



Using Unicenter VM: Operator To Manage Linux Servers

- Brian Jagos

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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

SYSTEM 005% 8 Users VM: Operator Sunday 29Jun03 16:36

```
VMYBEG001I VM:Operator (R) Copyright 1994, Computer Associates.  
VMYBEG002I VM:Operator 2.5B G0212 SP01, 1793 pages available, load point = 00E1F  
VMYCFG206I Loading LOG routing table ZVMRAA.
```

```
PRT 0010 DEFINED
```

```
VMYMAI176I SYSTEM routing table loaded for SYS
```

```
Console Total Heap Stack Buffers
```

```
SYSTEM
```

```
MAINOPER
```

```
VMYQST117I
```

```
VMYCFG023I Initialization completed 10:04:00 007:00
```

```
16:35:11 VMLSYS040W Spool space is 87.21
```

```
VMLSYS040W Spool space is 87.21
```

```
16:35:41 VMLSYS040W Spool space is full, steady.
```

```
----- SYSTEM Window -----
```

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

```
==>
```

```
MAINOPER
```

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

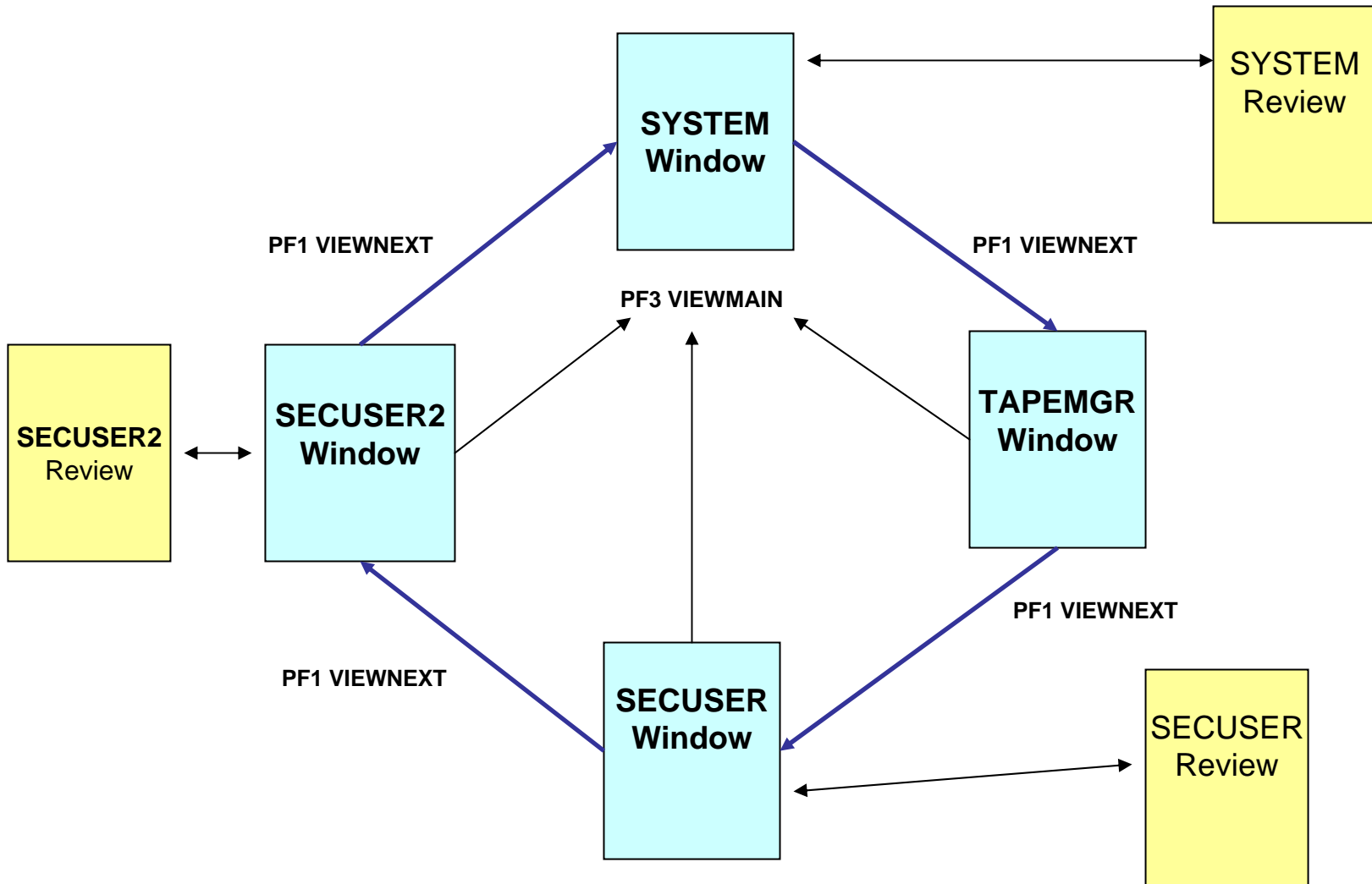
Use **ViewPrev** key to go to previous window in the ring

