

Introduction to the new Linux on System z Terminal Server using IUCV

Share Conference, Boston

Tuesday, August 3, 2010: 4:30 PM-5:30 PM, Room 208 (Hynes Convention Center)



Agenda

- **Introduction**
 - 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**



Introduction



Why do you need IUCV terminals?

- **Ask yourself**
 - How often did you reconfigure your network setup using a line-mode terminal?
 - Can you use “ed” to change and correct your configuration files?
 - *Why not using vi or emacs?*



How can IUCV terminals help you?

- **Full-screen terminal access to Linux instances on the same z/VM**
- **Access Linux instances that are not connected to an Internet Protocol (IP) network**
- **Use cases**
 - Provide an alternative terminal access to 3270 and 3215 line-mode terminals
 - Increase availability by providing emergency access if the network for a target system fails
 - 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



Working with IUCV terminals



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
 - The preferred console is the device which displays messages during the boot process when the 'init'-program is called
- **Linux terminal device drivers typically provide combined terminal/console devices**



What is z/VM IUCV and how does Linux use it?

- **Inter-user communication vehicle (IUCV)**
 - A z/VM CP interface for passing data between virtual machines or between CP and a virtual machine
- **The Linux kernel includes IUCV**
 - Base IUCV layer (intra-kernel API)
 - Collaborative Memory Management (CMM), monreader, and vmlogrdr
 - *AF_IUCV – Addressing family for network sockets*
 - *IUCV hypervisor console (HVC) terminal device driver*

