

zVPS Alerts

Richard Smrcina
Velocity Software, Inc.
March, 2012

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**
 - Email
 - 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

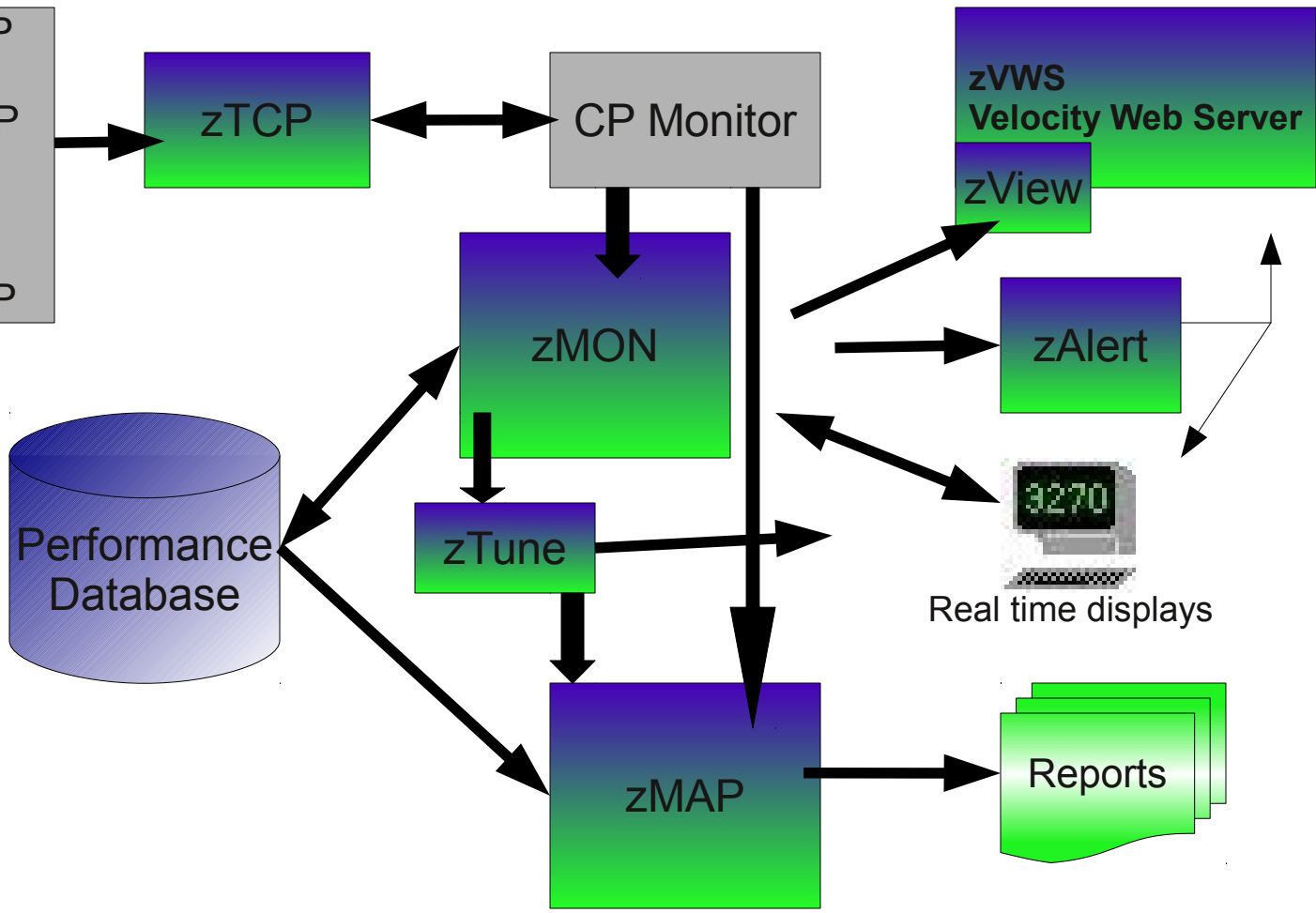
This presentation goes through the finer points of alert processing.

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... a proactive mechanism to using alerts, notifications, are also covered.

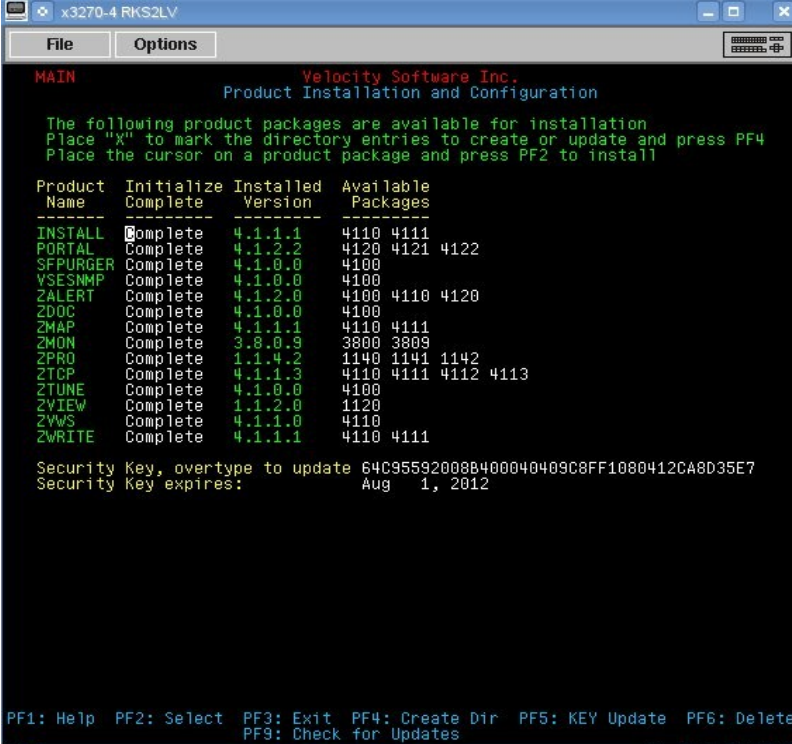
Where do alerts fit?

- 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 Version 4 installer
 - ◆ Creates a virtual machine (ZALERT)
 - By default SFSZVPS: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 Initialize Complete Installed Version Available Packages
-----
INSTALL Complete 4.1.1.1 4110 4111
PORTAL Complete 4.1.2.2 4120 4121 4122
SFPURGER Complete 4.1.0.0 4100
YSESNMP Complete 4.1.0.0 4100
ZALERT Complete 4.1.2.0 4100 4110 4120
ZDOC Complete 4.1.0.0 4100
ZMAP Complete 4.1.1.1 4110 4111
ZMON Complete 3.8.0.9 3800 3809
ZPRO Complete 1.1.4.2 1140 1141 1142
ZTCP Complete 4.1.1.3 4110 4111 4112 4113
ZTUNE Complete 4.1.0.0 4100
ZVIEW Complete 1.1.2.0 1120
ZVWS Complete 4.1.1.0 4110
ZWRITE Complete 4.1.1.1 4110 4111

Security Key, overtpe to update 64C95592008B400040409C8FF1080412CA8D35E7
Security Key expires: Aug 1, 2012

PF1: Help PF2: Select PF3: Exit PF4: Create Dir PF5: KEY Update PF6: Delete
PF9: Check for Updates
```

Installing zAlert package

- **Separate virtual machine is used to process alerts and send notifications**
- **The alert virtual machine wakes up every minute, reading the provided MONALERT file**
- **Each of the defined extracts is executed**
 - ◆ Values returned compared against user defined thresholds
 - ◆ Message displayed or action(s) taken when thresholds are exceeded

Installing zAlert package

- **A notification can be any of**
 - ♦ Message on the alert console or zView
 - ♦ CP MSG to a user
 - ♦ Email to interested parties
 - Text message on a mobile device
 - ♦ SNMP trap sent to a management console
 - ♦ Combinations of the above

Viewing alerts

- **Terminal session**

- Via ESAMON <alertfile>
eg: ESAMON ALERT1

