

# zVPS Alerts

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# Agenda

- **Overview**
- **What are alerts?**
  - ◆ Where do alerts fit
- **Installing zAlert package**
  - ◆ Viewing alerts
- **Alert samples**
- **Defining your own alert**
  - ◆ CPU Utilization
  - ◆ LPAR Utilization
- **Notification**
  - ◆ MSG to Operator
  - ◆ SNMP trap
- **Advanced topics**

# What are alerts?

- **An alert is an indication of an abnormal condition**
- **An abnormal condition can be**
  - ◆ Exceeding a certain threshold
  - ◆ An object in a state not conducive to proper operation
    - Volume offline
    - Virtual machine not logged on
    - Incorrect system settings

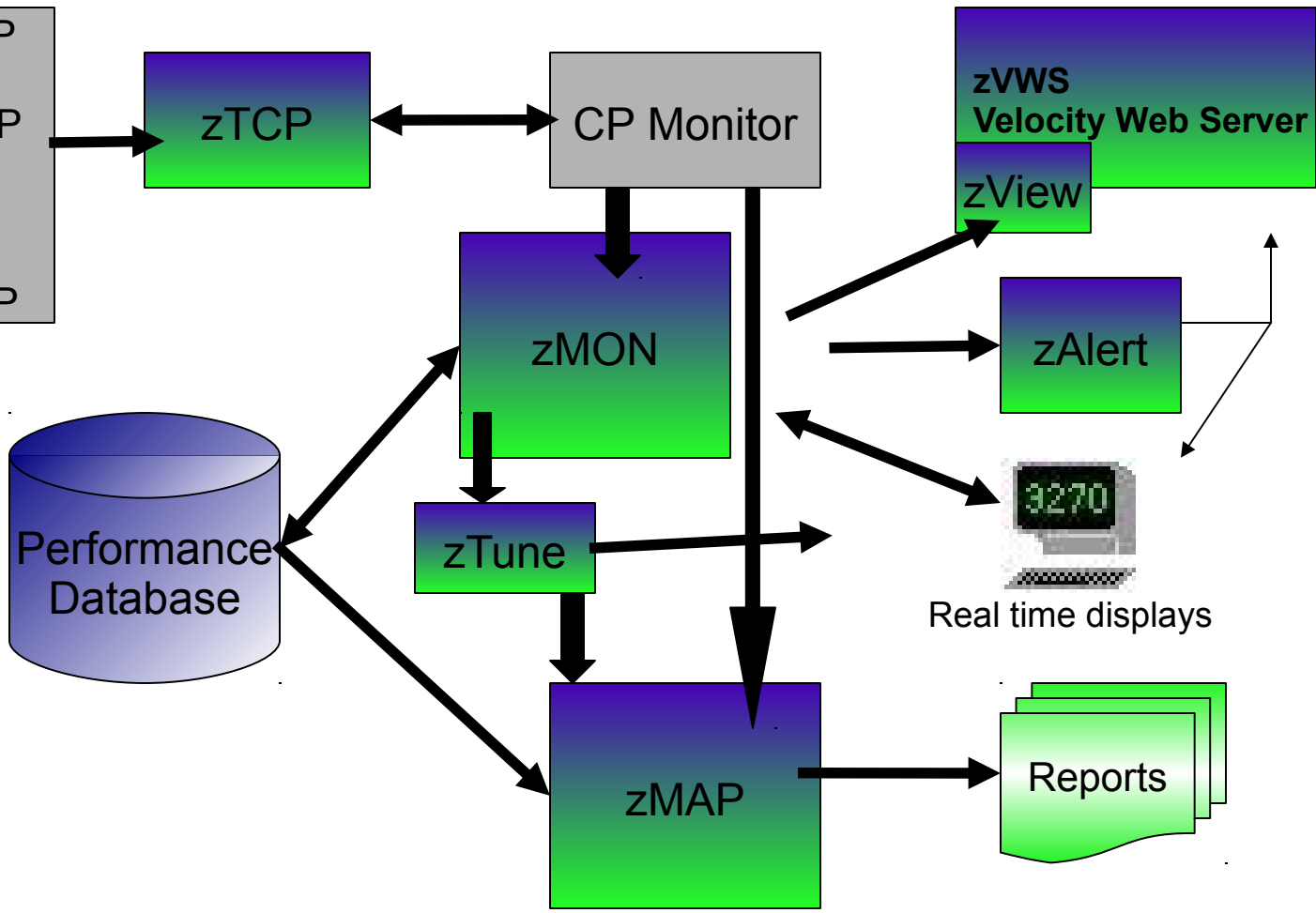
**This presentation goes through the finer points of alert processing.**

**Where alerts come from, how they are used and specified in the product.**

**Alerts are no good if they need to be visually watched or monitored... notifications provide a proactive mechanism to using alerts.**

# Where do alerts fit?

- VM TCP/IP SNMP MIB II
- Linux/Sys z SNMP
- Other Linux, Windows, Solaris, HP, AIX SNMP
- z/VSE 4.3+ SNMP



# Installing zAlert package

- zAlert is part of the Velocity Performance Suite (zVPS)
- Installed via the installer
  - ◆ Creates the virtual machine (ZALERT)
    - By default VMSYSVPS:ZALERT.
  - ◆ Sample alerts provided
  - ◆ More on the website

```
MAIN                                     Velocity Software Inc.
                                         Product Installation and Configuration

The following product packages are available for installation
Place "X" to mark the directory entries to create or update and press PF4
Place the cursor on a product package and press PF2 to install

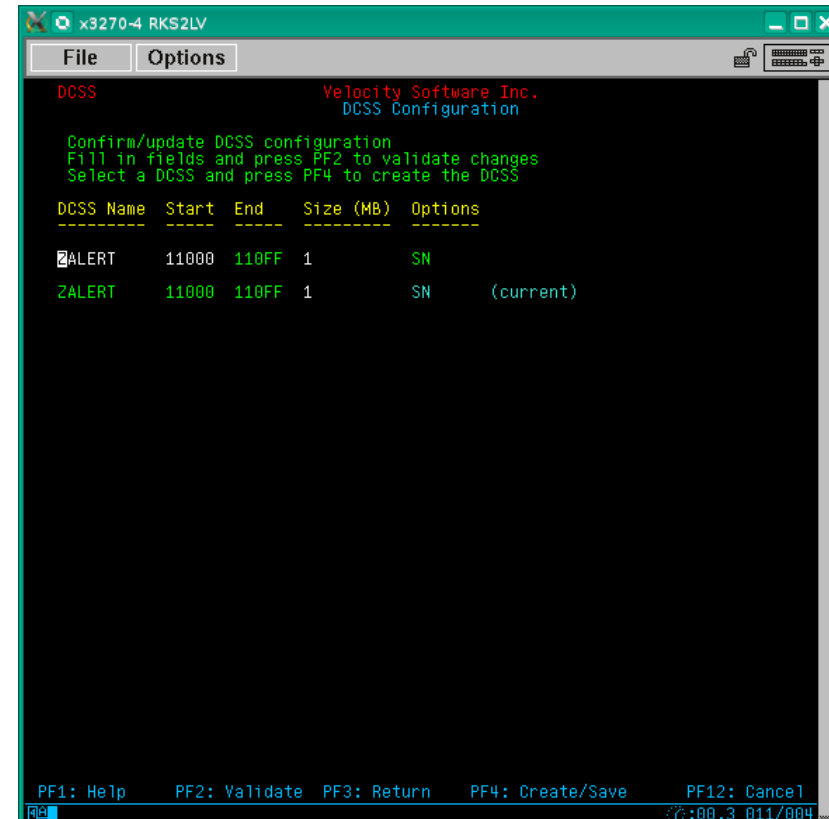
Product Name      Status      Installed Version      Available Packages
-----
INSTALL           Complete   4.3.0.0             4210 4211 4212 4220 4300
PORTAL            Complete   4.2.0.6             4150 4200 4204 4205 4206
SFPURGER          Complete   4.1.2.0             4100 4110 4120
TUNEFRC           Complete   4.2.0.0             4200
ZALERT            Complete   4.3.0.0             4150 4151 4200 4202 4203 4204 4300
ZDOC              Complete   4.2.2.0             4100 4220
ZMAP              Complete   4.3.0.9             4300 4307 4308 4309
ZMON              Complete   4.3.0.3             4300 4301 4302 4303
ZOPER             Complete   4.2.1.0             4200 4210
ZPROV2            Complete   2.1.4.2             2130 2132 2133 2140 2142
ZTCP              Complete   4.3.0.6             4300 4303 4306
ZTUNE             Complete   4.1.1.0             4100 4110
ZVIEW             Complete   4.3.0.2             4300 4301 4302
ZVWS              Complete   4.2.1.6             4210 4214 4215 4216
ZWRITE           Complete   4.3.0.9             4300 4305 4308 4309

License Key, ovrtype to update: 038D66E38ADF4F0CD71AAD47E0804C634E7D1F1
License Key expires:           Aug  2, 2017

PF1: Help  PF2: Select  PF3: Exit  PF4: Disk Config  PF5: Key Update  PF6: Delete
PF9: Check for Updates  PF10: Config
```

