can be any of**
  - Message displayed via a 3270 session, zVIEW or zALERT CGI
  - CP MSG to a user (eg: OPERATOR)
  - Email to interested parties
    - Text message on a mobile device
  - SNMP trap sent to a management console
  - Combinations of the above

Defining your own alerts

- **Alerts generally use the following statements**
  - EXTRACT
    - Signifies the start of the data extract
  - CRITERIA
    - Provides a filter for data extracted from the monitor
  - VAR
    - Defines a local variable made up of an expression involving monitor variables
  - ALERT
    - Defines an alert on a variable defined in VAR
  - LEVEL
    - User defined thresholds and optional actions
  - TEXT
    - User defined display text with variable replacement

Defining your own alerts

```
07:00:40 HCPPGT401I 90 percent of all paging space is in use.
```

- **Alerts can help to detect this condition**
  - Before it degenerates into an abend and outage
- **Sample page space utilization alert**

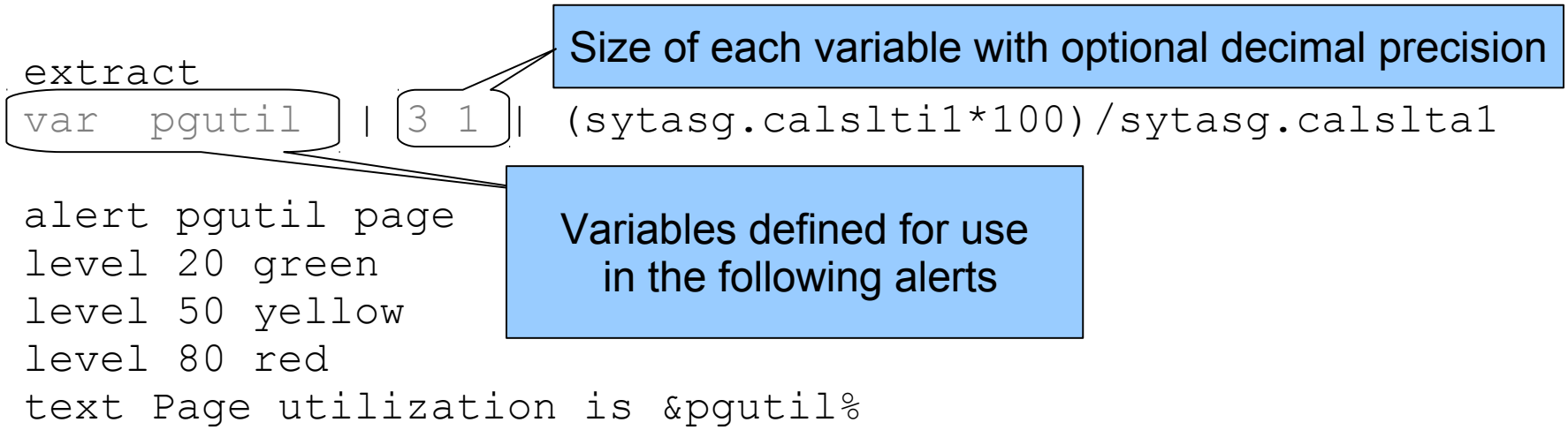
```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Defining your own alerts

'Extract' is the beginning of an alert definition or set of alert definitions

```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Defining your own alerts



Defining your own alerts

```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Fields to extract -
names are described in the PDR
(Performance Data Reference)

Can be a single field or multiple fields involved in simple to complex math operations.

Defining your own alerts

```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Paging Data

SYTASG			SYTASG		
	SAMPLES	flt	=	flt 0	Observations
	CAL90FUL	flt	=	flt 1	Times paging area was 90 percent full
	CAL91FUL	flt	=	flt 1	Times spooling area was 90 percent full
	CALSLTA1	flt	=	flt 0	Paging slots allocated
	CALSLTI1	flt	=	flt 0	Paging slots in use

Defining your own alerts

```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Four character code used when displaying alerts

ALERT statement defines a specific alert

Each alert requires a previously defined variable

Defining your own alerts

```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Color of the alert text when this level is exceeded

Values tested against the alert variable

LEVEL statement controls the threshold values

Defining your own alerts

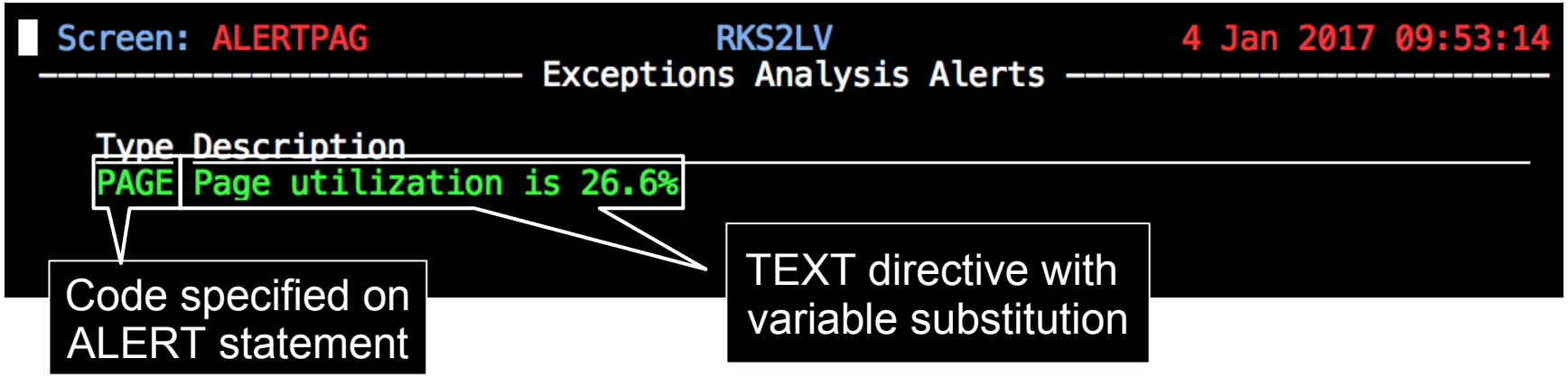
```
extract
var  pgutil   | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1

alert pgutil page
level 20 green
level 50 yellow
level 80 red
text Page utilization is &pgutil%
```

Alert variable substitution

Message displayed on 3270 and zView alert screens

Alert result - 3270

- **The 3270 screen based on the alert definition**



Alert result - zVIEW

- Same data in zVIEW

ALERTPAG - Exceptions Analysis Alerts - 17/01/04 at 09:57 - RKS2LV

Code	Alert Description
PAGE	Page utilization is 26.6%

Page and Spool Utilization combined

- **Some alerts can be combined under one extract**
  - Saves processing time
  - Needs to be similar data

```
extract
var  pgutil  | 3 1 | (sytasg.calslti1*100)/sytasg.calslta1
var  sputil  | 3 1 | (sytasg.calslti2*100)/sytasg.calslta2

alert pgutil page
level 20  green
level 50  yellow
level 80  red
text Page utilization is &pgutil%

alert sputil spol
level 20  green
level 50  yellow
level 80  red
text Spool utilization is &sputil%
```

```
Screen: PGSP                              RKS2LV
---------------------- Exceptions Analysis Alerts

  Type Description
  PAGE Page utilization is 26.0%
  SPOL Spool utilization is 61.2%
```

Alert rules

- **Adjust the number and value of levels based on local requirements**
  - At least one LEVEL statement is necessary
  - LEVEL statements are evaluated from the bottom up
- **Standard 3270 colors are allowed**
  - Turquoise, Blue, Red, Yellow, Green, Pink, White
  - If no color is specified, the default is Green
  - Color modifiers are allowed
    - **REV**video – reverse video
    - **BLI**nk – blink the entire text
    - **UNDERLINE** – underline the entire text

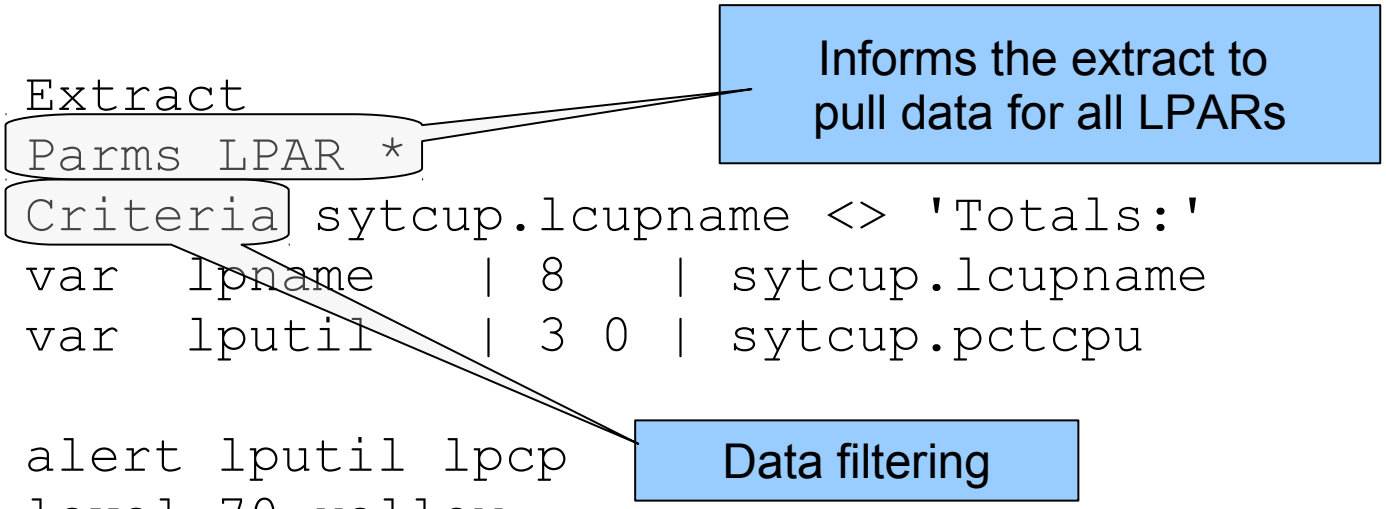
LPAR Utilization

- **Alert for LPAR Utilization**

```
Extract
Parms LPAR *
Criteria sytcup.lcupname <> 'Totals:'
var  lpname    | 8    | sytcup.lcupname
var  lputil    | 3 0  | sytcup.pctcpu

alert lputil lpcp
level 70 yellow
level 85 red
level 92 red rev
text LPAR utilization of &lpname is &lputil%
```