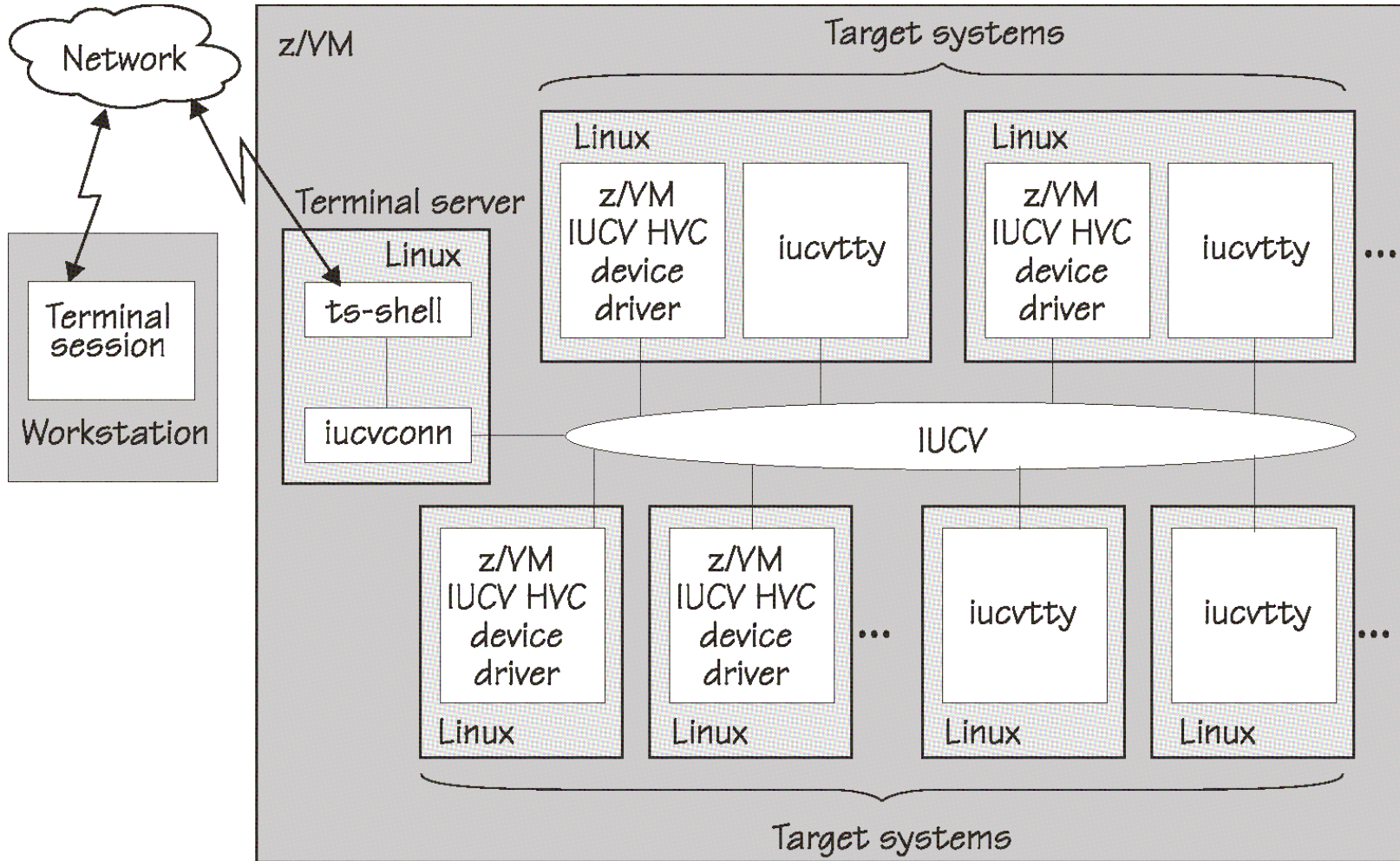


Introducing the IUCV terminal programs

- **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**
 - *iucvtty*
 - IUCV hypervisor console (HVC) device driver (Linux kernel)

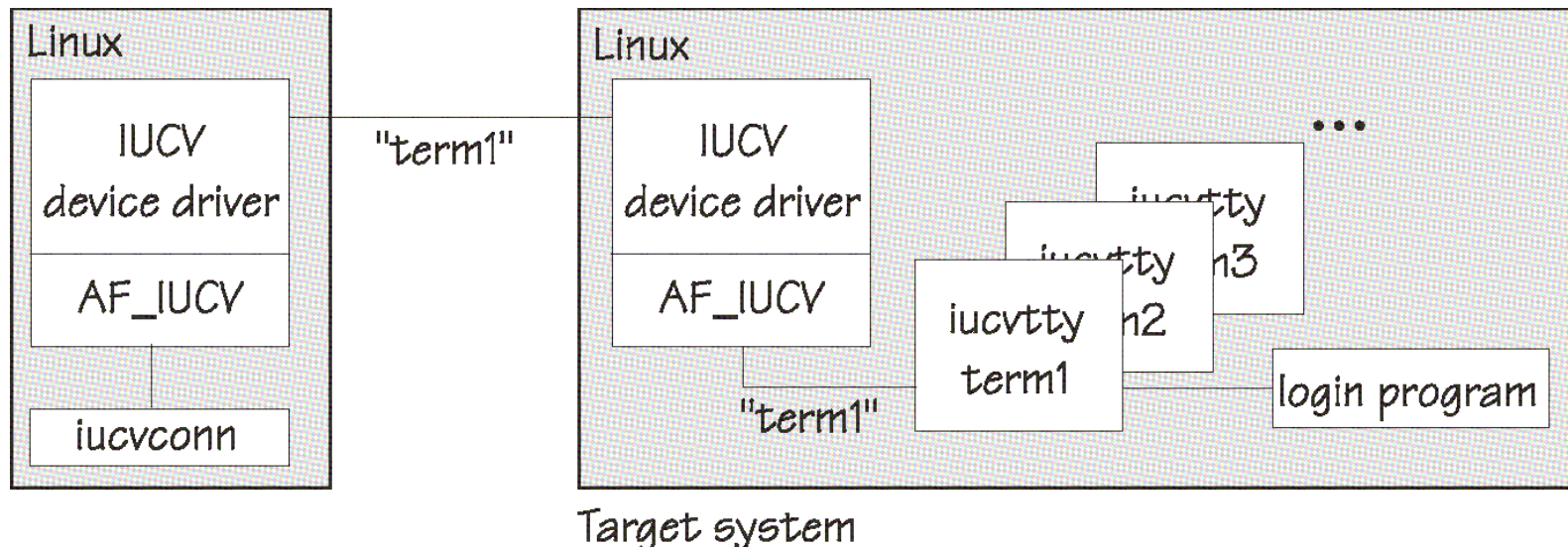


What does an IUCV terminal environment look like?



