Install and Use of the IBM Terminal Server for zLinux

by
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"THINK ... Penguins!"

VM Workshop

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Abstract

This session will cover how to install, configure and use the IBM terminal server for Linux on System z.

The Terminal Server is part of the `s390-tools` package and permits normal access to other zLinux guests running on the same z/VM system, even if they are not connected to a working TCP/IP network. This permits the use of common Linux tools like `vi, Emacs`, and `nano,` to be used even in the event of a network failure.

Other uses for the terminal server, including centralizing access to large Linux on System z penguin farms and segregating administrative network traffic from user traffic to enhance security, will be discussed as well

Agenda

- **Introduction**
  - What is IUCV?
  - How can IUCV terminals help you?
- **Working with IUCV terminals**
  - What does an IUCV terminal environment look like?
  - Establishing terminal sessions
- **Setting up your IUCV terminal environment**
  - Setting up target systems
  - Setting up a terminal server
- **Summary and Conclusion**

What are Linux terminals and consoles?

Linux terminals

Input/output devices through which users interact with Linux and Linux applications

Terminals differ in their modes and capabilities

Linux consoles

Consoles are output devices which display Linux kernel messages

The preferred console is the device which displays messages during the boot process when the 'init'-program is called

What is IUCV?

Inter-User Communications Vehicle == IUCV

a communications facility that allows a program running in a virtual machine to communicate with other virtual machines, with a CP system service, and with itself.

protocol is asynchronous

provided as a CP service, with well defined APIs, similar to how CP provides vswitches as a service

The Linux kernel includes IUCV

AF_IUCV – Addressing family for network sockets

IUCV hypervisor console (HVC) terminal device driver

Why would you want a IUCV terminal for Linux?

Do you have these problems?

Are you sick and tired of reconfiguring your Linux instances using a line-mode 3215 type terminal?

How often have you struggled using "ed" or "sed" to correct configuration files, for example, replacing the IP address in the network configuration settings?

Why not use common Linux tools like `vi`, `nano`, or (your favorite editor here)?

IUCV terminals can help you

Full-screen terminal access to Linux instances on the same z/VM

Provide an alternative terminal access to 3270 and 3215 line-mode terminals

Access to Linux instances that are not connected to an Internet Protocol (IP) network

Increase availability by providing emergency access if the network for a system fails

IUCV terminals can help you with security

Security

Centralize access to systems by providing a terminal server environment

Heighten security by separating user networks from administrator networks or by isolating sensitive Linux instances from public IP networks

The IUCV terminal programs

IUCV terminal programs (s390-tools)

`iucvconn` Start terminal connection over IUCV

`iucvtty` Allow remote logins over IUCV

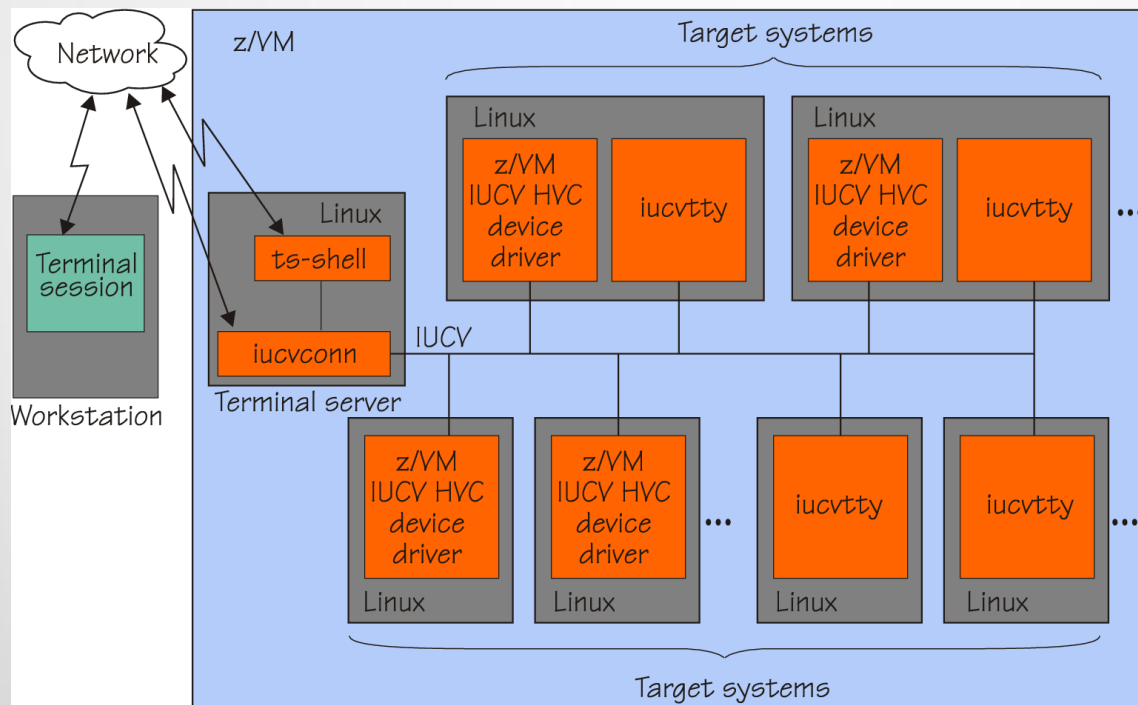`ts-shell` Login shell for setting up a terminal server using IUCV

