Using Unicenter VM:Operator To Manage Linux Servers

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Session 9146
Abstract

For some sites, moving to Linux on the zSeries means adding VM to your enterprise. For others, it just means a new use for an existing platform. Through the use of your existing CA VM management tools, this session will discuss how you can leverage your existing VM:Operator product to assist you in administering and managing your Linux environment.
Agenda

• VM:Operator Function Review
• Implementing Common Functions For Linux Servers
• Useful VM:Operator Macros
• Summary
Unicenter VM:Operator

- Automates VM console management
  - Allows a secondary operations console to work and function like an z/OS console
  - Automated message routing and filtering manager
  - Execution of action routines when specific messages received

- Consolidates system activity logs
  - Historical review of current and previous day activities

- Provides windows into VM service virtual machines
  - Window manager for all virtual Linux servers
Unicenter VM:Operator

- Windows into other processes arranged in a ‘ring’
  - Use pre-assigned PF keys or VIEW command to move from one window to another

- Supports remote access for system programmers
  - Share the operator console with authorized users
  - Separate message routing and action tables based upon system programmer needs
  - Invoked with the VMYIAMOP Utility
Primary Operations Console

Use **ViewNext** key to go to next window in the ring

Use **ViewPrev** key to go to previous window in the ring

Use **Review** PF key to go to message activity logs
Click on view and follow link to header & footer to enter Copyright and Author information (including session number) per VMREV120R.

Activity Review Window

REVIEW 000% 9 Users VM:Operator Monday 21Jul03 08:36
VMYREV119I Reviewing: 030720 SYSLOG Backward scrolling

22:54:12 MAINOPER 00 VMYIOS040A Not operable on virtual device 0009.
22:54:12 OPERATOR *3 DISCONNECT AT 22:54:12 EDT SUNDAY 07/20/03
22:54:37 OPERATOR *3 AUTO LOGON *** LINUXRAA USERS = 3 BY AUTOLOG1
22:54:37 OPERATOR *3 AUTO LOGON *** VMDIRECT USERS = 4 BY AUTOLOG1
22:54:37 OPERATOR *3 AUTO LOGON *** TCPPIP USERS = 5 BY AUTOLOG1
22:54:37 AUTOLOG1 *1 AUTOLOG1 PROFILE EXEC COMPLETED AT: 20 JUL 2003
22:54:37 OPERATOR *3 USER DSC LOGOFF AS AUTOLOG1 USERS = 4
22:54:37 OPERATOR *3 AUTO LOGON *** VMTAPE USERS = 5 BY AUTOLOG1
22:54:37 OPERATOR *3 AUTO LOGON *** VMSPPOOL USERS = 6 BY AUTOLOG1
22:54:39 VMSPPOOL *1 VMLCFG023I VMSPPOOL initialization complete on 07/20/03.
22:54:40 VMDIRECT *1 22:54:40 VMXDXR0065I Directory contains 58 users, 2 profile
22:54:40 VMDIRECT *1 22:54:40 VMXDXR0294I The directory contains 357 total pages
22:54:40 VMDIRECT *1 22:54:40 VMXDXR0182I A Quick Start of the object directory
22:54:40 VMDIRECT *1 22:54:40 -------------------------------------------
22:54:40 VMDIRECT *1 22:54:40 VMXLIE0268W User 'VMR06' does not exist.
22:54:40 VMDIRECT *1 22:54:40 VMXLIE0268W User 'VMR08' does not exist.

PF set 2 --------------------------------- System Review ---------------------------
1= Top 2= Refresh 3= Return 4= Prev Day 5= Next Day 6= Retrieve
7= Backward 8= Forward 9= Extract 10= AltPFkey 11= Print 12= Today
VMYREV120R Enter search string:  

VMRMAINT
The “Ring”
VM:Operator Control Files

Unicenter VM:Operator control files identify the general attributes of the VM:Operator system and define how it is configured. The VM:Operator control files are:

- VMOPER CONFIG
- CONSOLE files
- USERID files
- INCLUDE files
- Routing tables (LOGTABLE, SYSTABLE, and SECTABLE)
- User exits
- HOLDMSG files
- Session files
VM:Operator CONSOLE Files

