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

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Version Date: October 2016

IBM

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Significant contributions to this paper came from Dave Jones at V/Soft Software.

Special thanks to the following people who contributed information to this effort:

- Richard Lewis, Mike Bonett, Bruce Hayden, and Bill Maddox

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 logon. By default, this console is serial or text console ttyS0 (see Figure 1).

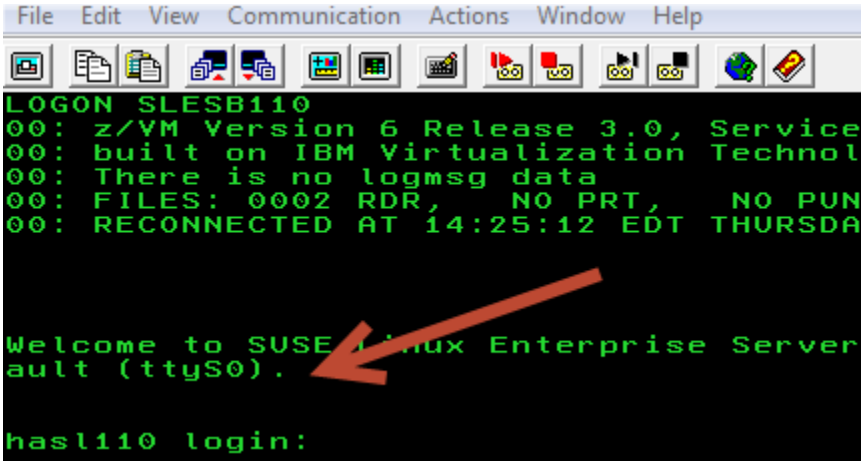

Figure 1

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).