```
vmlink .dir sfszvps:zmon.code  
vmlink .dir sfszvps:zvps.config  
ESAMON ALERT1
```

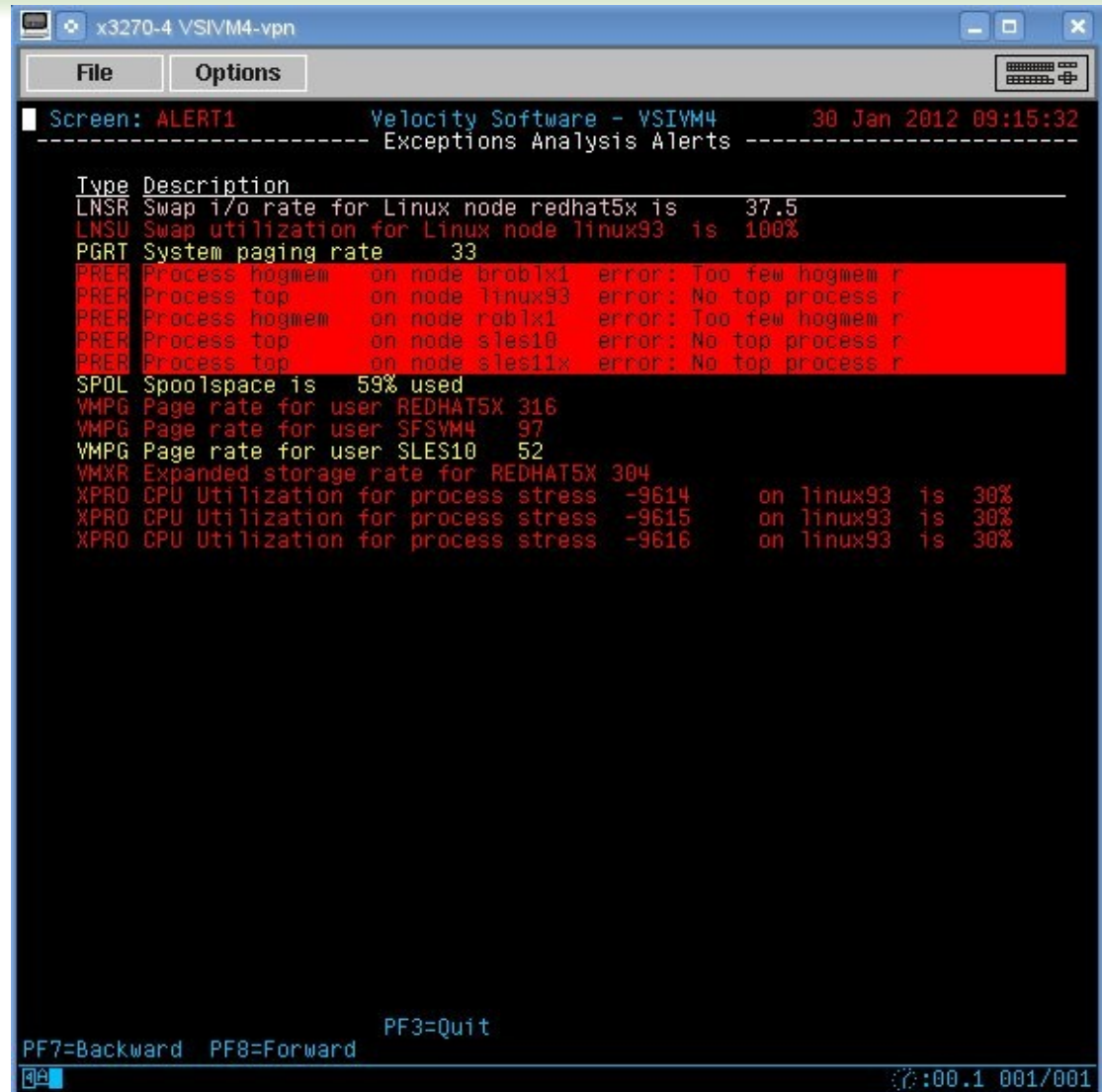
- **zView**

- Navigate to 'Alert Definitions' menu
- Select alert file to display



Viewing alerts

- Alert display on 3270



The screenshot shows a terminal window titled 'x3270-4 VSIVM4-vpn'. The window has a menu bar with 'File' and 'Options' and a toolbar. The main content area displays a list of alerts from 'Velocity Software - VSIVM4' on '30 Jan 2012 09:15:32'. The alerts are categorized by type and description. A red background highlights several 'PRER' (Process hogmem) alerts for nodes 'broblx1', 'linux93', 'roblx1', 'sles10', and 'sles11x', all with the error message 'error: No top process r'. Other alerts include 'LNSR' (Swap i/o rate), 'LNSU' (Swap utilization), 'PGRT' (System paging rate), 'SPOL' (Spoolspace used), 'VMPG' (Page rate for users), and 'XPRD' (CPU Utilization for process stress). At the bottom, there are navigation instructions: 'PF7=Backward PF8=Forward PF3=Quit' and a status bar showing '00:00.1 001/001'.

```
x3270-4 VSIVM4-vpn
File Options
Screen: ALERT1 Velocity Software - VSIVM4 30 Jan 2012 09:15:32
----- Exceptions Analysis Alerts -----
Type Description
LNSR Swap i/o rate for Linux node redhat5x is 37.5
LNSU Swap utilization for Linux node linux93 is 100%
PGRT System paging rate 33
PRER Process hogmem on node broblx1 error: Too few hogmem r
PRER Process top on node linux93 error: No top process r
PRER Process hogmem on node roblx1 error: Too few hogmem r
PRER Process top on node sles10 error: No top process r
PRER Process top on node sles11x error: No top process r
SPOL Spoolspace is 59% used
VMPG Page rate for user REDHAT5X 316
VMPG Page rate for user SFSVM4 97
VMPG Page rate for user SLES10 52
VMXR Expanded storage rate for REDHAT5X 304
XPRD CPU Utilization for process stress -9614 on linux93 is 30%
XPRD CPU Utilization for process stress -9615 on linux93 is 30%
XPRD CPU Utilization for process stress -9616 on linux93 is 30%
PF7=Backward PF8=Forward PF3=Quit
00:00.1 001/001
```

Viewing alerts

- Alert display on zView

Exceptions Analysis Alerts - 12/01/30 at 09:16			
Code	Alert Description		
DVRT	I/O rate for volume 0153(DXC2L2)	21/sec	
LNSR	Swap i/o rate for Linux node redhat5x is	18.7	
LNSU	Swap utilization for Linux node linux93 is	100%	
PGRT	System paging rate	29	
PRER	Process hogmem	on node broblx1 error: Too few hogmem r	
PRER	Process top	on node linux93 error: No top process r	
PRER	Process hogmem	on node roblx1 error: Too few hogmem r	
PRER	Process top	on node sles10 error: No top process r	
PRER	Process top	on node sles11x error: No top process r	
SPDL	Spoolspace is	59% used	
VHCP	User SUSELNX2 at	44.9% of processor	
VMPG	Page rate for user ROBLX1	65	
VMPG	Page rate for user SLES10	311	
VMPG	Page rate for user SLES11	108	
VMPG	Page rate for user SLES8	86	
VMPG	Page rate for user SUSELNX2	143	
VMXR	Expanded storage rate for REDHAT3	717	
XACP	Processor utilization at	63.3%	
XPRO	CPU Utilization for process stress -9614	on linux93 is 30%	
XPRO	CPU Utilization for process stress -9615	on linux93 is 30%	
XPRO	CPU Utilization for process stress -9616	on linux93 is 30%	
XPRO	CPU Utilization for process smallstr-24385	on suselnx2 is 43%	

Alert samples

- **Alert samples are shipped with the ZALERT package**
 - ♦ ALERT1 MONALERT is combined from the four previously provided sample files
 - ♦ 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
 - CPU/Spool/Page Utilization, I/O Rate, Paging Rate
 - Network 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  
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 | sytprp.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

ALERT statement defines a specific alert

```
var cpu_util | 5 1 | serial
```

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

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

Four character code used when displaying alerts

```
text Process
```

Each alert requires a previously defined variable

Defining your own alerts

- Alert for CPU Utilization

Extract

Parms CPU TOTAL

```
var LEVEL statement controls the threshold values serial  
var util | 5 | 1 | sytprp.cpuutil
```

```
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  | sytrp.cpuutil
```

```
alert util xacp
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 - 3270

- 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. The main display area shows the following text:

```
Screen: ALERT3 RKS2LV 31 Jan 2012 11:37:38
----- Exceptions Analysis Alerts -----
Type Description
XACP Processor utilization at 0.8%
```

Annotations on the screenshot:

- A black box labeled 'Alert file being displayed' points to the 'Options' menu button.
- A white box labeled 'Code specified on ALERT statement' points to the 'XACP' text in the alert description.
- A white box labeled 'TEXT directive with variable substitution' points to the '0.8%' value in the alert description.

At the bottom of the terminal, there are control instructions: 'PF7=Backward PF8=Forward PF3=Quit' and a status bar showing ':00.1 001/001'.

Alert result - zView

- Same data in zView

The screenshot displays the zVIEW software interface. At the top left, the version is 'v1.1.2.0' and the title is 'Welcome'. The main header area shows the 'VELOCITY SOFTWARE' logo, the text 'zVIEW - RKS2LV (RKS2LV)', and 'ALERT3 - Exceptions Analysis Alerts - 12/02/02 at 13:28'. Below the header, there are two buttons: 'Close Window' and 'Pause Updates'. The main content area is divided into a left sidebar and a central table. The sidebar contains a tree view of system components, with 'ALERT3' selected. The central table has two columns: 'Code' and 'Alert Description'. A single row is visible with the code 'XACP' and the description 'Processor utilization at 1.0%'.