• CONSOLE files are CMS files that reside on a minidisk accessed by VM:Operator
  • The installation process provides you with an initial CONSOLE file called MAINOPER CONSOLE. It can be modified or other CONSOLE files created

• Every console identified in your VM:Operator configuration file or attached to the userid running VM:Operator requires its own CONSOLE file specifying
  • Which windows are to run on the console
  • Which sessions are to run on the console
  • The virtual address and spooling parameters of the optional printer to be used by the console
VM:Operator INCLUDE Files

- INCLUDE files specify Unicenter VM:Operator window characteristics including
  - Processes (what is the purpose of the window)
  - Program function key settings
  - Color settings
  - Reserved window text lines
VM:Operator Routing Tables

- Routing tables are lists of entries that map message templates with actions.

- Three types of Unicenter VM:Operator routing tables
  - The LOGTABLE routing table is a front-end routing table defined in the Unicenter VM:Operator configuration file
  - The SYSTABLE routing table provide you with the tools to customize SYSTEM window message displays
  - The SECUSER routing table provide you with the tools to customize SECUSER window message displays
Benefits for Linux Servers

- Centralized Linux console management
  - Make use of existing windowing capabilities for all Linux virtual machines
  - Alleviates need to Telnet into Linux virtual server for simple administrative tasks

- Real-time and historical review of VM Linux userid message traffic
  - Includes all initialization and shutdown messages

- Automate Linux administration and provisioning processes
  - Automate initialization and shutdown of virtual Linux servers
  - Automate update of network configuration information
Consolidated Linux Console

```
SYSLINX 00%  9 Users  VM: Operator Thursday 22Aug02 11:32

linuxraa ls -l | more
LINUXRAA: ls -l | more
LINUXRAA: total 68
LINUXRAA: drwxr-xr-x  18 root root  4096 Aug  6 13:07 ..
LINUXRAA: -rw-------  1 root root  7356 Aug 22 11:13 .bash_history
LINUXRAA: -rw-r--r--  1 root root  1124 Feb 28 2000 .exrc
LINUXRAA: drwx--x--x  2 root root  4096 Jul 11 11:28 .gnupg
LINUXRAA: -rw-------  1 root root  14532 Jul 17 22:34 .pinerc
LINUXRAA: -rw-r--r--  1 root root  403 Jul 11 12:15 .thrc
LINUXRAA: -rw-r--r--  1 root root  2186 Apr 11 2001 .xinitrc
LINUXRAA: -rw-r--r--  1 root root  0 Aug 12 15:44 INFO
LINUXRAA: drwx------  2 root root  4096 Jul 17 22:34 Mail
LINUXRAA: -rw-r--r--  1 root root  0 Aug 12 15:44 WAKE_UP
LINUXRAA: drwxr-xr-x  3 root root  4096 Aug 21 16:54 beb
LINUXRAA: drwxr-xr-x  2 root root  4096 Jul 11 11:28 bin
LINUXRAA: drwxr-xr-x  2 root root  4096 Aug 21 16:13 eac
LINUXRAA: -rw-r--r--  1 root root  29 Jul 17 23:02 more
LINUXRAA: LinuxRAA:~ #
```

```
-------------------------------------------------------------- Linux Console --------------------------------------------------------------
1= ViewNext    2= Review    3= ViewPrev    4= RemvLine  5= Remv All  6= Retrieve
7=            8=            9= Repeat  10= Print  11= Expand  12= Remv Top
```
Reviewing Linux Activity

