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

4th European GSE / IBM Technical University for z/VSE, z/VM and Linux on System z
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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**

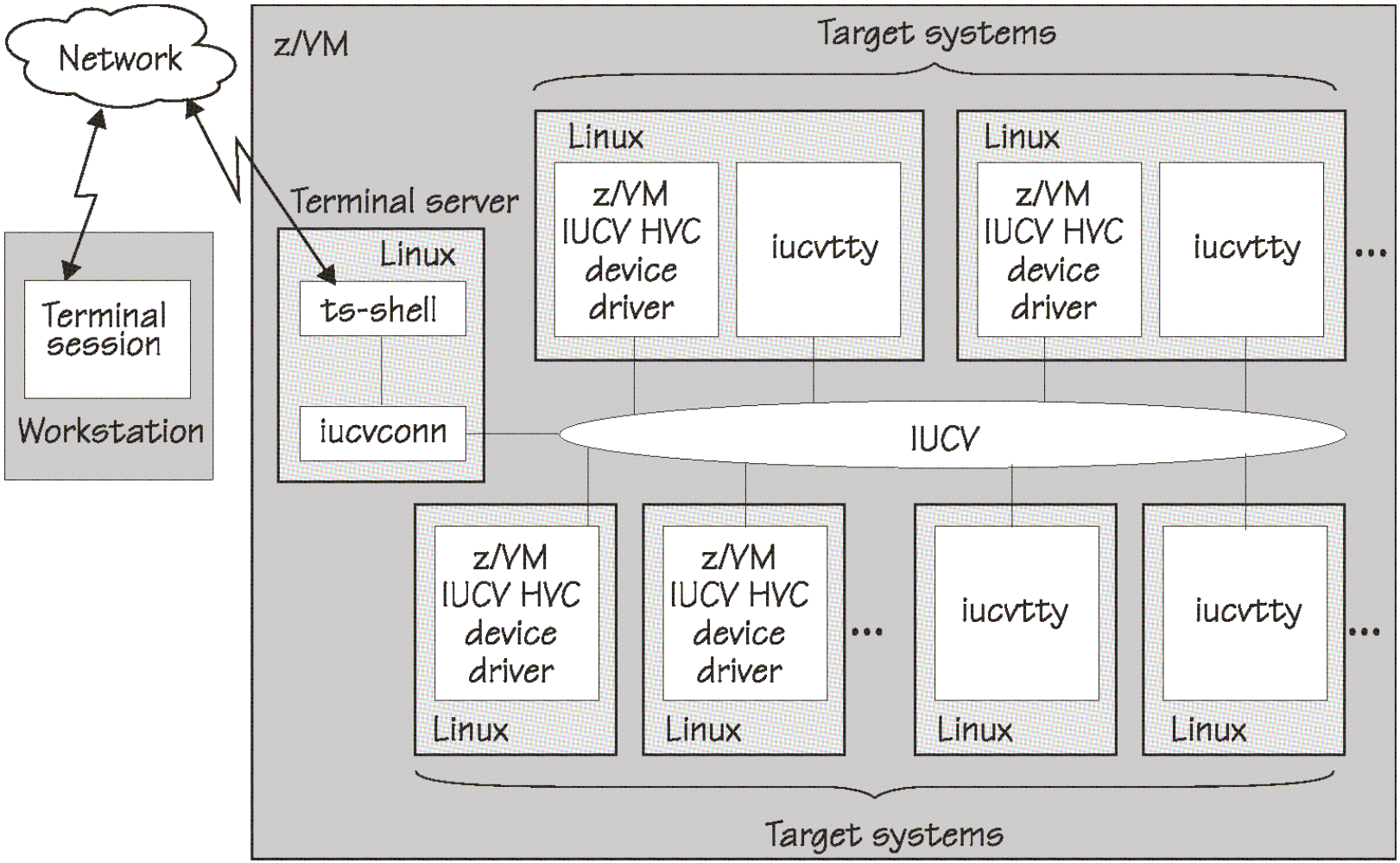
What is z/VM IUCV and how does Linux use it?