LPAR Utilization

- **Alert for LPAR Utilization**




```
Extract
Parms LPAR *
Criteria sytcup.lcupname <> 'Totals:'
var  lpname    | 8    | sytcup.lcupname
var  lputil    | 3 0  | sytcup.pctcpu

alert lputil lpcp
level 70 yellow
level 85 red
level 92 red rev
text LPAR utilization of &lpname is &lputil%
```

LPAR Utilization

```
Extract
Parms LPAR *
Criteria sytcup.lcupname <> 'Totals:'
var  lpname    | 8    | sytcup.lcupname
var  lputil    | 3 0  | sytcup.pctcpu

alert lputil lpcp
level 70 yellow
level 85 red
level 92 red rev
text LPAR utilization of &lpname is &lputil%
```

Text will be in reverse video (black text, red background)

ALERTLPR - Exceptions Analysis Alerts - 18/02/20 at 06:16 - VM5

Code	Alert Description
LPCP	LPAR VSIVM4 CPU Utilization is 94%

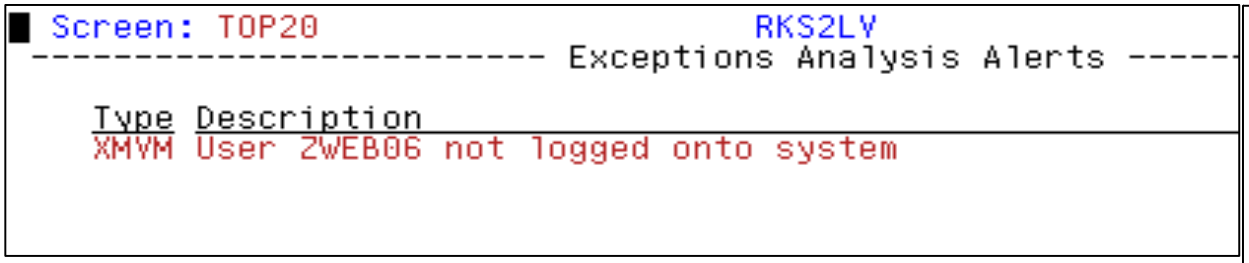
External Processing

- **An alert can call an external process**
  - Function
  - Stage
- **Function is a REXX EXEC that processes already extracted data**
  - Called for each record returned from an extract
  - Returns a single value
- **Stage is an EXEC that is called as a pipeline stage**
  - Must have a filetype of REXX
  - Can independently run it's own extract
  - Returns a single value

Missing Virtual Machine

- **Detection mechanism for required virtual machines**
  - Service machines
  - Utility machines
  - Linux systems

```
extract
var   dummy     | 1 | 1
stage alrtmusr | 8 |

alert dummy  xmvm
level 0 red action CP MSG OP &code &atext
text User &alrtmusr not logged onto system
```



MISSING USER

```
/* VELOCITY Virtual Machines
ZSERVE ZTCP
ZADMIN ZWEB01 ZWEB02 ZWEB03
ZWEB04 ZWEB05 ZWEBLOG
ZWEB06
/*
/*     SFS service machines
/*
VMSERVU VMSERVS SFSZVPS
/*
CRON
```

Second vdisk usage

- **Using two swap disks with different priority**
  - Second disk larger than the first
  - First disk fills, Linux uses the second disk
  - Alert when second disk is used

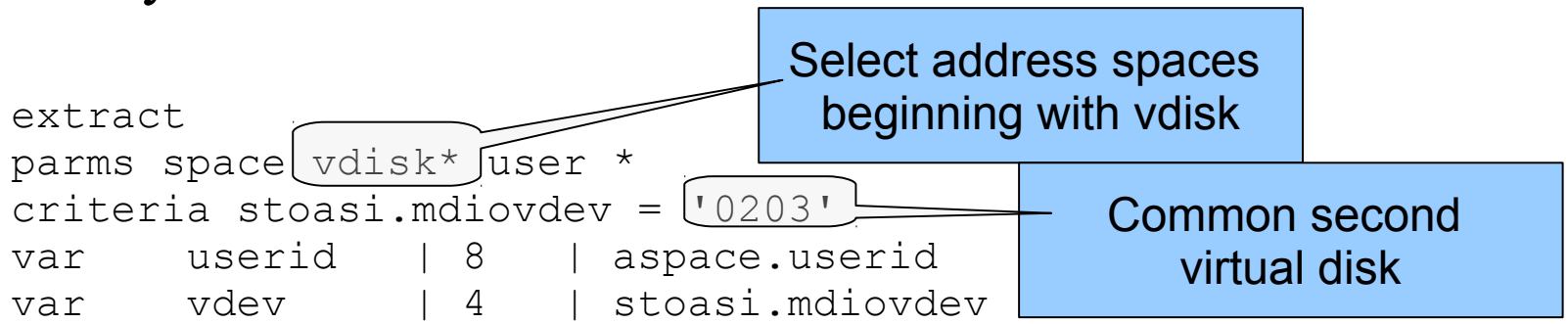
ESAVDSK - VDISK Analysis - RKS2LV

Time	Owner	Space Name	<--Size---> AddSpc Pages	VDSK Blks	<--pages--> Resi- dent	Lock- ed	Prv or Shr	VIO rate /min	Usr Lks	<AddSpce> Cre- ates	Del- etes	<----------pages/s Sto- len	<--DASD---> Read	Write
07:56:00	LINUX001	VDISK$LINUX001$0202$0031	4000	32000	407	0	Shr	311	1	0	0	41.2	48.0	38.6
07:56:00	LINUX001	VDISK$LINUX001$0203$0032	16000	128K	8093	0	Shr	845	1	0	0	37.6	172.5	36.6
07:56:00	LINUX002	VDISK$LINUX002$0202$0053	4000	32000	0	0	Shr	0	1	0	0	0	0	0

Vdisk activity indicator

Second vdisk usage

- **Create an alert to show Vdisk activity**
  - Only care about the second disk




```
extract
parms space vdisk* user *
criteria stoasi.mdiovdev = '0203'
var    userid    | 8    | aspace.userid
var    vdev      | 4    | stoasi.mdiovdev
var    io_rate   | 6    | stoasi.qdiiocnt

alert io_rate lsvd
level 0 red
text Node &userid is using the second virtual disk
```

Second vdisk usage

- **Result**

```
extract
parms space vdisk* user *
criteria stoasi.mdiovdev = '0203'
var    userid    | 8    | aspace.userid
var    vdev      | 4    | stoasi.mdiovdev
var    io_rate   | 6    | stoasi.qdiiocnt

alert io_rate lsvd
level 0 red
text Node &userid is using the second virtual disk
```

```
Screen: LSVD                              RKS2LV
------------------------ Exceptions Analysis Alerts ----

  Type Description
  LSVD Node LINUX001 is using the second virtual disk
```

Wait states

- **A condition that causes a virtual machine to delay processing**
- **When a virtual machine waits, it can not do useful work**
  - Simulation wait – waiting for simulation functions
    - Master processor, IUCV, RPI, line mode commands
  - Page wait – waiting for page fault resolution
  - CPU wait – waiting for CPU

Wait states

```
extract
parms user *
criteria userdata.userid <> 'System:' & useact.vmdttime > 0
var userid      | 8    | userdata.userid
var cpuwtpct    | 3 0 | (useint.hfcpuwt*100)/useint.nondorm

alert cpuwtpct vmcw
level  0 blue
level 10 blue
level 20 yellow
level 50 red
text User &userid is in &cpuwtpct% CPU wait
```

Wait states

ESAXACT - Transaction Delay Analysis - DEMO

Time	UserID /Class	<-Samples-> Total	Pct In Q	<---Percent non-dormant----------> Run	Sim	CPU	SIO	Pag	SVM	<Async> I/O	Pag	Ldg	Lim Lst	Pct Elg	non-dormant-------> E- SVM	T- SVM	CF	Tst Idl	Oth	D- SVM	Times I/O Throt	CPU%
08:10:00	LINUXVM	60	0	0	0	0.5	0	0	0.1	0	0	0	0	0	0	0	0	0	0	100	0	0.0
08:10:00	LXDB2001	60	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0.6
08:10:00	LXDB2002	60	100.0	0	0	1.7	0	0	0	0	0	0	0	0	0	0	0	98	0	0	0	0.9
08:10:00	LXSUGAR	60	100.0	0	0	1.7	0	0	0	0	0	0	0	0	0	0	0	98	0	0	0	0.2
08:10:00	OPERATOR	60	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0.0
08:10:00	ORACLE	60	98.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	1.4
08:10:00	RACFVM	60	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0
08:10:00	REDHAT6X	60	100.0	1.7	0	8.3	0	0	0	0	0	0	0	0	0	0	0	90	0	0	0	1.2
08:10:00	REDHAT73	60	46.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0.1
08:10:00	RKSDEV	60	0	.	.	.	.	.	.	.	.	.	.	0	.	.	.	.	.	0	0	0.0
08:10:00	RKSUBU01	60	31.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0.2
08:10:00	RKSVM01	60	61.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0.0
08:10:00	RKS2LV	60	80.0	0	0	4.2	0	0	0	0	0	0	0	0	0	0	0	96	0	0	0	0.6

```
Screen: WAITS          Velocity Software - VSIVM4       23 May 2018 08:10:10
------------------------ Exceptions Analysis Alerts ------------------------

   Type Description
   VMCW User JSV2LVL is in 2% CPU wait
   VMCW User LXDB2002 is in 2% CPU wait
   VMCW User LXSUGAR is in 2% CPU wait
   VMCW User REDHAT6X is in 8% CPU wait
   VMCW User RKS2LV is in 4% CPU wait
   VMCW User SLES12 is in 13% CPU wait
   VMCW User SSNODE3 is in 2% CPU wait
   VMCW User S11S2ORA is in 12% CPU wait
   VMCW User ZSXL0004 is in 3% CPU wait
   VMCW User ZSXL0007 is in 8% CPU wait
```