# Installing zAlert package

- Requires a DCSS for operation
- Alert messages stored in the DCSS
  - Message retrieval handled by a separate EXEC
- zAlert 4.1 can still be used as is, but is functionally stabilized



The screenshot shows a terminal window titled 'x3270-4 RKS2LV' with a menu bar containing 'File' and 'Options'. The main content displays 'DCSS Velocity Software Inc. DCSS Configuration' and instructions: 'Confirm/update DCSS configuration', 'Fill in fields and press PF2 to validate changes', and 'Select a DCSS and press PF4 to create the DCSS'. A table lists DCSS configurations:

DCSS Name	Start	End	Size (MB)	Options
<input checked="" type="checkbox"/> ALERT	11000	110FF	1	SN
<input type="checkbox"/> ZALERT	11000	110FF	1	SN (current)

At the bottom, function key shortcuts are listed: PF1: Help, PF2: Validate, PF3: Return, PF4: Create/Save, PF12: Cancel. The system clock shows 00:00.3 011/004.

# Installing zAlert package

- **ZALERT DCSS is unrestricted**
  - NAMESAVE statement not required for ZALERT
- **ZMON DCSS is required**

```
USER ZALERT ALERTS 32M 32M G
INCLUDE VSIPROF
IPL CMS PARM FILEPOOL VMSYSVPS:
IUCV ALLOW
NAMESAVE ZMON ZALERT
XAUTOLOG ZSERVE ZVPS
```



# Alert processing

- **The alert virtual machine**
  - Wakes up every minute, processes alerts
  - Sends out required notifications
- **Each of the defined extracts is executed**
  - ◆ Values returned from extracts is compared against user defined thresholds
  - ◆ Message displayed or action taken when thresholds are exceeded

# Viewing alerts

- Terminal session
  - ZALERT [alertfile]

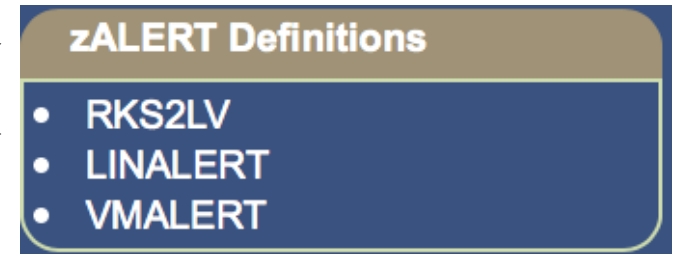
```
vmlink .dir vmsysvps:zmon.code  
ZALERT
```

```
Screen: RKS2LV RKS2LV 12 Jun 2017 10:31:38  
----- Exceptions Analysis Alerts -----  
  
Type Description  
APSP Page space is 16.72% used  
DSCK Node linux001 fs '/usr' is at 87%  
DSCK Node linux002 fs '/' has 120244K available  
DSCK Node linux002 fs '/var' is at 89% with 5528K avail  
ESAD ESAMON DCSS utilization is 2.6%  
LNCP CPU utilization on Linux node lxora12 is 5.14%  
LNDX /usr area on linux001 is 86.65% full  
LNDX /var area on linux001 is 80.60% full  
LNDX /usr area on linux002 is 86.65% full  
LNDX /var area on linux002 is 88.58% full  
SPOL Spool utilization is 60% (above 10)  
VMC2 User ZALERT used 0.1761 CPU sec (0.2935%)  
XACP Processor utilization at 1.0%  
  
PF3=Quit PF7=Backward PF8=Forward F5=Prev Alert F6=Next Alert  
3279 01/001
```

# Viewing alerts

- **zView**

- Select 'zAlert Definitions' →
- Select alert file to display →



A screenshot of a menu titled "zALERT Definitions". The menu is dark blue with a lighter blue header. It contains three items, each preceded by a white bullet point: "RKS2LV", "LINALERT", and "VMALEART".

**RKS2LV - Exceptions Analysis Alerts - 17/06/12 at 10:35 - RKS2LV**

Code	Alert Description
APSP	Page space is 16.71% used
DSCK	Node linux001 fs '/usr' is at 87%
DSCK	Node linux002 fs '/' has 120244K available
DSCK	Node linux002 fs '/var' is at 89% with 5528K avail
DVRT	I/O rate for volume VM5PG1 0127 18.12/sec
ESAD	ESAMON DCSS utilization is 2.6%
LNDX	/usr area on linux001 is 86.65% full
LNDX	/var area on linux001 is 80.60% full
LNDX	/usr area on linux002 is 86.65% full
LNDX	/var area on linux002 is 88.58% full
PGRT	System paging rate 52 (above 5)
SPOL	Spool utilization is 60% (above 10)
VMC2	User ZALERT used 0.1563 CPU sec (0.2605%)
VMC2	User ZWEB01 used 0.0026 CPU sec (0.0044%)
VMC2	User ZWEB02 used 0.0033 CPU sec (0.0055%)
VMC2	User ZWEB03 used 0.0016 CPU sec (0.0026%)
VMC2	User ZWEB04 used 0.0015 CPU sec (0.0025%)
VMC2	User ZWEB05 used 0.0108 CPU sec (0.0180%)
VMIO	I/O rate for user SFSZVPS 4
VMPG	Page rate for ZADMIN is 13.1/sec (above 5 for 1)
VMPG	Page rate for ZWEB05 is 5.8/sec (above 5 for 1)
XACP	Processor utilization at 0.9%