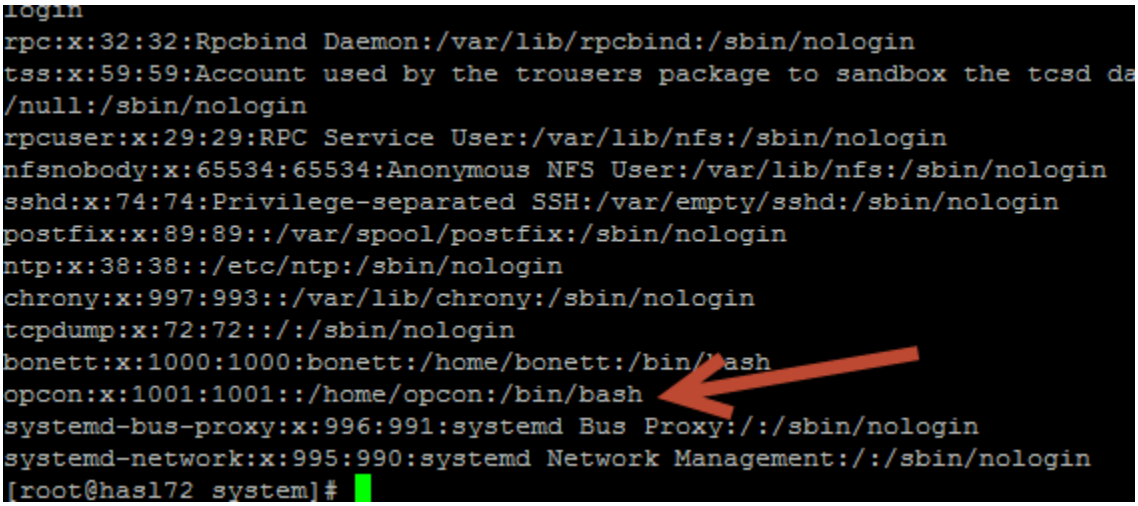

Figure 2

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

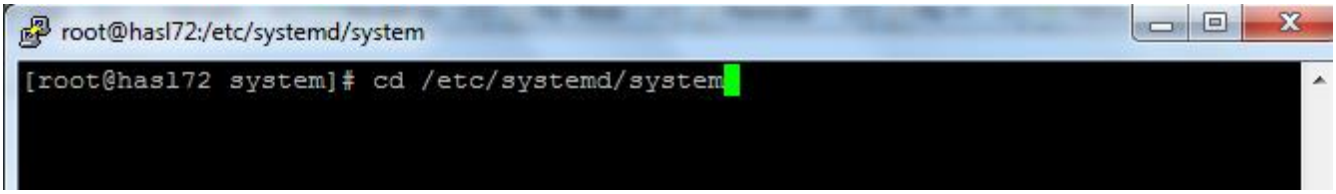

Figure 3

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

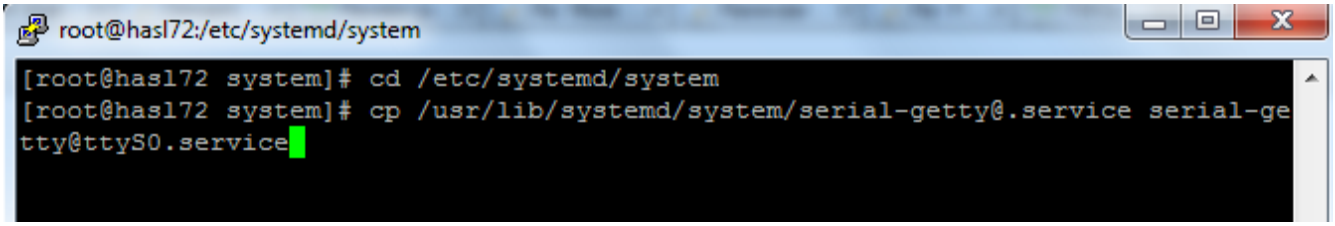

Figure 4

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

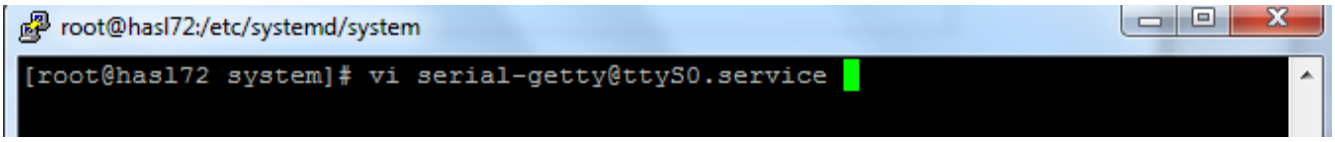

Figure 5

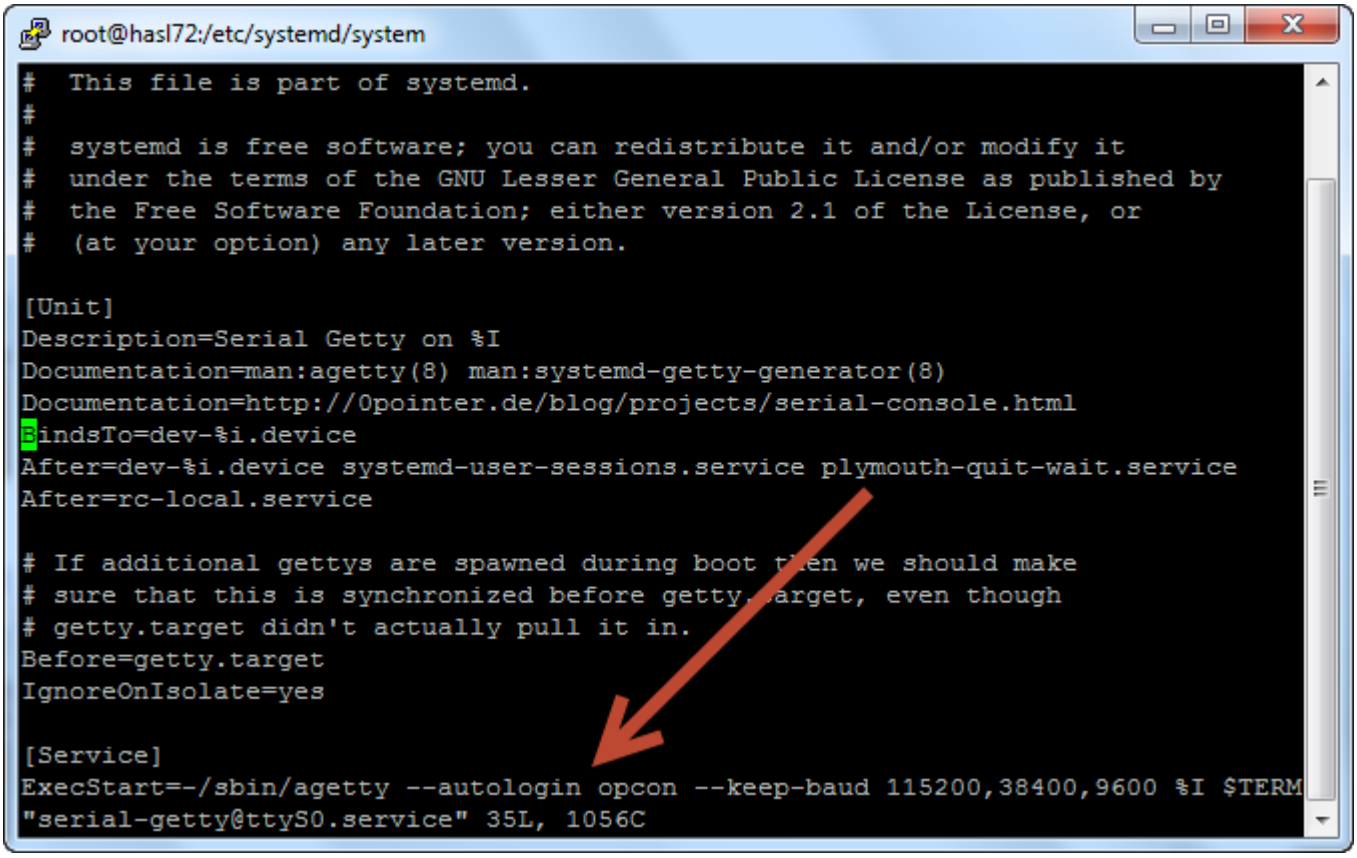

Figure 6