Code	Alert Description
XACP	Processor utilization at 1.0%

- **Adjust the number and value of levels based on local requirements**
 - At least one LEVEL statement is necessary
 - LEVEL statements must appear in ascending value order
- **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
 - **BLInk** – blink the entire text
 - **UNDERLINE** – underline the entire text

Defining your own alert - LPAR

- **Alert for LPAR Utilization**

```
Extract
```

```
Parms LPAR *
```

```
Criteria sytcup.lcupname <> 'Totals:'
```

```
var lparname      | 8    | sytcup.lcupname
```

```
var lparutil     | 3 0 | sytcup.pctcpu
```

```
alert lparutil lpcp
```

```
level 90 red
```

```
level 95 red rev
```

```
text LPAR utilization of &lparname is &lparutil%
```


Defining your own alert - LPAR

- Alert for LPAR Utilization

Extract

Parms LPAR *

Criteria sytcup.lcupname <> 'Totals:'

var lparname | 8 | sytcup.lcupname

var lparutil | 3 0 | sytcup.pctcpu

alert lparutil lpcp

level 90 red

level 95 red rev

text LPAR utilization of &lparname is &lparutil%

Informs the extract to pull data for all LPARs

Additional data selection passed to the extract as WHILE criteria

Defining your own alert - LPAR

- **Alert for LPAR Utilization**

Extract

Parms LPAR *

Criteria sytcup.lcupname <> 'Totals:'

var lparname | 8 | sytcup.lcupname

var lparutil | 3 0 | sytcup.pctcpu

alert lparutil lpcp

level 90 red

level 95 red rev

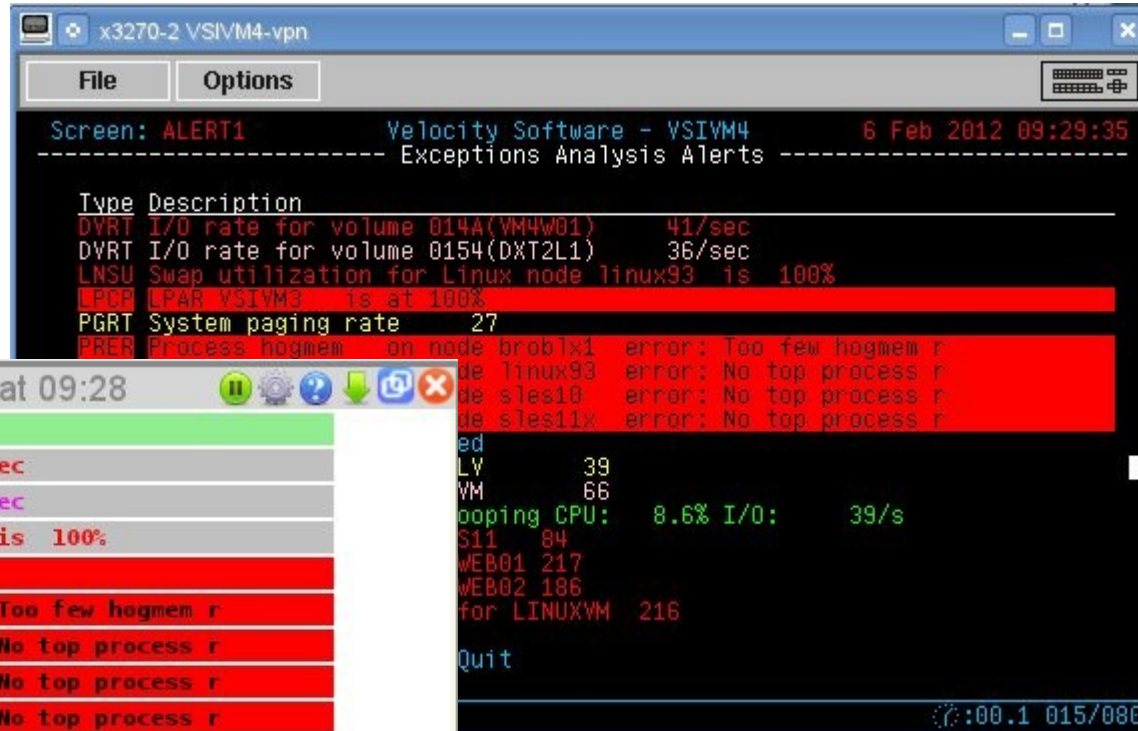
text LPAR utilization of &lparname is &lparutil%

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

Defining your own alert - LPAR

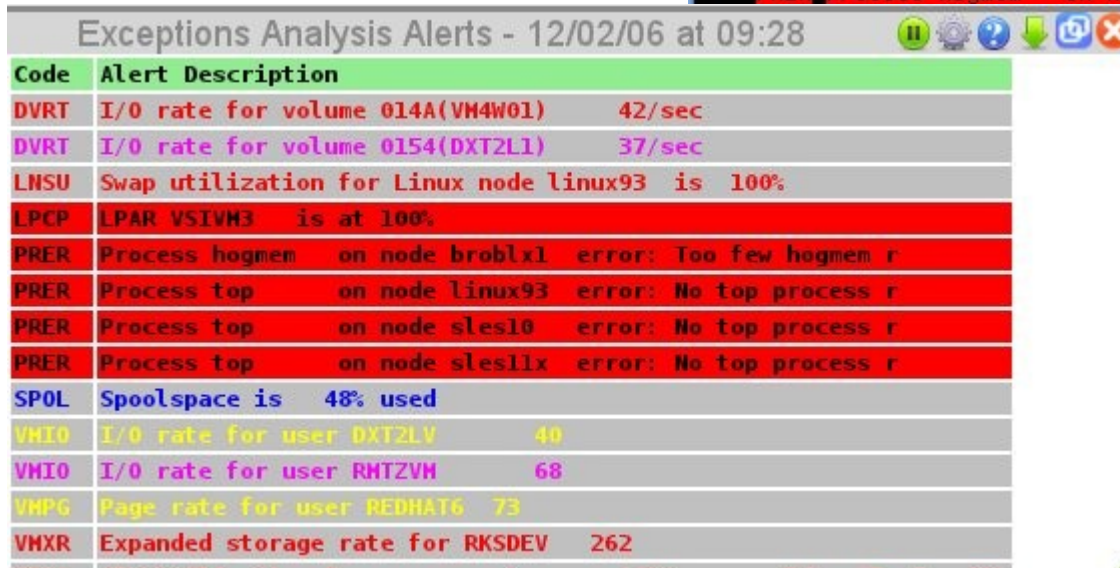
- Alert for LPAR Utilization display

3270 >



```
x3270-2 VSIVM4-vpn
File Options
Screen: ALERT1 Velocity Software - VSIVM4 6 Feb 2012 09:29:35
----- Exceptions Analysis Alerts -----
Type Description
DVRT I/O rate for volume 014A(VM4W01) 41/sec
DVRT I/O rate for volume 0154(DXT2L1) 36/sec
LNSU Swap utilization for Linux node linux93 is 100%
LPCP LPAR VSIVM3 is at 100%
PGRT System paging rate 27
PRER Process hogmem on node broblx1 error: Too few hogmem r
PRER Process top on node linux93 error: No top process r
PRER Process top on node sles10 error: No top process r
PRER Process top on node sles11x error: No top process r
Looping CPU: 8.6% I/O: 39/s
VM 66
S11 84
WEB01 217
WEB02 186
for LINUXVM 216
Quit
:00.1 015/080
```

zView v



Code	Alert Description
DVRT	I/O rate for volume 014A(VM4W01) 42/sec
DVRT	I/O rate for volume 0154(DXT2L1) 37/sec
LNSU	Swap utilization for Linux node linux93 is 100%
LPCP	LPAR VSIVM3 is at 100%
PRER	Process hogmem on node broblx1 error: Too few hogmem r
PRER	Process top on node linux93 error: No top process r
PRER	Process top on node sles10 error: No top process r
PRER	Process top on node sles11x error: No top process r
SPOL	Spoolspace is 48% used
VMIO	I/O rate for user DXT2LV 40
VMIO	I/O rate for user RHTZVM 68
VMPO	Page rate for user REDHAT6 73
VMXR	Expanded storage rate for RKSDEV 262

Defining your own alert – Complex operations

- **Numerous fields can be combined using math operations**

```
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

Time	Owner	Space Name	<--Size-->		<--pages-->		Prv	VIO	<AddSpce>			<-----pages/second----->				DASD	X-		
			AddSpc	VDSK	Resi-	Lock-			or	rate	Usr	Cre-	Del-	Sto-	<--DASD-->			Expanded	Storage
			Pages	Blks	dent	ed	Shr	/min	Lks	ates	etes	len	Read	Write	PGIN	PGOUT	Migr	Slots	Blks
17:20:00	LINUX001	VDISK\$LINUX001\$0202\$0048	16000	128K	0	0	Shr	0	1	0	0	0	0	0	0	0	0	12230	0
17:20:00	LINUX001	VDISK\$LINUX001\$0203\$0049	16000	128K	0	0	Shr	0	1	0	0	0	0	0	0	0	0	160	0
17:20:00	LINUX002	VDISK\$LINUX002\$0202\$002F	16000	128K	0	0	Shr	0	1	0	0	0	0	0	0	0	0	168	0
17:20:00	LINUX002	VDISK\$LINUX002\$0203\$0030	16000	128K	0	0	Shr	0	1	0	0	0	0	0	0	0	0	160	0
17:20:00	ZPRO01	VDISK\$ZPRO01\$\$\$0192\$0043	208	1664	0	0	Shr	0	1	0	0	0	0	0	0	0	0	12	0
17:20:00	ZPRO02	VDISK\$ZPRO02\$\$\$0192\$0044	208	1664	0	0	Shr	0	1	0	0	0	0	0	0	0	0	3	0
17:20:00	ZPRO03	VDISK\$ZPRO03\$\$\$0192\$0045	208	1664	0	0	Shr	0	1	0	0	0	0	0	0	0	0	3	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
```