`chiucvallow` Restrict access to IUCV HVC terminals

Terminal access over IUCV is provided by: (2 ways to connect)

1) `iucvtty`

2) IUCV hypervisor console (HVC) device driver

What does an IUCV terminal environment look like?

Establishing terminal iucvtty sessions

Authorizing the z/VM guest virtual machine for IUCV

Adding an IUCV user directory statement, for example, IUCV ANY

The z/VM user directory for a terminal server might look like:

```
USER TERMSRV  VMRULES 768M 1G G

* General statements

IPL 0150

MACH ESA 8

* IUCV authorization

IUCV ANY

OPTION MAXCONN 128

* Generic device statements

CONSOLE 0009 3215 T

SPOOL 000C 2540 READER *

* ...
```
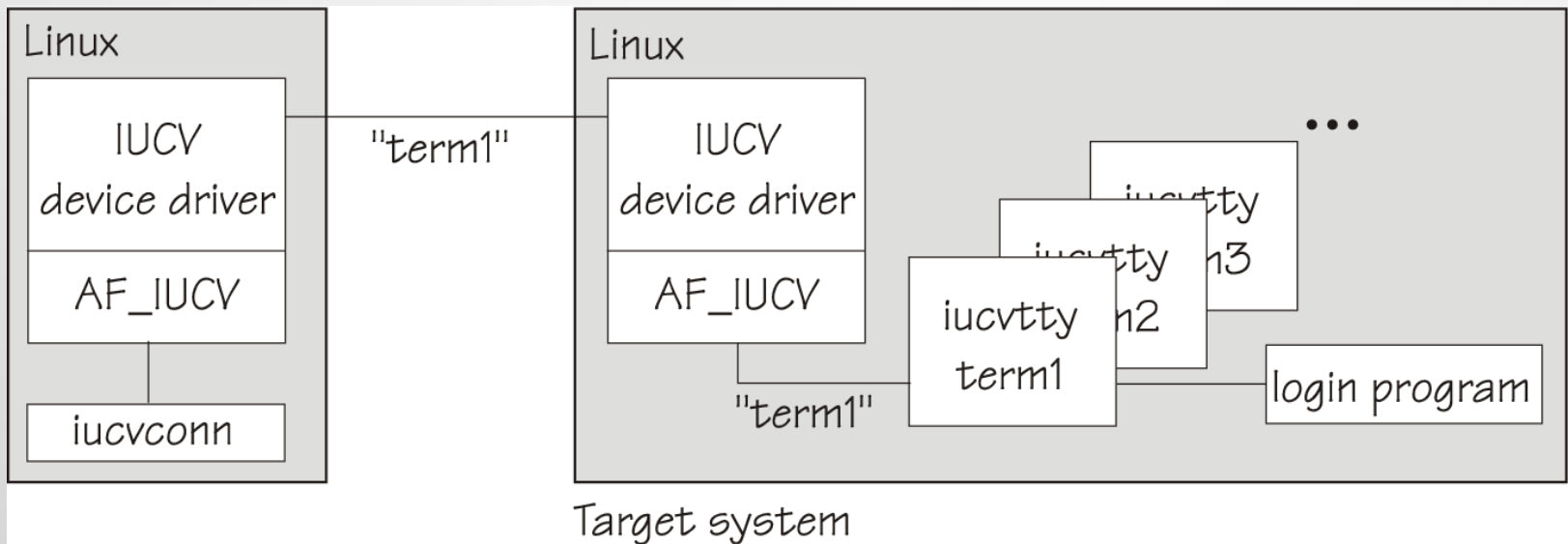
Establishing terminal iucvtty sessions