15:04:29 LINOPER 05 VMYINI006I 0.000 Ready;
15:04:29 LINUXRAA *8 shutdown -h now
15:04:30 LINUXRAA *8
15:04:30 LINUXRAA *8 Broadcast message from root (console) Wed Aug 21 15:04:29 2
15:04:30 LINUXRAA *8
15:04:30 LINUXRAA *8 The system is going down for system halt NOW !!
15:04:30 LINUXRAA *8 LinuxRAA:~ # INIT: Switching to runlevel: 0
15:04:30 LINUXRAA *8 INIT: Sending processes the TERM signal
15:04:31 LINUXRAA *8 bldgd: boot logging disabled
15:04:31 LINUXRAA *8 Master Resource Control: previous runlevel: 3, switching to
15:04:33 LINUXRAA *8 Shutting down httpd
15:04:33 LINUXRAA *8 ..failed
15:04:33 LINUXRAA *8 Shutting down CRON daemon
15:04:33 LINUXRAA *8 ..done
15:04:34 LINUXRAA *8 Shutting down Name Service Cache Daemon
15:04:34 LINUXRAA *8 ..done
15:04:34 LINUXRAA *8 Shutting down lpd
15:04:35 LINUXRAA *8 ..done

PF set 2 -------------------------------- System Review --------------------------------
1= Top 2= Refresh 3= Return 4= Prev Day 5= Next Day 6= Retrieve
7= Backward 8= Forward 9= Extract 10= AltPFkey 11= Print 12= Today

VMYREV120R Enter search string: _ LINOPER
Linux Server Window

LINUXRAA 000% 9 Users VM: Operator Thursday 22Aug02 11:39
VMYSEC054I SCIF userid: LINUXRAA Status: RUNNING
Shutting down Name Service Cache Daemon..done
Shutting down lpd
..done
Shutting down service at daemon:..done
Shutting down SMTP port:
..done
Shutting down RPC portmap daemon..done
Shutting down SSH daemon:..done
Shutting down syslog services
..done
Shutting down routing
..done
Shutting down network device ctc0..done
Saving random seed..done
Running /etc/init.d/halt.local
..done
Sending all processes the TERM signal...
..done

--------------------------- LinuxRAA Window ---------------------------
1= ViewNext  2= Review  3= ViewMain  4=  5=  6= Retrieve
7=  8=  9= Repeat  10= Print  11= Expand  12= Remv Top

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24/006
Linux Console Definitions

- **LINOP CONSOLE**
  - SYSTEM Window
  - REVIEW Window
  - SECUSER Window
  - REVIEW Window

**PROCESS MAIN**
- All Linux servers will be SECUSER’d into SYSTEM and REVIEW windows

**PROCESS REVERT**
- Create a pair of SECUSER and REVIEW windows for all priority Linux servers

Click on view and follow link to header & footer to enter Copyright and Author information (including session number)
Transforming The “Ring”

Click on view and follow link to header & footer to enter
Copyright and Author information (including session number)
Transform a Colony Into A Ring

1. Install a second VM:Operator machine
2. Modify traditional SYSTEM window into a consolidated Linux server window
3. Specify REVIEW window for all Linux server activity
4. Create individual windows for choice Linux servers

Don’t forget to create your own VMYIAMOP USERID files for the new VM:Operator system
Installation Steps

1. Create VM userid that mirrors system operator userid
   - Typically use LINOPER as userid
   - Specify link to VMRMAINT 154 minidisk
   - Allocate a new 1D0 minidisk to serve as SYSLOG minidisk

2. Update VMRMAINT CONFIG to reference new VM:Operator instance

3. Create new LINOPER MDISKs file on VMRMAINT 192 minidisk

4. Ensure PROFILE EXEC invokes VMISTART routine
LINOPER Architecture

VMRMAINT
191 minidisk
192 minidisk
193 minidisk
154 minidisk

LINOPER
191 minidisk
192 minidisk
1D0 minidisk
1FF minidisk

LOCAL
Program Material
SYSLOGs

VMISTART and LMP material

Click on view and follow link to header & footer to enter
Copyright and Author information (including session number)
LINOPER Directory Entry

USER LINOPER LINOPER 32M 32M ABEG 64
ACCOUNT 99999999 GENERAL
*AC= 99999999
MACHINE ESA
IPL CMS PARM AUTOCR
IUCV ANY MSGLIMIT 255
IUCV ALLOW
OPTION MAXCONN 512 MAINTCCW
CONSOLE 0009 3215
SPOOL 00C 2540 READER *
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A
LINK MAINT 190 190 RR
LINK MAINT 19E 19E RR
LINK VMRMAINT 154 192 RR
LINK VMRMAINT 192 1FF RR
MDISK 191 3390 211 5 SPACE MR
MDISK 1D0 3390 216 5 SPACE MR