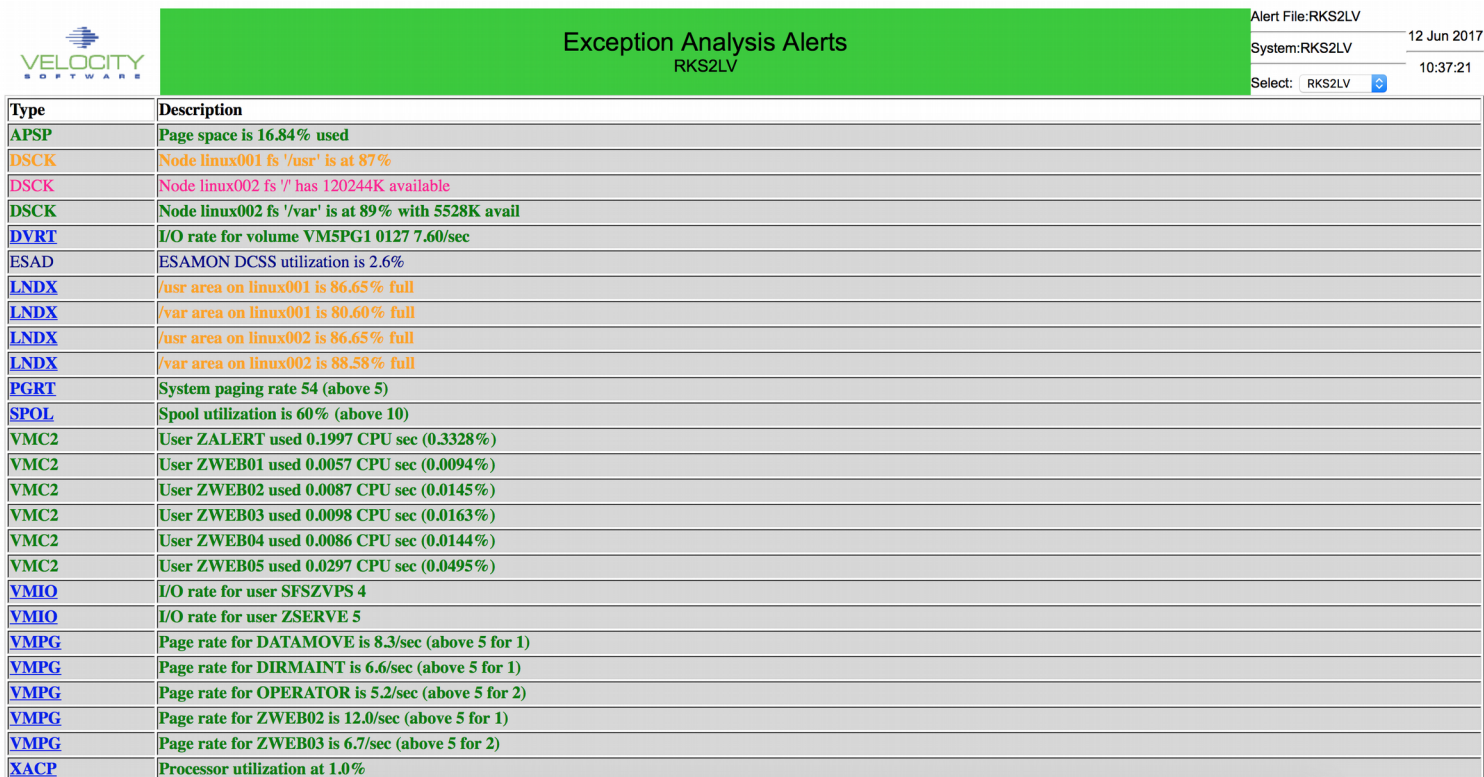
# Viewing alerts

- CGI

- Copy ZALERT.CGI from ZALERT top level directory to ZVWS.ROOT

http://<vm-host>/zalert.cgi

http://<vm-host>/zalert.cgi?file=<alertfile>



VELOCITY SOFTWARE

Exception Analysis Alerts  
RKS2LV

Alert File: RKS2LV  
System: RKS2LV  
12 Jun 2017  
10:37:21  
Select: RKS2LV

Type	Description
APSP	Page space is 16.84% used
DSCK	Node linux001 fs '/usr' is at 87%
DSCK	Node linux002 fs '/' has 120244K available
DSCK	Node linux002 fs '/var' is at 89% with 5528K avail
DYRT	I/O rate for volume VM5PG1 0127 7.60/sec
ESAD	ESAMON DCSS utilization is 2.6%
LNDX	/usr area on linux001 is 86.65% full
LNDX	/var area on linux001 is 80.60% full
LNDX	/usr area on linux002 is 86.65% full
LNDX	/var area on linux002 is 88.58% full
PGRT	System paging rate 54 (above 5)
SPOL	Spool utilization is 60% (above 10)
VMC2	User ZALERT used 0.1997 CPU sec (0.3328%)
VMC2	User ZWEB01 used 0.0057 CPU sec (0.0094%)
VMC2	User ZWEB02 used 0.0087 CPU sec (0.0145%)
VMC2	User ZWEB03 used 0.0098 CPU sec (0.0163%)
VMC2	User ZWEB04 used 0.0086 CPU sec (0.0144%)
VMC2	User ZWEB05 used 0.0297 CPU sec (0.0495%)
VMIO	I/O rate for user SFSZVPS 4
VMIO	I/O rate for user ZSERVE 5
VMPG	Page rate for DATAMOVE is 8.3/sec (above 5 for 1)
VMPG	Page rate for DIRMAINT is 6.6/sec (above 5 for 1)
VMPG	Page rate for OPERATOR is 5.2/sec (above 5 for 2)
VMPG	Page rate for ZWEB02 is 12.0/sec (above 5 for 1)
VMPG	Page rate for ZWEB03 is 6.7/sec (above 5 for 2)
XACP	Processor utilization at 1.0%

MANCE

# Alert samples

- **Alert samples are shipped with the ZALERT package**
  - ◆ ALERT1 MONALERT is the primary sample file
  - ◆ Older sample files are shipped with the filetype MONSAMP
    - VMALERT, LINALERT, HEALTH and HEALTH2
  - ◆ Samples check various conditions that can potentially occur
    - CPU/Spool/Page Utilization, I/O Rate, Paging Rate
    - Node CPU utilization, I/O Rate, Disk utilization, Swap rate and utilization
- **Additional samples available on our web site**

# Defining your own alerts

- **Coding an alert requires the use of data fields maintained by zVPS**
- **Data is extracted from the monitor**
- **Analyzed to determine if it exceeds a threshold**
- **For values greater than threshold**
  - ◆ Message issued
  - ◆ Optional action is taken
- **Alerts generally use the following statements**
  - ◆ EXTRACT
  - ◆ VAR
  - ◆ ALERT
  - ◆ LEVEL
  - ◆ TEXT

# Defining your own alerts

- **Alert for CPU Utilization**

Extract

```
Parms CPU TOTAL
```

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

```
var  cpu_serial  | 6    | serial
```

```
var  util        | 5 1 | sytprp.cpuutil
```

```
alert util xacp
```

```
level 00  green
```

```
level 20  yellow
```

```
level 40  pink
```

```
level 80  red
```

```
text Processor utilization at &util%
```

# Defining your own alerts

- **Alert for CPU Utilization**

Extract

Parms CPU TOTAL

PARMS determines the type of data to extract

```
var cpu_serial | 6 | serial
var util      | 5 1 | sytprp.cpuutil
```

```
alert util xacp
level 00 green
level 20 yellow
level 40 pink
level 80 red
text Processor utilization at &util%
```



# Defining your own alerts

- **Alert for CPU Utilization**

Extract

Parms CPU TOTAL

```
var  cpu_serial | 6 | serial
var  util       | 5 1 | sytprp.cpuutil
```

```
alert util xacp
level 00 green
level 20 yellow
level 40 pink
level 80 red
text Processor utilization
```

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

- **Alert for CPU Utilization**

Extract

Parms CPU TOTAL

Variables defined for use  
in the following alerts

var cpu_serial	6	serial
var util	5 1	sytprrp.cpuutil

```
alert util xacp
level 00 green
level 20 yellow
level 40 pink
level 80 red
```

Size of each variable with  
optional decimal precision

```
text Processor utilization at &util%
```

# Defining your own alerts

- **Alert for CPU Utilization**

Extract

Parms

```
var cpu_serial | 6 | serial
var util      | 5 1 | sytprp.cpuutil
```

ALERT statement defines a specific alert

```
alert util xacp
```

Four character code used when displaying alerts

```
level 00 green
level 20 yellow
level 40 pink
level 80 red
```

```
text Process
```

Each alert requires a previously defined variable

# Defining your own alerts

- **Alert for CPU Utilization**

```
Extract
```

```
Parms CPU TOTAL
```

```
var serial  
var util | 5 1 | sytrp.cpuutil
```

LEVEL statement controls the threshold values

```
alert util xacp  
level 00 green
```

```
level 20 yellow
```

```
level 40 pink
```

```
level 80 red
```

```
text Proces
```

Color of the alert text when this level is exceeded

Values tested against the alert variable

%

# Defining your own alerts

- **Alert for CPU Utilization**

Extract

Parms CPU TOTAL

```
var  cpu_serial | 6    | serial
var  util       | 5 1  | sytprp.cpuutil
```

```
alert util xact
level 00 green
level 20 yellow
level 40 pink
level 80 red
text Processor utilization at &util%
```

Message displayed on  
3270 and zView alert screens

Alert variable  
substitution

# Alert result

- The 3270 screen based on the alert definition

The screenshot shows a 3270 terminal window titled "x3270-2 RKS2LV". The window has a menu bar with "File" and "Options" buttons. A black box with white text "Alert file being displayed" points to the "Options" button. The main display area shows the following text:

```
Screen: ALERT3A RKS2LV 15 Jun 2015 07:48:51
----- Exceptions Analysis Alerts -----
Type Description
XACP Processor utilization at 2.3%
```

Annotations:

- A callout box "Code specified on ALERT statement" points to the "XACP" text in the "Type" column.
- A callout box "TEXT directive with variable substitution" points to the "Processor utilization at 2.3%" text in the "Description" column.