- **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**

Extract

```
var page_use | 3 0 | (sytag.calslti1*100)/sytag.calslta1
```

```
alert page_use amsp
```

```
level 30 yellow
```

```
level 35 red ACTION CP MSGNOH ZVPS Page utilization is &page_use%
```

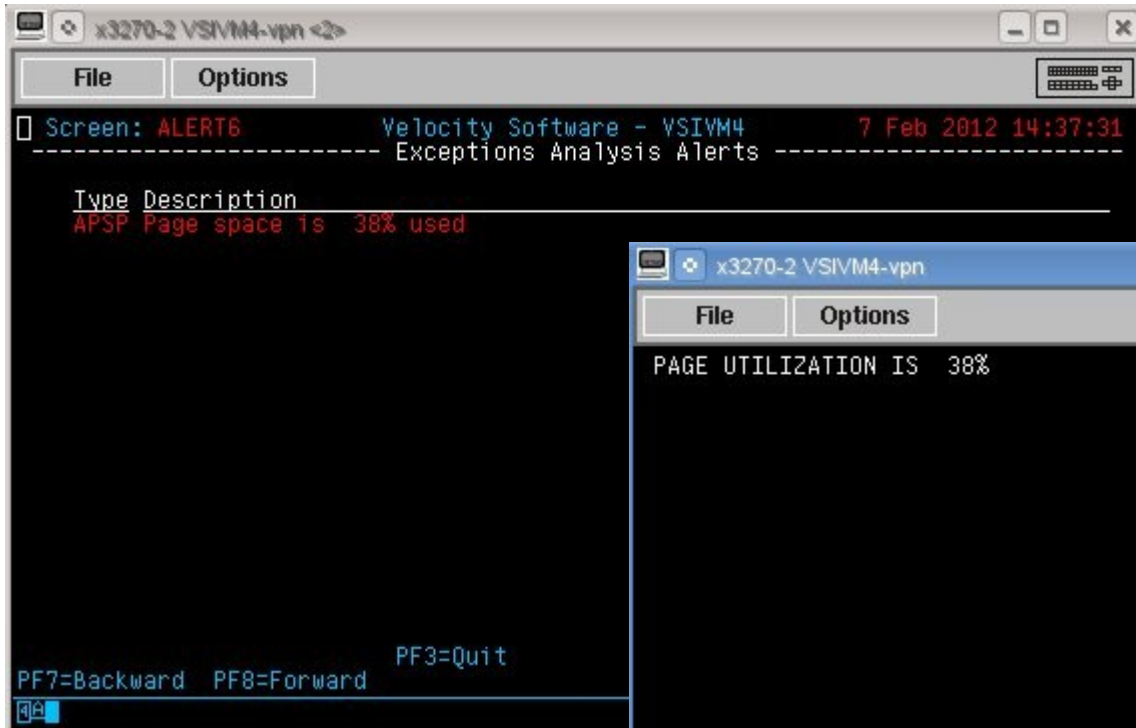
```
level 50 red rev
```

```
text Page space is &page_use% used
```

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

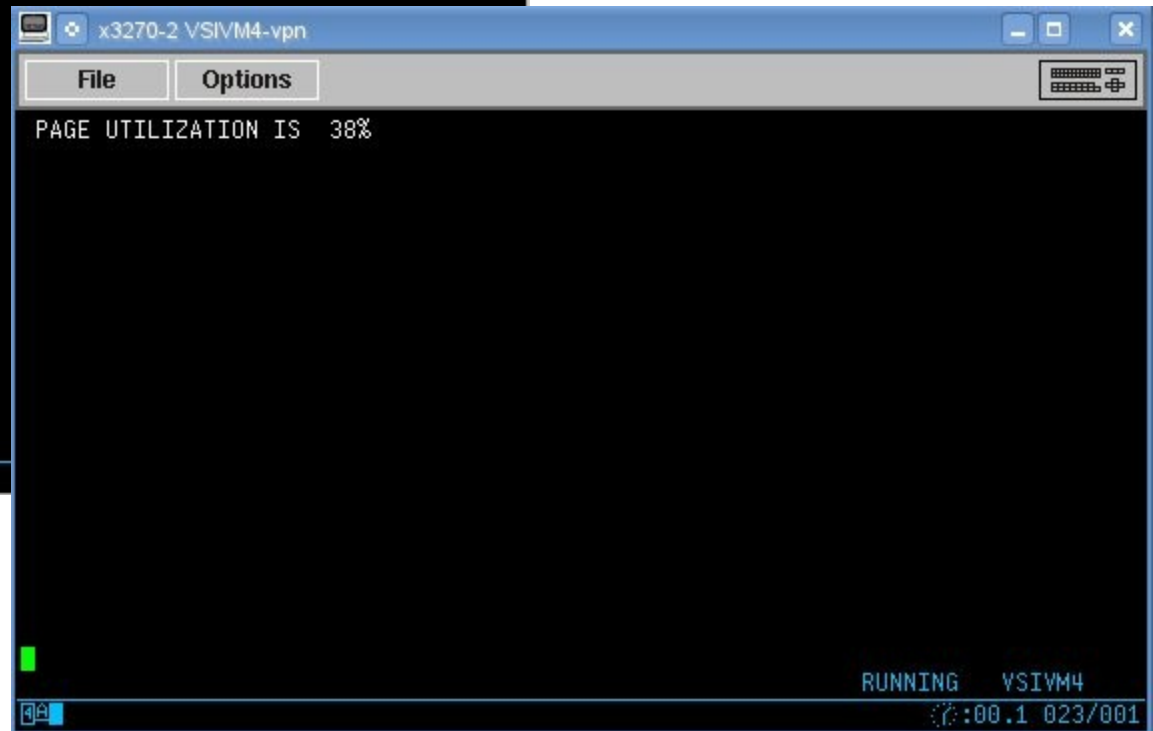
Notifications

- **Results of ACTION**



```
x3270-2 VSIWM4-vpn <>
File Options
Screen: ALERT6 Velocity Software - VSIWM4 7 Feb 2012 14:37:31
----- Exceptions Analysis Alerts -----
Type Description
APSP Page space is 38% used

PF7=Backward PF8=Forward PF3=Quit
```



```
x3270-2 VSIWM4-vpn
File Options
PAGE UTILIZATION IS 38%

RUNNING VSIWM4
(::00.1 023/001
```

- **A REXX EXEC can be invoked to send an email**

```
Extract
var  spool_use  | 3 0 | (sytag.calslti2*100)/sytag.calslta2

alert spool_use spol
level 50 yellow
level 75 red
level 85 red rev ACTION CMS EMAIL RKS2LV SPOL &spool_use
text Spool area utilization &spool_use%
```

Executes a CMS command -
EMAIL EXEC

- **A REXX EXEC can be invoked to send an email**

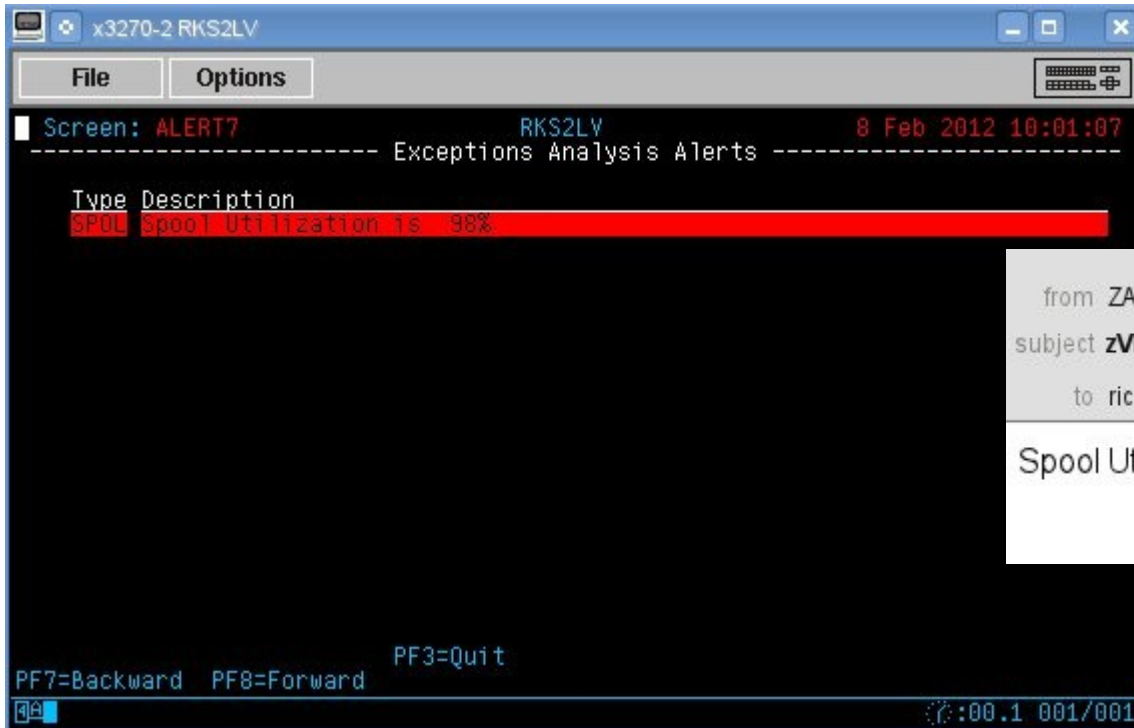
```
/* EMAIL: Sample EXEC to provide notify function */
parse arg node code value

Select
  When code='SPOL' then
    msg='Spool Utilization for 'node value'%'
  When code='XACP' then
    msg='CPU Utilization for 'node value'%'
  Otherwise
    exit
End

Queue 'input Subject: zVPS 'code' alert'
Queue 'input 'msg
Queue 'COMMAND CMS SENDFILE ( NOTE'
'EXEC NOTE rich@velocitysoftware.com (NONOTEBOOK'
exit
```

