

Automatically Logging on a User at Linux System Boot Time for Console Management



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Special Notices

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Introduction

Using console management tools like IBM Operations Manager for z/VM greatly enhances the management and operations of Linux virtual machines hosted by z/VM. It is often desirable to have the console manager issue commands and respond to the command's output. This can be done with an active Linux virtual machine but requires that a Linux user ID be logged on to the console device. While the console manager can script the logon of a Linux user ID on the virtual machine console, this introduces challenges in password management as well as potential violations of corporate security policies. Solutions like a modified `sulogin` may be used, but this solution requires root to be the login id. This might also be a potential violation of corporate policies.

It should be noted that having a Linux user ID always logged on to the virtual machine console does not represent a serious exposure. The console device of a virtual machine is only accessible through the login process of z/VM, which is protected by z/VM security mechanisms.

This paper will introduce the “systemd serial-getty” method for SLES12.x and RHEL 7.x versions that will automatically logon a user ID at Linux boot time. If you are going to a non-serial terminal, you will need to do similar steps with `systemd getty`. Two additional options will be introduced for older Linux versions: 1) “`mingetty –autologon`” for SLES11.x and RHEL 5.4 – 6.x versions, and 2) “`mingetty –logon`” for even older versions that do not support the `--autologon` option.

It may be helpful to define some terms. The term `getty` in Linux is short for “get tty”. The *tty* part of the name stands for *Teletype*, but has come to mean any type of text terminal. `Getty` GETs a TTY (a terminal) going. Each terminal needs its own `getty` command. For serial ports, the terminal is referenced as `ttySx` where *x* is the serial port number. To see what serial devices are active on your Linux virtual machine, issue “`ls -l ttyS*`” in the `/dev` directory.

systemd serial-getty

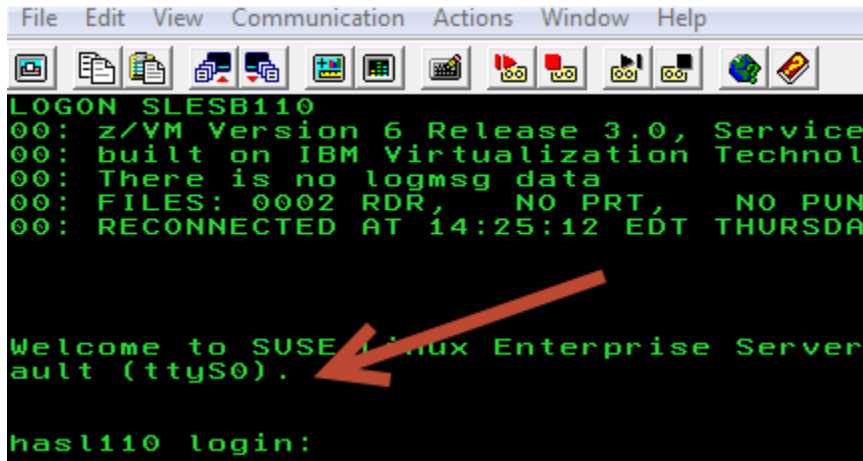
After the Linux on z Systems system boots the user will see a login prompt, typically:

```
<systemname> login
```

Since 2015, most Linux distributions generate this prompt using `systemd`, a new init system to bootstrap the user space and manage all processes, versus UNIX System V or Berkeley Software Distribution (BSD) init systems used more in the past. The name `systemd` follows the UNIX convention of naming daemons and therefore, the *d* is appended to the name. One of `systemd`'s main goals is to unify basic Linux configurations and service behaviors across all distributions.^[7]

The `serial-getty` and `getty` functions are a part of the `systemd` init system. In this paper, we will use `serial-getty` to autologon an ID at Linux boot time. For Linux on z Systems, the console terminal is the 3215/3270 text terminal of the z/VM system from which the Linux virtual machine is IPLed. It is accessed through z/VM when a user logs onto the Linux virtual machine at the z/VM level using the virtual machine's eight character name and associated password. For example, a Linux virtual machine

known to z/VM as USER SLESB110 with Linux hostname hasl110 would be accessed via a z/VM 3270 terminal. Then, the Linux virtual machine will be IPLed within this virtual machine and the 3215/3270 CMS session is now a Linux console showing the IPL console messages. The final messages of the IPL, or a reconnect, will be to prompt for the init process to invoke serial-getty to prompt for login. By default, this console is serial or text console ttyS0 (see Figure 1).



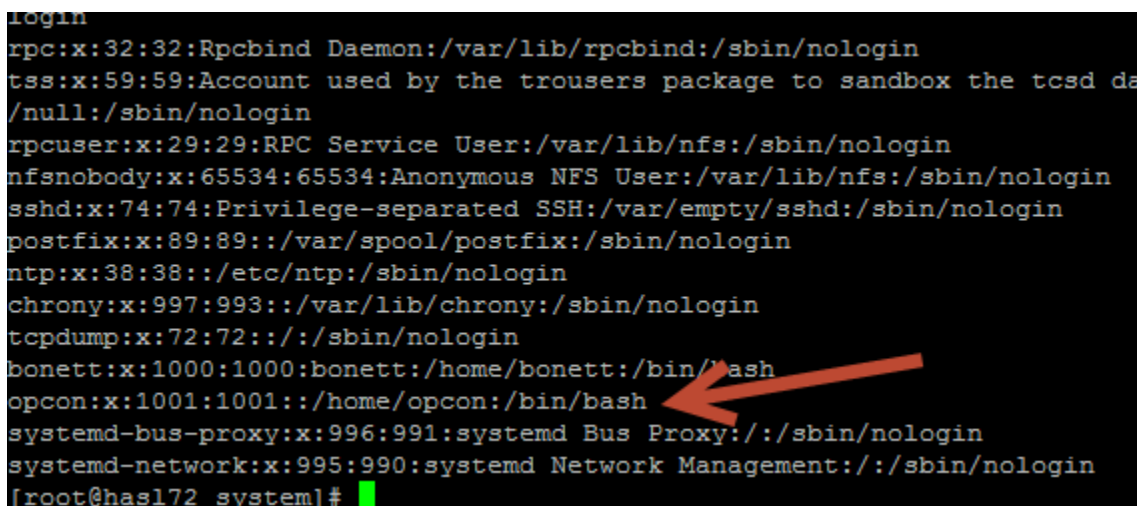
```
File Edit View Communication Actions Window Help
LOGON SLESB110
00: z/VM Version 6 Release 3.0, Service
00: built on IBM Virtualization Technol
00: There is no logmsg data
00: FILES: 0002 RDR, NO PRT, NO PUN
00: RECONNECTED AT 14:25:12 EDT THURSDA

Welcome to SUSE Linux Enterprise Server
ault (ttyS0).
hasl110 login:
```

Figure 1

Now we need to configure terminal ttyS0 to autologon a user ID when it is started. The user ID will be OPCON.

OPCON must be a valid user to this Linux virtual machine. In our example, we are simply using /etc/passwd and OPCON is defined accordingly (Figure 2).