At the bottom of the screen, there is a status bar with the text "PF7=Backward PF8=Forward PF3=Quit" and a system clock showing ":00.2 001/001".

- **Adjust the number and value of levels based on local requirements**
  - ◆ At least one LEVEL statement is necessary
  - ◆ LEVEL statements are evaluated bottom to top
- **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
    - **BL**ink – 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 95 red rev
```

```
text LPAR utilization of &lpname is &lputil%
```



# LPAR Utilization

- Alert for LPAR Utilization

Extract

Parms LPAR \*

Informs the extract to pull data for all LPARs

Criteria sytcup.lcupname <> 'Totals:'

var lpname | 8 | sytcup.lcupname

var lputil | 3 0 | sytcup.pctcpu

Data filtering

alert lputil lpcp

level 70 yellow

level 85 red

level 95 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 95 red **rev**

text LPAR utilization of &lpname is &lputil%

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

# LPAR Utilization

- Alert for LPAR Utilization display

3270 →

```
Screen: ALERTLPR          Velocity Software - VSIVM5          4 Jan 2017 11:36:12
----- Exceptions Analysis Alerts -----
Type Description
LPCP LPAR VSIVM4 CPU Utilization is 78%
```

zView ↓

ALERTLPR - Exceptions Analysis Alerts - 17/01/04 at 11:36 - VM5	
Code	Alert Description
LPCP	LPAR VSIVM4 CPU Utilization is 78%

# Defining your own alert – Complex operations

- **Numerous fields can be combined using math operations**
  - Statements can be continued with a dash

```
extract
parms user *
criteria userdata.userid <> 'System:' & useact.vmdtttime > 0
var    userid      | 8    | userdata.userid
var    cpuutil     | 3 1 | useact.vmdtttime * 100 / RUNTIME
var    io_rate     | 6 0 | (useact.vmdvdsct+useact.vmdvosct-
      +useact.vmdvcsct+useact.vmdvusct-
      +useact.vmdvtsct)/runtime
var    page_rate   | 6    | (useact.vmdctpgr+useact.vmdctpgw)/RUNTIME
var    exp_store   | 8    | useact.vmdctxrd+useact.vmdctxwt
var    userprt     | 8    | useact.vmdctpgr
var    vmdtttime   | 5 2 | useact.vmdtttime
```

# Defining your own alert - 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-->		<--pages-->		Prv	VIO	<AddSpce>			<-----pages/s<				
			AddSpc	VDSK	Resi-	Lock-			or	rate	Usr	Cre-	Del-	Sto-	<--DASD-->	
			Pages	Blks	dent	ed	Shr	/min	Lks	ates	etes	len	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 

# Defining your own alert - 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.qdiocnt
```

Select address spaces  
beginning with vdisk

Common second  
virtual disk

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

# Defining your own alert - 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.qdiocnt

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**

# 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

```
09:25:10 ZALERT VMPG Page rate for TCPIP has recovered, now 0.2  
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
<a href="http://uei.opennms.org/generic/traps/EnterpriseDefault">uei.opennms.org/generic/traps/EnterpriseDefault</a> Edit notifications for event				
Trap from 192.168.5.48 Type: 0 Message: SPOL Spool utilization is 72% (above 70)				

# Advanced topics

- **Priority**
- **Alert options**
- **Enable/Disable**
- **Limit**
- **Include/Exclude**
- **Multiple alerts**
- **External processing**
- **Operating zAlert**

# Advanced topics – Alert Options

- **Options add additional function at the alert level**
  - Priority
  - Log
  - Count
  - Separated on alert directive with a vertical bar

```
ALERT DISKPCT LNDX | <options>
```

- **Log - Writes alert text displays to a file**
- **Count - Tallies the number of times an alert appears on the display**

# Advanced topics – Priority

- **Priority alters the display sequence of an alert or level**
  - Priority is a numeric value 1-9, default is 3

```
extract
parms node *
criteria hstmem.used > 0
var      node      | 8      | tcpip.node
var      memused   | 6 2  | (hstmem.used/hstmem.size)*100
var      desc      | 16   | hstmem.desc
function diskpct   | 6 2  | &node &memused &desc

alert diskpct lndx | pri 2
level 5  green
level 50 yellow
level 80 pink
level 90 red rev pri 6
ltext &desc area on &node is getting really full!! (&diskpct%)
text &desc area on &node is &diskpct% full
```

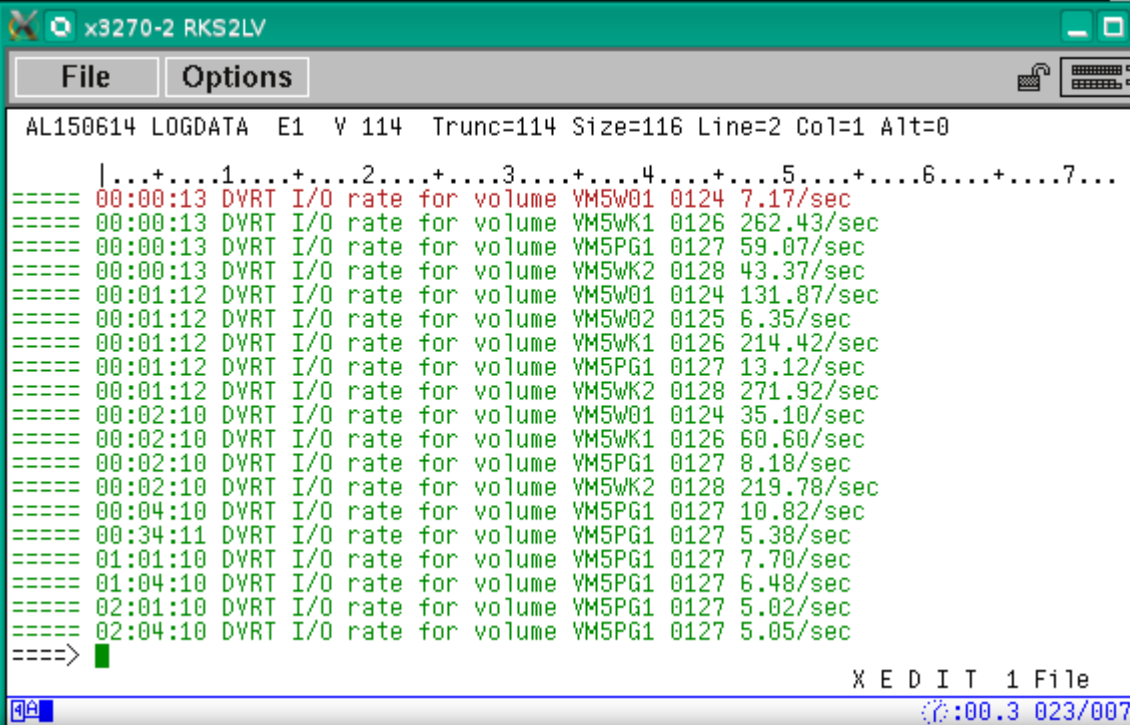
# Advanced topics – Priority

```
x3270-2 RKS2LV
File Options
Screen: ALRT6 RKS2LV 15 Jun 2015 10:58:34
----- Exceptions Analysis Alerts -----
Type Description
LNDX /var area on linux001 is getting really full!! (90.18%)
APSP APSP Page space is 12% used (10)
LNDX / area on linux001 is 37.92% full
LNDX /boot area on linux001 is 19.01% full
LNDX /local area on linux001 is 21.36% full
LNDX /usr area on linux001 is 86.65% full

PF7=Backward PF8=Forward PF3=Quit
:00.1 001/001
```

# Advanced topics – Alert Options