VM:Operator Program Material
VM:Operator LOCAL minidisk
VM:Operator SYSLOG minidisk
**VMRMMAINT CONFIG**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VM:ACCOUNT</th>
<th>VMACCT</th>
<th>0212</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT</td>
<td>VM:SPOOL</td>
<td>VMSPOOL</td>
<td>0212</td>
</tr>
<tr>
<td>PRODUCT</td>
<td>VM:BACKUP</td>
<td>VMBACKUP</td>
<td>0212</td>
</tr>
<tr>
<td>PRODUCT</td>
<td>VM:OPERATOR</td>
<td>VMOPER</td>
<td>0212</td>
</tr>
<tr>
<td>PRODUCT</td>
<td>VM:OPERATOR</td>
<td>LINOPER</td>
<td>0212</td>
</tr>
</tbody>
</table>

Specify new userid here as 3\textsuperscript{rd} token

Copy release designator as 4\textsuperscript{th} token
LINOPER MDISKS

*-------------------------------------------------------
* This file identifies the minidisks associated with
* the VM:Operator Service Virtual Machine named LINOPER.
*-------------------------------------------------------

* The record format is:
*
* KEYWORD     OWNERID   VADDR  RPASS    WPASS    MPASS

LOCAL       LINOPER   191    VMRPASS  VMRPASS
VMSI        VMRMAINT  154    VMRPASS  VMRPASS
SYSLOG      LINOPER   1D0    VMRPASS  VMRPASS
LINOP CONSOLE

* Following are windows organized in a ring. You pass
* to the next window by pressing the PF1 key.

INCLUDE SYSLIN
INCLUDE LAPC045
INCLUDE LDB2023
INCLUDE LWEB010
PF1 VIEWMAIN

*-Following are "review" windows NOT chained in a ring.

INCLUDE REVIEW
INCLUDE RLAPC045
INCLUDE RLDB2023
INCLUDE RLWEB010
Sample SECUSER INCLUDE

*This file defines a Linux DB2 SECUSER window. It references
*a REVIEW window defined in Ruserid INCLUDE and uses the
*Luserid SECTABLE routing table.

WINDOW LDB2023
PROCESS SECUSER LDB2023 NOTIME HILIGHT SECTABLE LDB2023

COLOR TITLE BLUE WHITE
COLOR FIXED WHITE BLUE
COLOR BKGROUND GREEN
COLOR HILIGHT WHITE
COLOR PREHOLD RED HOLDING RED BLINK
COLOR INPUT UNDERLINE GREEN WHITE

PF1 VIEWNEXT
PF2 VIEW RLDB2023 REFRESH TODAY

...
Routing Table Hints

• **LOGTABLE**
  - Do not suppress display of *8 IUCV messages
  - Add SPAWN records for new Linux macros

• **SYSTABLE**
  - IGNORE all IUCV Class 1-7 messages so that only SECUSER messages (IUCV class *8) display
  - VM:Operator process messages will still display

• **SECTABLE**
  - Specify NOTIME parameter so that you don’t have to account for time stamps when matching messages
Sample LOGTABLE Entries

SPAWN LINLOGOF MSG * *8 1 HCPGSP2630I
SPAWN LINLOGON MSG * *8 1 We are running under VM
SPAWN UPNETLIN MSG * *1 1 UPNETLIN

MSG * *8

*IGNORE MSG * *8
Communicating With Servers

• **Choice 1**
  - Create a VM:Operator macro for each Linux server
  - Macro name must match each Linux server
    `ldb2023 shutdown –h now`

• **Choice 2**
  - Create a single VM:Operator macro that requires you to specify Linux userid as part of command
    `linux ldb2023 shutdown –h now`
One Userid – One Macro Example