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

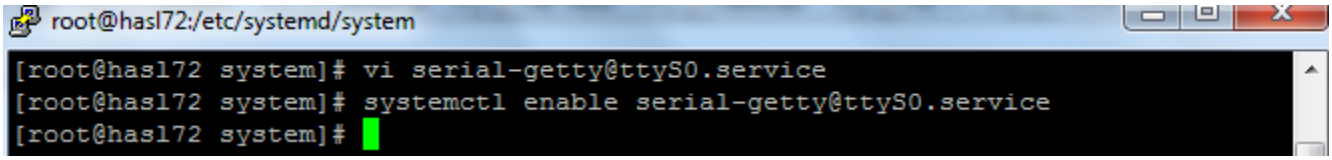

Figure 7

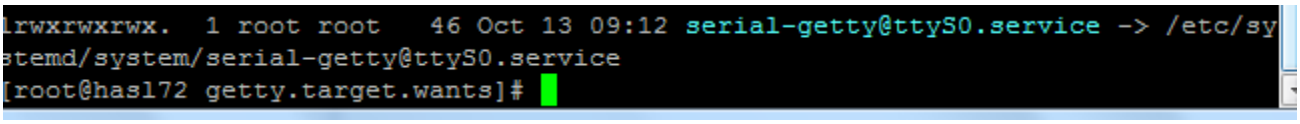

Figure 8

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

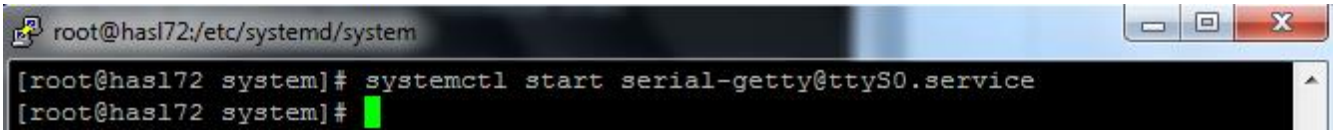

Figure 9

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.

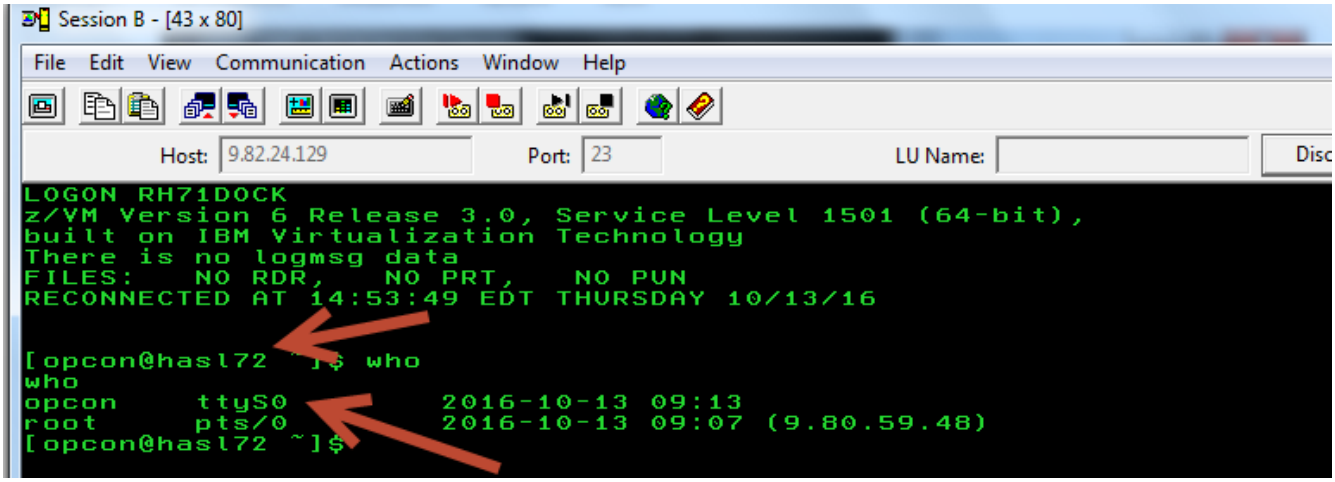

Figure 10

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:

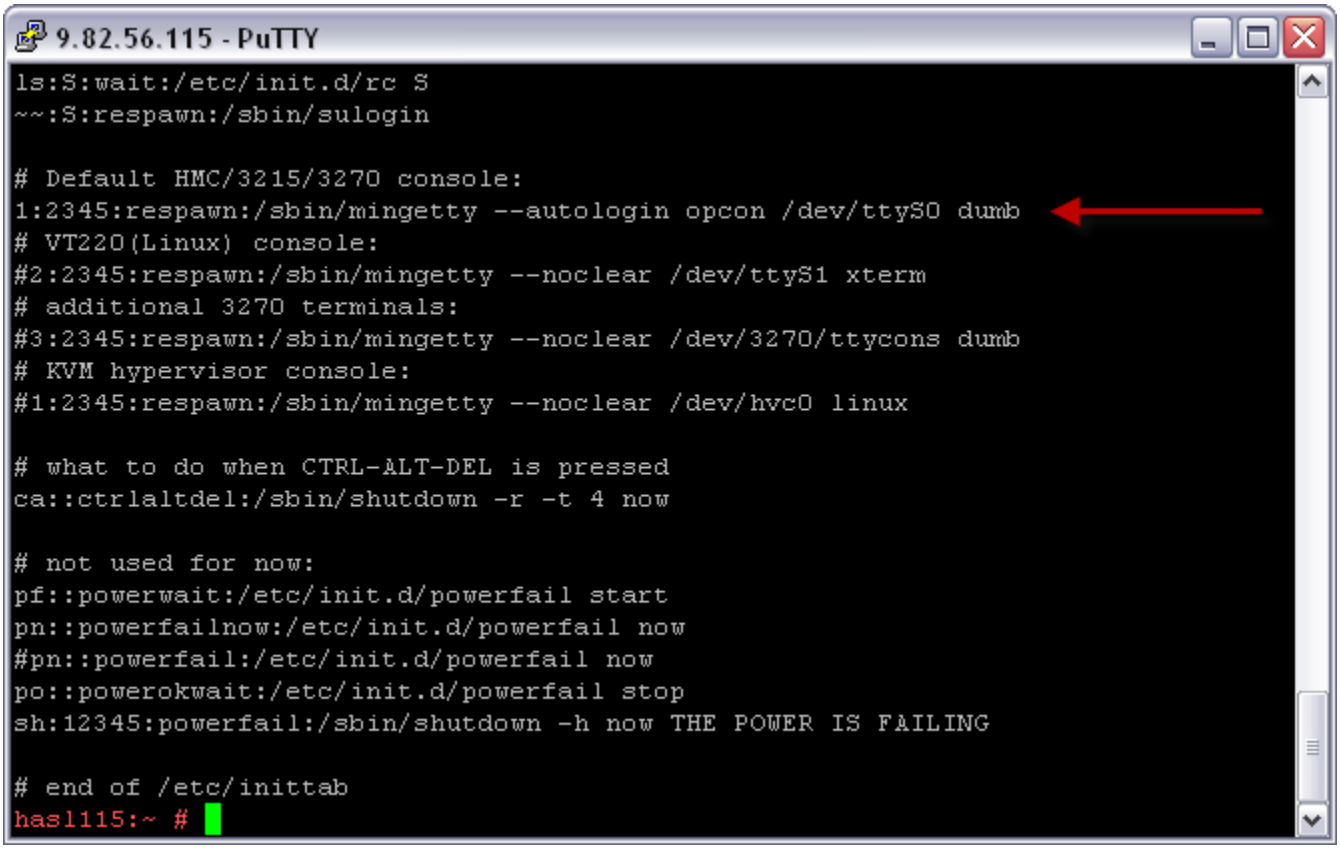

Figure 11

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

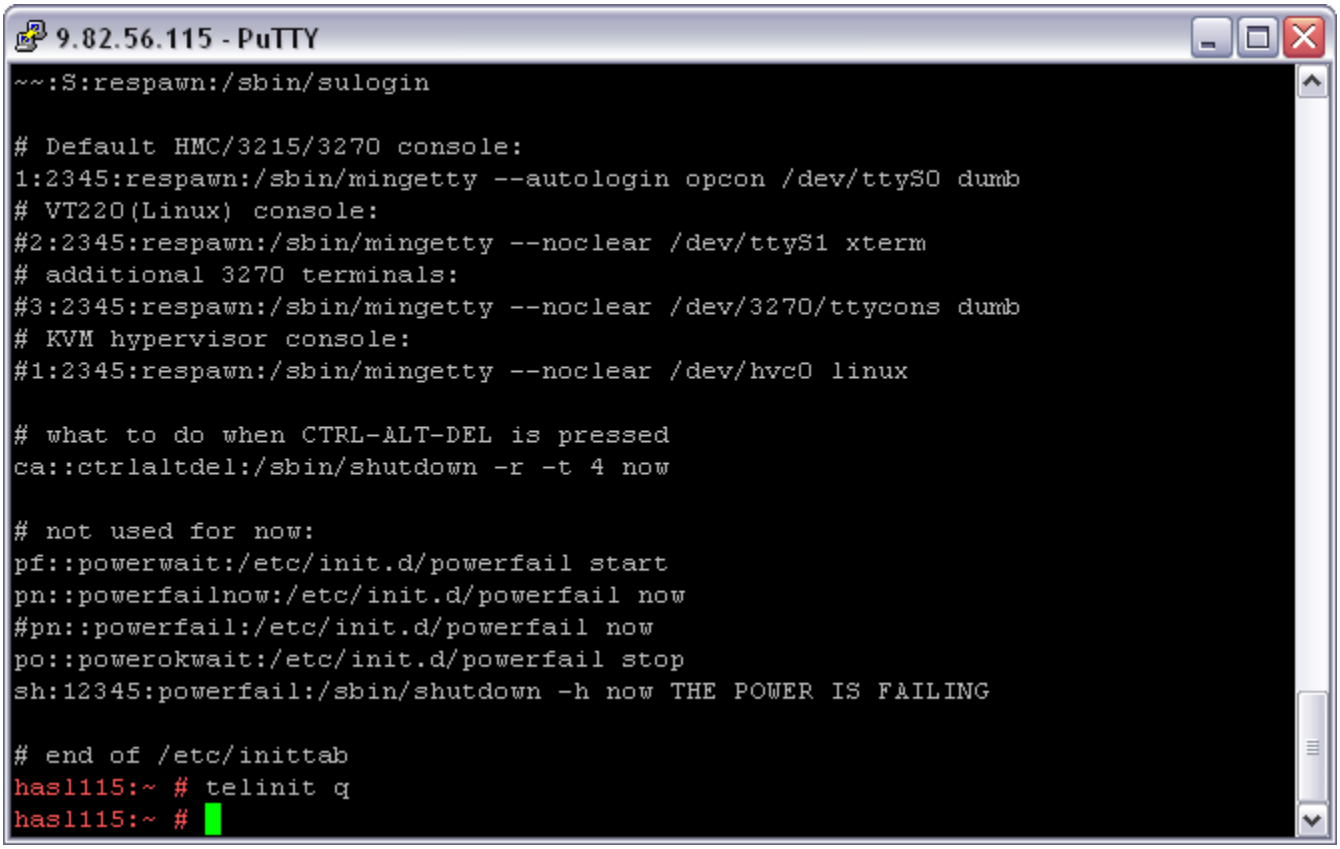

Figure 12

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*.