Use **Review** PF key to go to message activity logs

Activity Review Window

```
REVIEW    000%      9 Users      V M : O p e r a t o r      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 ***          TCPIP    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 ***          VMSPool  USERS = 6      BY AUTOLOG1
22:54:39 VMSPool   *1 VMLCFG023I VMSPool initialization complete on 07/20/03.
22:54:40 VMTAPE    *1 VMTCFG003I VMTAPE is ready to use: 20Jul03 22:54:39.
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 'VMR07' 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: _
```


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

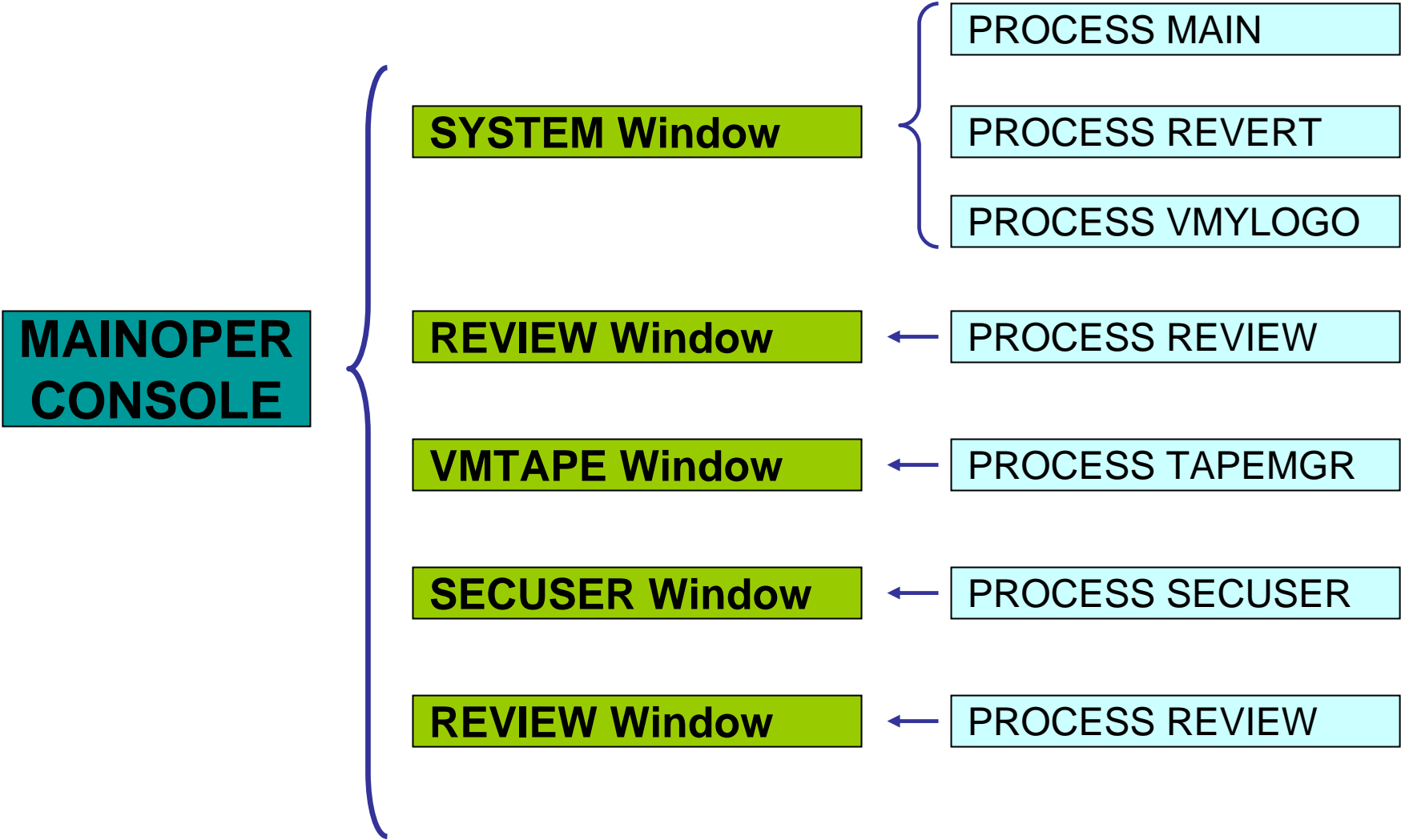
-  Routing tables (LOGTABLE, SYSTABLE, and SECTABLE)