```
alert io_rate dvrt | log
level 5 green
level 10 blue
level 20 turquoise
level 30 pink
level 40 red rev
text I/O rate for volume &volser &rdev &io_rate/sec
```



The screenshot shows a terminal window titled 'x3270-2 RKS2LV' with a menu bar containing 'File' and 'Options'. The terminal output displays log data for I/O rates, with a header line: 'AL150614 LOGDATA E1 V 114 Trunc=114 Size=116 Line=2 Col=1 Alt=0'. Below this, there is a header line for the data columns: '|...+...1...+...2...+...3...+...4...+...5...+...6...+...7...'. The data rows are as follows:

Time	Device	Volume	Rate
00:00:13	DVRT	VM5W01 0124	7.17/sec
00:00:13	DVRT	VM5WK1 0126	262.43/sec
00:00:13	DVRT	VM5PG1 0127	59.07/sec
00:00:13	DVRT	VM5WK2 0128	43.37/sec
00:01:12	DVRT	VM5W01 0124	131.87/sec
00:01:12	DVRT	VM5W02 0125	6.35/sec
00:01:12	DVRT	VM5WK1 0126	214.42/sec
00:01:12	DVRT	VM5PG1 0127	13.12/sec
00:01:12	DVRT	VM5WK2 0128	271.92/sec
00:02:10	DVRT	VM5W01 0124	35.10/sec
00:02:10	DVRT	VM5WK1 0126	60.60/sec
00:02:10	DVRT	VM5PG1 0127	8.18/sec
00:02:10	DVRT	VM5WK2 0128	219.78/sec
00:04:10	DVRT	VM5PG1 0127	10.82/sec
00:34:11	DVRT	VM5PG1 0127	5.38/sec
01:01:10	DVRT	VM5PG1 0127	7.70/sec
01:04:10	DVRT	VM5PG1 0127	6.48/sec
02:01:10	DVRT	VM5PG1 0127	5.02/sec
02:04:10	DVRT	VM5PG1 0127	5.05/sec

The terminal shows a cursor at the end of the last line. At the bottom right of the terminal window, it says 'X E D I T 1 File' and a status bar at the very bottom shows ':00.3 023/007' and 'PERFORMANCE'.



# Advanced topics – Alert Options

```
alert page_use apsp | count
level 10 green
level 30 yellow
level 50 red
text &code Page space is &page_use% used (&tcount intervals)
```

```
x3270-2 RKS2LV
File Options
Screen: ALRT6 RKS2LV 16 Jun 2015 05:26:30
----- Exceptions Analysis Alerts -----
Type Description
APSP APSP Page space is 12% used (2 intervals)
LNDX / area on linux001 is 37.92% full
LNDX /boot area on linux001 is 19.01% full
LNDX /local area on linux001 is 21.36% full
LNDX /usr area on linux001 is 86.65% full
LNDX /var area on linux001 is getting really full!! (90.18%)
PF7=Backward PF8=Forward PF3=Quit
:00.1 001/001
```

# Advanced topics – Alert Options

- **Log writes out the currently displayable text message**
  - TEXT or LTEXT
- **Count takes an optional key value**
  - Used when an alert can return multiple values
  - Eg: user, node, device
  - Specify variable that contains the key value after COUNT keyword

**alert usercpu vmcp | count &userid**

- **Multiple options can be specified**

# Advanced topics – Enable/Disable

- **Disable removes an alert from evaluation (4.2)**
  - Used in a maintenance situation when unwanted alerts or false alerts may be triggered
- **Enable is the opposite of disable**
  - The default and need not be specified
  - Provided for consistency

```
alert page_use amsp
disable
level 10 green
level 30 yellow
level 50 red
text Page space is &page_use% used
```

# Advanced topics - Limit

- **The LIMIT directive delays an ACTION for the specified number of intervals**

```
extract
var serial      | 6    | system.serial
var spool_use   | 3 0 | (sytag.calslti2*100)/sytag.calslta2

alert spool_use spol
limit 5 1 | &serial
level 70  yellow
level 80  red
level 90  red rev ACTION CP MSG ZVPS Spool Util is &spool_use%
text Spool Utilization is &spool_use%
```

# Advanced topics - Limit

- **The LIMIT directive delays an ACTION for the specified number of intervals**

```
extract
var serial          | 6      | system.serial
var spool_use      | 3 0 | (sytag.calslti2*100)/sytag.calslta2
```

```
alert spool_use spol
limit 5 1 | &serial
level 70 yellow
level 80 red
level 90 red rev ACTION CP MSG ZVPS Spool Util is &spool_use%
text Spool Utilization is &spool_use%
```

Key field

After the delay, number of intervals TO execute ACTION (default is 1)

Number of intervals to delay executing ACTION

# Advanced topics - Limit

- **This LIMIT directive:**

```
limit 5 1 | &serial
```

- **Will delay ACTION for 5 intervals**
- **Execute ACTION for 1 intervals**
- **Repeat**
- **For example, when started at 11:52**

```
11:58:29 * MSG FROM ZALERT : 10 Feb 2012 11:58 SPOOL UTIL IS 95%
12:04:30 * MSG FROM ZALERT : 10 Feb 2012 12:04 SPOOL UTIL IS 95%
12:10:31 * MSG FROM ZALERT : 10 Feb 2012 12:10 SPOOL UTIL IS 95%
```

First message is delayed 5 intervals

One interval of ACTION

# Advanced topics - Limit

- **LIMIT initial action setting**

```
extract
var serial      | 6    | system.serial
var spool_use   | 3 0 | (sytag.calslti2*100)/sytag.calslta2

alert spool use spol
limit 5 1 1 | &serial
level 70 yellow
level 80 red
level 90 red rev ACTION CP spool_use%
text Spool Utilization is &spool_use%
```

Number of intervals the  
action is taken before  
the delay

# Advanced topics - Limit

- LIMIT escalation**

```
extract
var serial      | 6    | system.serial
var spool_use   | 3 0 | (sytag.calslti2*100)/sytag.calslta2

alert spool_use spol
limit 10:5 1 | &serial
level 70 yellow
level 80 red
level 90 red rev ACTION CP use &spool_use is &spool_use%
text Spool Utilization is &spool_use%
```

Delay 10 intervals, then 5



# Advanced topics – Include/Exclude

- **User or Node can be specified in an extract**
- **A subset can be selected with wildcards**
- **Given the following alert definition:**

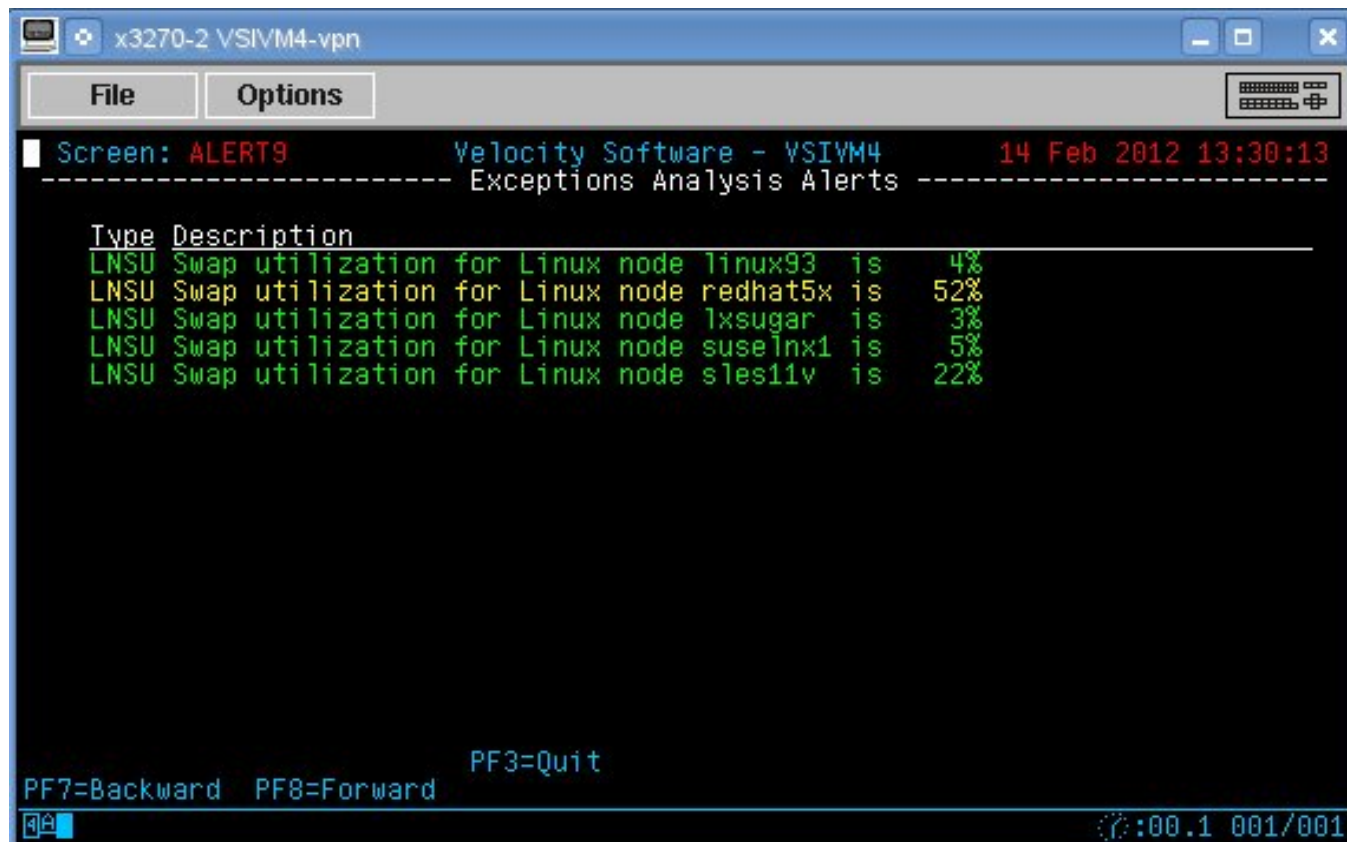
```
extract
parms node *
criteria ucddsys.swappct > 0
var node | 8 | tcpip.node
var swapused | 4 0 | ucddsys.swappct