iucvconn establishes terminal sessions

Socket communication is based on the AF_IUCV address family

Addressing is based on z/VM user ID and an terminal identifier ("term1") ; you choose the terminal id

iucvtty waits for incoming connections and starts /bin/login to log on users

Establishing terminal iucvtty sessions

Establishing terminal iucvtty sessions

Choosing a terminal identifier

For example: term1 (8 characters max)

Enabling user logins in target

Start the iucvtty program through `/etc/inittab`

`i1:2345:respawn:/usr/bin/iucvtty term1`

How do you use iucvconn?

```
dave@HP-openSuSE-13:~/Desktop> ssh dave@192.168.128.52

Password:

Last login: Fri Jun 20 12:56:35 2014 from 192.168.128.200

dave@termsrv:~> iucvconn SLS11SP3  term1

sls11sp3 login: dave

Password:

Last login: Fri Jun 20 12:56:49 EDT 2014 on pts/0

Directory: /home/dave

Fri Jun 20 14:36:50 EDT 2014

:~> ls -al

total 12

drwxr-xr-x 2 dave users 4096 Jun 20 13:30 .

drwxr-xr-x 4 root root  4096 Jun 20 12:55 ..

-rw------- 1 dave users    8 Jun 20 13:30 .bash_history

dave@sls11sp3:~>
```

Establishing terminal HVC sessions

IUCV HVC device driver provides up to 8 terminal devices (`/dev/hvc`, **0-7**)

Using the terminal identifiers "`lnxhvc0`" .. "`lnxhvc7`". Names are hard coded in the device driver

`hvc0` can be activated as (preferred) Linux console

Establishing terminal HVC sessions

Specifying the number of IUCV HVC terminal devices

Set kernel parameter: `hvc_iucv=2`

Enabling user logins

Start a getty program on each terminal through `/etc/inittab`

```
h0:2345:respawn:/sbin/mingetty hvc0

h1:2345:respawn:/sbin/agetty -L 9600 hvc1
  xterm
```