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Linux data

- **Linux statistics are collected via SNMP**
- **Integrated into the monitor by zTCP**

- **Node utilization**
  - CPU Utilization reported for each node
- **Process utilization**
  - CPU Utilization of each process running on a node

Node and process utilization

```
extract
parms node *
criteria ucdsys.totcpu > 0
var node    | 8   | tcpip.node
var cpuutil | 4 1 | ucdsys.systpct + ucdsys.userpct

alert cpuutil lncp
level  5  green
level 50  yellow
level 90  red
text CPU utilization on node &node is &cpuutil%

extract
parms node *
criteria vsisft.name <> '*Totals*'
var node     | 8   | tcpip.node
var name     | 8   | vsisft.name
var pid      | 8   | vsisft.id
var procutil | 4 2 | vsisft.totcpupct

alert procutil lnpu
level 10 yellow
level 50 red
text Process utilization for &name-&pid on &node is &procutil%
```

Node and process utilization

```
extract
parms node *
criteria ucdsys.totcpu > 0
var node     | 8
var cpuutil  | 4

alert cpuutil lnc
level  5  green
level 50  yellow
level 90  red
text CPU utilizat

extract
parms node *
criteria vsisft.r
var node      | 8
var name      | 8
var pid       | 8
var procutil  | 4

alert procutil lnpu
level 10 yellow
level 50 red
text Process utilization for &name-&pid on &node is &procutil%
```

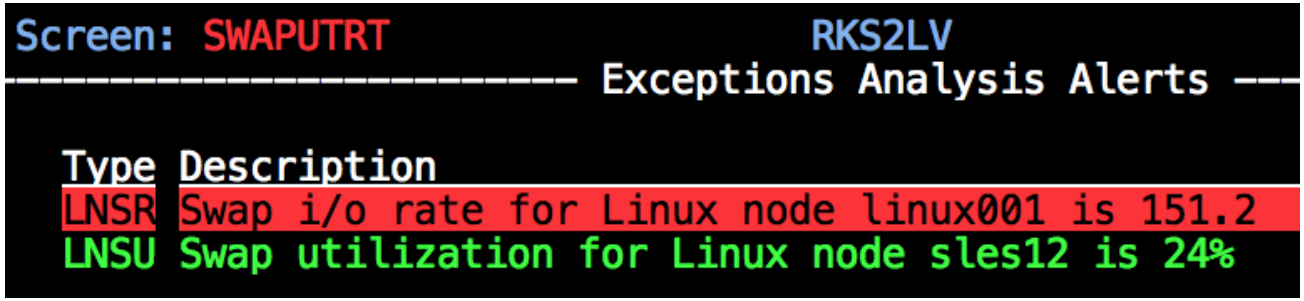
```
Screen: NODEPRCS        Velocity Software - VSIVM4       30 May 2018 07:16:06
------------------------ Exceptions Analysis Alerts ------------------------

 Type Description
 LNCP CPU utilization on node mail is 32.9%
 LNCP CPU utilization on node ssnode1 is 9.8%
 LNCP CPU utilization on node ssnode2 is 8.4%
 LNCP CPU utilization on node ssnode3 is 7.9%
 LNCP CPU utilization on node suselnx2 is 51.3%
 LNPU Process utilization for init-1 on lxora12 is 2.38%
 LNPU Process utilization for init-1 on lxora12b is 2.38%
 LNPU Process utilization for python-3339 on ssnode1 is 9.39%
 LNPU Process utilization for python-3214 on ssnode2 is 8.23%
 LNPU Process utilization for python-3329 on ssnode3 is 7.76%
 LNPU Process utilization for smallstr-8785 on suselnx2 is 51.21%
```

Swap utilization and rate

- **Swap utilization**
  - How much swap are we using?
- **Swap rate**
  - Are we swapping now?

Swap utilization and rate

```
extract
parms node *
criteria ucdsys.swappct > 0
var    node      | 8    | tcpip.node
var    swaprate  | 6 1  | ucdsys.swaprate
var    swapused  | 4 0  | ucdsys.swappct

alert swaprate lnsr
level 50  red rev
text Swap i/o rate for Linux node &node is &swaprate

alert swapused lnsu
Level 20  green
level 50  yellow
level 90  red rev
text Swap utilization for Linux node &node is &swapused%
```



Notifications

- **A notification is a message sent to interested parties of an alert condition**
- **Sent in one or more of the following forms**
  - CP MSG/MSGNOH
  - Email
  - Text page (via email)
  - SNMP Trap

Notifications

- **At it's simplest a notification can take the form of a message to a CMS user**

```
alert userprt vmpg | count &userid
level   5 green action CP MSG OP &code &atext
text Page rate for &userid is &userprt/sec (above &tlevel for &tcount)
```

ACTION keyword on the LEVEL statement allows targeted messaging for a specific threshold

```
09:27:10 ZALERT   VMPG Page rate for OPERATOR is 6.8/sec (above 5 for 6)
```

- **SNMP Trap configuration**
  - Create/Modify SNMP TRAPDEST on the CONFIG disk

```
* following is default 1.3.6.1.4.1.15601
192.168.5.182 velocity 2B06010401F971 ;
```

  - Use the TRAP directive on the LEVEL command

```
alert spool_use spol
level 10 green
level 70 yellow trap &code &atext
level 80 pink
level 90 red
text Spool utilization is &spool_use% (above &tlevel)
```

Notifications

- **SNMP Trap result**

```
Screen: RKS2LV                    RKS2LV                    6
------------------------ Exceptions Analysis Alerts ---------

  Type Description
  APSP Page space is 26.51% used
  DVRT I/O rate for volume VM5W01 0124 103.35/sec
  DVRT I/O rate for volume VM5PG1 0127 7.72/sec
  ESAD ESAMON DCSS utilization is 3.3%
  LNCP CPU utilization on Linux node sles12 is 22.66%
  LNDX /usr area on linux001 is 86.65% full
  LNDX /usr area on linux002 is 86.65% full
  LNDX /var area on linux002 is 88.36% full
  LNPU Process stresser CPU usage on node sles12 is 20.65%
  LNSU Swap utilization for Linux node sles12 is 24%
  PGRT System paging rate 48 (above 5)
  SPOL Spool utilization is 72% (above 70)
  VMCP User ZVPS is at 1.8807%
  VMC2 User RKSDEV used 0.0018 CPU sec (0.0030%)
  VMC2 User ZALERT used 0.2047 CPU sec (0.3412%)
  VMIO I/O rate for user SFSZVPS 17
  VMPG Page rate for OPERATOR is 6.9/sec (above 5 for 5)
  VMPG Page rate for SMTP is 5.5/sec (above 5 for 1)
  VMPG Page rate for ZALERT is 10.6/sec (above 5 for 1)
  XACP Processor utilization at 3.1%
```

▼ ID	Severity	Time	Node	Interface
217	**Normal** ⊞ ⊟	Jan 6, 2017 9:41:00 AM ◀ ▶		192.168.5.48 ⊞ ⊟
		uei.opennms.org/generic/traps/EnterpriseDefault ⊞ ⊟ Edit notifications for event		
		Trap from 192.168.5.48 Type: 0 Message: SPOL Spool utilization is 72% (above 70)		

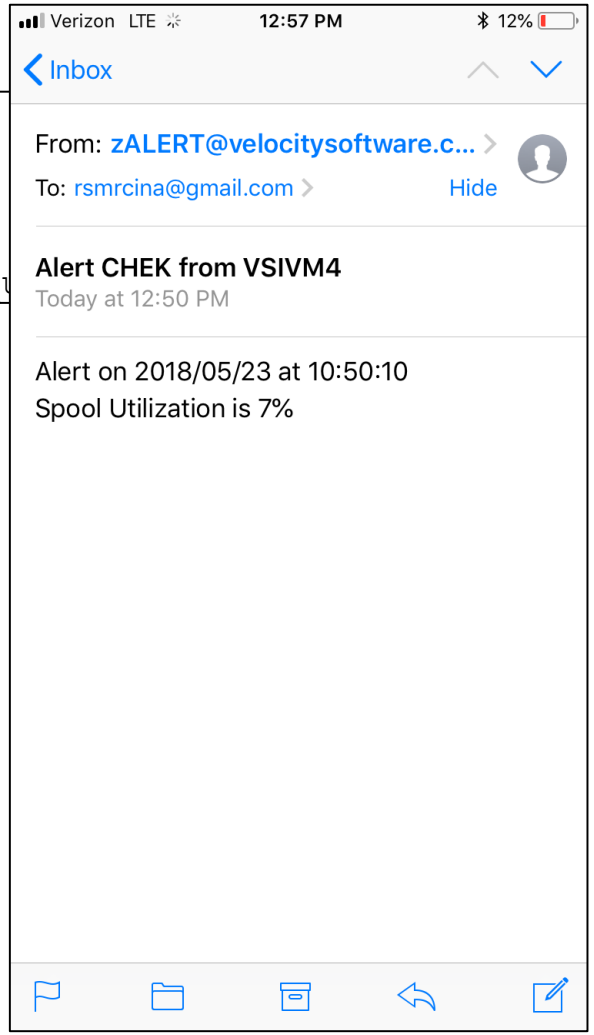
Notifications

- **Email**

VSIVM4 MONALERT:

```
alert spool_use chek
limit 359 1 | &cpu_serial
email joeadmin@mydomain.com
level  1  green notify
text Spool Utilization is &spool
```

```
VSIVM4   NOTIFY   C1  F 80

      |...+....1....+....2
===== * * * Top of File * * *
===== *
===== * * * End of File * * *
```