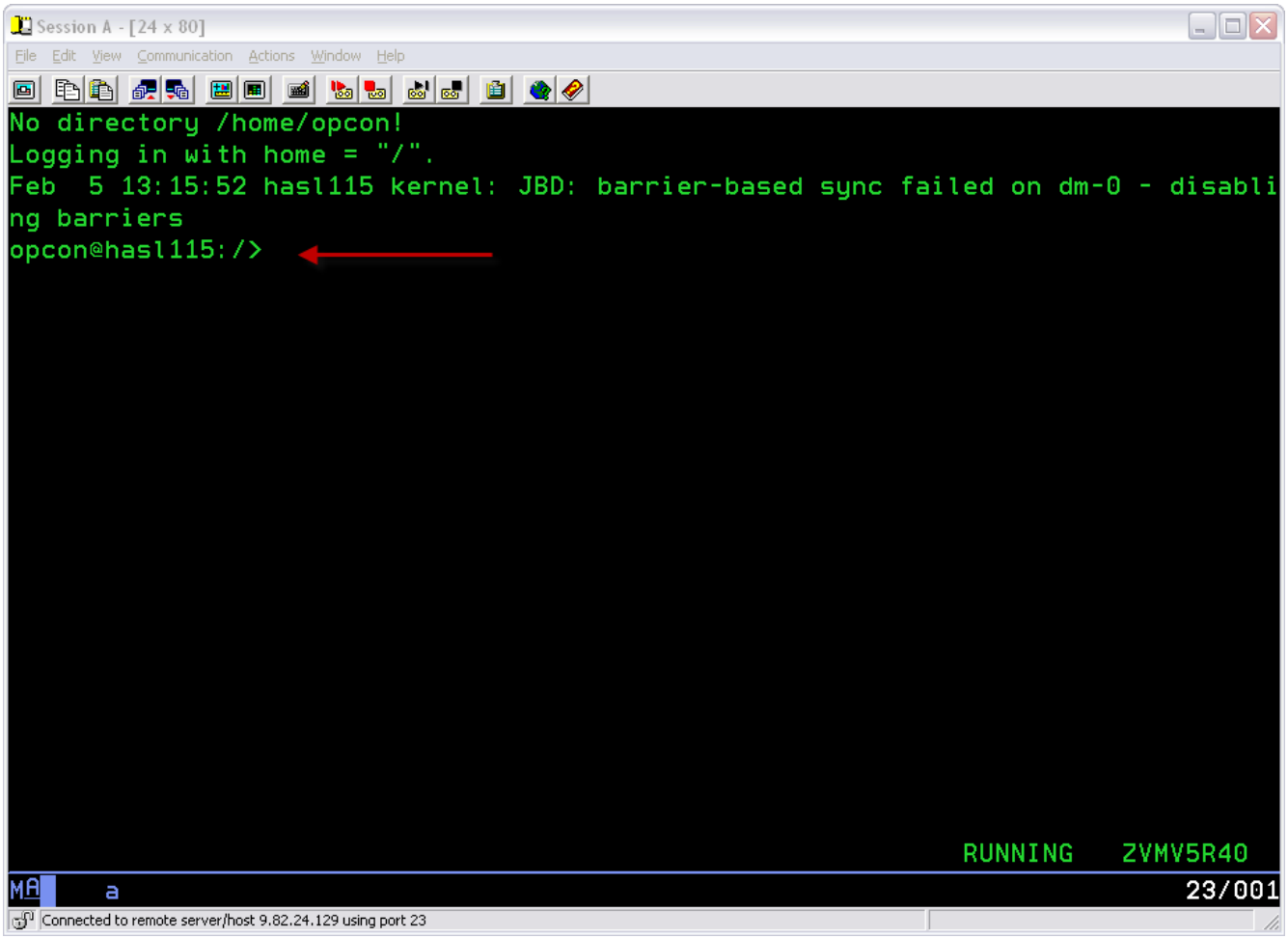

Figure 13

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:

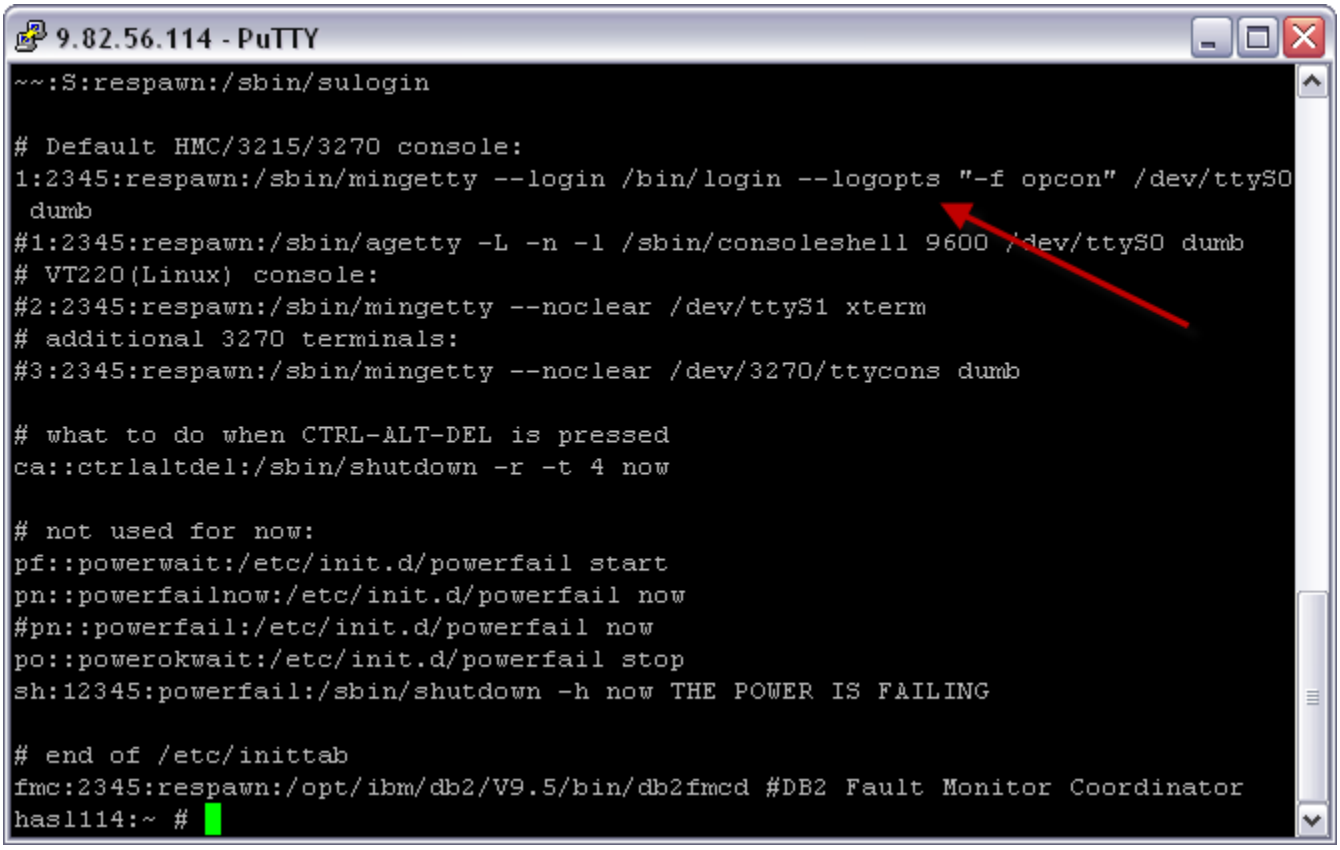

Figure 14

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.