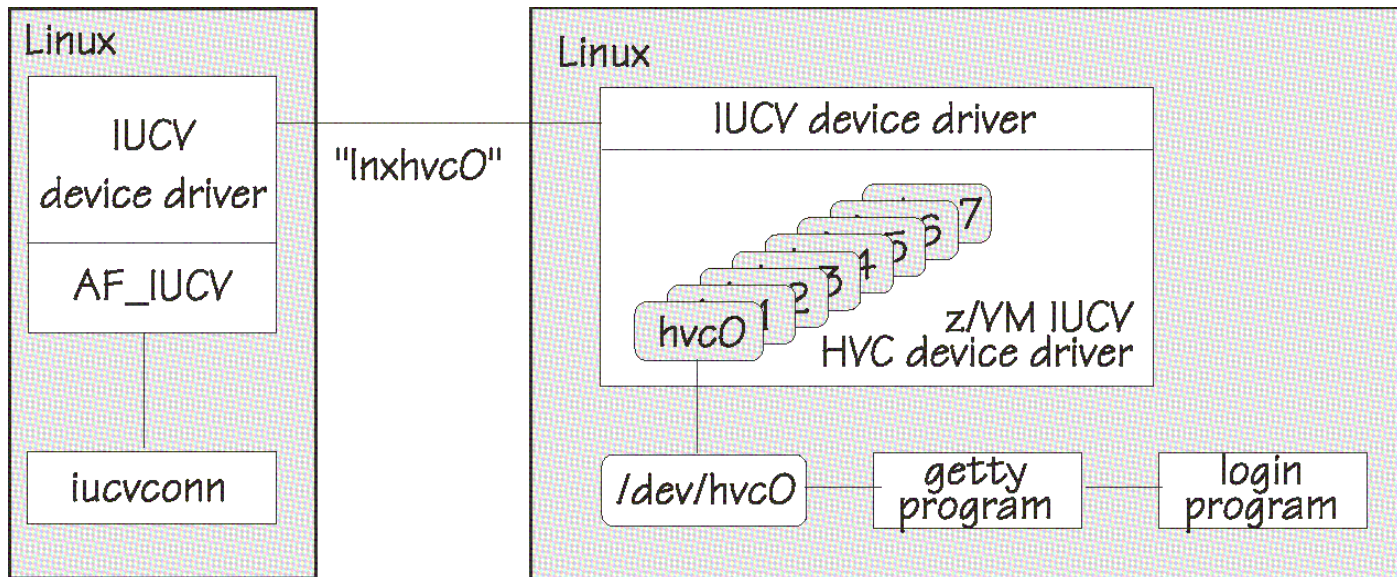
Establishing terminal sessions (iucvtty)

- **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”)
- **iucvtty waits for incoming connections and starts /bin/login to log on users**



Establishing terminal sessions (z/VM IUCV HVC DD)

- **IUCV HVC device driver provides up to 8 terminal devices (/dev/hvc)**
 - Using the terminal identifiers “Inxhvc0” .. “Inxhvc7”
- **hvc0 can be activated as (preferred) Linux console**



Target system



What is the difference between iucvtty and IUCV HVC?

Criteria	iucvtty	IUCV HVC device driver
Origin	s390-tools	Linux kernel
Number of terminal instances	> 8	max. 8
Terminal identifiers	variable	fixed
Direct root login	✗	✓
Receiving kernel messages	✗	✓
Acting as preferred console	✗	✓
Restricting access to terminals	✓	✓
Typical use case	administrative access	emergency access



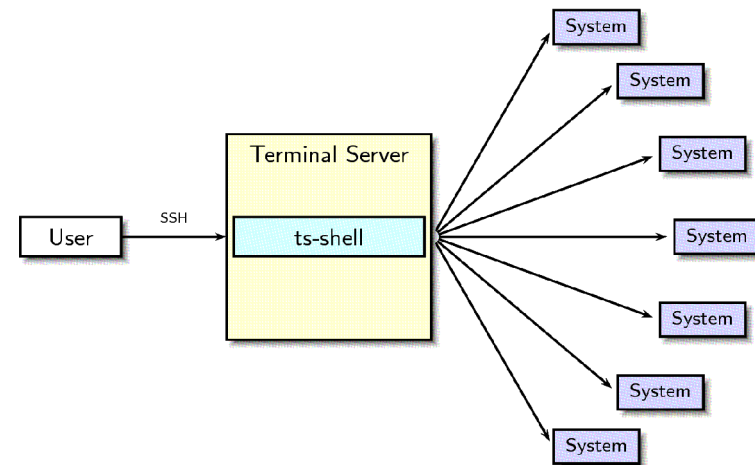
What else can you do with iucvconn?