-  User exits

-  HOLDMSG files

-  Session files

Sample Console Definitions



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 000% 9 Users VM : Operator Thursday 22Aug02 11:32

```
linuxraa ls -l | more
LINUXRAA: ls -l | more
LINUXRAA: total 68
LINUXRAA: drwx----- 7 root root 4096 Aug 21 16:11 .
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 .exerc
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 .therc
LINUXRAA: -rwxr-xr-x 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
==> _____ LINOPER

Reviewing Linux Activity

```
REVIEW 000% 8 Users VM : Operator Thursday 22Aug02 11:10
VMYREV119I Reviewing: 020821 SYSLOG Backward scrolling
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 blogd: 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

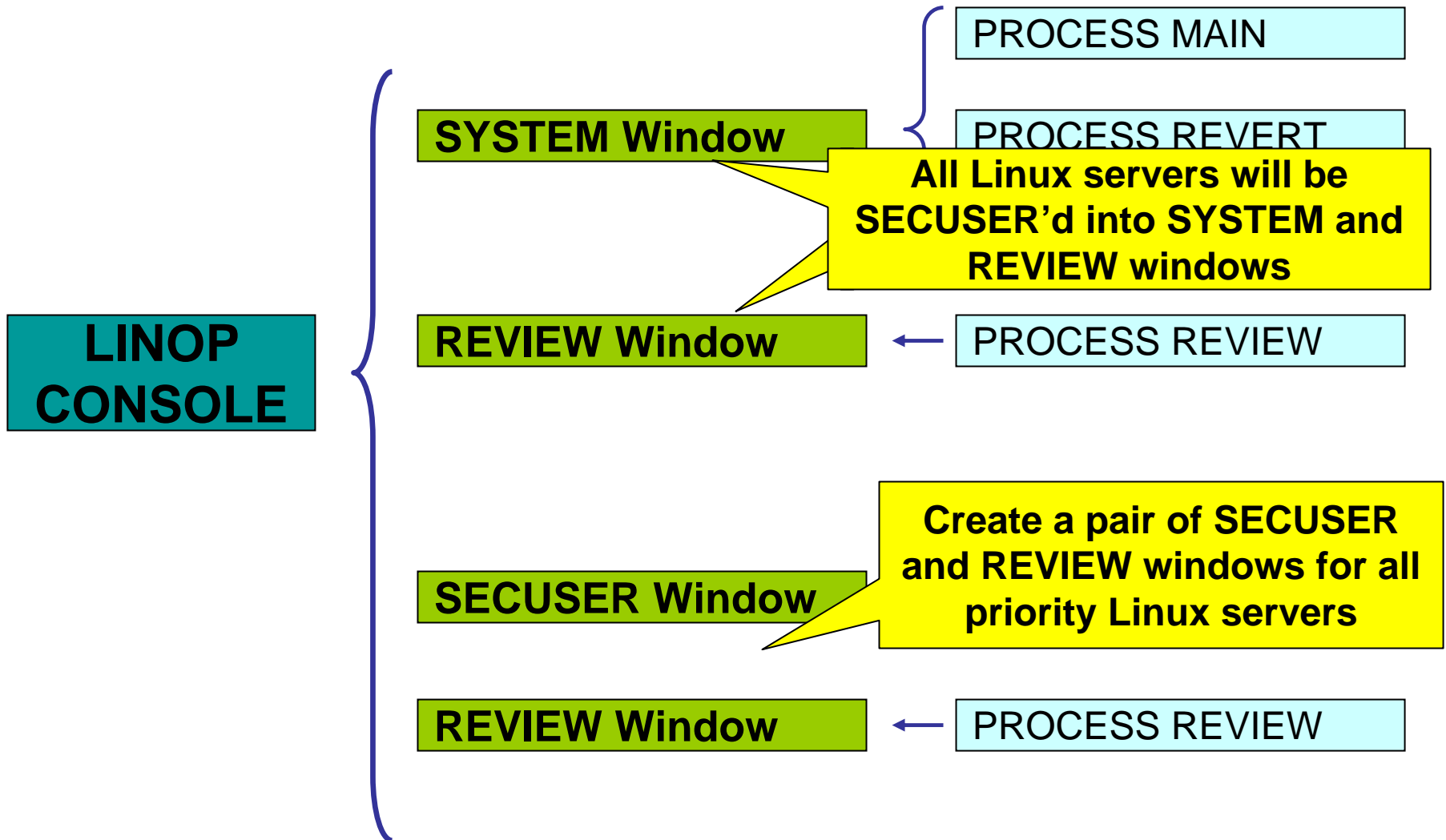
----- LinuxRAA Window -----

1= ViewNext 2= Review 3= ViewMain 4= 5= 6= Retrieve

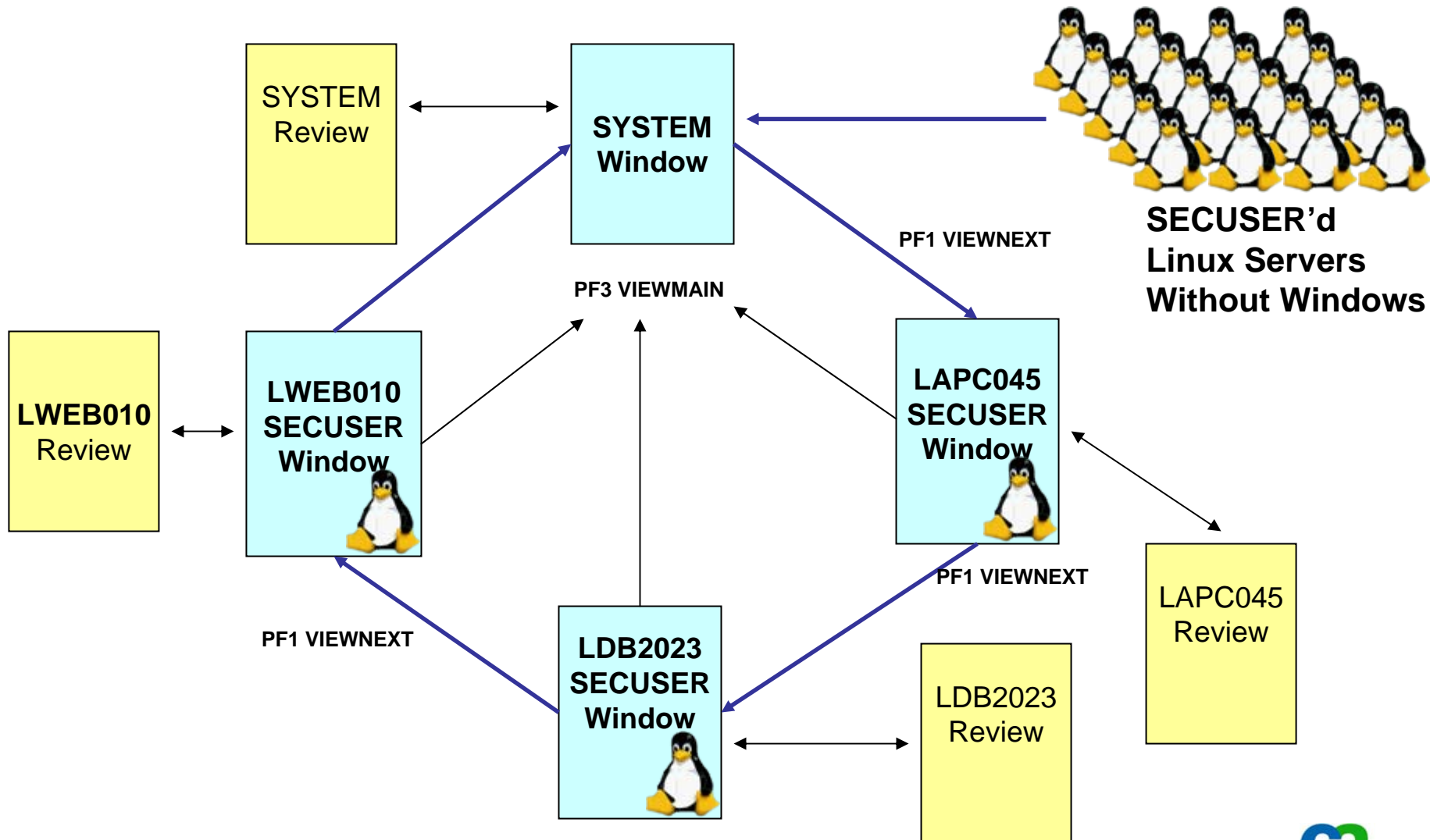
7= 8= 9= Repeat 10= Print 11= Expand 12= Remv Top

==> _____ LINOPER

Linux Console Definitions



Transforming The "Ring"