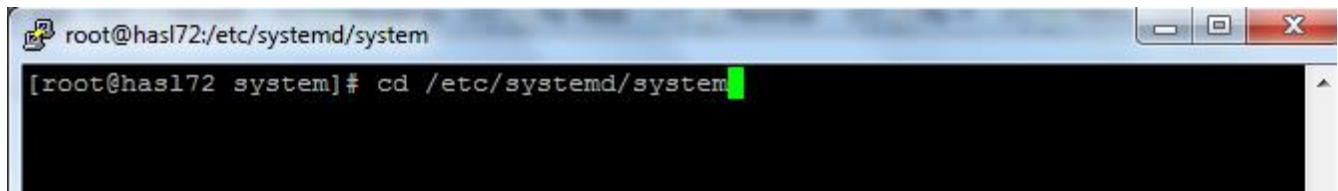
```
login
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
tss:x:59:59:Account used by the trousers package to sandbox the tcsd da
/null:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
nfsnobody:x:65534:65534:Anonymous NFS User:/var/lib/nfs:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin
postfix:x:89:89::/var/spool/postfix:/sbin/nologin
ntp:x:38:38::/etc/ntp:/sbin/nologin
chrony:x:997:993::/var/lib/chrony:/sbin/nologin
tcpdump:x:72:72:::/sbin/nologin
bonett:x:1000:1000:bonett:/home/bonett:/bin/bash
opcon:x:1001:1001::/home/opcon:/bin/bash
systemd-bus-proxy:x:996:991:systemd Bus Proxy:/:/sbin/nologin
systemd-network:x:995:990:systemd Network Management:/:/sbin/nologin
[root@hasl72 system]#
```

Figure 2

The following systemd serial-getty steps will be used to autologon OPCON to terminal ttyS0 when it is

started. These steps worked on both SLES and RHEL for the authors’.

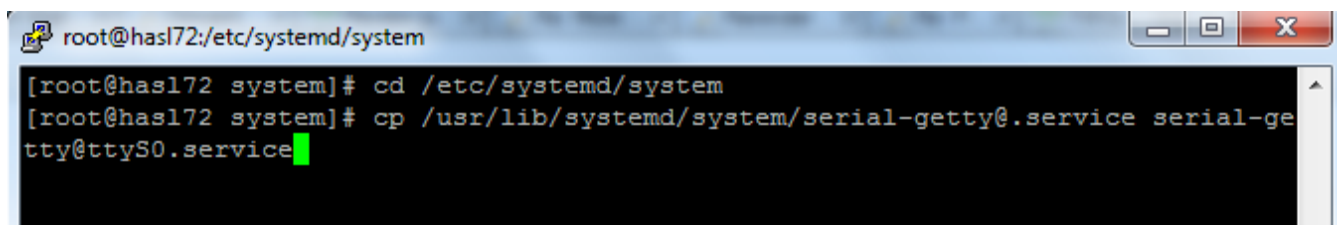
Step1: Change to the /etc/systemd/system directory, Figure 3

A terminal window titled 'root@hasl72:/etc/systemd/system' with standard window controls. The command prompt shows '[root@hasl72 system]# cd /etc/systemd/system' with a green cursor at the end of the line.

```
root@hasl72:/etc/systemd/system
[ root@hasl72 system]# cd /etc/systemd/system
```

Figure 3

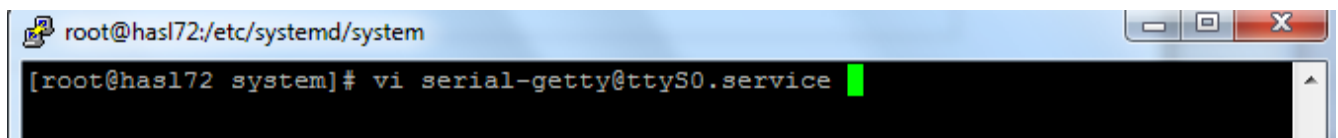
Step 2: Copy [/usr/lib/systemd/system/serial-getty@.service](#) to [serial-getty@ttyS0.service](#) , Figure 4

A terminal window titled 'root@hasl72:/etc/systemd/system' with standard window controls. It shows two commands: first, '[root@hasl72 system]# cd /etc/systemd/system' and second, '[root@hasl72 system]# cp /usr/lib/systemd/system/serial-getty@.service serial-getty@ttyS0.service' with a green cursor at the end of the second line.

```
root@hasl72:/etc/systemd/system
[ root@hasl72 system]# cd /etc/systemd/system
[ root@hasl72 system]# cp /usr/lib/systemd/system/serial-getty@.service serial-getty@ttyS0.service
```

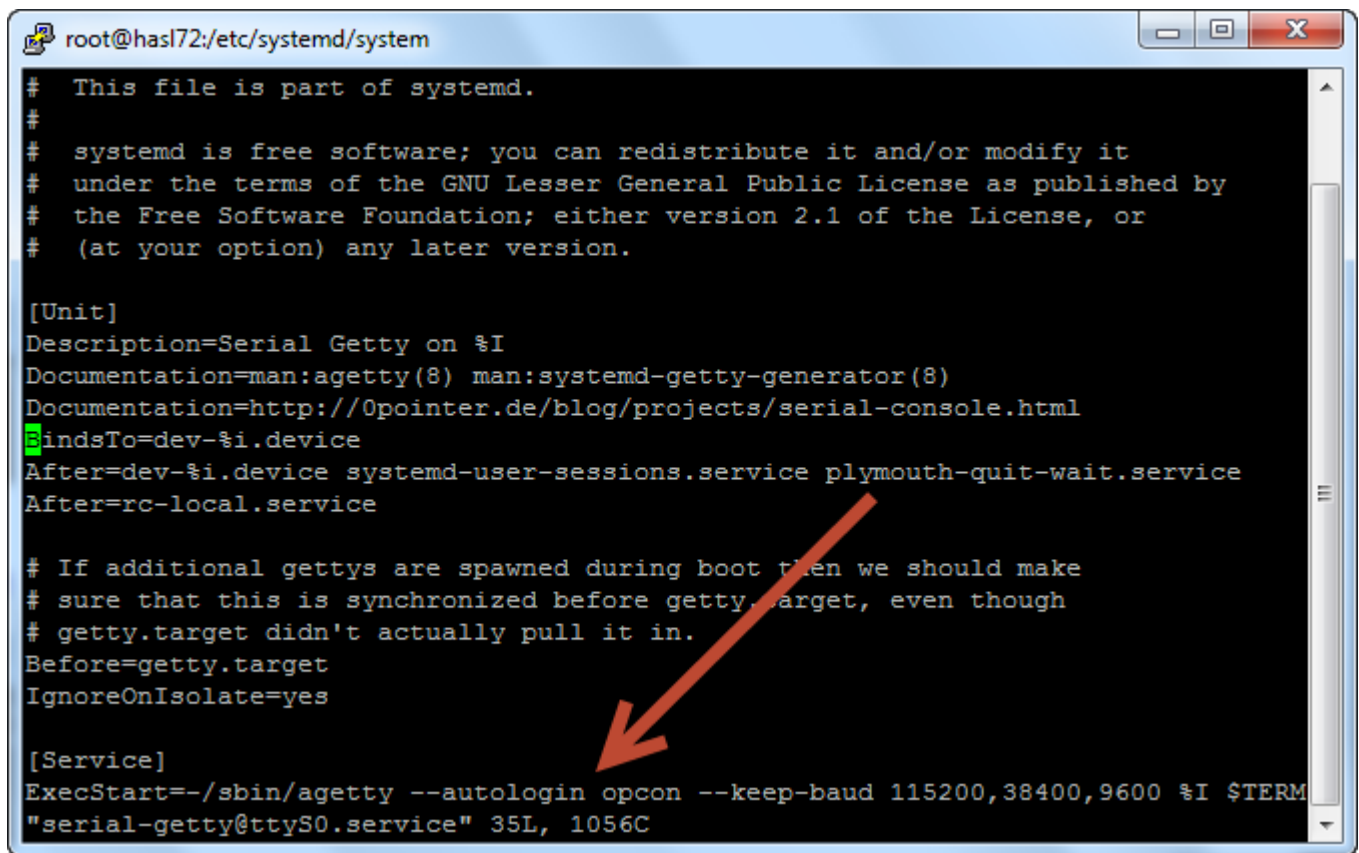
Figure 4

Step 3: Edit [serial-getty@ttyS0.service](#) and add –autologin opcon to agetty command, Figures 5 & 6.