z/OS alerts

- **Since z/OS data is integrated into the architecture, writing alerts is very easy**

```
Screen: ZOS              Velocity Software - VSIVM4        17 Jun 2019 06:52:15
------------------------ Exceptions Analysis Alerts ------------------------

  Type Description
  ZCEC IFL CPU Utilization 102.0
  ZSIO VSI1 I/O Rate 26.5
  ZSYS VSI1 CPU Utilization 20.2
```

```
extract
parms zos   * CPU TOTAL
criteria zoscpu.samples > 0
var   sysid     | 8    | zossid.sysid
var   cpuutil   | 6 1  | zoscpu.pctbusy
var   cpuutiln  | 6 1  | zoscpu.pctbusy / zoscpu.samples

alert cpuutiln zsys
level    2 blue
level    8 yellow
level   80 red
text &sysid CPU Utilization &cpuutil
```

MongoDB alerts

- **Same for Mongo, Docker and ILMT**

```
extract
criteria vsimng.seconds > 0
var userid    | 8    | tcpip.node
var upcount   | 8 0  | VSIMNG.GUPDATE+VSIMNG.GDELETE+VSIMNG.GINSERTS
var qucount   | 8 0  | VSIMNG.GQUERY+VSIMNG.GGETMORE+VSIMNG.GCOMMAND

alert upcount mnou
limit 5:60 1 1 | &userid
level <10 red
text User &userid Mongo update count &upcount

alert qucount mnqu
limit 5:60 1 1 | &userid
level <10 red
text User &userid Mongo query count &qucount
```

```
Screen: MONGO          Velocity Software - VSIVM4       17 Jun 2019 09:17:14
------------------------ Exceptions Analysis Alerts ------------------------

  Type Description
  MNOU User mongo01 Mongo update count 12589
  MNQU User mongo01 Mongo query count 49614
```

TCP/IP (customer request)

- **Failed attempts**

```
extract
parms node *
var    userid      | 8    | tcpip.node
var    fails       | 3 1  | tcp.attmptfails

alert fails tcpf
level 10 blue
level 20 blue rev
level 40 yellow rev
level 80 red rev
text User &userid TCP fail count &fails
```

```
TCPF   User s11s2ora TCP fail count 11.9
```

ATTMPTFAILS	flt	=	flt 0	TCP Connections to CLOSED from SYNSENT/ SYN-RCVD

zOPERATOR

- The VM System Console is the destination for messages issued by CP
- The user OPERATOR is typically the destination for these messages
- Most messages are informational
- You really want to be aware of the ones that aren't

zOPERATOR

Console and Automations Manager

No charge component of zVPS

Integrated with zMON

Scrollable, searchable console display

Messages can be

Colored, Highlighted, Held, Suppressed, Sent to a User, Written to a File, Emailed, Trap Sent, Command Executed

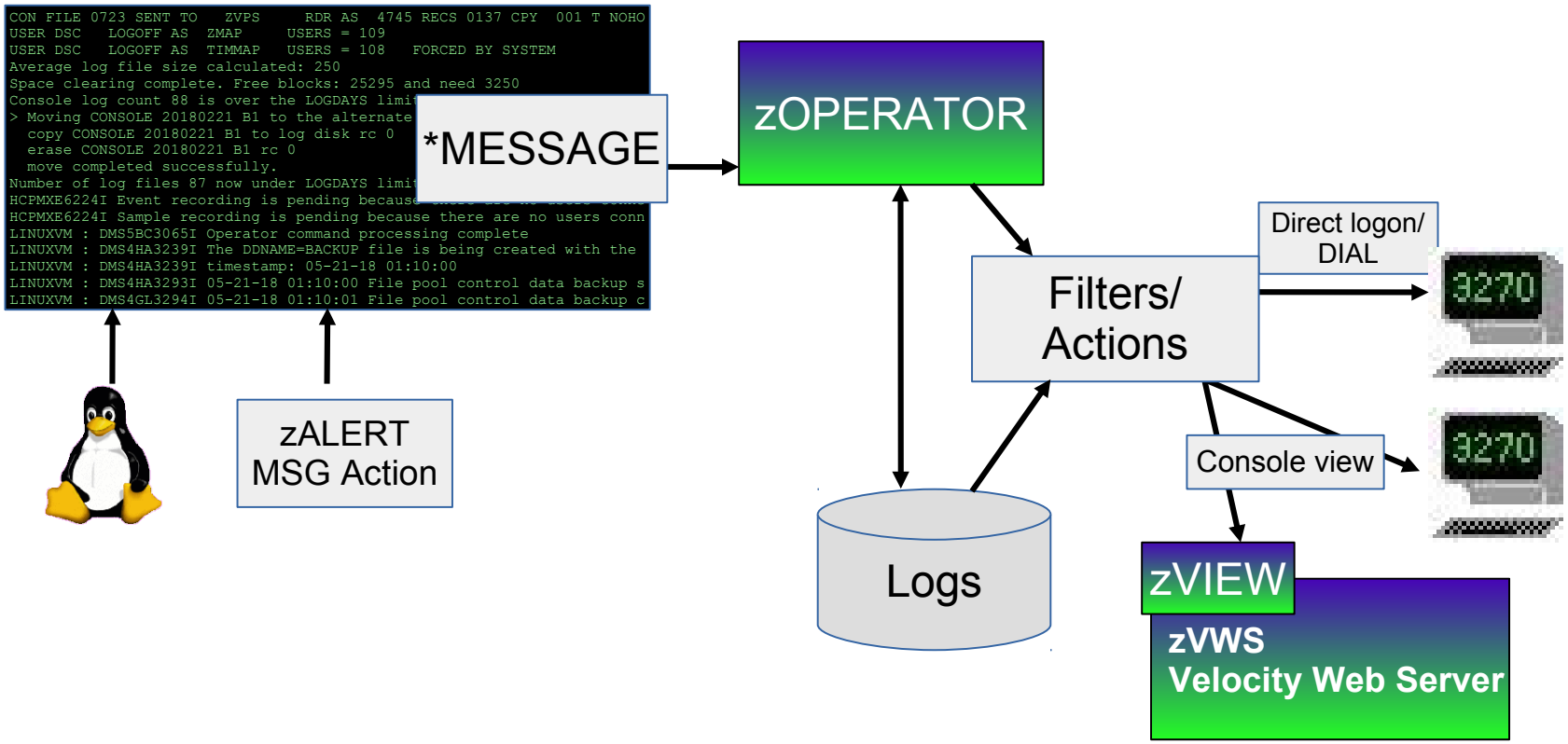
Log files retained for user specified days

Can be used on Operator or any other user that collects messages

Can handle Linux messages

Secuser/Observer, Syslog

zOPERATOR Technology



Redisplay and Searching

Page or Search forward or backward

Date and/or Time selection

Text search

- Similar to XEDIT / literal /
- ALL command
- Multiple operands with & | ¬

Customizable PFKEYs

zOPERATOR commands

Commands with data inserted from command line

CLEAR key to clear current display

Console display access

Logged on to OPERATOR

DIAL terminals

- Option to restrict commands
- One terminal buffer
- Terminal size must be <= original screen size

View from another CMS user

zVIEW web interface

- Automatically updates every 60 seconds
- Select data and time range
- Select user
- zALERT click through

Console Messages

Typical console display

```
05:11:52 USER DSC   LOGOFF AS  ZWEBLOG  USERS = 23
05:11:52 USER DSC   LOGOFF AS  ZADMIN   USERS = 22
05:11:55 USER DSC   LOGOFF AS  ZWEB01   USERS = 21
05:11:55 USER DSC   LOGOFF AS  ZWEB02   USERS = 20
05:11:55 USER DSC   LOGOFF AS  ZWEB03   USERS = 19
05:11:55 USER DSC   LOGOFF AS  ZWEB04   USERS = 18
05:11:55 USER DSC   LOGOFF AS  ZWEB05   USERS = 17
05:11:58 AUTO LOGON  ***       ZADMIN   USERS = 18     BY ZVPS
05:11:58 AUTO LOGON  ***       ZWEBLOG  USERS = 19     BY ZADMIN
05:11:58 AUTO LOGON  ***       ZWEB01   USERS = 20     BY ZADMIN
05:11:58 AUTO LOGON  ***       ZWEB02   USERS = 21     BY ZADMIN
05:11:58 AUTO LOGON  ***       ZWEB03   USERS = 22     BY ZADMIN
05:11:58 AUTO LOGON  ***       ZWEB04   USERS = 23     BY ZADMIN
05:11:58 AUTO LOGON  ***       ZWEB05   USERS = 24     BY ZADMIN
05:12:14 GRAF  0700 LOGOFF AS  ZVPS     USERS = 23
05:12:21 GRAF  0700 LOGON  AS  MAINT640 USERS = 24

                                                               RUNNING   SYSTEM1
3279                                                                      42/001
```