Transform a Colony Into A Ring

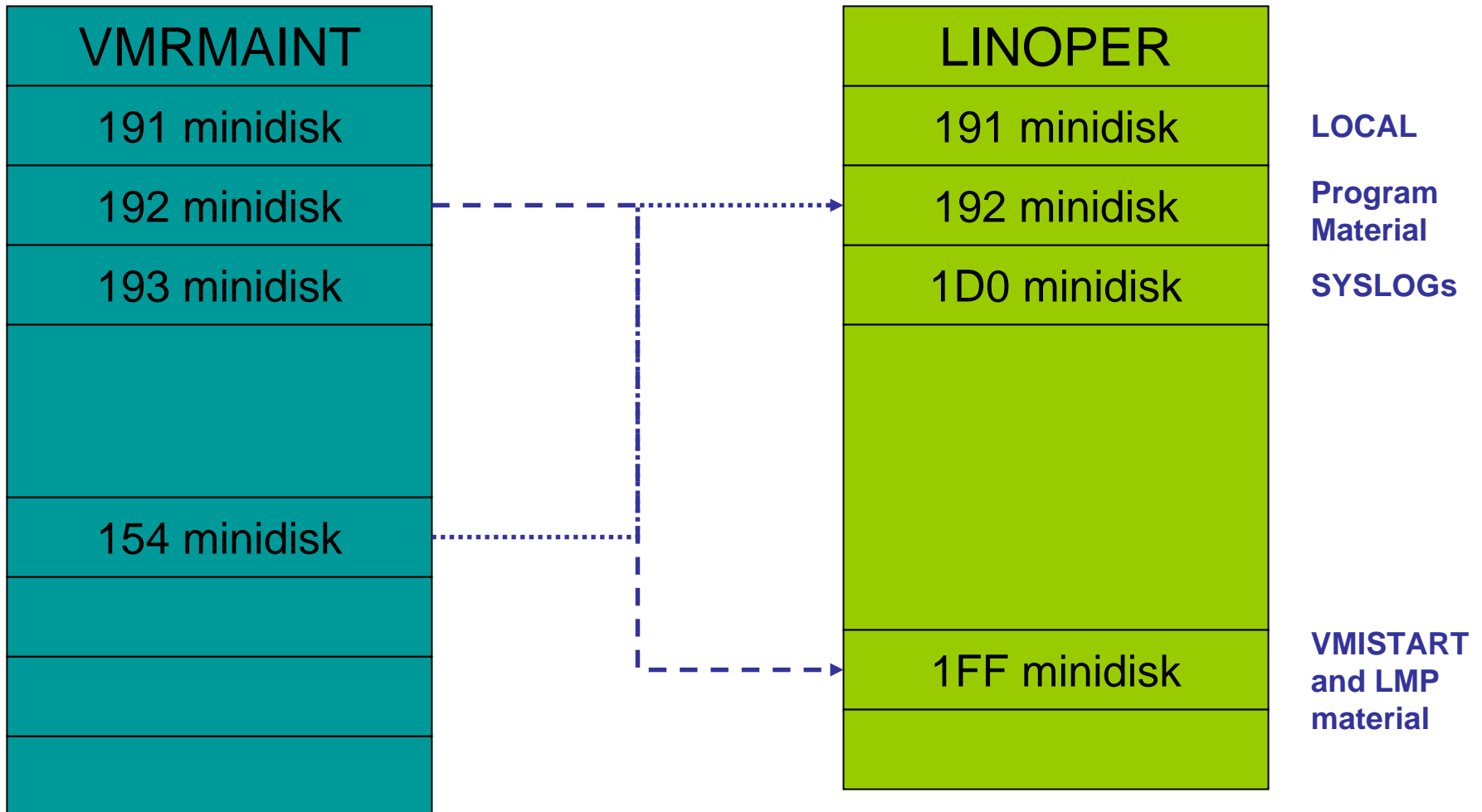
1. Install a second VM: Operator machine
2. Modify traditional SYSTEM window into a consolidated Linux server window
3. Specify REVIEW window for all Linux server activity
4. Create individual windows for choice Linux servers

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



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 VMRMANT 154 192 RR

LINK VMRMANT 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

VMRMAINT CONFIG

PRODUCT	VM:ACCOUNT	VMACCT	0212
PRODUCT	VM:SPOOL	VMSPool	0212
PRODUCT	VM:BACKUP	VMBACKUP	0212
PRODUCT	VM:OPERATOR	VMOPER	0212
PRODUCT	VM:OPERATOR	LINOPER	0212

Specify new userid here as 3rd token

Copy release designator as 4th 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