A terminal window titled 'root@hasl72:/etc/systemd/system' with standard window controls. The command prompt shows '[root@hasl72 system]# vi serial-getty@ttyS0.service' with a green cursor at the end of the line.

```
root@hasl72:/etc/systemd/system
[ root@hasl72 system]# vi serial-getty@ttyS0.service
```

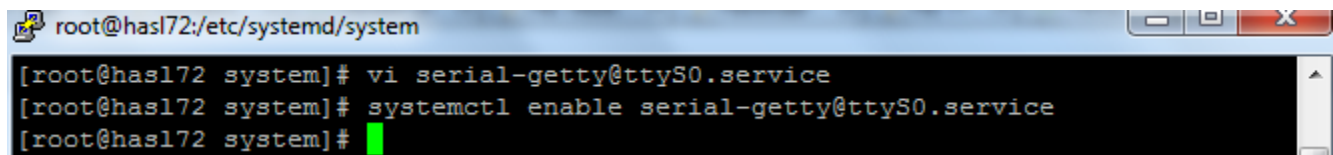
Figure 5



```
root@hasl72:/etc/systemd/system
# This file is part of systemd.
#
# systemd is free software; you can redistribute it and/or modify it
# under the terms of the GNU Lesser General Public License as published by
# the Free Software Foundation; either version 2.1 of the License, or
# (at your option) any later version.
[Unit]
Description=Serial Getty on %I
Documentation=man:agetty(8) man:systemd-getty-generator(8)
Documentation=http://0pointer.de/blog/projects/serial-console.html
BindsTo=dev-%i.device
After=dev-%i.device systemd-user-sessions.service plymouth-quit-wait.service
After=rc-local.service
# If additional gettys are spawned during boot then we should make
# sure that this is synchronized before getty.target, even though
# getty.target didn't actually pull it in.
Before=getty.target
IgnoreOnIsolate=yes
[Service]
ExecStart=/sbin/agetty --autologin opcon --keep-baud 115200,38400,9600 %I $TERM
"serial-getty@ttyS0.service" 35L, 1056C
```

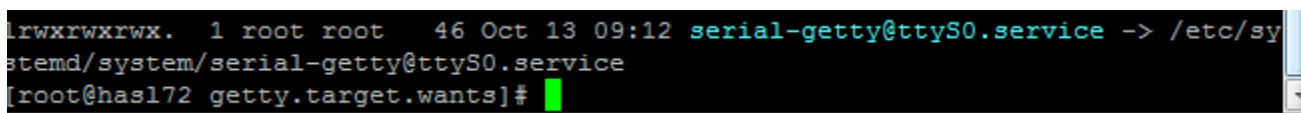
Figure 6

Step 4: Enable [serial-getty@ttyS0.service](#). This will create a symbolic link from [/etc/systemd/system/getty.target.wants/serial-getty@ttyS0.service](#) to [/etc/systemd/system/serial-getty@ttyS0.service](#) , Figures 7 & 8



```
root@hasl72:/etc/systemd/system
[root@hasl72 system]# vi serial-getty@ttyS0.service
[root@hasl72 system]# systemctl enable serial-getty@ttyS0.service
[root@hasl72 system]#
```

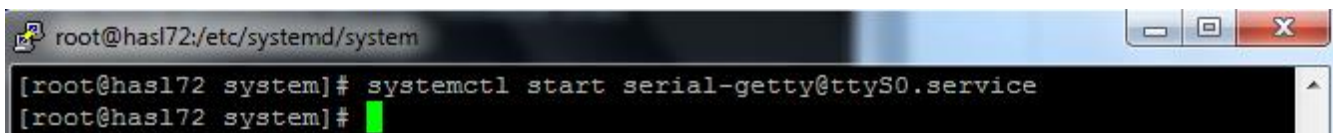
Figure 7



```
lrwxrwxrwx. 1 root root 46 Oct 13 09:12 serial-getty@ttyS0.service -> /etc/sy
stemd/system/serial-getty@ttyS0.service
[root@hasl72 getty.target.wants]#
```

Figure 8

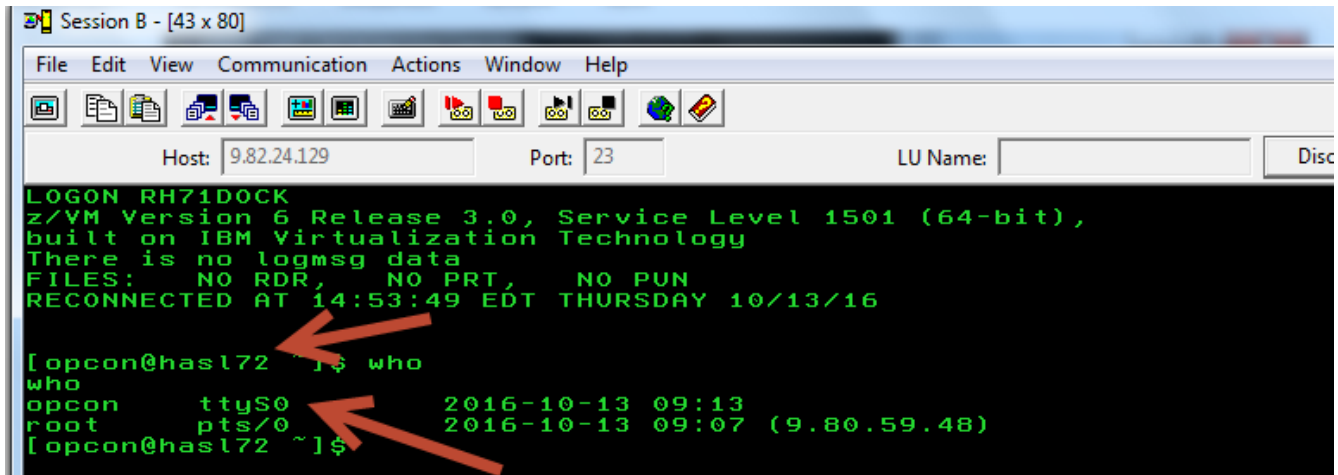
Step 5: Start the getty service for ttyS0: `systemctl start serial-getty@ttyS0.service` , Figure 9.



```
root@hasl72:/etc/systemd/system
[root@hasl72 system]# systemctl start serial-getty@ttyS0.service
[root@hasl72 system]#
```

Figure 9

Now, whenever you access this virtual machine via its z/VM 3270 terminal ttyS0, the user ID OPCON will automatically be logged on, Figure 10. In this example, the virtual machine RH71DOCK is accessed via z/VM terminal ttyS0 and OPCON is automatically logged on.



```
Session B - [43 x 80]
File Edit View Communication Actions Window Help
Host: 9.82.24.129 Port: 23 LU Name: Disc
LOGON RH71DOCK
z/VM Version 6 Release 3.0, Service Level 1501 (64-bit),
built on IBM Virtualization Technology
There is no logmsg data
FILES: NO RDR, NO PRT, NO PUN
RECONNECTED AT 14:53:49 EDT THURSDAY 10/13/16

[opcon@hasl72 ~]$ who
who
opcon ttyS0 2016-10-13 09:13
root pts/0 2016-10-13 09:07 (9.80.59.48)
[opcon@hasl72 ~]$
```

Figure 10

Once this console is disconnected, it is available for management by tools like IBM Operations Manager for z/VM.