- **Accessing special functions through escape characters**
 - Use Ctrl+_ followed by “d” to disconnect terminal sessions
- **Creating terminal session transcripts**
 - Writing the terminal data stream to a log file (transcript)
 - Replaying transcripts with realistic output delays

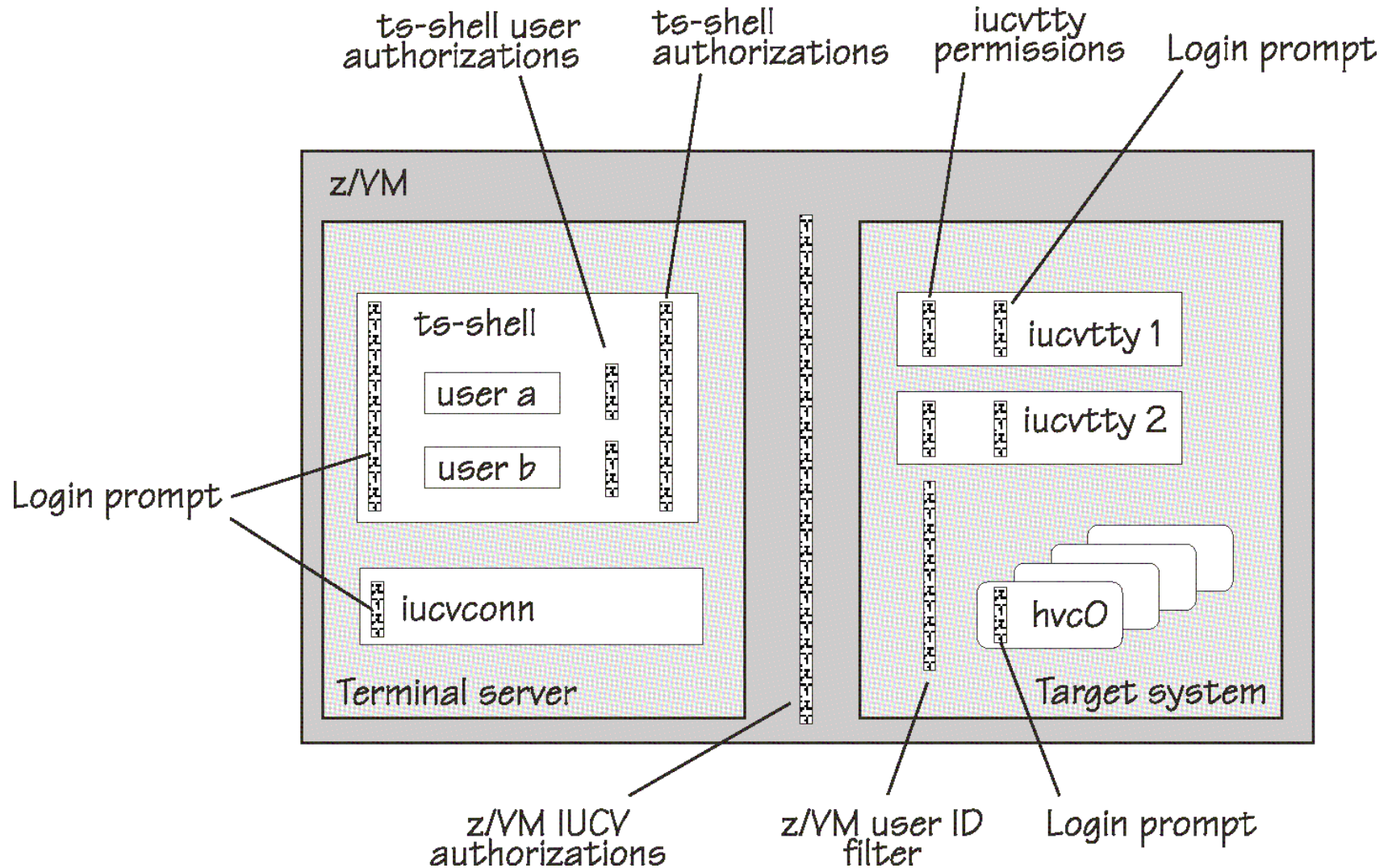


What you can do with ts-shell?

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



How can you secure an IUCV terminal environment?