Consolidated Linux Console

SYSLINX 000% 9 Users VM : Operator Thursday 22Aug02 11:32

```
linuxraa ls -l | more
LINUXRAA: ls -l | more
LINUXRAA: total 68
LINUXRAA: drwx----- 7 root root 4096 Aug 21 16:11 .
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 .exerc
LINUXRAA: drwx--x--x 2 root root 4096 Jul 11 11:28 .gnupg
LINUXRAA: -rw----- 1 root root 14532 Jul 17 22:34 .pinerc
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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
==> _____ LINOPER

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

ULINUX DATA File

LDB2023 linux Susetb01 maint tcaratac test

LDB2023 comm CTCA 3002 3003 TCPIP

**LDB2023 disk LI9M01.191.60 LI9M01.200.3200 LI9M01.201.3337
LI9M01.0202.3339**

**LDB2023 tcpip limaintb.int.east.com 167.68.141.1 255.255.255.255
167.68.40.1**

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
====>
|...+....1....+....2....+....3....+....4....+....5....+....6....+....7...
==== / *-----
==== Step 2: Make a copy of the chandv.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

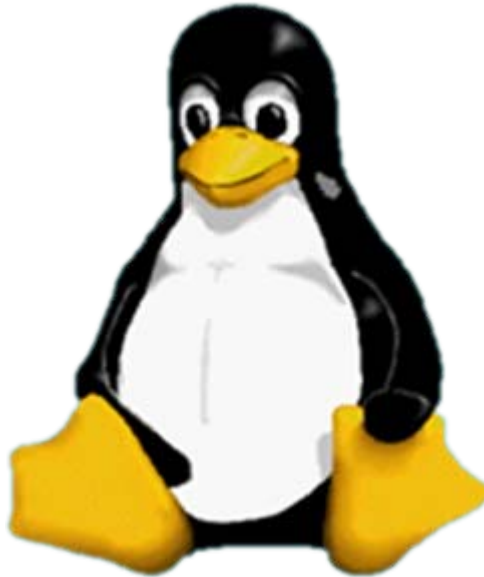
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Contact Information

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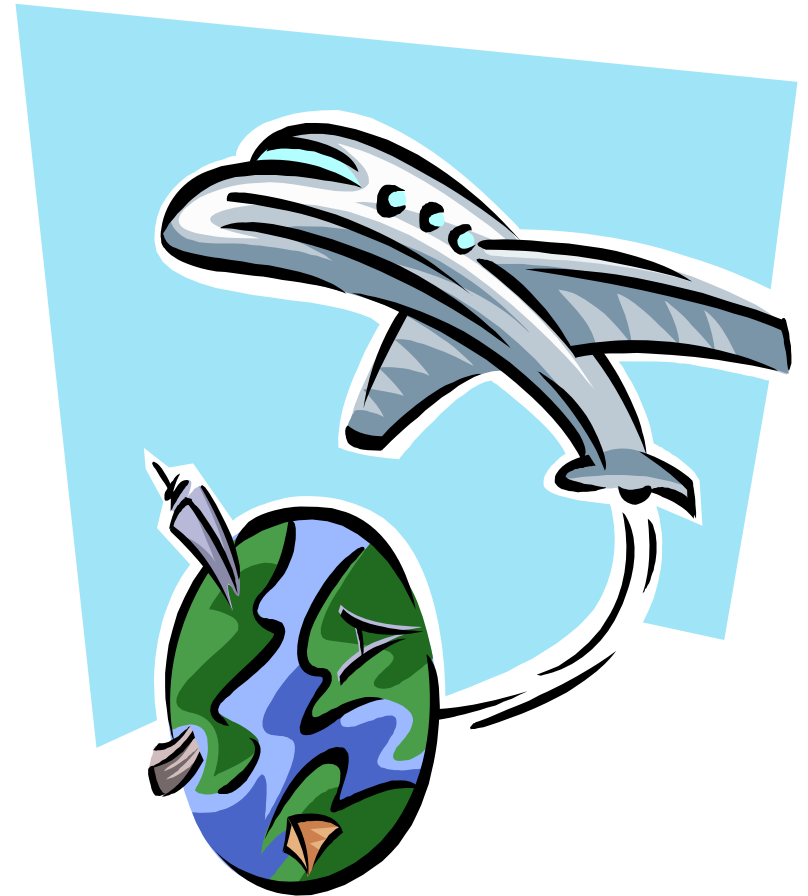
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