Note: The user opcon will need to have the necessary authorities to perform the tasks Operations Manager sends to it. Therefore, it may be necessary to add the user ID as an authorized sudo user. Detailed information on sudo is beyond the scope of this paper. For more information on sudo, review the man page on the Linux system: man sudo

If you are on later versions of Linux (which versions??) and only the systemd method is used, then skip to page 16, “**Accessing the Console with IBM’s Operations Manager for z/VM**”, otherwise, the other two mingetty methods are now introduced for earlier versions of Linux as documented in the introduction above.

mingetty --autologin

Again, when the Linux on z Systems boots the user will see a login prompt, typically:

<systemname> login:

For the SLES11 system used in this example, this prompt is being generated by `mingetty` (minimum `getty`) which is spawned by the `init` process every time a user ends a session on the console. In turn, `mingetty` invokes the login process when the user enters their name and passes the user name to login. The `--autologin` parameter of `mingetty` logs the specified user onto the console (in this example `/dev/ttyS0`) when the system is first booted without prompting for a user ID or password. The `mingetty` statement is found in the `/etc/inittab` file on the Linux system.

Change the mingetty line for the 3270 console

First make a backup copy of the `/etc/inittab` file in case there's a need to revert to the standard `inittab`:

```
cp /etc/inittab /etc/inittab.save
```

For this example, the user ID `opcon` will be logged on at boot time. In `/etc/inittab` change the `mingetty` line for the 3270 console (`/dev/ttyS0`)

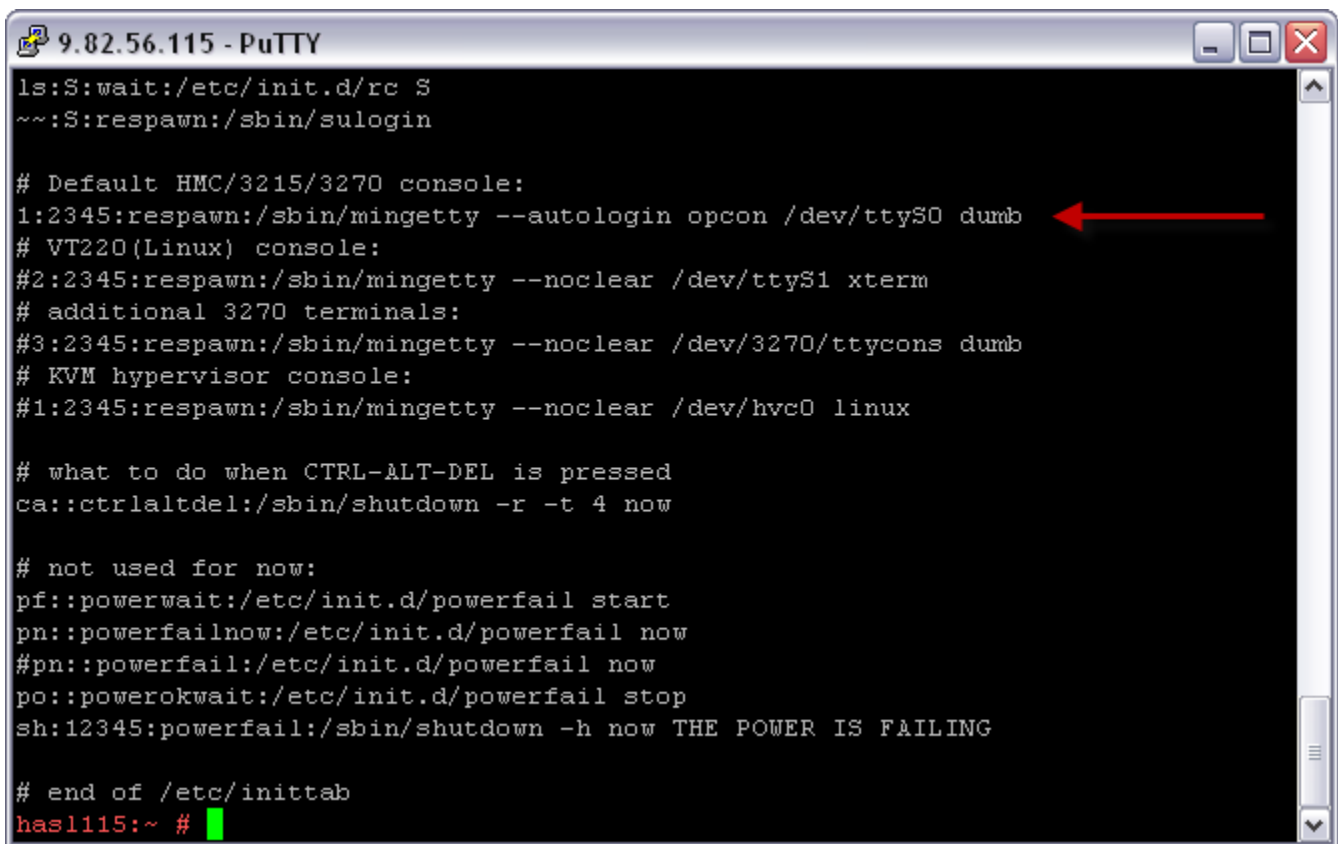
from:

```
1:2345:respawn:/sbin/mingetty --noclear /dev/ttyS0 dumb
```