alert swapused lnsu
level 01 green
level 50 yellow
level 80 pink
level 90 red rev
text Swap utilization for Linux node &node is &swapused%
```

All defined nodes  
are made available

# Advanced topics – Include/Exclude

- All nodes with at least 1% swap utilization are displayed



The screenshot shows a terminal window titled "x3270-2 VSIWM4-vpn". The window has a menu bar with "File" and "Options" and a keyboard icon. The main content area displays the following text:

```
Screen: ALERT9 Velocity Software - VSIWM4 14 Feb 2012 13:30:13
----- Exceptions Analysis Alerts -----
```

Type	Description	Value
LNSU	Swap utilization for Linux node linux93 is	4%
LNSU	Swap utilization for Linux node redhat5x is	52%
LNSU	Swap utilization for Linux node lxsugar is	3%
LNSU	Swap utilization for Linux node suselnx1 is	5%
LNSU	Swap utilization for Linux node sles11v is	22%

At the bottom of the terminal, there are control instructions: "PF7=Backward PF8=Forward PF3=Quit". The status bar at the very bottom shows a cursor icon, a refresh icon, and the text ":00.1 001/001".

# Advanced topics – Include/Exclude

- **The alert can be tailored to show a subset by adjusting the wildcard**

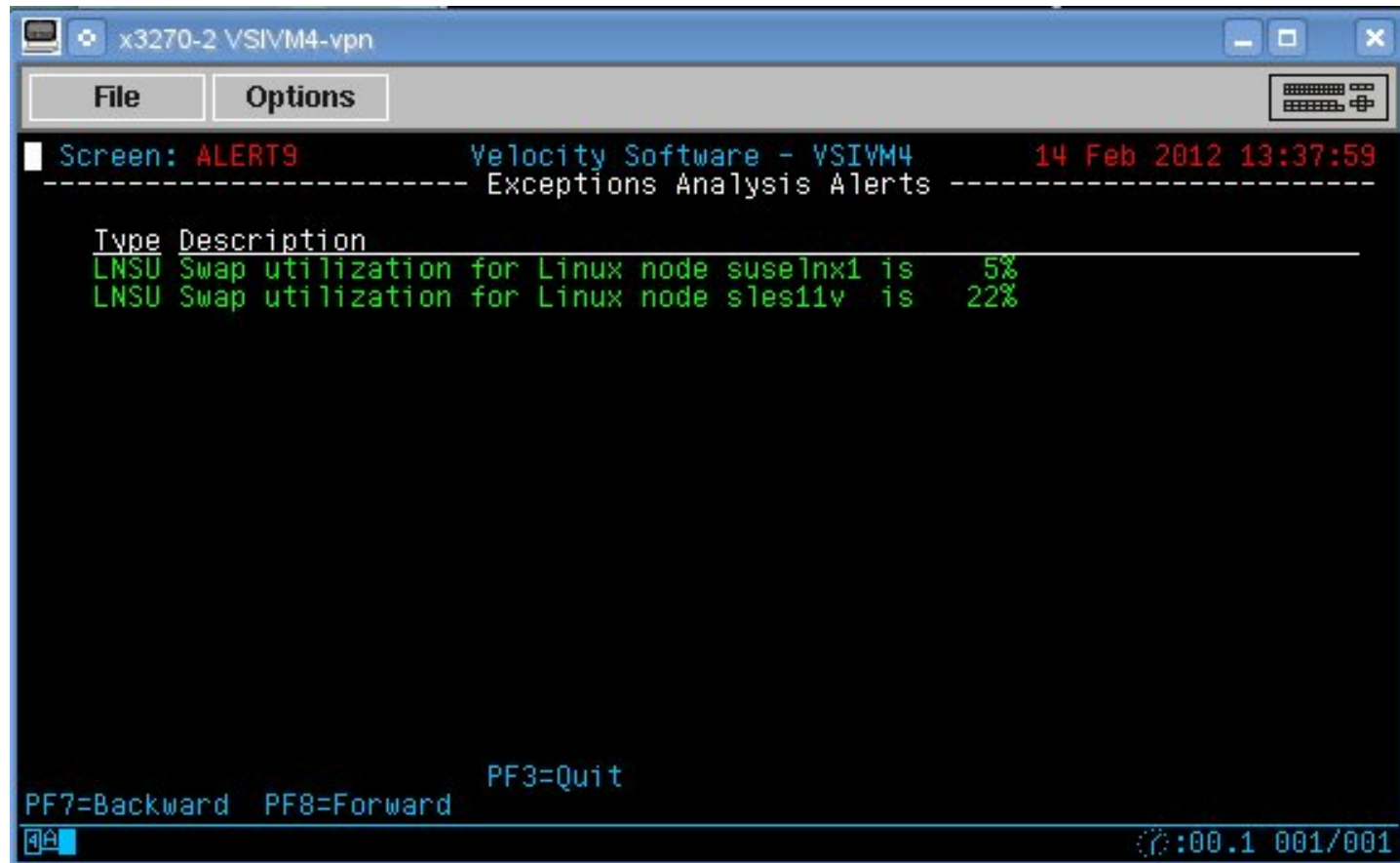
```
extract
parms node s*
criteria ucddsys.swappct > 0
var    node      | 8    | tcpip.node
var    swapused  | 4 0  | ucddsys.swappct
```

Only show nodes  
beginning with 's'

```
alert swapused lnsu
level 01 green
level 50 yellow
level 80 pink
level 90 red rev
text Swap utilization for Linux node &node is &swapused%
```

# Advanced topics – Include/Exclude

- The display shows nodes matching the wildcard



The screenshot shows a terminal window titled "x3270-2 VSIVM4-vpn". The window has a menu bar with "File" and "Options" and a keyboard icon. The main display area shows the following text:

```
Screen: ALERT9 Velocity Software - VSIVM4 14 Feb 2012 13:37:59
----- Exceptions Analysis Alerts -----
```

Type	Description
LNSU	Swap utilization for Linux node suse1nx1 is 5%
LNSU	Swap utilization for Linux node sles11v is 22%

At the bottom of the terminal, there are function key definitions: PF7=Backward, PF8=Forward, and PF3=Quit. The status bar at the very bottom shows a cursor icon, a refresh icon, and the text ":00.1 001/001".

# Advanced topics – Include/Exclude

- **If an alert is required to show nodes that don't fit into a wildcard**
  - ◆ An include or exclude must be used

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

alert swapused lnsu
include node sub1
level 01  green
level 50  yellow
level 80  pink
level 90  red rev
text Swap utilization for Linux node &node is &swapused%
```

**<filename> IXLIST**

```
-SUB1-
linux93
sles11v
redhat5x
-END SUB1-
```

# Advanced topics – Include/Exclude

- **If an alert is required to show nodes that don't fit into a wildcard**
  - ◆ An include or exclude must be used