LDB2023   VMOPER   G1   F 80   Trunc=80 Size=8 Line=0 Col=1 Alt=0

====>

* * * Top of File * * *

/*-------------------------------------------------------------------
VM:Operator dialog to communicate with the specified Linux guest
machine via SCIF
--------------------------------------------------------------------*/

parse arg command
parse source with . linuxServer .
foo = diag(8, 'SEND' linuxServer command)
exit 0

* * * End of File * * *
Linux Management Routines

- **STARTLIN/SHUTLIN VMOPER macros**
  - Used to startup or shutdown one or more virtual Linux servers

- **GETLDATA EXEC**
  - Used to read ULINUX DATA file for server information

- **CLONELIN EXEC**
  - Used to interface with VM:Director to create new Linux servers based upon template directory definitions and to interface with VM:Backup HiDRO to restore Linux master file systems to the new userid

- **UPNETLIN VMOPER macro**
  - Used to update network configuration information after new Linux userid has been defined and files (DASD) restored

Note: These routines are not included as part of the product – contact the speaker for copies
<table>
<thead>
<tr>
<th>LDB2023</th>
<th>linux</th>
<th>Susetb01 maint tcaratac test</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDB2023</td>
<td>comm</td>
<td>CTCA 3002 3003 TCPIP</td>
</tr>
<tr>
<td>LDB2023</td>
<td>disk</td>
<td>LI9M01.191.60 LI9M01.200.3200 LI9M01.201.3337 LI9M01.0202.3339</td>
</tr>
<tr>
<td>LDB2023</td>
<td>tcpip</td>
<td>limaintb.int.east.com 167.68.141.1 255.255.255.255 167.68.40.1</td>
</tr>
</tbody>
</table>
STARTLIN/SHUTLIN Macros

• Macros used to start up or shutdown Linux server farms
  • Uses configuration data in ULINUX DATA file on LINUX record

• STARTLIN starts up 8 servers at a time

• SHUTLIN shuts down all servers
  • Logs off server after shutdown is complete

• Both macros allow you to start up or shutdown:
  • Specific servers
  • Test servers
  • Production servers
CLONELIN Macro

- Create master Linux images
  - VM directory images [VM:Director]
  - DASD backups for Linux file systems [VM:Backup]

1. Clones new image from base directory entry
   - Use VM:Director ADDENTRY and ADDMDISK commands
   - Restore file systems from DASD backups

2. Use VM:Backup restore templates to restore data to new server

3. Automate networking configuration to specify new TCPIP settings with VM:Operator via UPNETLIN macro
UPNETLIN Macro

- Automates process of modifying network configuration information
- Reads ULINUX DATA file to obtain
  - TCPIP data
  - Hostname
  - IP address
  - Mask value
  - Gateway IP address
- Uses Perl to update configuration files
  - Easier than using VM:Operator DIALOG commands to modify files
Automate Linux Configuration

UPNETLIN VMOPER A1 V 80 Trunc=80 Size=259 Line=169 Col=1 Alt=0

===>

/* --------------------------------------------------------------

Step 2: Make a copy of the chandev.conf file

ADDRESS 'COMMAND' 'CP SEND ' reqLinuxID ,
    'cp chandev.conf chandev.confback'
 'TEST PROCESS WAIT 2'

/* --------------------------------------------------------------

Step 3: Change CTC0 addresses 3000 and 3001 to new CTCA

ADDRESS 'COMMAND' 'CP SEND ' reqLinuxID ,
    "perl -i -p -e 's/ctc0,0x3000,0x3001,0,0/",
        ||"ctc0,0x"||ctcaA||",0x"||ctcaB||",0,0/g;' chandev.conf'
 'TEST PROCESS WAIT 2'

/* --------------------------------------------------------------

Step 4: Copy rc.config and change IP address

ADDRESS 'COMMAND' 'CP SEND ' reqLinuxID ,
    'cp rc.config rc.config.back'
 ADDRESS 'COMMAND' 'CP SEND ' reqLinuxID ,
Summary

- Current VM:Operator features can be used to manage new Linux server farm
- Consolidated Linux SYSTEM window provides single management point
- Use SECUSER windows only for critical Linux servers
- Using VM:Operator macros can ease administrative tasks
Questions
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