to:

```
1:2345:respawn:/sbin/mingetty --autologin opcon /dev/ttyS0 dumb
```

as shown below in Figure 11 below:



```
9.82.56.115 - PuTTY
ls:S:wait:/etc/init.d/rc S
~~:S:respawn:/sbin/sulogin

# Default HMC/3215/3270 console:
1:2345:respawn:/sbin/mingetty --autologin opcon /dev/ttyS0 dumb
# VT220(Linux) console:
#2:2345:respawn:/sbin/mingetty --noclear /dev/ttyS1 xterm
# additional 3270 terminals:
#3:2345:respawn:/sbin/mingetty --noclear /dev/3270/ttycons dumb
# KVM hypervisor console:
#1:2345:respawn:/sbin/mingetty --noclear /dev/hvc0 linux

# what to do when CTRL-ALT-DEL is pressed
ca::ctrlaltdel:/sbin/shutdown -r -t 4 now

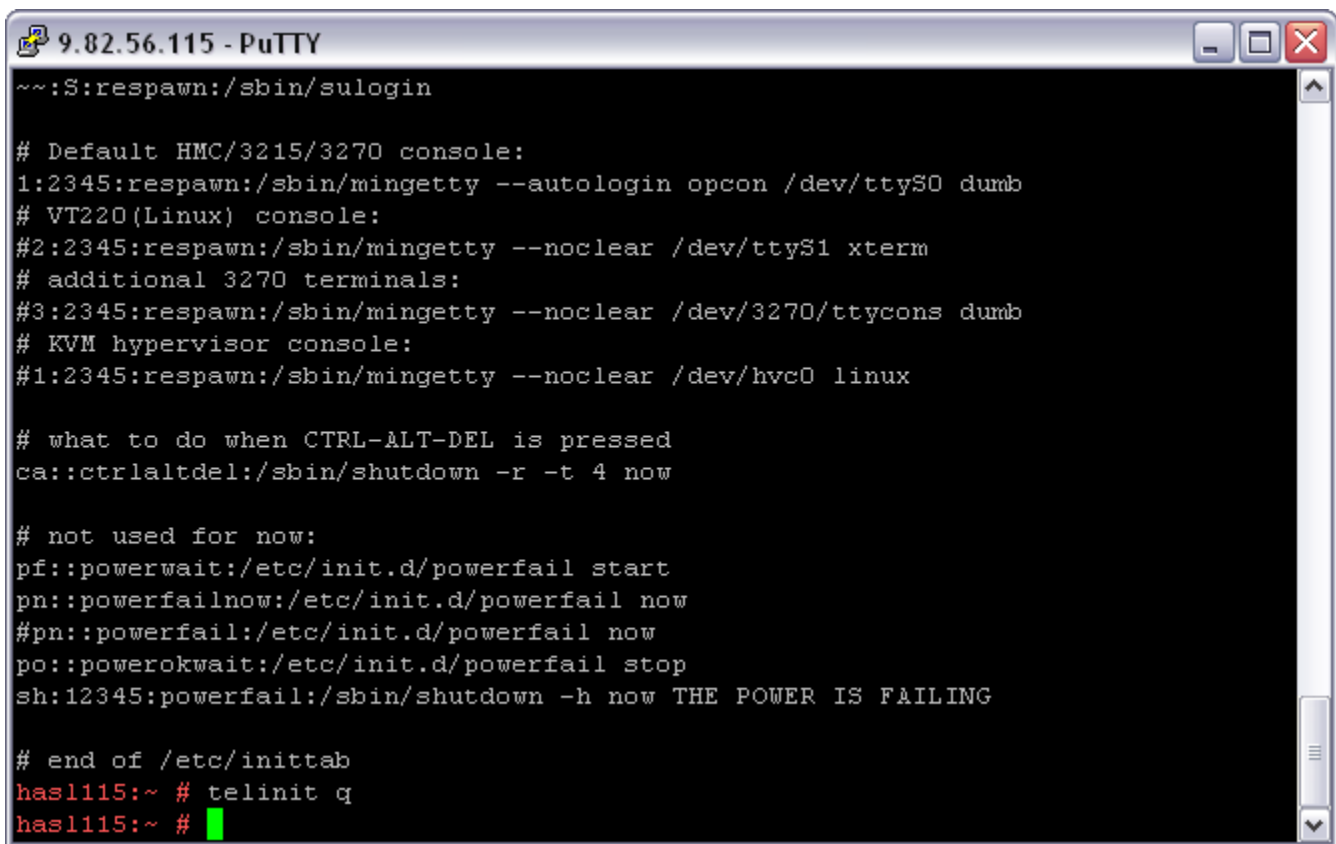
# not used for now:
pf::powerwait:/etc/init.d/powerfail start
pn::powerfailnow:/etc/init.d/powerfail now
#pn::powerfail:/etc/init.d/powerfail now
po::powerokwait:/etc/init.d/powerfail stop
sh:12345:powerfail:/sbin/shutdown -h now THE POWER IS FAILING

# end of /etc/inittab
has1115:~ #
```

Figure 11

After saving the change to */etc/inittab* it is a good idea to make sure that syntax errors have not been introduced into the file. This can be done with the *telinit* command:

```
telinit q
```



```
9.82.56.115 - PuTTY
~~:S:respawn:/sbin/sulogin

# Default HMC/3215/3270 console:
1:2345:respawn:/sbin/mingetty --autologin opcon /dev/ttyS0 dumb
# VT220(Linux) console:
#2:2345:respawn:/sbin/mingetty --noclear /dev/ttyS1 xterm
# additional 3270 terminals:
#3:2345:respawn:/sbin/mingetty --noclear /dev/3270/ttycons dumb
# KVM hypervisor console:
#1:2345:respawn:/sbin/mingetty --noclear /dev/hvc0 linux

# what to do when CTRL-ALT-DEL is pressed
ca::ctrlaltdel:/sbin/shutdown -r -t 4 now

# not used for now:
pf::powerwait:/etc/init.d/powerfail start
pn::powerfailnow:/etc/init.d/powerfail now
#pn::powerfail:/etc/init.d/powerfail now
po::powerokwait:/etc/init.d/powerfail stop
sh:12345:powerfail:/sbin/shutdown -h now THE POWER IS FAILING

# end of /etc/inittab
has1115:~ # telinit q
has1115:~ #
```

Figure 12

If the response from this command is simply the shell prompt (i.e. no other messages) then the file is okay, no syntax errors were found (as in Figure 12). If syntax errors are found, then the command will identify the inittab statement with the errors. It is very important to resolve any errors in */etc/inittab* prior to rebooting the Linux system.

If the changes are not successful, login to the Linux virtual console will not be possible. It will be necessary to login using a network session (i.e. ssh) and fix any errors in inittab or simply revert the changes by copying inittab.save back over inittab. If network logins are not permitted, it will be necessary to access the root device for this Linux from another Linux virtual machine to make repairs.

Once the changes are successful, it's time to reboot the Linux virtual machine to see the results of the changes made to */etc/inittab*.

```
Session A - [24 x 80]
File Edit View Communication Actions Window Help

No directory /home/opcon!
Logging in with home = "/".
Feb 5 13:15:52 hasl115 kernel: JBD: barrier-based sync failed on dm-0 - disabling barriers
opcon@hasl115:/>
```

RUNNING ZVMV5R40

MA a 23/001

Connected to remote server/host 9.82.24.129 using port 23

Figure 13

As shown above in Figure 13, the Linux virtual console has finished the boot sequence and the user ID `opcon` is logged on automatically as desired. Once this console is disconnected, it is available for management by tools like IBM's Operations Manager for z/VM.

Note: The user `opcon` will need to have the necessary authorities to perform the tasks Operations Manager sends to it. Therefore, it may be necessary to add the user ID as an authorized `sudo` user. Detailed information on `sudo` is beyond the scope of this paper. For more information on `sudo`, review the man page on the Linux system: `man sudo`.

If you are on later versions (which versions?) of Linux and only the `systemd` and/or `mingetty` – autologin methods are used, then skip to page 16, “**Accessing the Console with IBM's Operations Manager for z/VM**”, otherwise, the `mingetty --logon` method is now introduced for earlier versions of Linux as documented in the introduction above.

mingetty --logon

For versions of Linux that do not support the `mingetty --autologin` option, the `mingetty --logon` option is available. While there is an annoying bug in this option, it does not impact function. It is unlikely that this bug will be fixed as the `login -f` flag is deprecated at this time and the new `--autologon` or `systemd` option is supported in the more current Linux distributions.