- **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

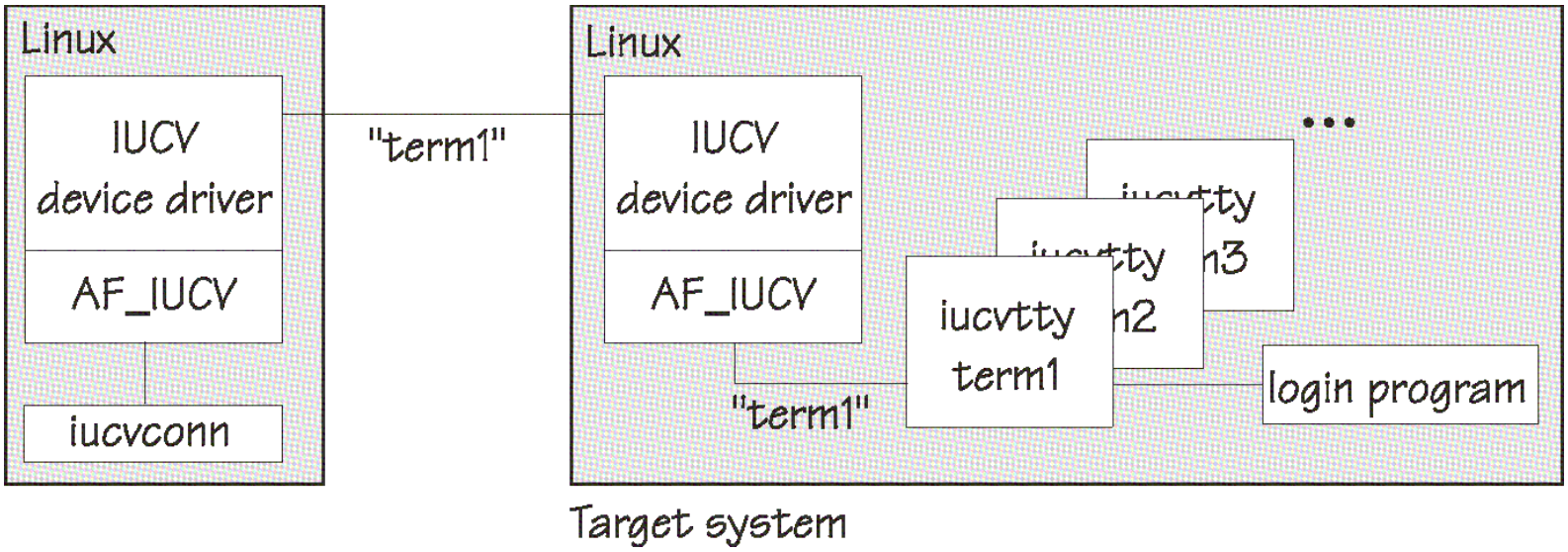
- **IUCV terminal programs (s390-tools)**
  - *iucvconn* – Start terminal connection over IUCV
  - *iucvtty* – Allow remote logins over IUCV
  - *ts-shell* – Login shell for setting up a terminal server using IUCV
  - *chiucvallow* – Restrict access to IUCV HVC terminals
- **Terminal access over IUCV is provided by**
  - iucvtty
  - IUCV hypervisor console (HVC) device driver (Linux kernel)

What does an IUCV terminal environment look like?