VELOCITY SOFTWARE

Console Messages

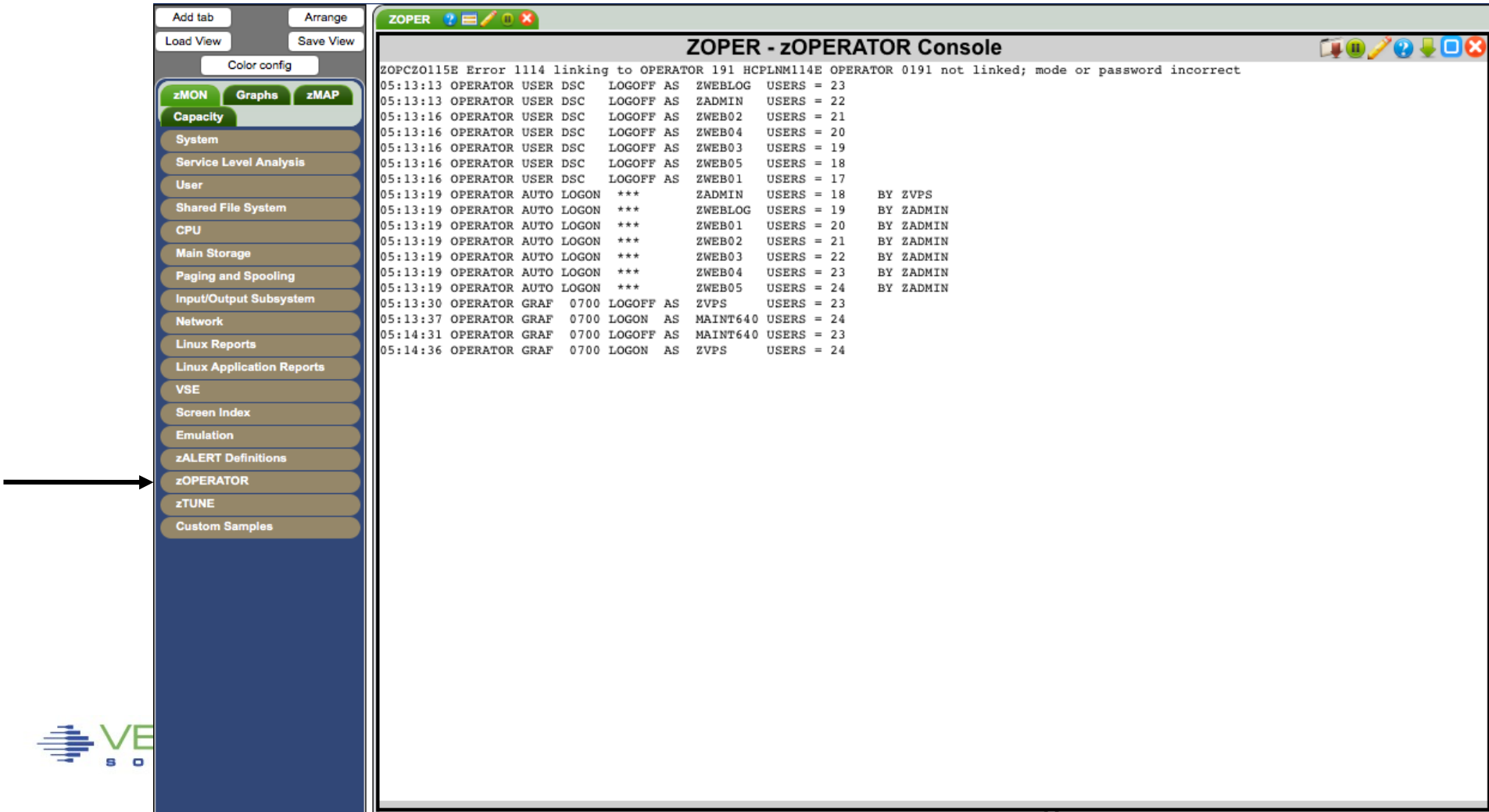
zOPERATOR console display

```
Screen: ZOPER    Velocity Software            ESAMON 4.304 03/07 05:13
1 of 1                      OPERATOR Console  USER *              2828 0414C7

05:13:13 OPERATOR USER DSC   LOGOFF AS  ZWEBLOG  USERS = 23
05:13:13 OPERATOR USER DSC   LOGOFF AS  ZADMIN   USERS = 22
05:13:16 OPERATOR USER DSC   LOGOFF AS  ZWEB02   USERS = 21
05:13:16 OPERATOR USER DSC   LOGOFF AS  ZWEB04   USERS = 20
05:13:16 OPERATOR USER DSC   LOGOFF AS  ZWEB03   USERS = 19
05:13:16 OPERATOR USER DSC   LOGOFF AS  ZWEB05   USERS = 18
05:13:16 OPERATOR USER DSC   LOGOFF AS  ZWEB01   USERS = 17
05:13:19 OPERATOR AUTO LOGON  ***       ZADMIN   USERS = 18    BY ZVPS
05:13:19 OPERATOR AUTO LOGON  ***       ZWEBLOG  USERS = 19    BY ZADMIN
05:13:19 OPERATOR AUTO LOGON  ***       ZWEB01   USERS = 20    BY ZADMIN
05:13:19 OPERATOR AUTO LOGON  ***       ZWEB02   USERS = 21    BY ZADMIN
05:13:19 OPERATOR AUTO LOGON  ***       ZWEB03   USERS = 22    BY ZADMIN
05:13:19 OPERATOR AUTO LOGON  ***       ZWEB04   USERS = 23    BY ZADMIN
05:13:19 OPERATOR AUTO LOGON  ***       ZWEB05   USERS = 24    BY ZADMIN
05:13:30 OPERATOR GRAF  0700 LOGOFF AS  ZVPS     USERS = 23
05:13:37 OPERATOR GRAF  0700 LOGON  AS  MAINT640 USERS = 24
PF1=Help      2=          3=Quit       4=Del Hold   5=All        6=PFKEY Off
PF7=Backward  8=          9=Loc Back  10=          11=          12=Retrieve
====> 
3279                                                          43/008
```