Change the mingetty line for the 3270 console

First make a backup copy of the `/etc/inittab` file in case there's a need to revert to the standard `inittab`:

```
cp /etc/inittab /etc/inittab.save
```

For this example, the user ID `opcon` will be logged on at boot time. In `/etc/inittab` change the `mingetty` line for the 3270 console (`/dev/ttyS0`)

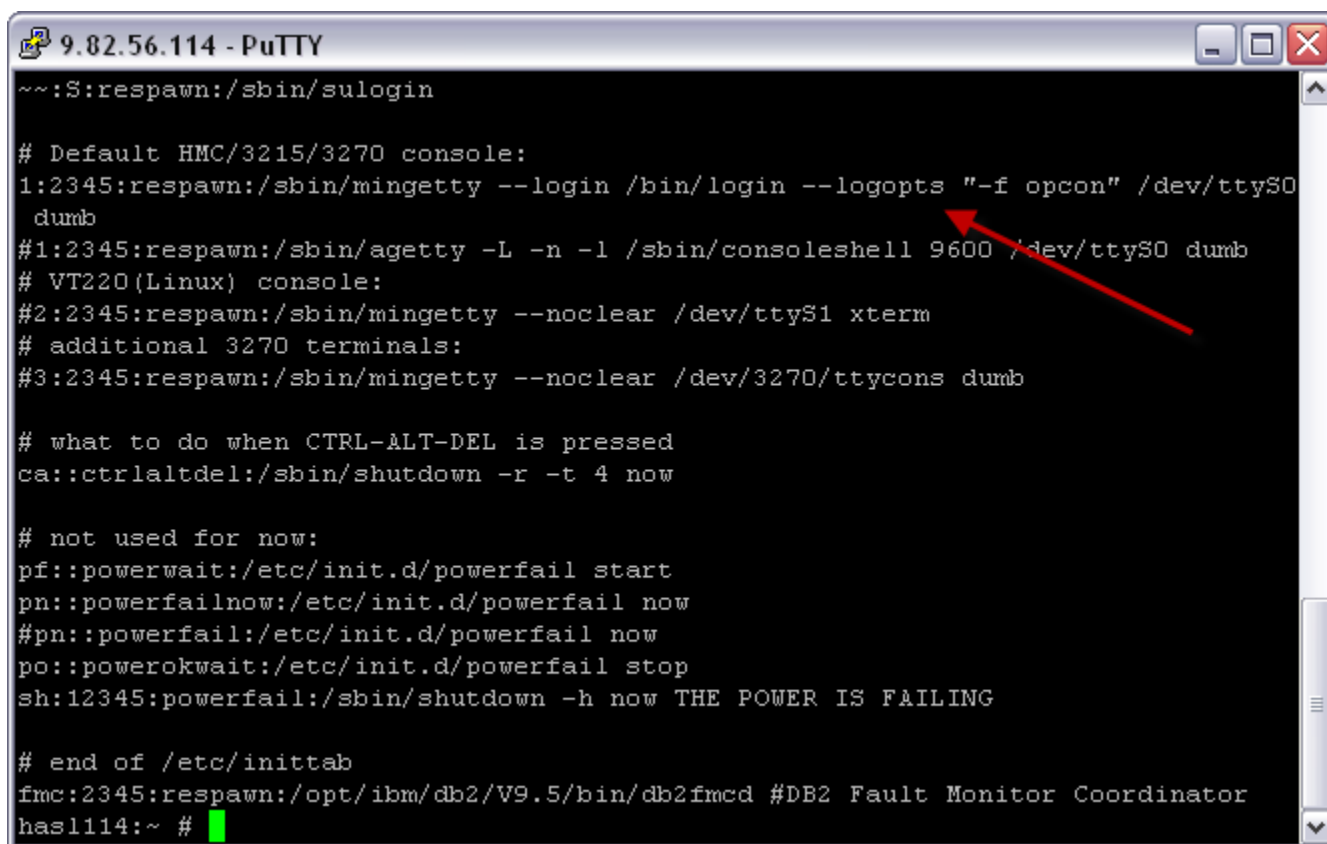
from:

```
1:2345:respawn:/sbin/mingetty --noclear /dev/ttyS0 dumb
```

to:

```
1:2345:respawn:/sbin/mingetty --login /bin/login --logopts "-f opcon" /dev/ttyS0 dumb
```

as shown below in Figure 14:



```
9.82.56.114 - PuTTY
~~:S:respawn:/sbin/sulogin

# Default HMC/3215/3270 console:
1:2345:respawn:/sbin/mingetty --login /bin/login --logopts "-f opcon" /dev/ttyS0
dumb
#1:2345:respawn:/sbin/agetty -L -n -l /sbin/consleshell 9600 /dev/ttyS0 dumb
# VT220(Linux) console:
#2:2345:respawn:/sbin/mingetty --noclear /dev/ttyS1 xterm
# additional 3270 terminals:
#3:2345:respawn:/sbin/mingetty --noclear /dev/3270/ttycons dumb

# what to do when CTRL-ALT-DEL is pressed
ca::ctrlaltdel:/sbin/shutdown -r -t 4 now

# not used for now:
pf::powerwait:/etc/init.d/powerfail start
pn::powerfailnow:/etc/init.d/powerfail now
#pn::powerfail:/etc/init.d/powerfail now
po::powerokwait:/etc/init.d/powerfail stop
sh:12345:powerfail:/sbin/shutdown -h now THE POWER IS FAILING

# end of /etc/inittab
fmc:2345:respawn:/opt/ibm/db2/V9.5/bin/db2fmc #DB2 Fault Monitor Coordinator
hasl114:~ #
```

Figure 14

After saving the change to */etc/inittab* it is a good idea to make sure that syntax errors have not been introduced into the file. This can be done with the *telinit* command:

```
telinit q
```

If the response from this command is simply the shell prompt (i.e. no other messages) then the file is okay, no syntax errors were found (as in Figure 12). If syntax errors are found, then the command will identify the *inittab* statement with the errors.

If the changes are not successful, login to the Linux virtual console will not be possible. It will be necessary to login using a network session (i.e. *ssh*) and fix any errors in *inittab* or simply revert the changes by copying *inittab.save* back over *inittab*. If network logins are not permitted, it will be necessary to access the root device for this Linux from another Linux virtual machine to make repairs.

As mentioned earlier, there is an annoying bug when using this option. In Figure 15, notice the default login prompt is presented. The logon will not take place until a command is issued. This will not impact functionality of Operations Manager.