Establishing terminal HVC sessions
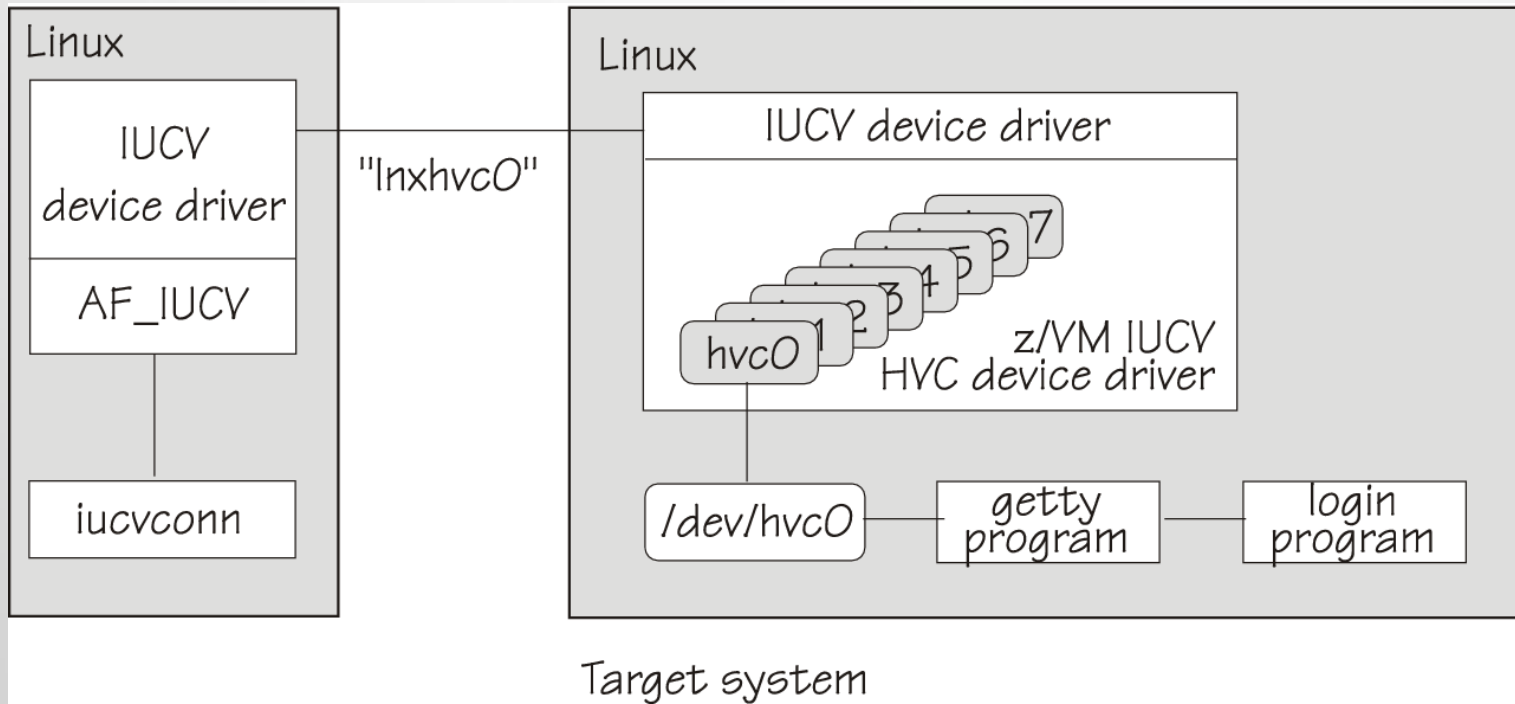
Permitting root logins

List HVC terminal devices in `/etc/securetty`

Activating `hvc0` to receive Linux kernel messages

Set kernel parameter: `console=hvc0 console=ttyS0`

Establishing terminal HVC sessions

Establishing terminal HVC sessions

```
dave@HP-openSuSE-13:~/Desktop> ssh dave@192.168.128.52

Password:

Last login: Fri Jun 20 14:36:16 2014 from 192.168.128.200

dave@termsrv:~> iucvconn SLS11SP3  lnxhvc0

Welcome to SUSE Linux Enterprise Server 11 SP3  (s390x) - Kernel 3.0.76-0.11-default
    (hvc0).

sls11sp3 login: root

Password:

Last login: Fri Jun 20 12:54:54 EDT 2014 from 192.168.128.200 on pts/1

You have new mail.

Directory: /root

Fri Jun 20 15:12:58 EDT 2014

sls11sp3:~ # ps

PID TTY       TIME CMD

 5387 hvc0    00:00:00 bash

 5422 hvc0    00:00:00 ps

sls11sp3:~ #
```

iucvtty vs. IUCV HVC which to use?

Criteria	iucvtty	IUCV HVC device driver
Origin	s390-tools	Linux kernel
Number of terminal instances	> 8	<= 8
Terminal identifiers	anything	static
Direct root login	No	Yes
Receiving kernel messages	No	yes
Acting as preferred console	No	Yes
Restricting access to terminals	Yes	Yes
Typical use case	administrative actions	emergency actions

iucvtty Features

iuvtty supports

Accessing special functions through escape characters

Use Ctrl+_ followed by "d" to disconnect terminal sessions

Creating transcripts of terminal sessions with target systems

Writing the terminal data stream to a log file (transcript)

Replaying transcripts with realistic output delays

TS-SHELL

ts-shell helps you to:

Set up a terminal server to simplify system administration by providing a central access point