VELOCITY SOFTWARE

Console Messages

zOPERATOR console web interface

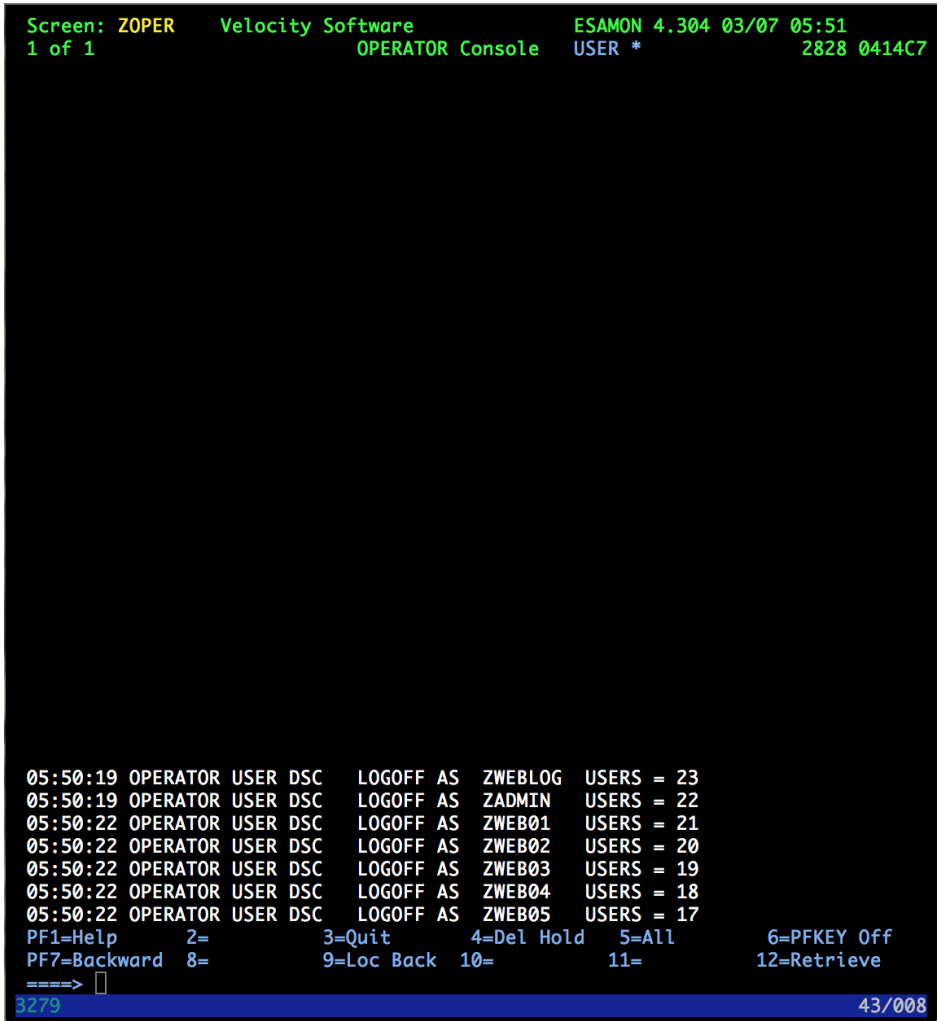


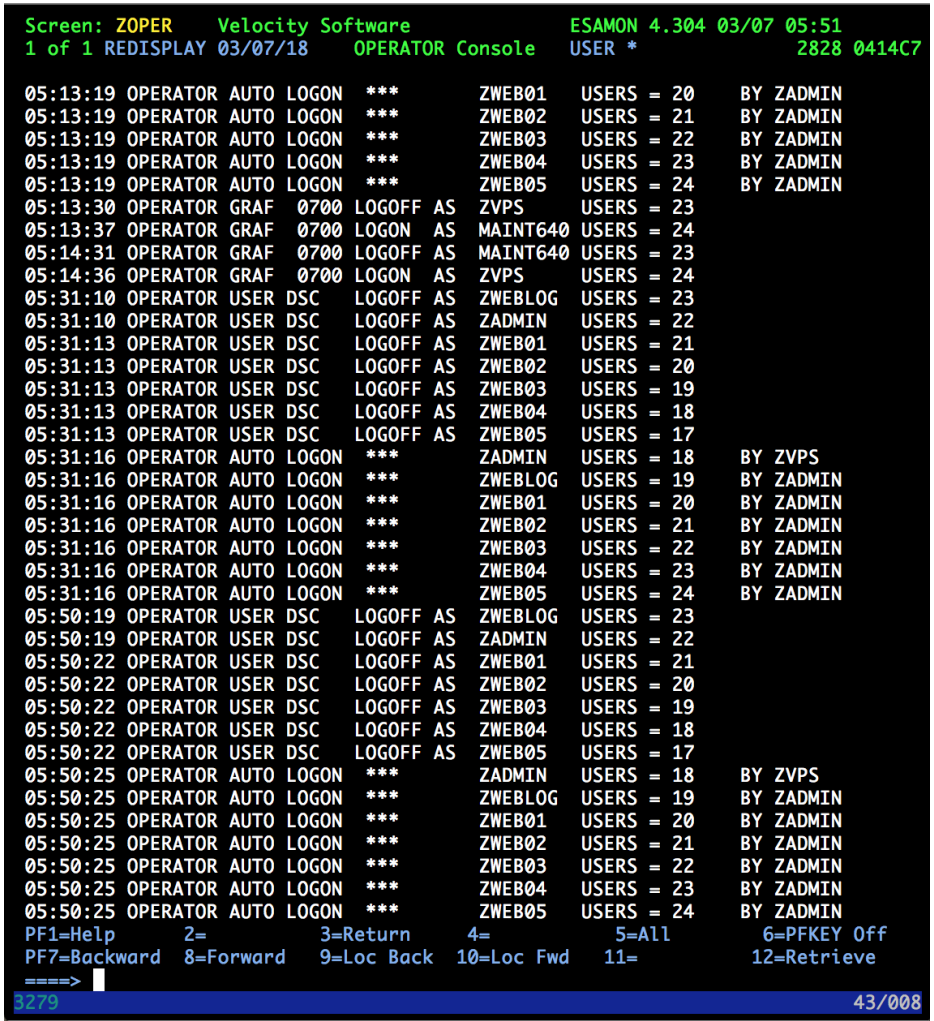
zOPERATOR rules to control message display

```
 ZOPRULES                      Velocity Software Inc.              ZOPER PROD4211
                              ZOPER ZOPRULES Configuration

                              zOPERATOR Action Rules
Match:  Msg type CMSOUT User ID ________ Comment Error writing console file
        Start col 10    End col 12  = Target ZOP
      & Start col2 19  End col2 19  = Target E
Action: Color RED       Ext highlight REVERSE   Suppress ___ Hold YES Stop ___
        Send to ____________________    Send type ______      Send zSERVE ___
        Cmd ____________________________________________ File ________________
        EMAIL address ____________________________________________ SNMP trap ___

Match:  Msg type CPOUT  User ID OPERATOR Comment Suppress AUTO LOGON
        Start col 10    End col *   = Target AUTO LOGON
      _ Start col2 ___ End col2 ___ _ Target ____________________________________
Action: Color _________ Ext highlight _________ Suppress YES Hold ___ Stop YES
        Send to ____________________    Send type ______      Send zSERVE ___
        Cmd ____________________________________________ File ________________
        EMAIL address ____________________________________________ SNMP trap ___
```