Setting up your IUCV terminal environment



Setting up target systems with IUCV HVC devices

1. Specifying the number of IUCV HVC devices

- Set kernel parameter: `hvc_iucv=2`

2. Enabling user logins

- Start a getty program on the terminal through `/etc/inittab`

```
h0:2345:respawn:/sbin/agetty -L 9600 hvc0 xterm
h1:2345:respawn:/sbin/agetty -L 9600 hvcl xterm
```

3. Permitting root logins

- List hvc device nodes in `/etc/securetty`

4. Activating hvc0 to receive Linux kernel messages

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



Setting up target systems with iucvtty

1. Choose a terminal identifier

- For example: `lxterm1`

2. Enabling user logins

- Start the `iucvtty` program through `/etc/inittab`

```
i1:2345:respawn:/usr/bin/iucvtty lxterm1
```



Setting up a terminal server for iucvconn

- **Authorize the z/VM guest virtual machine for IUCV**
 - Add an IUCV user directory statement, for example, IUCV ANY
 - The z/VM user directory for a terminal server might look like:

```
USER T6313004 XSECRETX 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 connections with iucvconn

```
hans@larsson:~$ ssh hans@t6313004
Password:
hans@t6313004:~> iucvconn T6313005 lxterm1
login: hans
Password:
[hans@t6313005 ~]$ ls
[hans@t6313005 ~]$ ps
  PID TTY          TIME CMD
 1731 pts/0        00:00:00 bash
 1762 pts/0        00:00:00 ps
[hans@t6313005 ~]$
```



Setting up a terminal server for ts-shell

- **Creating a group and a user for ts-shell**

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

- **Granting authorizations to ts-shell users**

- Edit /etc/iucvterm/ts-authorization.conf

```
@testgrp = list:t6313006,t6313007,t6313008
bob = list:t6313005
```



Establishing terminal connections with ts-shell

```
hans@larsson:~$ ssh bob@t6313004
```

```
Password:
```

```
Last login: Fri Mar 5 12:01:32 2010 from dyn-9-152-212-21
```

```
Welcome to the Terminal Server shell.
```

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

```
bob@ts-shell> list
```

```
t6313006
```

```
t6313007
```

```
t6313008
```

```
t6313005
```

```
bob@ts-shell>
```

```
bob@ts-shell> connect t6313005
```

```
ts-shell: Connecting to t6313005 (terminal identifier:  
lnxhvc0)...
```

```
Red Hat Enterprise Linux Server release 5.4 (Tikanga)  
Kernel 2.6.18-164.el5 on an s390x
```

```
t6313005 login: root
```

```
Password:
```

```
Last login: Fri Mar 5 12:02:45 on hvc0
```

```
[root@t6313005 ~]# ps
```

PID	TTY	TIME	CMD
1678	hvc0	00:00:00	bash
1708	hvc0	00:00:00	ps