Notifications

- A REXX EXEC can be invoked to send an email



The screenshot shows a terminal window titled 'x3270-2 RKS2LV'. The window has a menu bar with 'File' and 'Options' buttons. The main display area shows the following text:

```
Screen: ALERT7 RKS2LV 8 Feb 2012 10:01:07
----- Exceptions Analysis Alerts -----
Type Description
SPOL Spool Utilization is 98%
```

At the bottom of the terminal, there are control instructions: 'PF7=Backward PF8=Forward PF3=Quit' and a status bar showing ':00.1 001/001'.

from ZALERT@RKS2LV.VELOCITYSOFTWARE.COM ☆
subject **ZVPS SPOL alert**
to rich@velocitysoftware.com ☆

Spool Utilization for RKS2LV 98 %

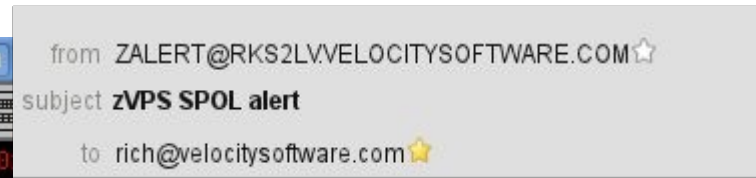
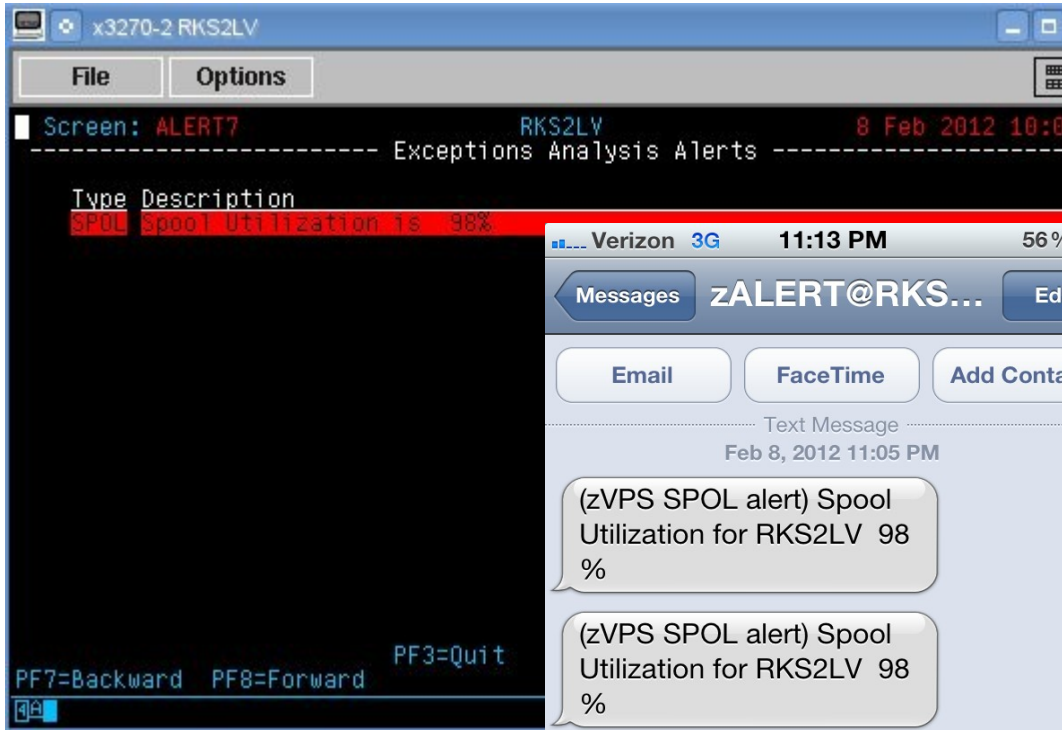
- **Cell phone text alerts**
 - ♦ Produced via an email message
 - ♦ Each carrier varies in their approach
 - ♦ List of Email to SMS gateways for most providers

<http://www.tech-faq.com/how-to-send-text-messages-free.html>

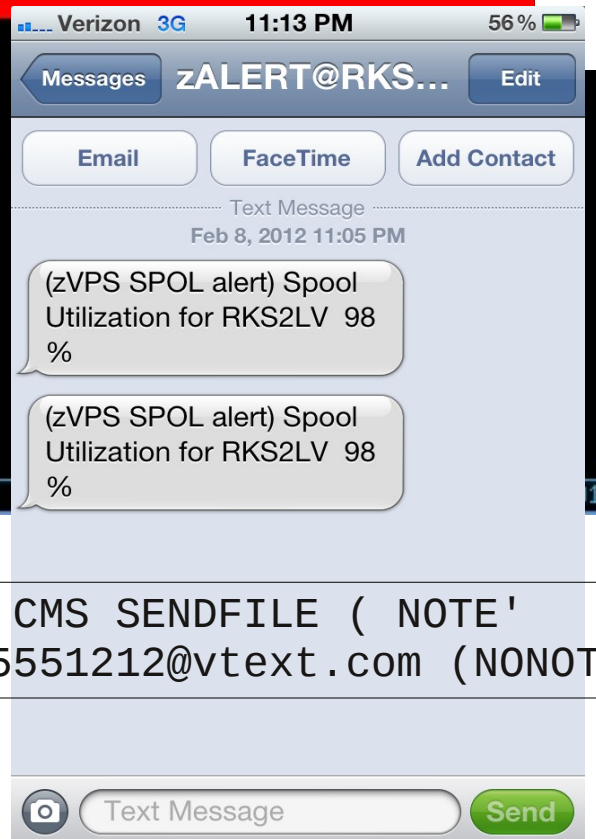
AT&T (formerly Cingular)	[10-digit-number]@txt.att.net
Sprint	[10-digit-number]@messaging.sprintpcs.com
T-Mobile	[10-digit-number]@tmomail.net
US Cellular	[10-digit-number]@email.uscc.net
Verizon	[10-digit-number]@vtext.com

Notifications

- SMS/Text Message sample



Spool Utilization for RKS2LV 98 %



Queue 'COMMAND CMS SENDFILE (NOTE '
'EXEC NOTE 2015551212@vtext.com (NONOTEBOOK'

- **SNMP Trap configuration**
 - ◆ Create/Modify SNMP TRAPDEST on the CONFIG disk
 - * following is default 1.3.6.1.4.1.15601
192.168.5.64 velocity 2B06010401F971 ;
 - ◆ Use the ALERT directive on the LEVEL command

```
Extract
var  spool_use  | 3 0 | (sytag.calslti2*100)/sytag.calslta2

alert spool_use spol
level 50 yellow
level 75 red
level 85 red rev ALERT VM (RKS2LV) Spool Utilization is &spool_use%
text Spool area utilization &spool_use%
```

- **SNMP Trap configuration**
 - ♦ Enterprise management consoles
 - NetCool, HP OpenView, CA-Unicenter TNG
 - ♦ Trap string can be generated in any required format for proper handling
 - ♦ Using a special code as the first token of the alert, trap payload is set specifically for management consoles

```
Extract
var spool_use | 3 0 | (sytag.calslti2*100)/sytag.calslta2

alert spool_use spol
level 50 yellow
level 75 red
level 85 red rev ALERT SPL002 VM (RKS2LV) Spool Utilization is &spool_use%
text Spool area utilization &spool_use%
```