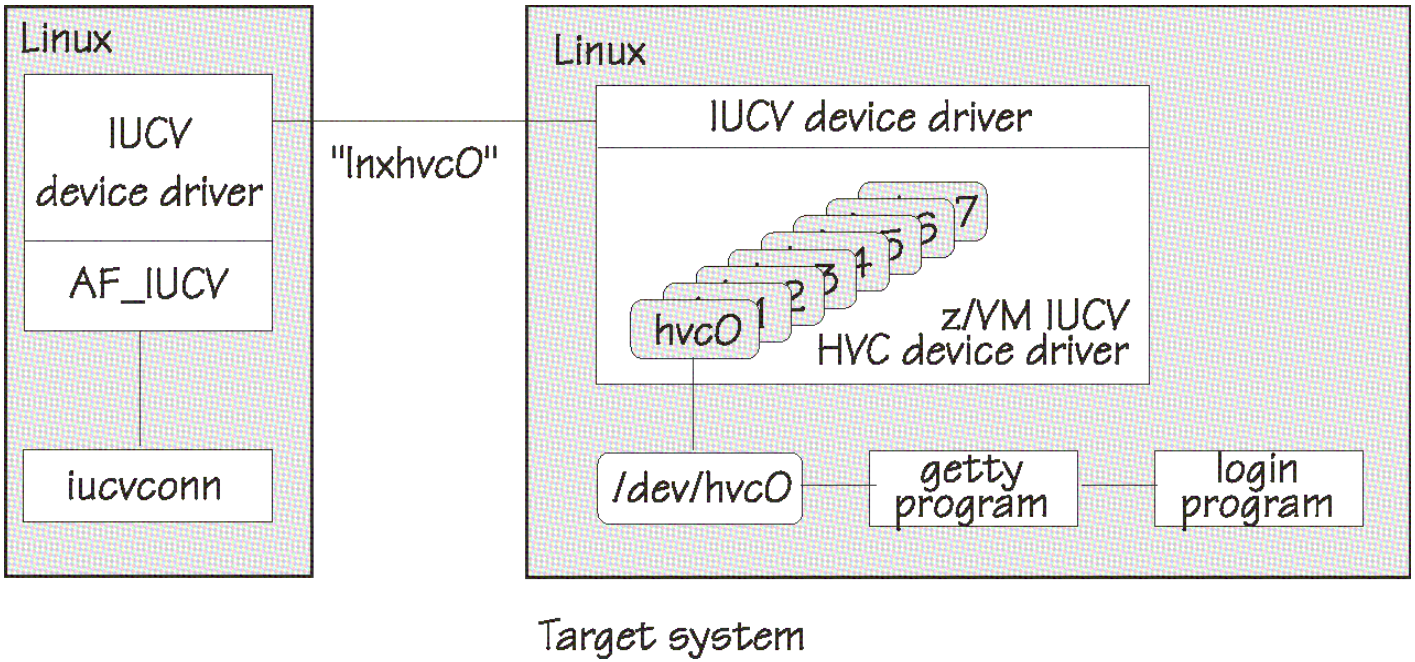
Establishing terminal sessions (iucvtty)

- **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 “lnxhvc0” .. “lnxhvc7”
- **hvc0 can be activated as (preferred) Linux console**



What is the difference between iucvtty and IUCV HVC?

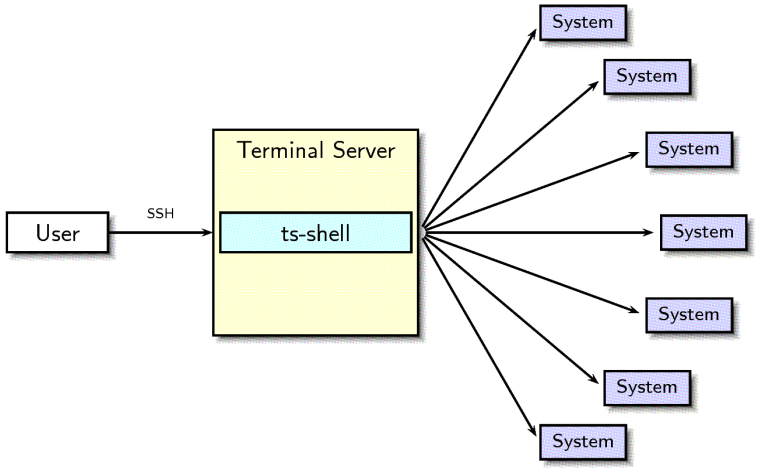
Criteria	iucvtty	IUCV HVC device driver
Origin	s390-tools	Linux kernel
Number of terminal instances	> 8	max. 8
Terminal identifiers	variable	fixed
Direct root login	☒	☑
Receiving kernel messages	☒	☑
Acting as preferred console	☒	☑
Restricting access to terminals	☑	☑
Typical use case	administrative access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

What else can you do with iucvconn?