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

alert swapused lnsv
include node sub1
level 01 green
level 50 yellow
level 80 pink
level 90 red rev
text Swap utilization for Linux node &node is &swapused%
```

Variable used  
for matching

List name  
applied to alert

<filename> IXLIST

-SUB1-

linux93

sles11v

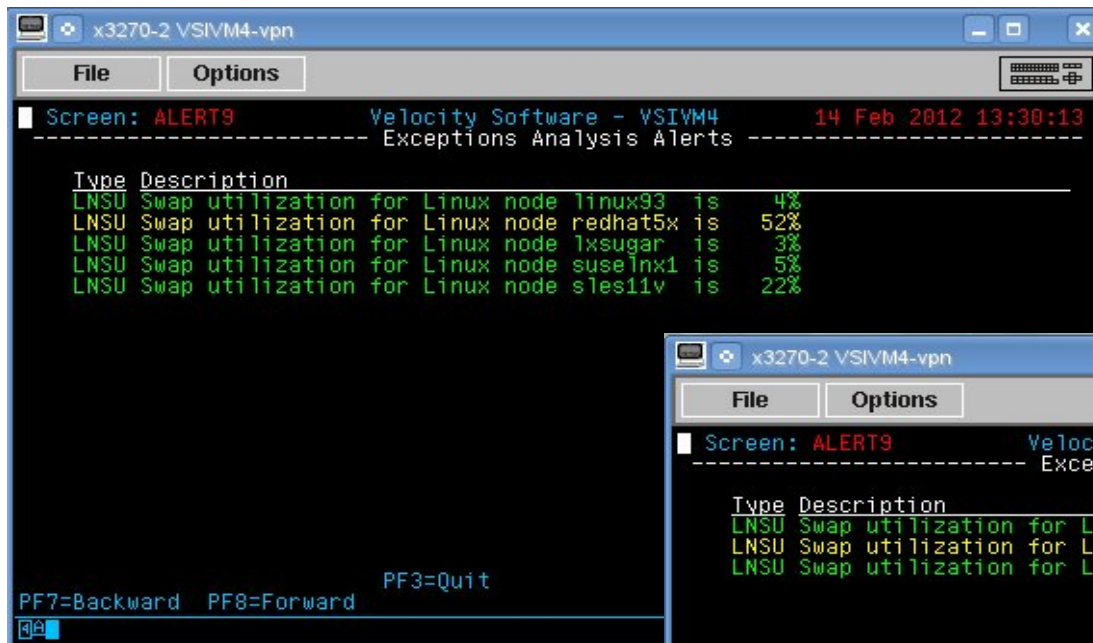
redhat5x

-END SUB1-

Include/Exclude  
file name must  
match the alert  
file name

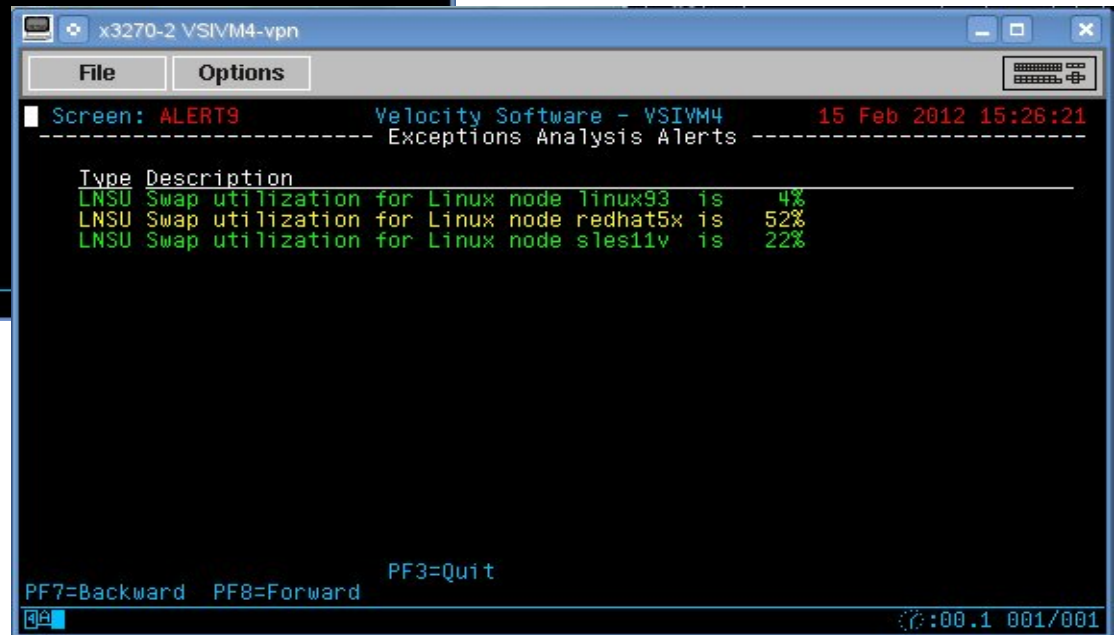
# Advanced topics – Include/Exclude

- Results of Include file



Original display

```
x3270-2 VSIWM4-vpn
File Options
Screen: ALERT9 Velocity Software - VSIWM4 14 Feb 2012 13:30:13
----- Exceptions Analysis Alerts -----
Type Description
LNSU Swap utilization for Linux node linux93 is 4%
LNSU Swap utilization for Linux node redhat5x is 52%
LNSU Swap utilization for Linux node lxsugar is 3%
LNSU Swap utilization for Linux node suselnx1 is 5%
LNSU Swap utilization for Linux node sles11v is 22%
PF7=Backward PF8=Forward PF3=Quit
```



Include applied

```
x3270-2 VSIWM4-vpn
File Options
Screen: ALERT9 Velocity Software - VSIWM4 15 Feb 2012 15:26:21
----- Exceptions Analysis Alerts -----
Type Description
LNSU Swap utilization for Linux node linux93 is 4%
LNSU Swap utilization for Linux node redhat5x is 52%
LNSU Swap utilization for Linux node sles11v is 22%
PF7=Backward PF8=Forward PF3=Quit
00:00.1 001/001
```

# Advanced topics – Multiple alerts

- **One extract can supply data for multiple alerts**

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

alert swaprate lnsr
level 02  green
level 10  yellow
level 30  pink
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 80  pink
level 90  red rev
text Swap utilization for Linux node &node is &swapused%
```



# Advanced topics – 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 or plugs the result into defined alert variables

# Advanced topics – External Processing

- **Function is specified in place of 'var'**

```
extract
parms node *
criteria hstmem.used > 0
var      node      | 8    | tcpip.node
var      memused   | 6 2 | (hstmem.used/hstmem.size)*100
var      desc      | 60  | hstmem.desc
function diskpct   | 6 0 | &node &memused &desc

alert diskpct lndx
level 20  green
level 50  yellow
level 80  pink
level 90  red rev
text Filesystem &desc on &node is at &diskpct%
```

# Advanced topics – External Processing

- **Function is specified in place of 'var'**

```
extract
parms node *
criteria hstmem.used > 0
var   node   | 8   | tcpip.node
var   memused | 6 2 | (hstmem.used/hstmem.size)*100
var   desc   | 16  | hstmem.desc
function diskpct | 6 0 | &node &memused &desc

alert diskpct indx
text Filesystem &desc on &node is at &diskpct%
level 20 green
level 50 yellow
level 80 pink
level 90 red rev
```

Size of returned value

Parameters passed  
as exec args

Function definition  
is the exec called  
and the variable  
used in the alert

# Advanced topics – External Processing

- **REXX exec called from the alert**

```
/* DISKPCT EXEC: Filter out memory or read-only filesystems */  
parse arg node pct descr .
```

Parameters passed  
from alert

```
firstword = word(descr,1)  
rptzero = 'Real Memory Swap Physical Virtual Cached'
```

```
if wordpos(descr,rptzero) > 0 then  
  pct = 0
```