Notifications

- SNMP Trap result

```
Received 97 bytes from UDP: [192.168.5.48]:1114
0000: 30 5F 02 01 00 04 08 76 65 6C 6F 63 69 74 79 A4 0_.....velocity.
0016: 50 06 07 2B 06 01 04 01 F9 71 40 04 C0 A8 05 30 P..+.....q@....0
0032: 02 01 06 02 01 00 43 04 00 00 00 0C 30 33 30 31 .....C.....0301
0048: 06 07 2B 06 01 04 01 F9 71 04 26 56 4D 20 28 52 ..+.....q.&VM (R
0064: 4B 53 32 4C 56 29 20 53 50 4F 4F 4C 20 55 54 49 KS2LV) SPOOL UTI
0080: 4C 49 5A 41 54 49 4F 4E 20 49 53 20 20 39 36 25 LIZATION IS 96%
0096: 20
```

```
2012-02-16 13:42:58 192.168.5.48(via UDP: [192.168.5.48]:1114) TRAP, SNMP v1, community
velocity
    VELOCITY-MIB::velocity Enterprise Specific Trap (0) Uptime: 0:00:00.12
    VELOCITY-MIB::velocity = STRING: "VM (RKS2LV) SPOOL UTILIZATION IS 96%"
```

Advanced topics

- **Limit**
- **Time**
- **Include/Exclude**
- **Multiple alerts**
- **External processing**

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 2 5 | serial
level 70    yellow
level 80    red
level 90    red rev ACTION CP MSG ZVPS &date &time 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 2 5 | serial
level 70 yellow
level 80 red
level 90 red rev ACTION CP MSG ZVPS &date &time Spool Util is
        &spool_use%
text Spool Utilization is &spool_use%
```

Key field

Number of intervals to delay executing ACTION

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

Continuation IS allowed

Advanced topics - Limit

- **This LIMIT directive:**

```
limit 2 5 | serial
```

- **Will delay ACTION for 2 intervals**
- **Execute ACTION for 5 intervals**
- **Repeat**
- **For example, when started at 11:52**

```
11:54:29 * MSG FROM ZALERT : 10 Feb 2012 11:54 SPOOL UTIL IS 95%
11:55:29 * MSG FROM ZALERT : 10 Feb 2012 11:55 SPOOL UTIL IS 95%
11:56:29 * MSG FROM ZALERT : 10 Feb 2012 11:56 SPOOL UTIL IS 95%
11:57:29 * MSG FROM ZALERT : 10 Feb 2012 11:57 SPOOL UTIL IS 95%
11:58:29 * MSG FROM ZALERT : 10 Feb 2012 11:58 SPOOL UTIL IS 95%
12:01:30 * MSG FROM ZALERT : 10 Feb 2012 12:01 SPOOL UTIL IS 95%
12:02:30 * MSG FROM ZALERT : 10 Feb 2012 12:02 SPOOL UTIL IS 95%
12:03:30 * MSG FROM ZALERT : 10 Feb 2012 12:03 SPOOL UTIL IS 95%
12:04:30 * MSG FROM ZALERT : 10 Feb 2012 12:04 SPOOL UTIL IS 95%
12:05:30 * MSG FROM ZALERT : 10 Feb 2012 12:05 SPOOL UTIL IS 95%
12:08:31 * MSG FROM ZALERT : 10 Feb 2012 12:08 SPOOL UTIL IS 95%
```

First message is delayed 2 intervals

Five intervals of ACTION

Two interval delay

Advanced topics - Time

- A time based alert defines one or more periods of the day that an alert is active
- The display of the alert is discontinued and any actions not executed

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

```
alert spool_use spol
time 07:00 to 11:00 | 13:00 to 17:00
level 70 yellow
level 80 red
level 90 red rev ACTION CP MSG ZVPS &date &time Spool Util is ,
      &spool_use%
text Spool Utilization is &spool_use%
```

Multiple times can
be specified

Timeframe for alert
to be active

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:**

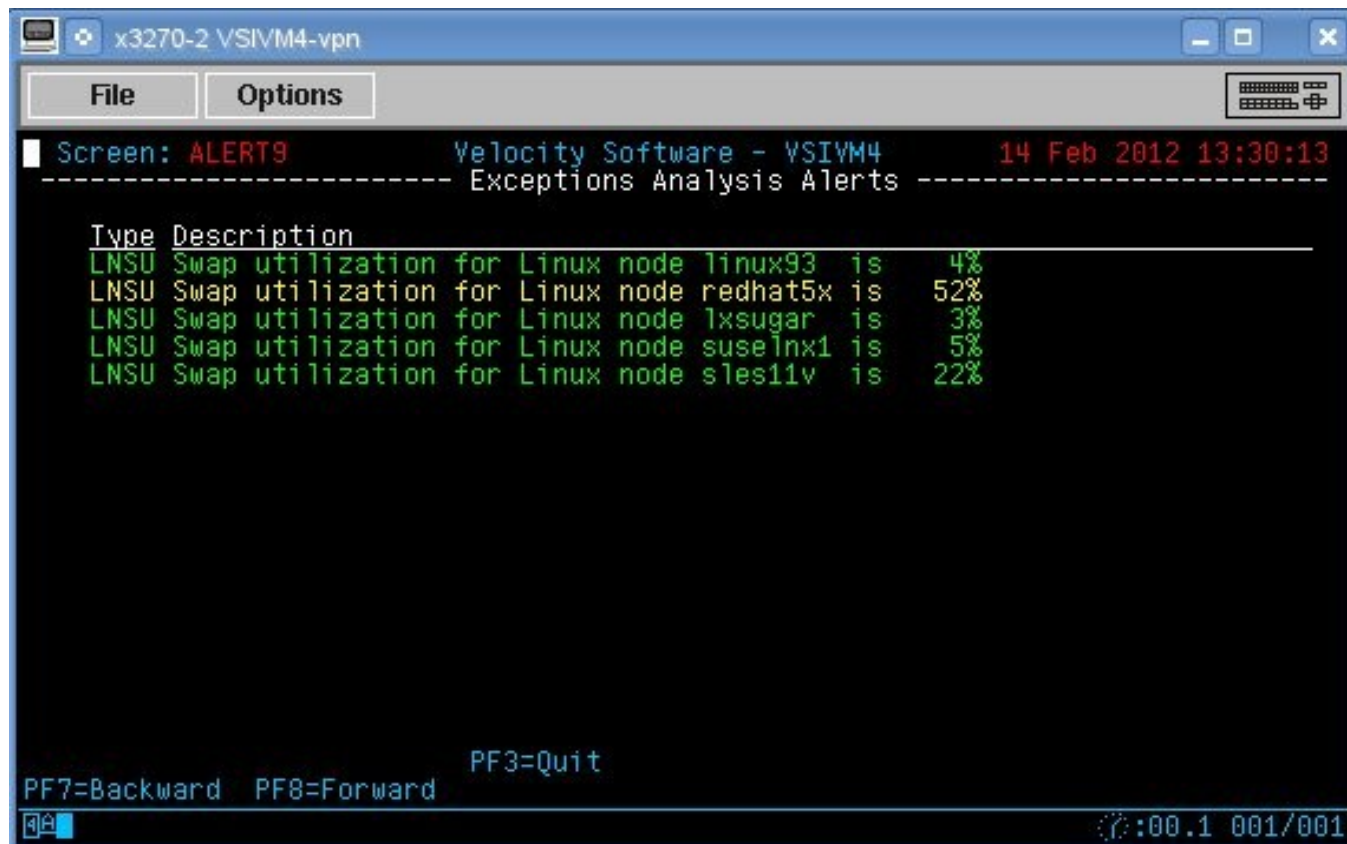
```
extract
parms node *
criteria ucdsys.swappct > 0
var      node      | 8      | tcpip.node
var      swapused  | 4 0   | ucdsys.swappct
```

All defined nodes
are made available

```
alert swapused Insu
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

- 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" and a status bar showing ":00.1 001/001".