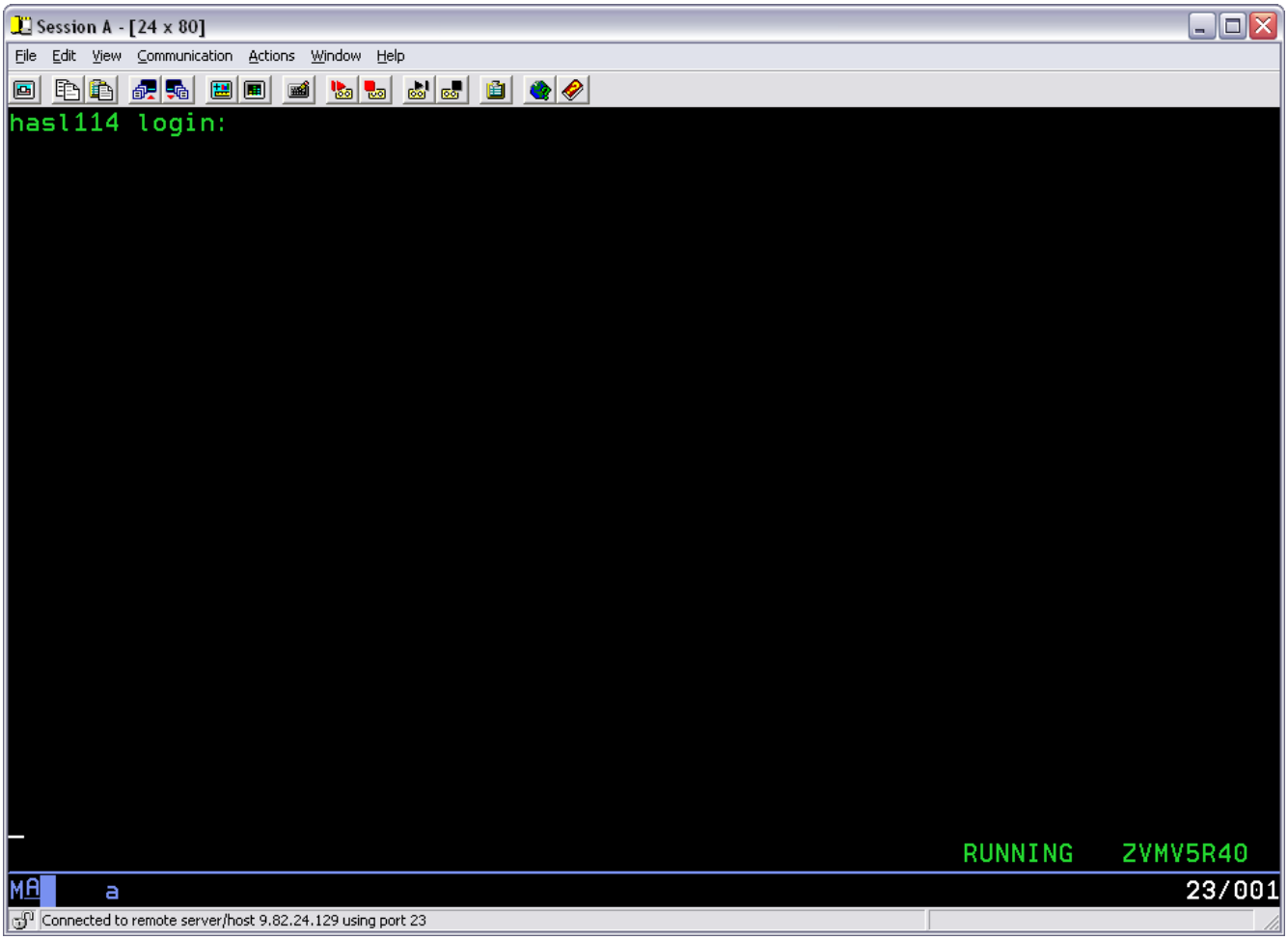

Figure 15

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

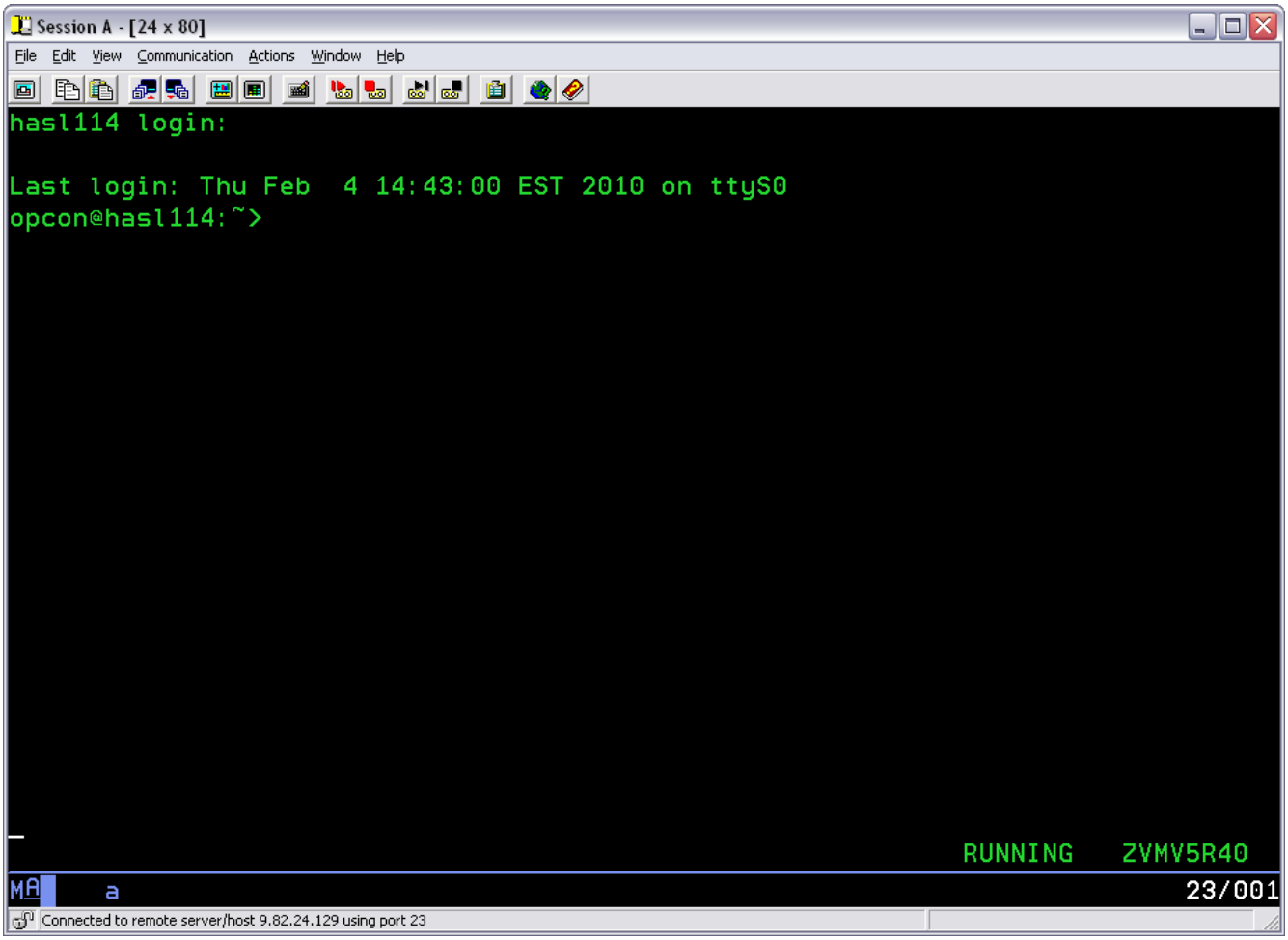

Figure 16

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 thse 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.