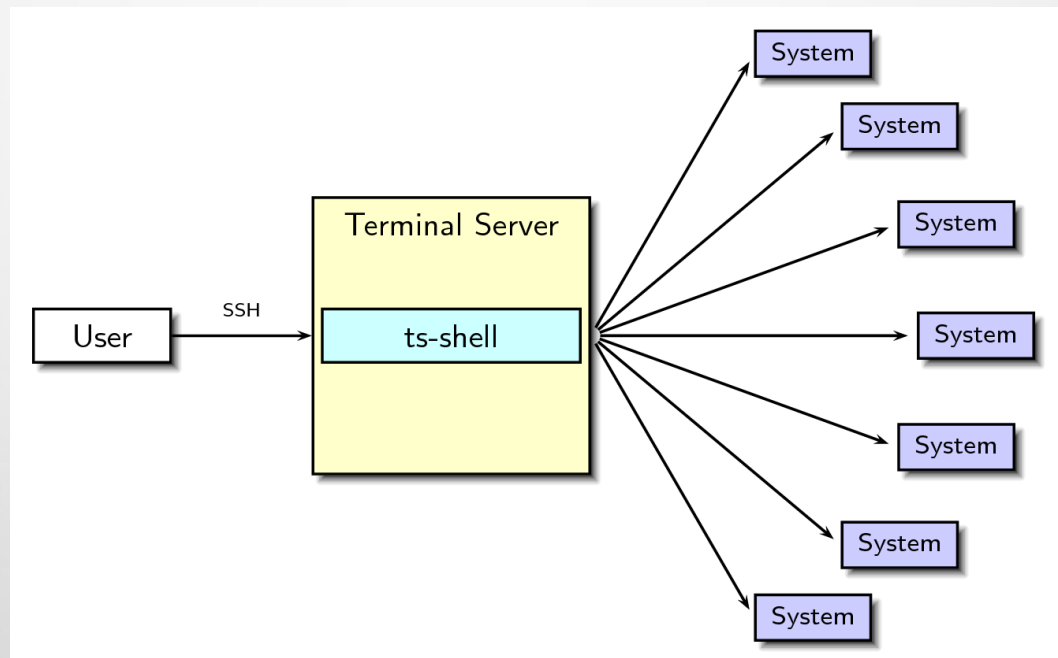Authorize users to establish IUCV terminal connections to specific target systems

Improve auditing through creating transcripts of terminal sessions with target systems

Restrict users from getting access to the terminal server system

TS-SHELL

In a ts-shell session, you can
– List your authorizations
– Establish terminal connections

Authorizing TS-SHELL Users

Before ts-shell connects to a target system, ts-shell verifies that:

The user is authorized for the specified target system

The target system is included in the global ts-shell authorization

ts-shell creates a transcript of a terminal session when

The target system is listed in the audit-systems configuration

Authorizing TS-SHELL Users

Creating a group and a user for ts-shell

```
groupadd testgrp

useradd -m -s /usr/bin/ts-shell -g ts-shell -G testgrp dave2
```