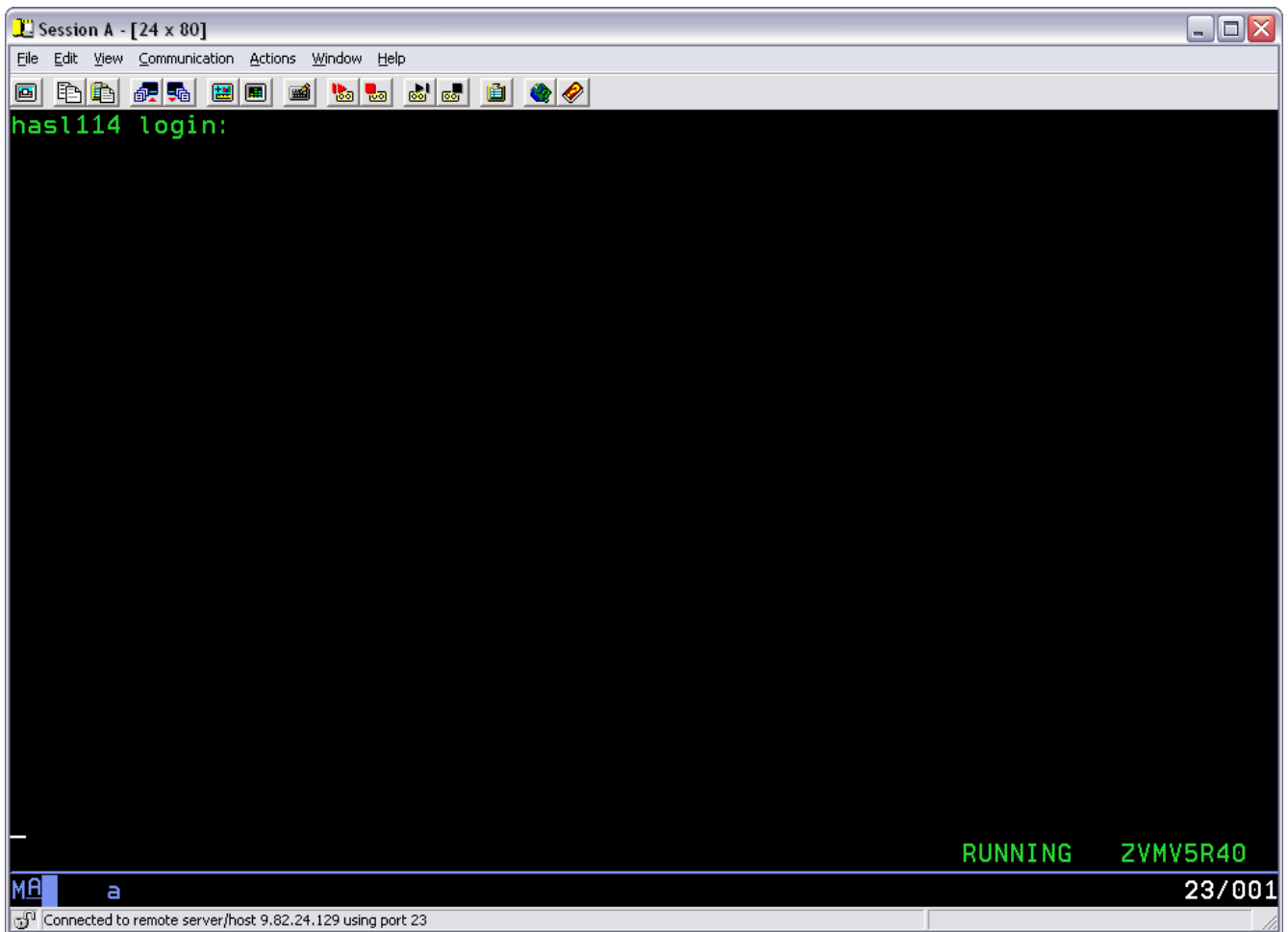


Figure 15

After entering a space and pressing enter on the console, the login is complete and shown in Figure 16 below:

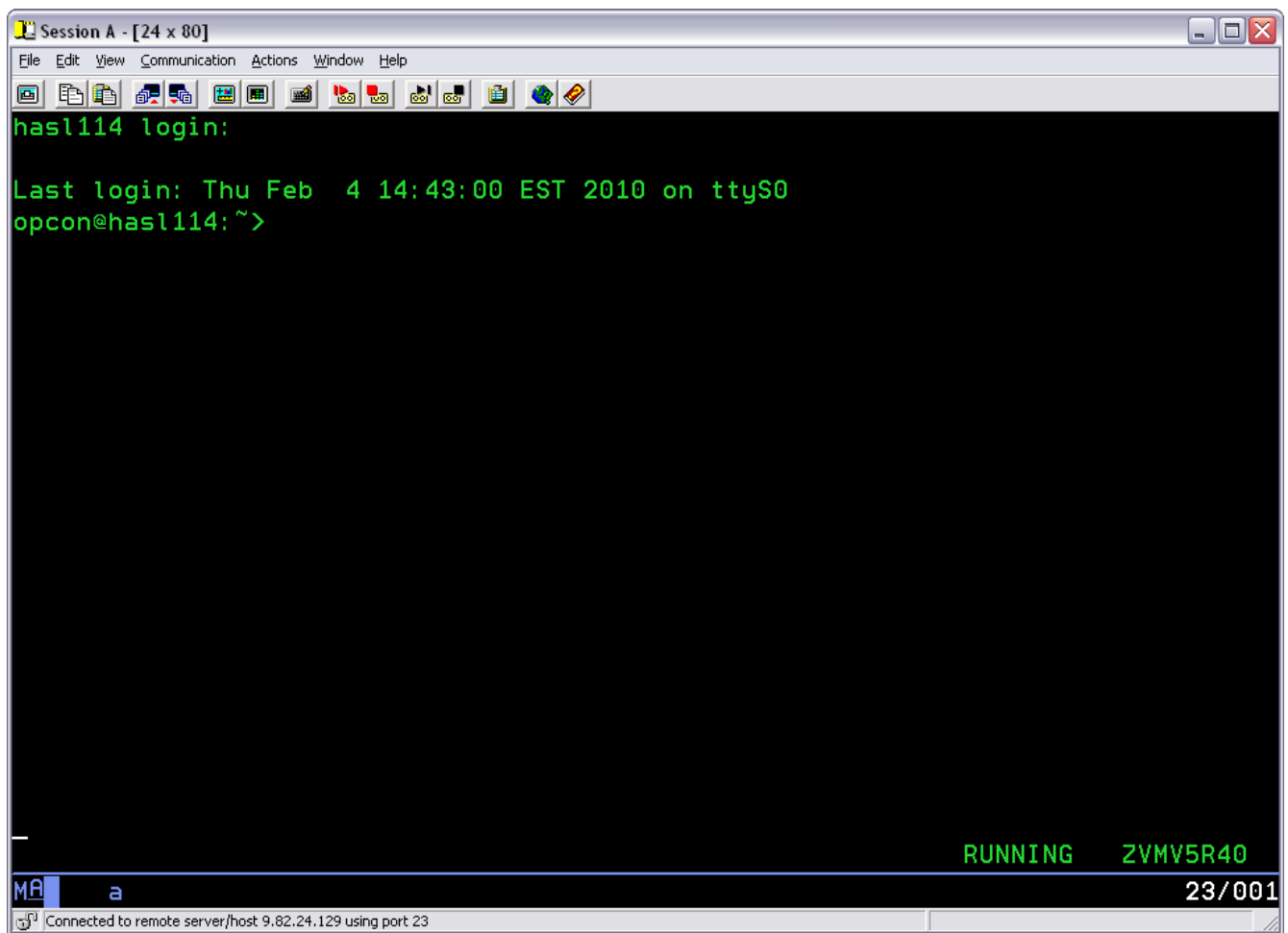


Figure 16

It is not necessary to enter the space for Operations Manager to interact with the console. This effort was demonstrated to show that the user ID opcon actually was logged on to the virtual console.

Note: : The user opcon will need to have the necessary authorities to perform the tasks Operations Manager sends to it. Therefore, it may be necessary to add the user ID as an authorized sudo user. Detailed information on sudo is beyond the scope of this paper. For more information on sudo, review the man page on the Linux system: man sudo.