Advanced topics – Include/Exclude

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

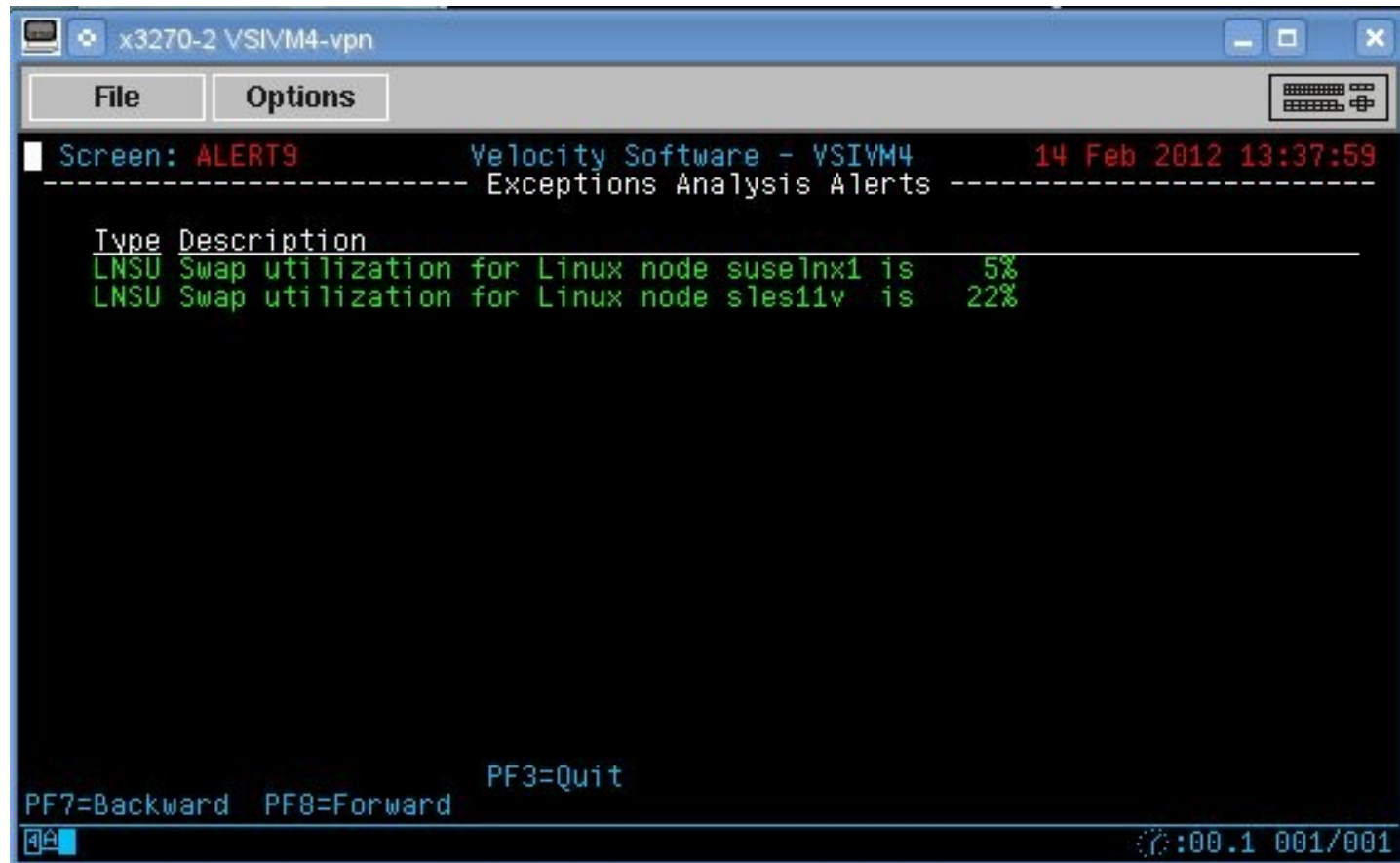
```
extract
parms node s*
criteria ucdsys.swappct > 0
var node | 8 | tcpip.node
var swapused | 4 0 | ucdsys.swappct
```

Only show nodes
beginning with 's'

```
alert swapused Insu
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 VSIWM4-vpn". The window has a menu bar with "File" and "Options" buttons. The terminal content is as follows:

```
Screen: ALERT9 Velocity Software - VSIWM4 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 bottom right shows a refresh icon, a timer at :00.1, and a counter at 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 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%
```

Variable used
for matching

List name
applied to alert

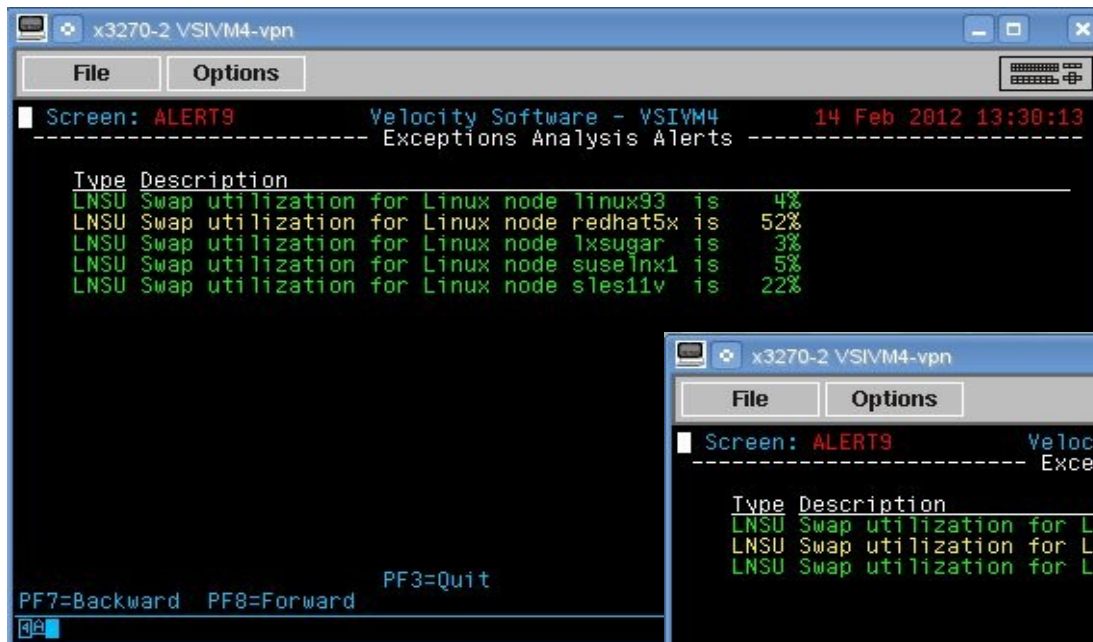
<filename> IXLIST

-SUB1-
linux93
sles11v
redhat5x
-END SUB1-

Include/Exclude
file name must
match the alert
file name

Advanced topics – Include/Exclude

- Results of Include file



x3270-2 VSIWM4-vpn

File Options

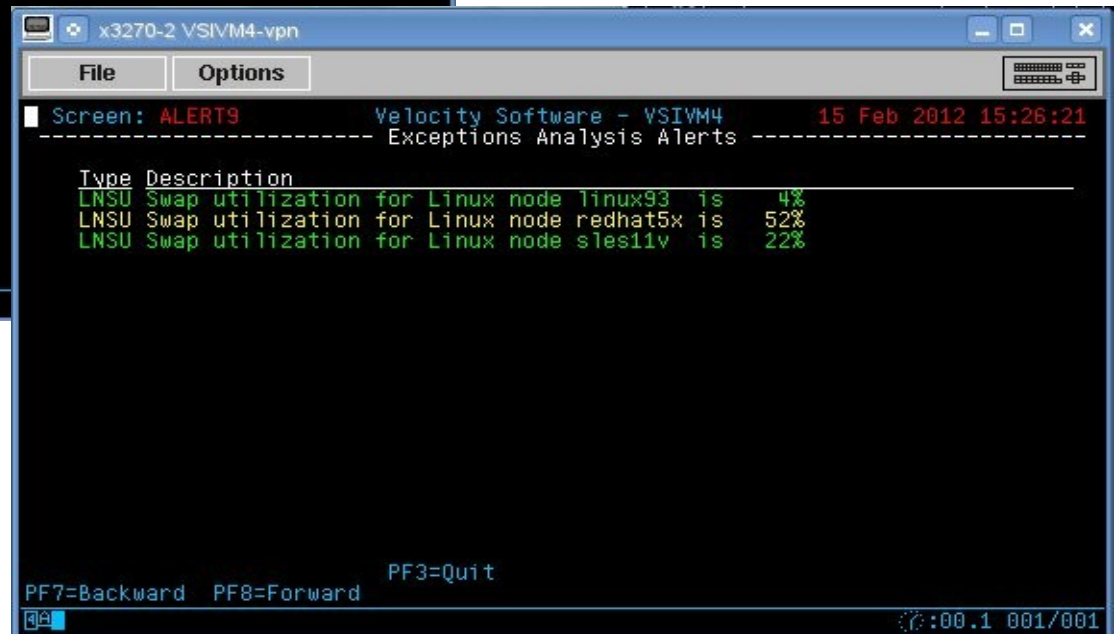
Screen: ALERT9 Velocity Software - VSIWM4 14 Feb 2012 13:30:13
----- Exceptions Analysis Alerts -----

Type	Description	is	%
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

Original display

Include applied



x3270-2 VSIWM4-vpn

File Options

Screen: ALERT9 Velocity Software - VSIWM4 15 Feb 2012 15:26:21
----- Exceptions Analysis Alerts -----

Type	Description	is	%
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.swappct > 0
var      node      | 8    | tcpip.node
var      swaprate  | 6 1 | ucdsys.swaprate
var      swapused  | 4 0 | ucdsys.swappct

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

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


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
```