```
[root@t6313005 ~]# logout
```

```
ts-shell: Connection ended
```



Summary & Conclusion



Summary and Conclusion

- **IUCV terminals are flexible and easy to use**
- **IUCV terminals help you to**
 - Access your Linux instances in emergency situations
 - Simplify system administration by providing a central access point



Questions?



Hans-Joachim Picht
Linux on System z Initiatives

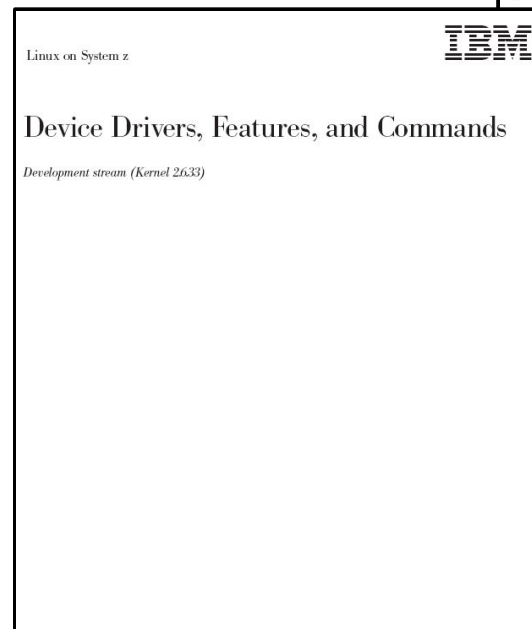
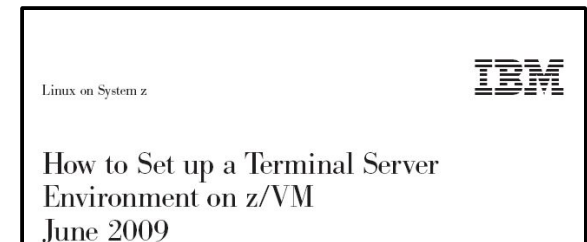
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Where do you get more information?

- **developerWorks**
 - How to Set up a Terminal Server Environment (SC34-2596)
 - Device Drivers, Features, and Commands (SC33-8411)
- **s390-tools package**
 - Man-pages for iucvconn(1), iucvtty(1), ts-shell(1), af_iucv(7), and hvc_iucv(9)
 - ts-shell Readme



Kernel 26 - Development stream

SC34-2596-00



Which Linux distributions include IUCV terminals?

- **Red Hat Enterprise Linux (RHEL)**
 - RHEL 5 Update 4 or higher
- **Novell SUSE Enterprise Linux Server (SLES)**
 - SLES 10 Service Pack 3 or higher
- **“Upstream” packages**
 - Linux kernel 2.6.30
 - s390-tools 1.8.1

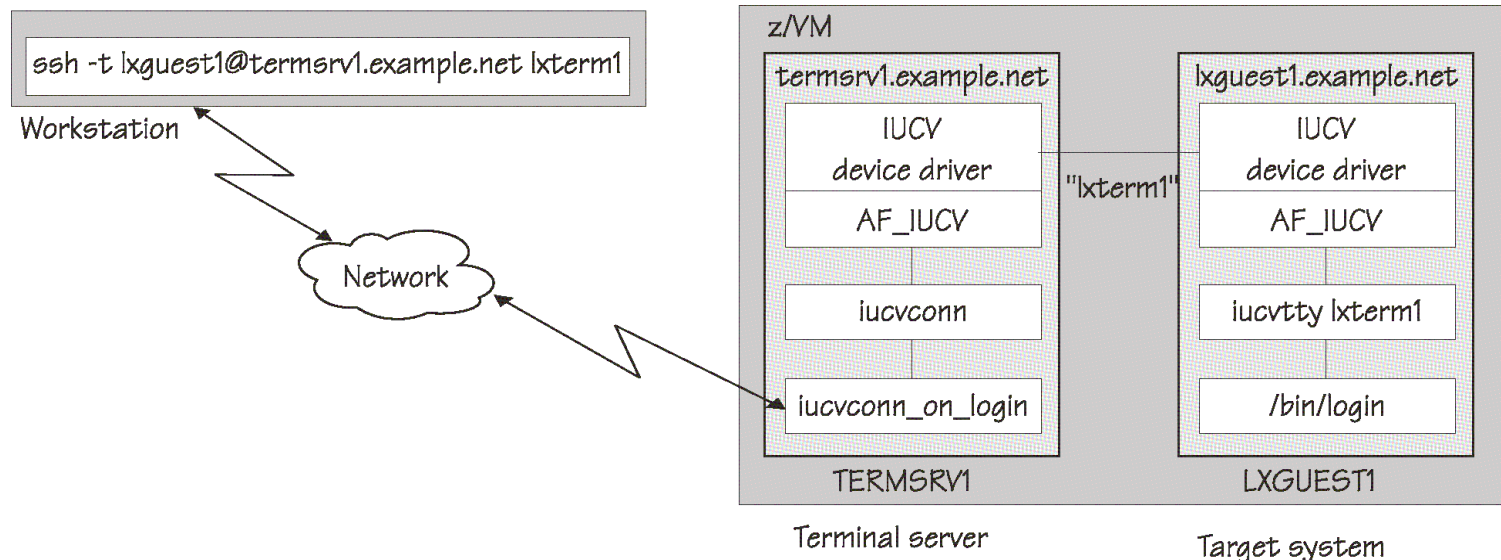


Backup



What is iucvconn_on_login?

- **iucvconn_on_login is an alternative login shell for setting up a terminal server**