Accessing the Console with IBM's Operations Manager for z/VM

With the Linux virtual machine, SLESA114, rebooted and automatically logged on as opcon, IBM's Operations Manager is able to more easily interact with the Linux console. From an authorized user ID, the Operations Manager VIEWCON command is issued to access the SLESA114 console (Figure 17).

Comment: Is SLESA114 the right user ID? I thought you were using a different one? Also can these screenshots be updated to reflect the simpler command: VIEWCON SLESA114. And if you recapture the screenshot, recapture the next one too since the VIEWCON panel has changed slightly.

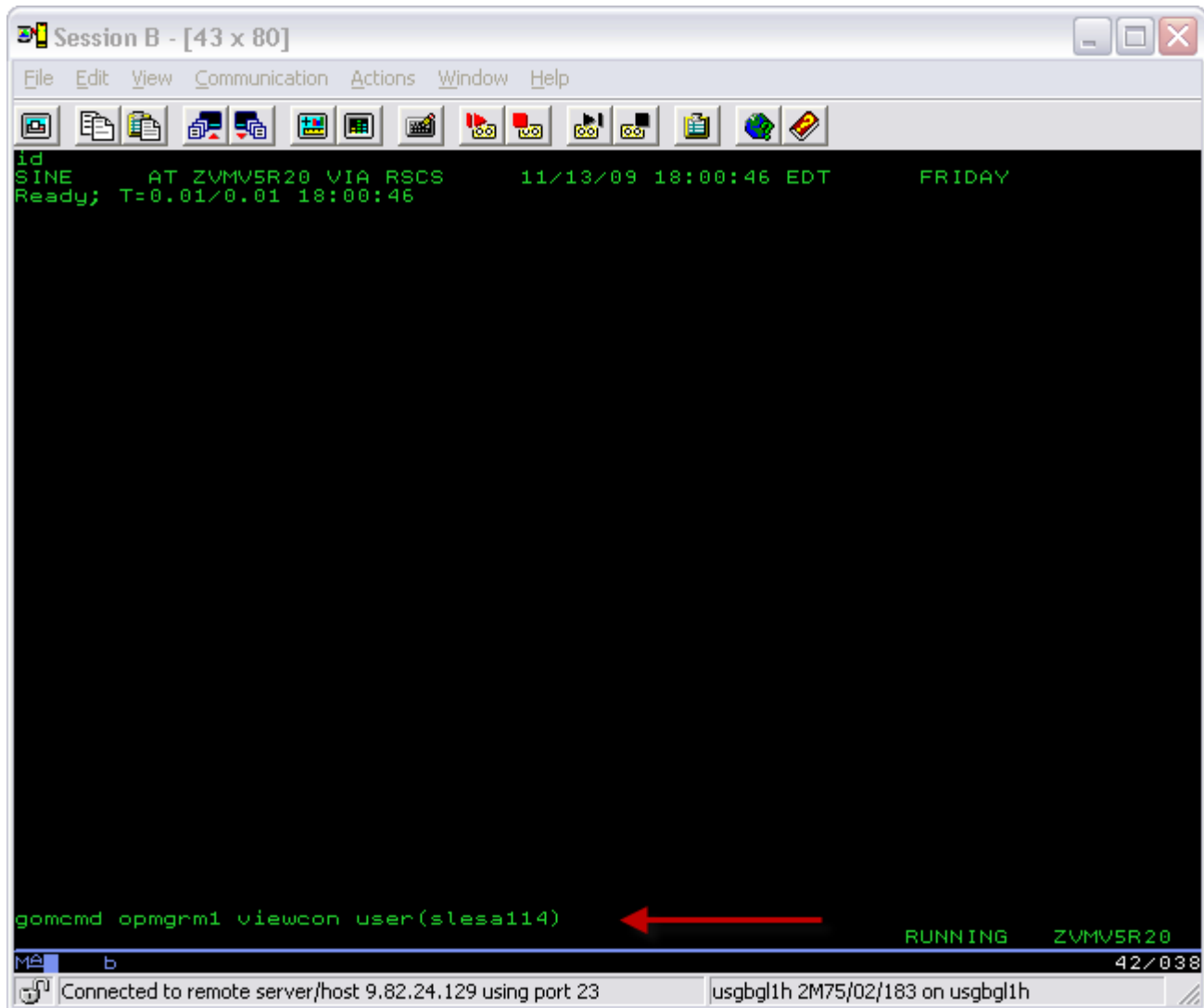


Figure 17

Figure 18 shows the results of the VIEWCON command issued in Figure 17. Also shown in Figure 18 is the user issuing the "who" command while looking at the console in Operations Manager.


```
Session B - [43 x 80]
File Edit View Communication Actions Window Help

Setting up network interfaces:
lo
lo IP address: 127.0.0.1/8
Checking for network time protocol daemon (NTPD): ..unused
[1A..done eth0
eth0 configuration: qeth-bus-ccw-0.0.0800
eth0 IP address: 9.82.56.114/27
Checking for network time protocol daemon (NTPD): ..unused
[1A..doneSetting up service network . . . . .
Starting syslog services..done
Starting slpd ..done
audit(1258149900.926:3): audit_pid=1295 old=0 by auid=4294967295
Starting auditd ..done
Starting RPC portmap daemon..done
Importing Net File System (NFS)..unused
Starting nfsboot (sm-notify) ..done
Starting mail service (Postfix)..done
Mount SMB/ CIFS File Systems ..unused
Starting CRON daemon..done
Starting cupsd..done
Starting ZENworks Management Daemon..done
Starting Name Service Cache Daemon..done
Starting SSH daemon..done
Executing suseRegister (looking for new update channels): ..done
Starting service gdm..done
Nov 13 17:05:04 hasl114 syslog-ng[1251]: Connection broken to AF_INET(9.39.68.1
Starting INET services. (xinetd)..done
0513-059 The ctrmc Subsystem has been started. Subsystem PID is 1335.
* -- Operations Manager VIEWCON session from SINE entered the following --
who
who
Master Resource Control: runlevel 5 has been reached
Skipped services in runlevel 5: [80C[23Dnfs smbfs splash
Last login: Fri Nov 13 16:55:47 EST 2009 on ttyS0
opcon@hasl114:~>
* -- Operations Manager VIEWCON session from SINE entered the following --
who
who
opcon ttyS0 2009-11-13 17:05
opcon@hasl114:~>

SLESA114 (Scroll)
42/001
Connected to remote server/host 9.82.24.129 using port 23 usgbgl1h 2M75/02/183 on usgbgl1h
```

Figure 18

It is now possible for the user of Operations Manager for z/VM to issue Linux commands as user OPCON via this VIEWCON interface. In addition, Operations Manager for z/VM automation routines can interact with this console as OPCON and issue commands accordingly.

Summary

Console management of Linux virtual machines can be enhanced when the guest console is logged on as a specific Linux user ID. This allows:

- Interactive Linux commands to be entered and the resulting output to be monitored on the console without having to login using a password that is displayed in the clear.
- Automation tools like Operations Manager to send commands to the Linux guest automatically in response to console messages or other operational conditions.

Using the method appropriate for the specific Linux version, the Linux virtual machine will automatically logon the desired user ID after Linux completes the boot process without requiring the console manager to pass the user ID and password. This enables enhanced console management while removing potential issues with corporate security policies.