Console Messages

Suppressed messages





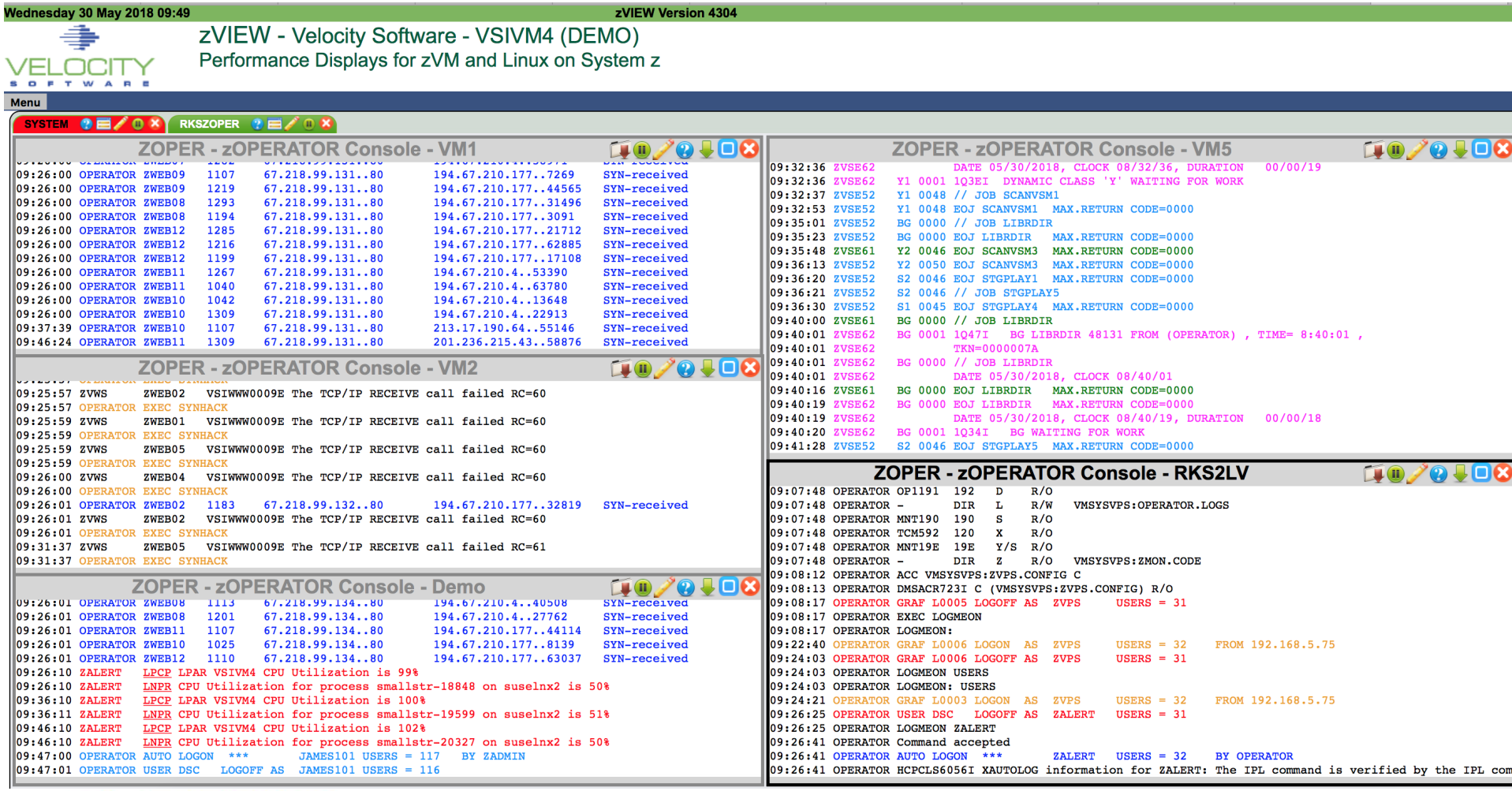
Suppressed messages

ZOPER - zOPERATOR Console

```
ZOPCZO115E Error 1114 linking to OPERATOR 191 HCPLNM114E OPERATOR 0191 not linked; mode or password incorrect
05:13:13 OPERATOR USER DSC    LOGOFF AS   ZWEBLOG   USERS = 23
05:13:13 OPERATOR USER DSC    LOGOFF AS   ZADMIN    USERS = 22
05:13:16 OPERATOR USER DSC    LOGOFF AS   ZWEB02    USERS = 21
05:13:16 OPERATOR USER DSC    LOGOFF AS   ZWEB04    USERS = 20
05:13:16 OPERATOR USER DSC    LOGOFF AS   ZWEB03    USERS = 19
05:13:16 OPERATOR USER DSC    LOGOFF AS   ZWEB05    USERS = 18
05:13:16 OPERATOR USER DSC    LOGOFF AS   ZWEB01    USERS = 17
05:13:19 OPERATOR AUTO LOGON   ***        ZADMIN    USERS = 18     BY ZVPS
05:13:19 OPERATOR AUTO LOGON   ***        ZWEBLOG   USERS = 19     BY ZADMIN
05:13:19 OPERATOR AUTO LOGON   ***        ZWEB01    USERS = 20     BY ZADMIN
05:13:19 OPERATOR AUTO LOGON   ***        ZWEB02    USERS = 21     BY ZADMIN
05:13:19 OPERATOR AUTO LOGON   ***        ZWEB03    USERS = 22     BY ZADMIN
05:13:19 OPERATOR AUTO LOGON   ***        ZWEB04    USERS = 23     BY ZADMIN
05:13:19 OPERATOR AUTO LOGON   ***        ZWEB05    USERS = 24     BY ZADMIN
05:13:30 OPERATOR GRAF   0700 LOGOFF AS   ZVPS      USERS = 23
05:13:37 OPERATOR GRAF   0700 LOGON  AS   MAINT640  USERS = 24
05:14:31 OPERATOR GRAF   0700 LOGOFF AS   MAINT640  USERS = 23
05:14:36 OPERATOR GRAF   0700 LOGON  AS   ZVPS      USERS = 24
05:31:10 OPERATOR USER DSC    LOGOFF AS   ZWEBLOG   USERS = 23
05:31:10 OPERATOR USER DSC    LOGOFF AS   ZADMIN    USERS = 22
05:31:13 OPERATOR USER DSC    LOGOFF AS   ZWEB01    USERS = 21
05:31:13 OPERATOR USER DSC    LOGOFF AS   ZWEB02    USERS = 20
05:31:13 OPERATOR USER DSC    LOGOFF AS   ZWEB03    USERS = 19
05:31:13 OPERATOR USER DSC    LOGOFF AS   ZWEB04    USERS = 18
05:31:13 OPERATOR USER DSC    LOGOFF AS   ZWEB05    USERS = 17
05:31:16 OPERATOR AUTO LOGON   ***        ZADMIN    USERS = 18     BY ZVPS
05:31:16 OPERATOR AUTO LOGON   ***        ZWEBLOG   USERS = 19     BY ZADMIN
05:31:16 OPERATOR AUTO LOGON   ***        ZWEB01    USERS = 20     BY ZADMIN
05:31:16 OPERATOR AUTO LOGON   ***        ZWEB02    USERS = 21     BY ZADMIN
05:31:16 OPERATOR AUTO LOGON   ***        ZWEB03    USERS = 22     BY ZADMIN
05:31:16 OPERATOR AUTO LOGON   ***        ZWEB04    USERS = 23     BY ZADMIN
05:31:16 OPERATOR AUTO LOGON   ***        ZWEB05    USERS = 24     BY ZADMIN
05:50:19 OPERATOR USER DSC    LOGOFF AS   ZWEBLOG   USERS = 23
05:50:19 OPERATOR USER DSC    LOGOFF AS   ZADMIN    USERS = 22
05:50:22 OPERATOR USER DSC    LOGOFF AS   ZWEB01    USERS = 21
05:50:22 OPERATOR USER DSC    LOGOFF AS   ZWEB02    USERS = 20
05:50:22 OPERATOR USER DSC    LOGOFF AS   ZWEB03    USERS = 19
05:50:22 OPERATOR USER DSC    LOGOFF AS   ZWEB04    USERS = 18
05:50:22 OPERATOR USER DSC    LOGOFF AS   ZWEB05    USERS = 17
```

Console Messages

Enterprise View



Trapping a required machine log off

```
Match:  Msg type CPOUT  User ID OPERATOR Comment Trap zALERT log off
        Start col 21    End col *    = Target LOGOFF
      & Start col2 32  End col2 *    = Target ZALERT
Action: Color RED       Ext highlight _________ Suppress ___ Hold ___ Stop YES
        Send to _____________________    Send type ______      Send zSERVE ___
        Cmd LOGMEON &5                                  File _____________________
        EMAIL address rich@velocitysoftware.com                  SNMP trap ___
```

```
09:26:25 OPERATOR USER DSC   LOGOFF AS  ZALERT   USERS = 31
09:26:25 OPERATOR LOGMEON ZALERT
09:26:41 OPERATOR Command accepted
09:26:41 OPERATOR AUTO LOGON  ***       ZALERT   USERS = 32    BY OPERATOR
09:26:41 OPERATOR HCPCLS6056I XAUTOLOG information for ZALERT: The IPL command
                  is verified by the IPL command processor.
```

LOGMEON EXEC:

```
/* */
Parse Arg id
'CP SLEEP 10'
'XAUTOLOG' id
```

Sending an email

```
Email from domain          velocitysoftware.com
SMTP server                VM:SMTP
```

Make sure email settings are correct in zOPERATOR configuration

```
Match:  Msg type CPOUT  User ID OPERATOR Comment Trap zALERT log off
        Start col 21    End col *    = Target LOGOFF
      & Start col2 32   End col2 *    = Target ZALERT
Action: Color RED       Ext highlight _________ Suppress ___ Hold ___ Stop YES
        Send to ____________________    Send type ______      Send zSERVE ___
        Cmd LOGMEON &5                                File ________________
        EMAIL address rich@velocitysoftware.com                SNMP trap ___
```

OPERATOR@rks2lv.velocitysoftware.com

Message from zOPERATOR: OPERATOR USER DSC LOGOFF AS ZALERT USERS = 31

To: RICH@VELOCITYSOFTWARE.COM,

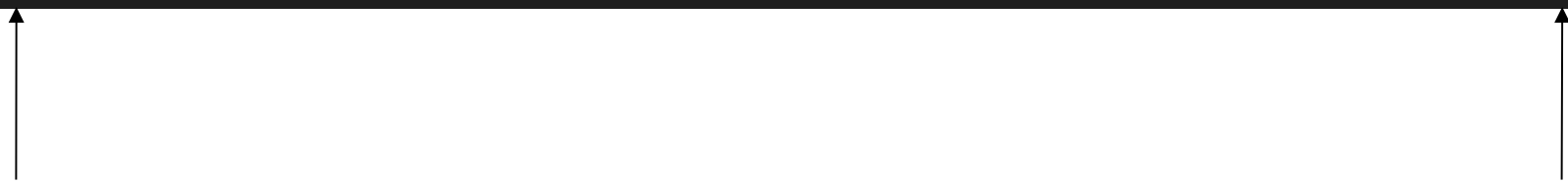
Reply-To: No reply

10:23:11 OPERATOR USER DSC LOGOFF AS ZALERT USERS = 31

Recent real-world example

Customer wanted to be notified when a Linux filesystem check was performed on certain machines for certain filesystems

```
(1) -- /var¨ fsck.ext3 -a /dev/disk/by-path/ccw-0.0.0205-part1
n/ccw-0.0.0205-part1 has been mounted 1 times without being checked, check forced.
...3....+....4....+....5....+....6....+....7....+....8....+....9....+...10....+...
n/ccw-0.0.0205-part1: 1682/12512 files (3.3% non-contiguous), 11163/12498 blocks
```



Recent real-world example

zOperator Rule

```
ZOPRULES                      Velocity Software Inc.              ZOPER PROD4220
                            ZOPER ZOPRULES Configuration

Match:  Msg type *       User ID LINUX002 Comment fsck checker
        Start col 28     End col *    = Target ccw-0.0.0205-part1
      & Start col2 95    End col2 *   = Target check forced.
Action: Color RED        Ext highlight _________ Suppress ___ Hold ___ Stop YES
        Send to ____________________     Send type ______       Send zSERVE ___
        Cmd ____________________________________________ File ____________________
        EMAIL address rich@velocitysoftware.com                  SNMP trap ___
```

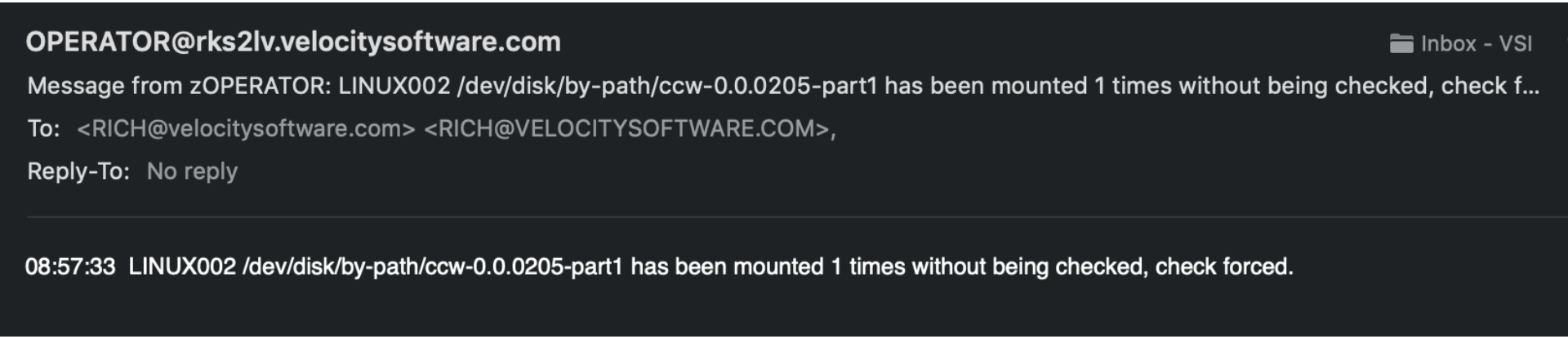
Recent real-world example

Result – Console Message

```
Screen: ZOPER    RKS2LV                          ESAMON 4.350 03/07 10:20
1 of 1 REDISPLAY 03/07/19    OPERATOR Console    USER *                2828 0414C7


08:57:33 LINUX002 Ý/sbin/fsck.ext3 (1) -- /local¨ fsck.ext3 -a /dev/disk/by-pat
                  h/ccw-0.0.0206-part1
08:57:33 LINUX002 /dev/disk/by-path/ccw-0.0.0206-part1: clean, 11/5024 files, 1
                  194/4998 blocks
08:57:33 LINUX002 Ý/sbin/fsck.ext2 (1) -- /usr¨ fsck.ext2 -a /dev/disk/by-path/
                  ccw-0.0.0204-part1
08:57:33 LINUX002 /dev/disk/by-path/ccw-0.0.0204-part1: clean, 27766/75040 file
                  s, 130290/149998 blocks
08:57:33 LINUX002 Ý/sbin/fsck.ext3 (1) -- /var¨ fsck.ext3 -a /dev/disk/by-path/
                  ccw-0.0.0205-part1
08:57:33 LINUX002 /dev/disk/by-path/ccw-0.0.0205-part1 has been mounted 1 times
                   without being checked, check forced.
08:57:33 OPERATOR File EMAIL FILE A1 sent to SMTP at RKS2LV on 03/07/19 08:57:3
                  3
08:57:33 SMTP     * From SMTP: Received Spool File 1042
08:57:33 SMTP     * From SMTP: Mail delivered to: <RICH@VELOCITYSOFTWARE.COM>
08:57:33 LINUX002 /dev/disk/by-path/ccw-0.0.0205-part1: 1686/12512 files (3.3%
                  non-contiguous), 11171/12498 blocks
```