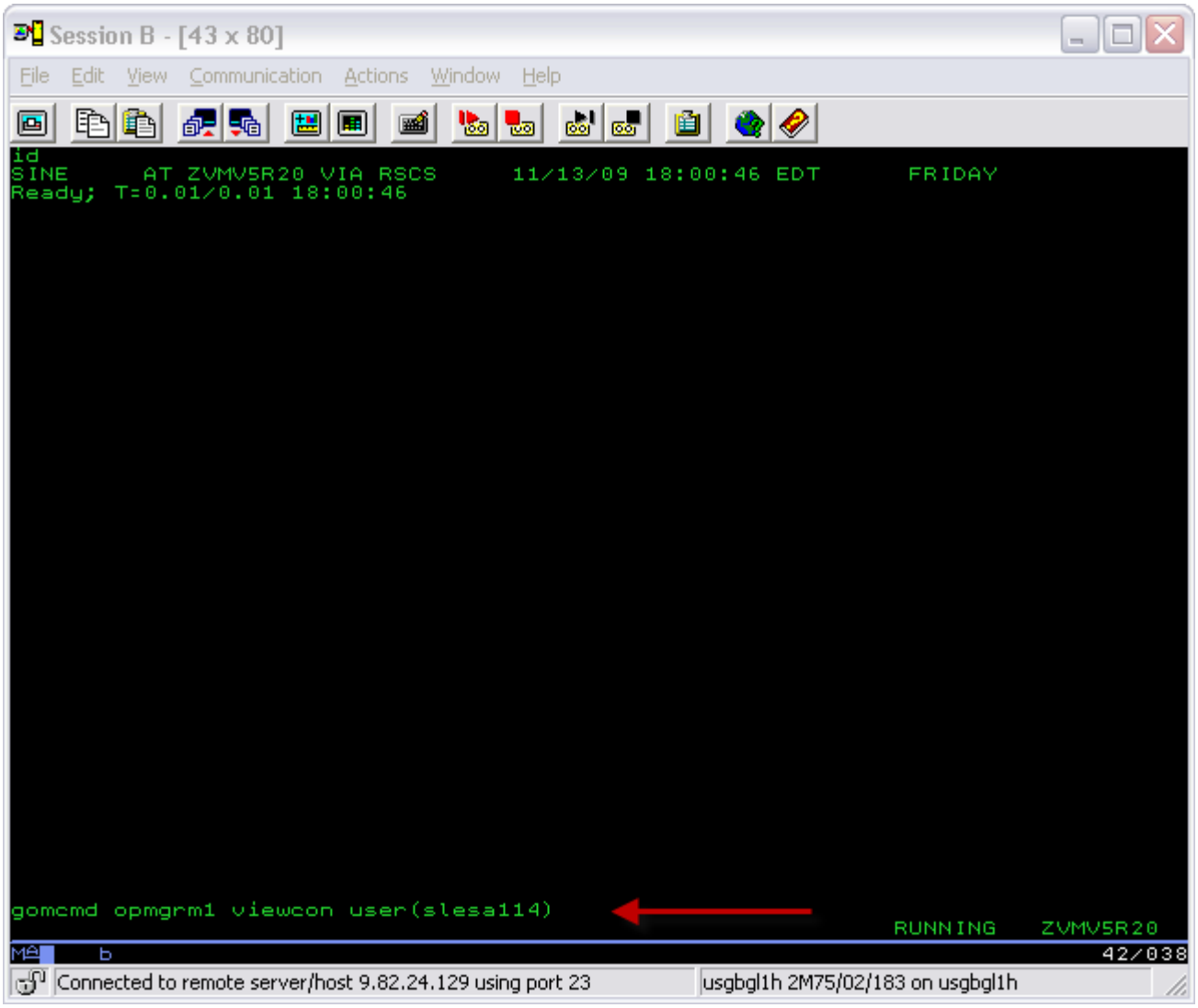

Figure 17

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.

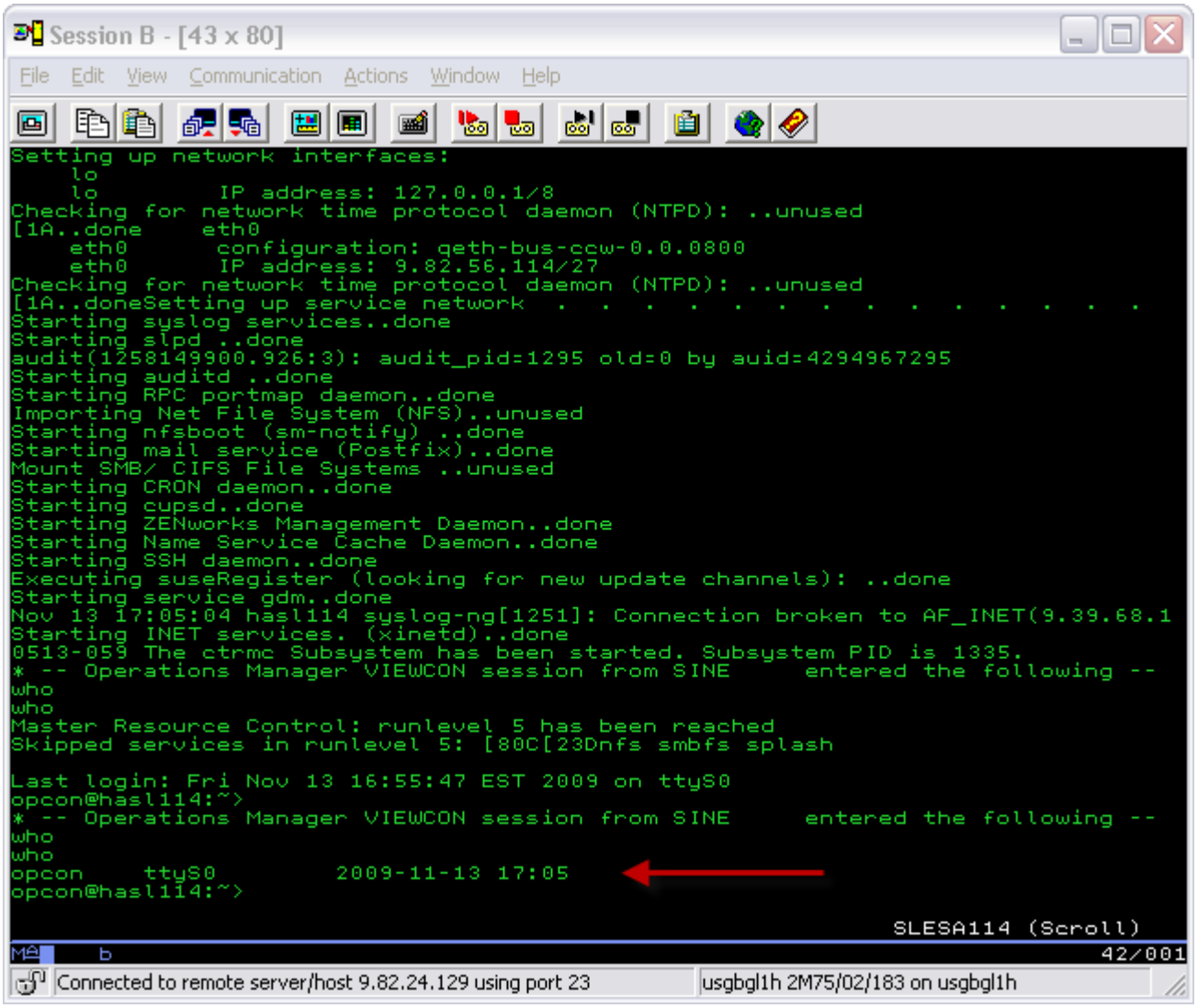

Figure 18

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.