 1. Log in to Linux with a user ID that matches the z/VM user ID of the target system
 2. After a successful login, a terminal session is established and the user is prompted to log in to the target system
- **Creating a user for iucvconn_on_login**
 - `useradd -m -s /usr/bin/iucvconn_on_login lxgquest1`



Using the IUCV terminal programs

- **Using the iucvconn program:**

- To access the first z/VM IUCV HVC terminal on the Linux instance in z/VM guest LNXSYS02
`$ iucvconn LNXSYS02 lnxhvc0`
- To create a transcript of the terminal session to the Linux instance in z/VM guest LNXSYS99
`$ iucvconn -s ~/transcripts/lnxsys99 LNXSYS99 lnxhvc0`

- **Using the iucvtty program:**

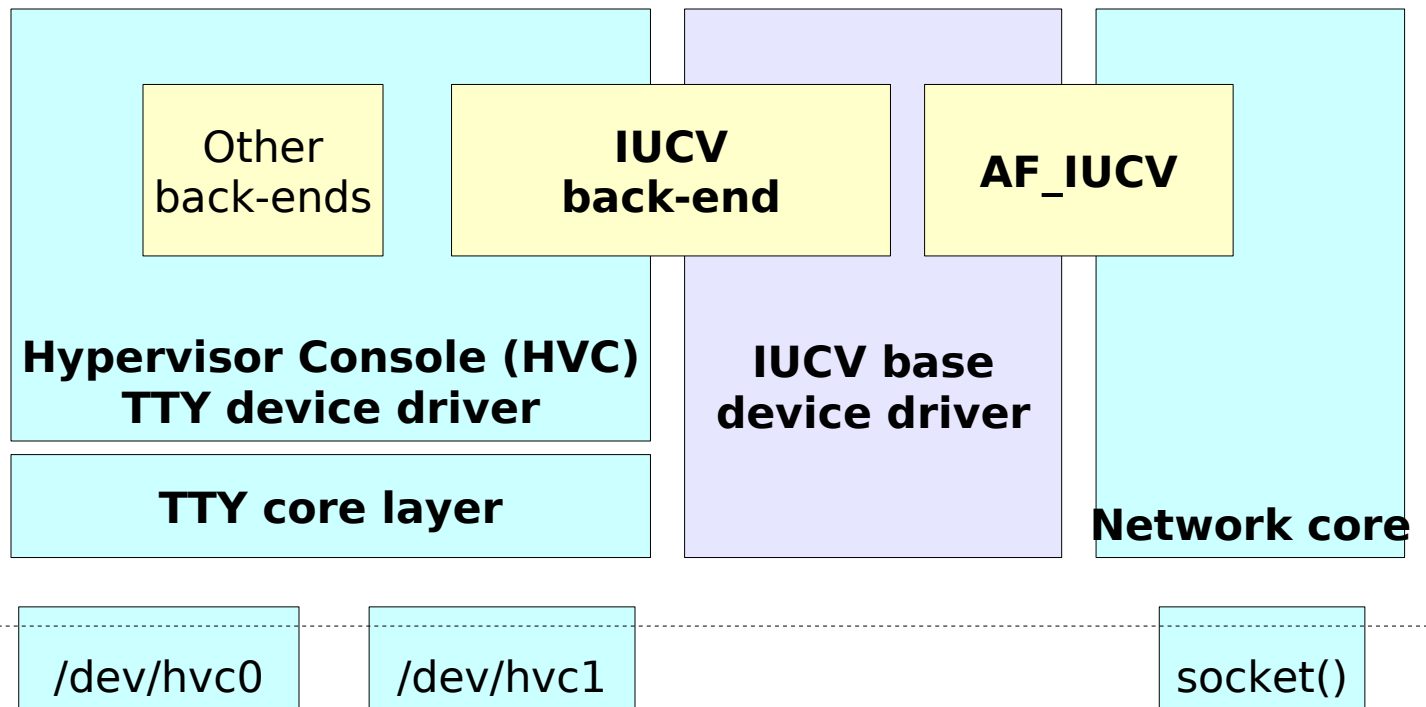
- To allow remote logins using the terminal identifier „lnxterm“
`# iucvtty lnxterm`
- To access the „lnxterm“ terminal on the Linux instance in z/VM guest LNXSYS01
`$ iucvconn LNXSYS01 lnxterm`
- To use /sbin/sulogin instead of /bin/login for terminal identifier “suterm”
`# iucvtty suterm -- /sbin/sulogin`

- **Configuring the Linux system for providing terminals over IUCV (using /etc/inittab)**

- z/VM IUCV HVC terminal devices
`h0:2345:respawn:/sbin/agetty -L 9600 hvc0 linux`
- iucvtty
`t1:2345:respawn:/usr/bin/iucvtty lnxterm`



Which Linux kernel components are used?



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