Recent real-world example

Result - Email



Create/Modify SNMP TRAPDEST on the CONFIG disk

```
* following is default 1.3.6.1.4.1.15601
192.168.5.182 velocity 2B06010401F971 ;
```

Make sure OPERATOR is authorized in zTCP

In ESATCP PARMS

```
authuser = 'ZALERT'
authuser = 'OPERATOR'
```

Sending a Trap

```
ZOPRULES                 Velocity Software Inc.              ZOPER PROD4210
                         ZOPER ZOPRULES Configuration

Match:  Msg type SECUSR User ID ________ Comment Linux authentication error
        Start col 29     End col 55   = Target PAM: Authentication failure
      _ Start col2 ___  End col2 ___ _ Target _________________________________
Action: Color RED        Ext highlight _________ Suppress ___ Hold ___ Stop ___
        Send to ____________________     Send type ______     Send zSERVE ___
        Cmd ________________________________________ File _________________
        EMAIL address __________________________________________ SNMP trap YES
```

Looking for
'PAM: Authentication failure'

```
                                                      ESAMON 4.300 01/11 14:11
                                          OPERATOR Console  USER *        2828 0414C7
14:01:07 LINUX001 sshdÝ4729¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:01:07 LINUX001 sshdÝ4729¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:02:17 LINUX001 sshdÝ4729¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:02:17 LINUX001 sshdÝ4729¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:02:17 ZTCP     14:02:17 Unauthorized command request from: OPERATOR requesti
                  ng:ALERT LINUX001 s
14:02:17 ZTCP     14:02:17 Unauthorized command request from: OPERATOR requesti
                  ng:ALERT LINUX001 s
14:03:04 LINUX001 sshdÝ4733¨: pam_unix2(sshd:auth): conversation failed
14:03:04 LINUX001 sshdÝ4733¨: error: ssh_msg_send: write
14:03:04 LINUX001 sshdÝ4733¨: error: ssh_msg_send: write
14:05:34 OPERATOR USER DSC    LOGOFF AS  ZTCP     USERS = 33
14:05:40 OPERATOR AUTO LOGON   ***       ZTCP     USERS = 34     BY ZVPS
14:06:22 LINUX001 sshdÝ4734¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:06:22 LINUX001 sshdÝ4734¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:07:00 OPERATOR GRAF L0005 RECONNECT  ZTCP     USERS = 34     FROM 192.168.5.7
                  7
14:07:12 LINUX001 sshdÝ4734¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:07:12 LINUX001 sshdÝ4734¨: error: PAM: Authentication failure for root from
                  192.168.5.77
14:08:10 ZALERT   VMPG Page rate for OPERATOR is 16.1/sec (above 5 for 3)
14:08:10 ZALERT   VMPG Page rate for SMTP is 10.8/sec (above 5 for 3)
14:08:10 ZALERT   VMPG Page rate for ZALERT is 7.2/sec (above 5 for 3)
14:08:19 LINUX001 sshdÝ4738¨: pam_unix2(sshd:auth): conversation failed
14:08:19 LINUX001 sshdÝ4738¨: error: ssh_msg_send: write
14:08:19 LINUX001 sshdÝ4738¨: error: ssh_msg_send: write
14:09:10 ZALERT   VMPG Page rate for SMTP has recovered, now 2.5
14:09:33 OPERATOR GRAF L0005 DISCONNECT ZTCP     USERS = 34
14:11:10 ZALERT   VMPG Page rate for OPERATOR has recovered, now 4.2
14:11:10 ZALERT   VMPG Page rate for ZALERT has recovered, now 3.6
PF1=Help      2=           3=Quit       4=Del Hold    5=All        6=PFKEY Off
PF7=Backward  8=           9=Loc Back  10=           11=          12=Retrieve
====>
```

Result of sending the trap

247	**Normal** ⊞⊟	Jan 11, 2017 2:08:03 PM ◀▶	192.168.5.48 ⊞⊟
		uei.opennms.org/generic/traps/EnterpriseDefault ⊞⊟ Edit notifications for event	
		Trap from 192.168.5.48 Type: 0 Message: LINUX001 sshd[4734]: error: PAM: Authentication failure for root from 192.168.5.77	

Codepage challenges

IE/Edge seem to have the most problems

- Spinning load screen

In other cases square brackets from Linux machines don't show up correctly

In CONFIG ZVIEW add

```
HOSTCODEPAGE = 37
```

Works for messages routed to OPERATOR

```
alert cpuutil vmcp
limit 5 1 | &userid
level 20 yellow rev action cp msg op &code &atext
level 40 red
text &userid running at &cpuutil%
```

CLICKTHRU directive in CONFIG ZALERT

```
CLICKTHRU VMCP GRAPH=USERCPU  USER=W1
```

Points to a display element in zVIEW

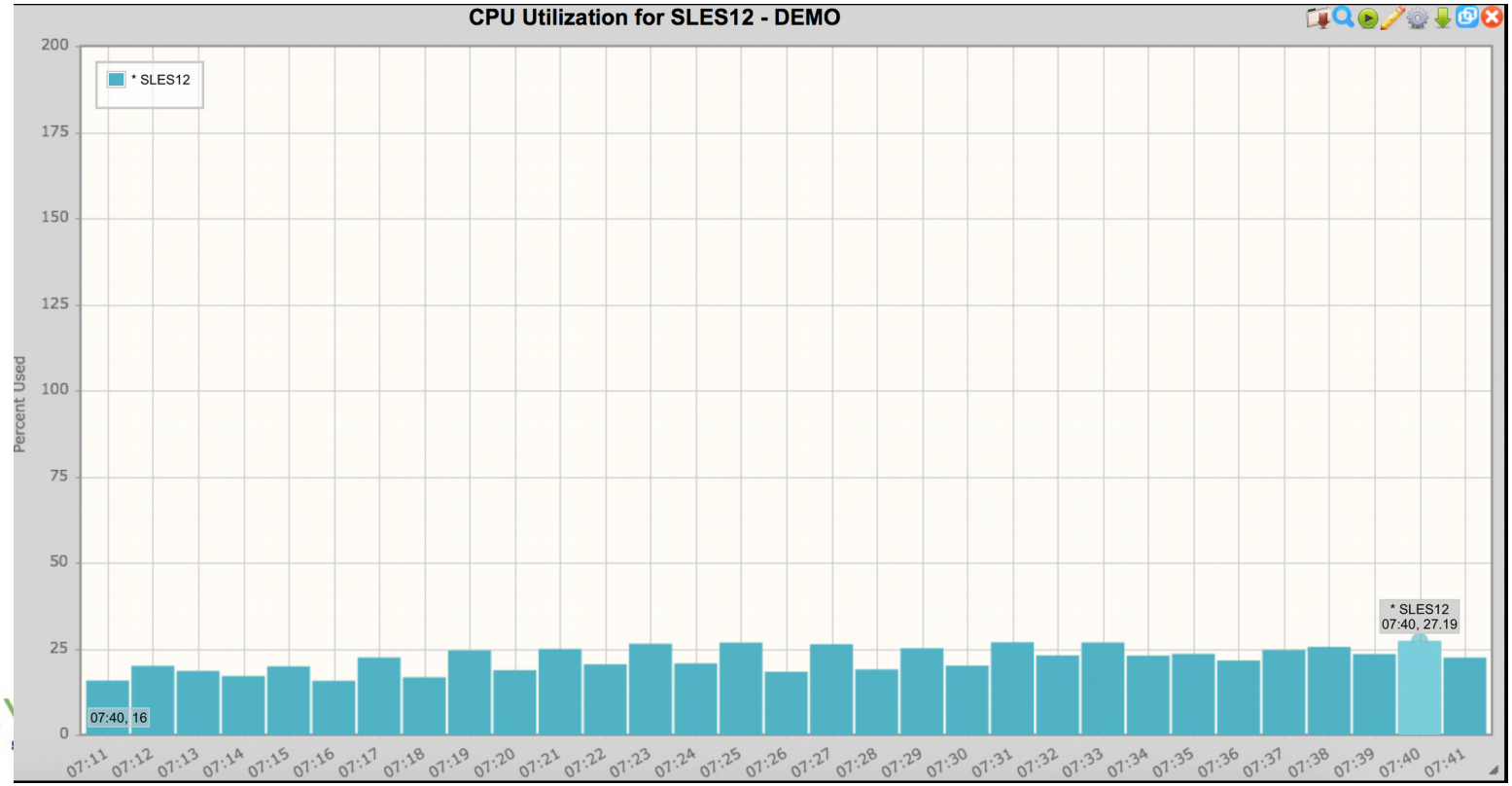
- Passes an optional parameter

```
07:34:10 ZALERT    VMCP SLES12 RUNNING AT 23.0%
07:40:04 S11S2ORA -- MARK --
07:40:10 ZALERT    VMCP SLES12 RUNNING AT 27.2%
```

Alerts configured for click through are underlined

Click on an alert code

- Bring up the specific report, graph or view
- Targeted to the optional parameter



Summary

- **Proactive monitoring can watch the system**
  - Based on monitor data or console activity
- **Notifications can be delivered for more critical issues**
- **Management consoles fit this mechanism perfectly**
- **Many useful samples are provided**

Questions?

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