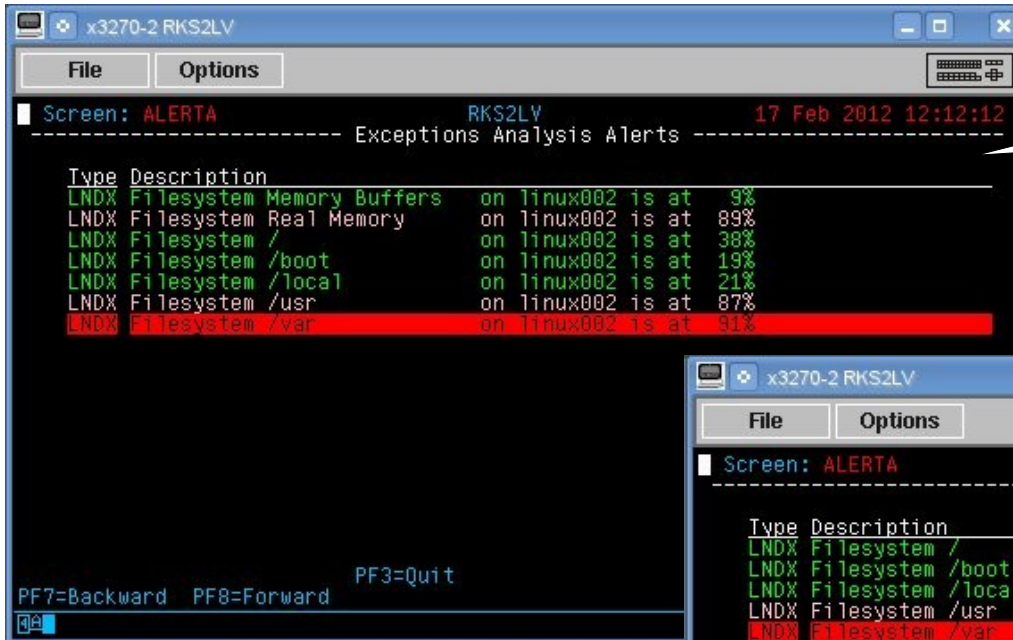
```
if left(descr,6) = '/media' then  
  pct = 0
```

```
return pct
```

Value returned
to the alert

Advanced topics – External Processing

- Results of function call



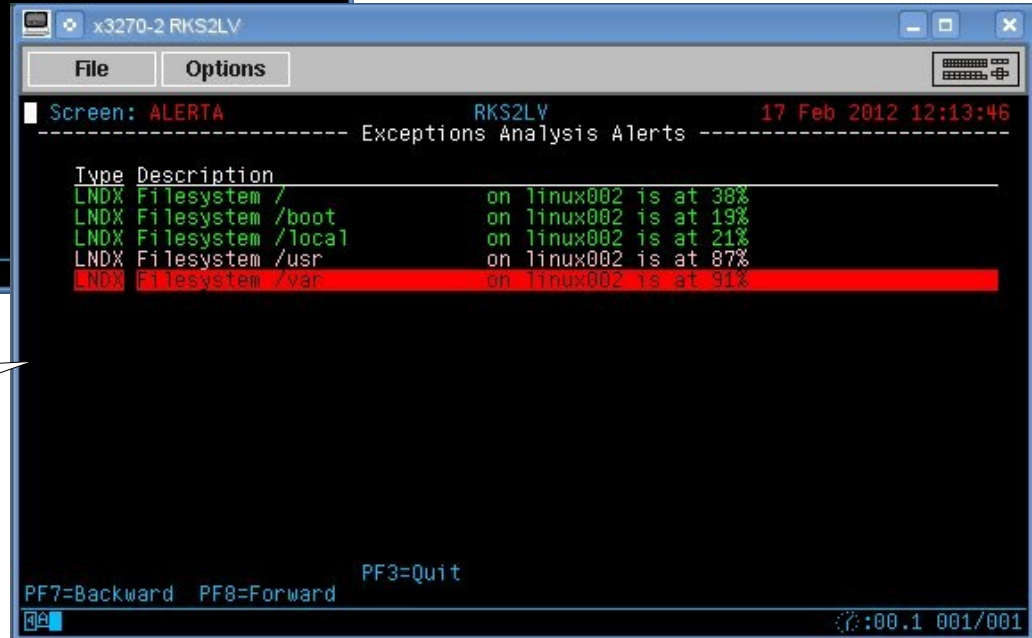
A screenshot of a terminal window titled 'x3270-2 RKS2LV'. The window has a menu bar with 'File' and 'Options'. The main content area shows a header 'Screen: ALERTA' and 'RKS2LV' with a timestamp '17 Feb 2012 12:12:12'. Below this is a section titled 'Exceptions Analysis Alerts'. A table lists system metrics:

Type	Description	on linux002 is at	%
LNDX	Filesystem Memory Buffers	9%	
LNDX	Filesystem Real Memory	89%	
LNDX	Filesystem /	38%	
LNDX	Filesystem /boot	19%	
LNDX	Filesystem /local	21%	
LNDX	Filesystem /usr	87%	
LNDX	Filesystem /var	91%	

At the bottom, there are keyboard shortcuts: 'PF7=Backward PF8=Forward PF3=Quit'.

Original display

With DISKPCT EXEC



A second screenshot of the terminal window, showing the same data as the first but with updated values. The timestamp is now '17 Feb 2012 12:13:46'. The table of system metrics is:

Type	Description	on linux002 is at	%
LNDX	Filesystem /	38%	
LNDX	Filesystem /boot	19%	
LNDX	Filesystem /local	21%	
LNDX	Filesystem /usr	87%	
LNDX	Filesystem /var	91%	

The bottom of the window shows 'PF7=Backward PF8=Forward PF3=Quit' and a status bar at the very bottom with '00:00.1 001/001'.

Advanced topics – External Processing

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

```
extract
```

```
var    dummy    | 1 | 1  
stage procchk   | 50 |
```

Size of returned value

```
alert dummy xmvm  
level 0 red  
text &procchk
```

Name of the stage
and returned value

- **Written as a pipe stage**

- ♦ Using CALLPIPE to invoke pipes and return value(s)
- ♦ Can execute zMON extracts

```
/* Return msg stem to caller */  
msg.0 = m  
'CALLPIPE stem msg. | *:'
```

Advanced topics – More External Processing

- **Check for 'node down'**

```
extract
parms node *
criteria hstsys.iplyy > 0
var      nodenm      | 8 | tcpip.node
var      samples     | 1 | hstsys.samples
function nodedn     | 2 | &nodenm &samples

alert nodedn lxup
level 0 red
text Node &nodenm is down
```
- **No value in 'samples' indicates down**
- **Level works with greater than only**
- **Function is required for further processing**

Advanced topics – More External Processing

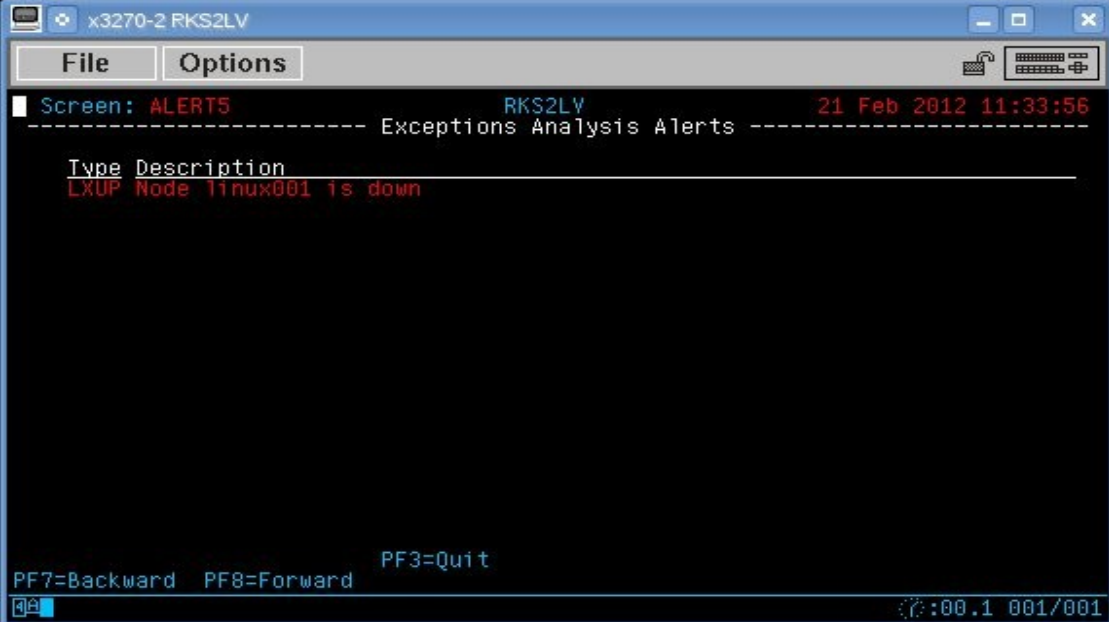
```
extract
parms node *
criteria hstsys.iplyy > 0
var      nodenm    | 8 | tcpip.node
var      samples   | 1 | hstsys.samples
function nodedn   | 2 | &nodenm &samples

alert nodedn lxup
level 0 red
text Node &nodenm is down
```

```
/* NODEDN: Alert function to check
The interval samples for each
passed node. If samples is null,
return 1 to the alert. */
parse arg node samples

if samples >= 0 then
    return 0
else
    return 1
```

- **Pass 'samples' from each node**
- **If ≥ 0 return 0**
- **Otherwise return 1**
- **Level checks for >0**



The screenshot shows a terminal window titled 'x3270-2 RKS2LV'. The window has a menu bar with 'File' and 'Options'. The main display area shows the following text:

```
Screen: ALERT5 RKS2LV 21 Feb 2012 11:33:56
----- Exceptions Analysis Alerts -----
Type Description
LXUP Node 1linux001 is down
```

At the bottom of the terminal, there are status indicators: 'PF7=Backward PF8=Forward PF3=Quit' and a progress indicator '0:00.1 001/001'.

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



Rich Smrcina
Velocity Software, Inc
rich@velocitysoftware.com