Granting authorization to ts-shell users
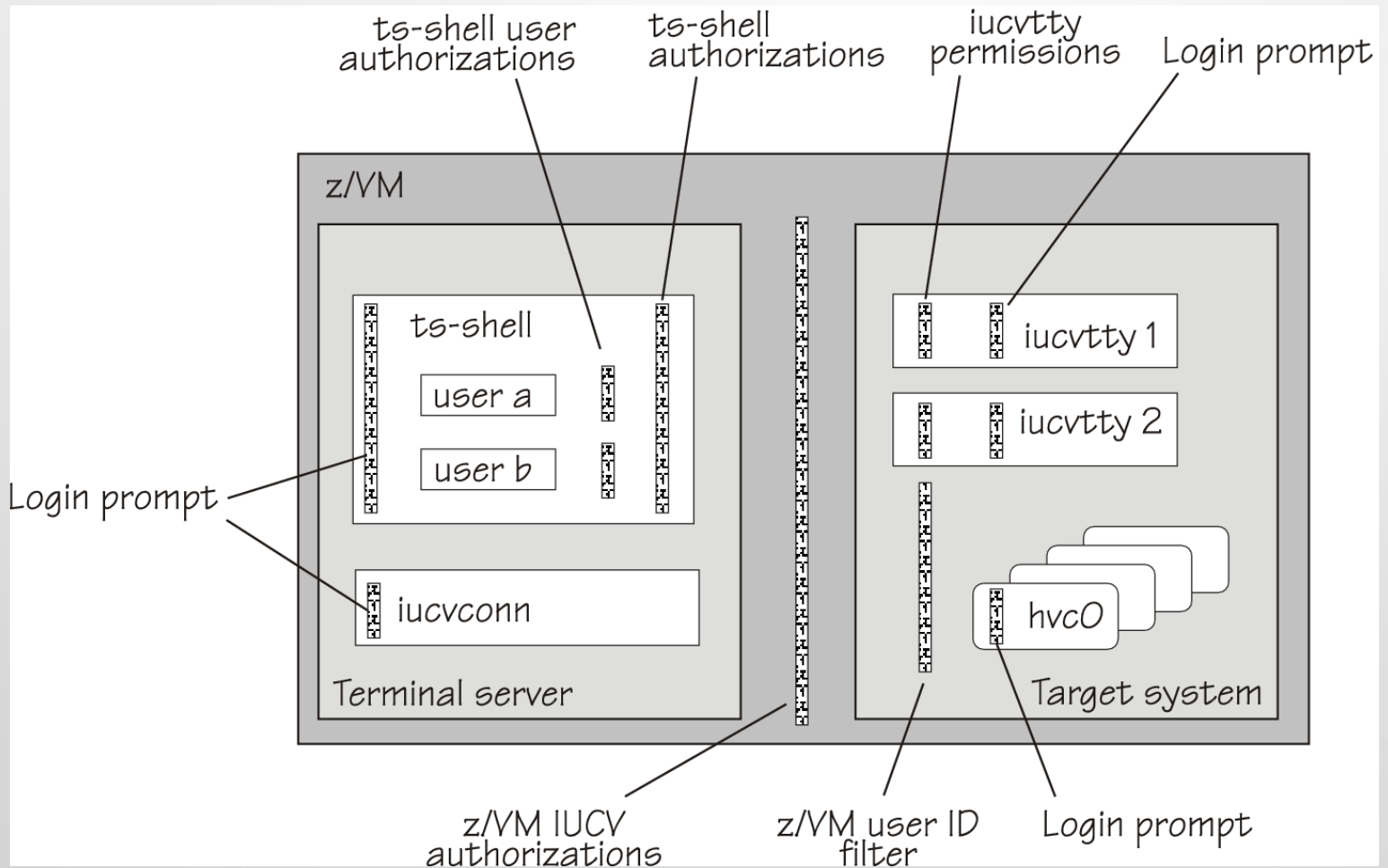
Edit `/etc/iucvterm/ts-authorization.conf`

```
@testgrp = list:linux006,linux007,linux008

dave2 = list:linux005
```

Using TS-SHELL

```
dave@HP-openSuSE-13:~/Desktop> ssh dave2@192.168.128.52

Password:

Welcome to the Terminal Server shell.

Type 'help' to get a list of available commands.

dave2@ts-shell> list

dave2@ts-shell> connect SLS11SP3

ts-shell: Connecting to SLS11SP3 (terminal identifier: lnxhvc0)...

Welcome to SUSE Linux Enterprise Server 11 SP3  (s390x) - Kernel 3.0.76-0.11-default
    (hvc0).

sls11sp3 login: root

Password:

Last login: Fri Jun 20 16:00:29 EDT 2014 on hvc0

You have new mail.

Directory: /root

Sat Jun 21 10:35:02 EDT 2014

sls11sp3:~ # exit
```

Securing IUCV environment

Which Linux distributions include the terminal server using IUCV?

Red Hat

Red Hat Enterprise Linux 5 Update 4 or higher

Red Hat Enterprise Linux 6

Novell

Novell SUSE Linux Enterprise Server 10 Service Pack 3 or higher

Novell SUSE Linux Enterprise Server 11 Service Pack 1 or higher

IBM DeveloperWorks "upstream" availability

Linux kernel 2.6.30 or higher

s390-tools 1.8.1 or higher

Need more infomation?

IBM developerWorks

How to Set up a Terminal Server Environment (SC34-2596)

Device Drivers, Features, and Commands (SC33-8411)

at: http://www.ibm.com/developerworks/linux/linux390/index.html

s390-tools package

Man pages for iucvconn(1), iucvtty(1), ts-shell(1), af_iucv(7), and hvc_iucv(9)

ts-shell README

Summary and Conclusion

IUCV terminals are flexible and easy to use

The terminal server using IUCV helps you to

Simplify system administration by providing a central access point

Heighten availability by providing emergency access to Linux instances when network is down

Work more comfortably by using full-screen terminals as alternative to traditional mainframe terminals

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