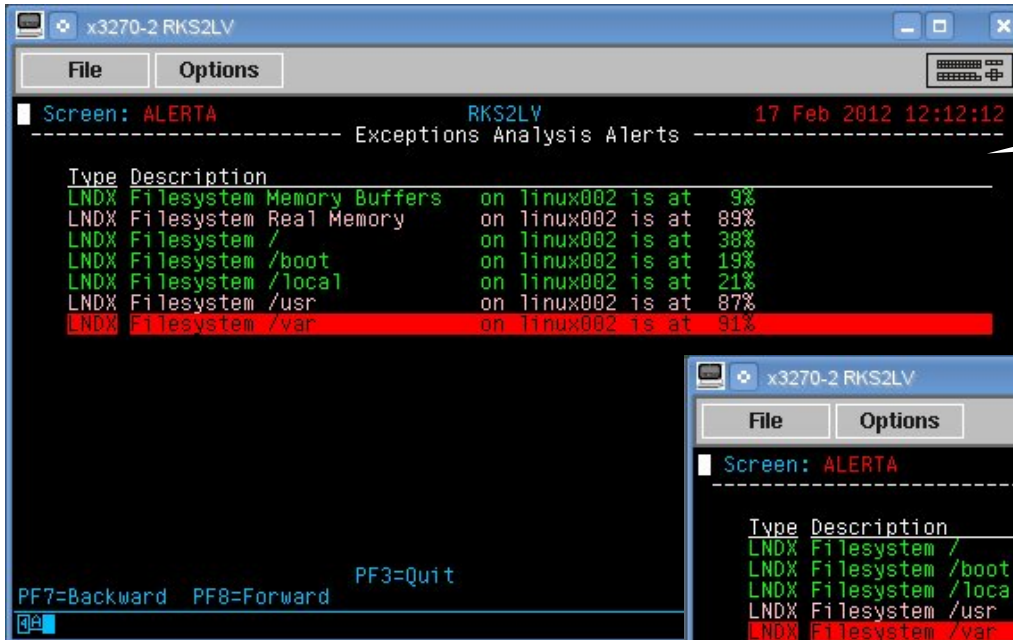
```
if left(descr,6) = '/media' then  
  pct = 0
```

```
return pct
```

Value returned  
to the alert

# Advanced topics – External Processing

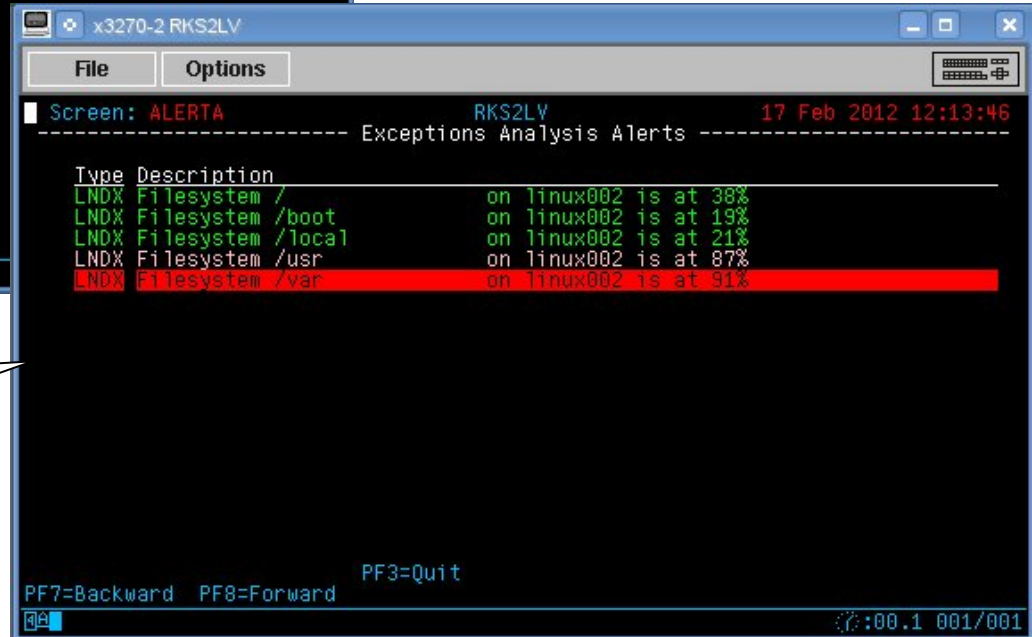
- Results of function call



Original display

```
x3270-2 RKS2LV
File Options
Screen: ALERTA RKS2LV 17 Feb 2012 12:12:12
----- Exceptions Analysis Alerts -----
Type Description
LNDX Filesystem Memory Buffers on linux002 is at 9%
LNDX Filesystem Real Memory on linux002 is at 89%
LNDX Filesystem / on linux002 is at 38%
LNDX Filesystem /boot on linux002 is at 19%
LNDX Filesystem /local on linux002 is at 21%
LNDX Filesystem /usr on linux002 is at 87%
LNDX Filesystem /var on linux002 is at 91%
PF7=Backward PF8=Forward PF3=Quit
```

With DISKPCT EXEC



```
x3270-2 RKS2LV
File Options
Screen: ALERTA RKS2LV 17 Feb 2012 12:13:46
----- Exceptions Analysis Alerts -----
Type Description
LNDX Filesystem / on linux002 is at 38%
LNDX Filesystem /boot on linux002 is at 19%
LNDX Filesystem /local on linux002 is at 21%
LNDX Filesystem /usr on linux002 is at 87%
LNDX Filesystem /var on linux002 is at 91%
PF7=Backward PF8=Forward PF3=Quit
:00.1 001/001
```

# Advanced topics – External Processing

- **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
```

```
Screen: TOP20                                RKS2LV
----- Exceptions Analysis Alerts -----
Type Description
XMVM User ZWEB06 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
```

# Advanced topics – Threshold comparison operators

- **Check for 'node down'**

```
extract
parms node *
criteria hstsys.iplyy > 0
var  node      | 8  | tcpsys.node
var  ipaddr    | 15 | tcpsys.ipaddress
var  hsamp     | 1  | hstsys.samples

alert hsamp lxup | count &node
level =0 red
text Node &node (&ipaddr) is down (&tcount intervals)
```

- **No value in 'samples' indicates down**
- **Level allows additional comparison indicators for threshold evaluation (eg: < > = <= >= <>)**

# Advanced topics – Threshold comparison operators

- **Results of 'node down'**

```
x3270-2 RKS2LV
File Options
Screen: RKS2LV RKS2LV 16 Jun 2015 07:13:11
----- Exceptions Analysis Alerts -----
Type Description
APSP Page space is 7.60% used
DSRV Device 0126 VM5WK1 service time: 1.25
LXUP Node linux001 (192.168.5.183) is down (3 intervals)
SPOL Spoolspace is 76% used (above 70 for 1221 intervals)
YMC2 User ZALERT used 0.04 CPU sec (0.07%)
XACP Processor utilization at 0.2%
XMVM User ZWEB06 not logged onto system

PF7=Backward PF8=Forward PF3=Quit
:00.1 001/001
```



## Advanced topics – Operating

- **The alert engine virtual machine (ZALERT) should be brought up shortly after the monitor (ZSERVE)**
- **Config file (CONFIG ZALERT)**

```
/*  
/* Configuration data for zALERT  
/*  
  
AUTHUSER ZVPS  
NTFYLOGS 30  
LOGRETAIN 15  
ALERTFILE RKS2LV ALRT6
```

# Advanced topics – Operating

- **Many ZALERT functions can be controlled via SMSG**
  - CMS
  - CP
  - QUERY
  - REREAD
  - RESTART
  - SET
  - STATUS
  - STOP

- **Due to a change in ZMON**

- HSTMEM.DESC is now 60 bytes

- An alert that contains:

```
var desc      | 32 | hstmem.desc||hstmem.descr
```

- Should now contain:

```
var desc      | 60 | hstmem.desc
```

- **Alert recovery support**
  - After an action is executed for an exceeded threshold, an additional action can be executed when the threshold is no longer exceeded
- **Include/Exclude lists now support CMS wildcards**
  - % for any single arbitrary character
  - \* for a group of characters before or after
- **%INCLUDE support**
  - Allows additional alert files to be brought in
- **Invalid alert variables are now flagged**

# Summary

- Alerts provide the way to passively monitor your system
- Thresholds exceeded are displayed on one screen
- Notifications can be delivered for critical issues
- Management consoles fit this mechanism perfectly
- Many useful samples are provided

# Questions



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