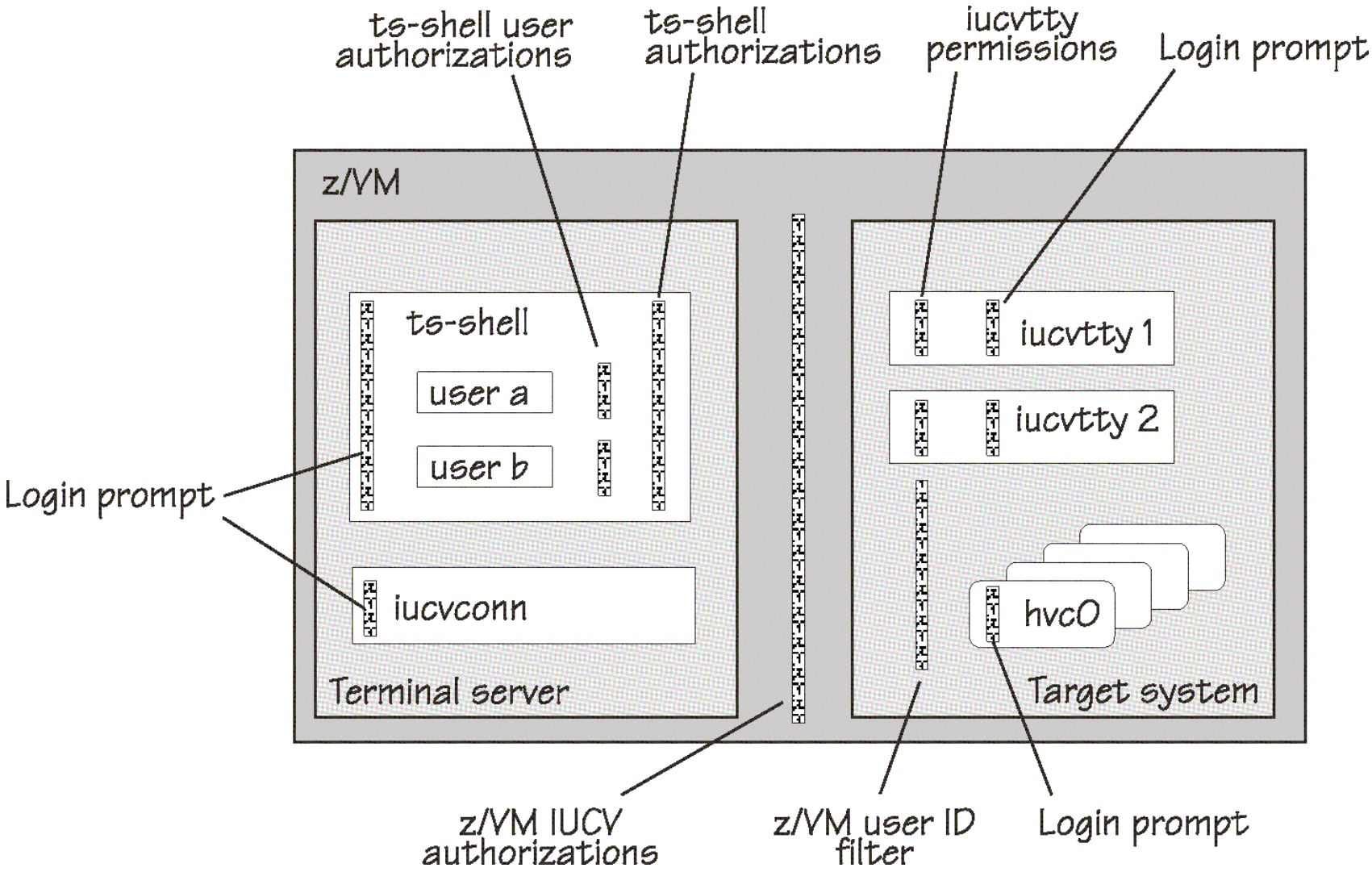
- **Accessing special functions through escape characters**
  - Use Ctrl+_ followed by “d” to disconnect terminal sessions
- **Creating terminal session transcripts**
  - Writing the terminal data stream to a log file (transcript)
  - Replaying transcripts with realistic output delays

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 hvc1 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>
```

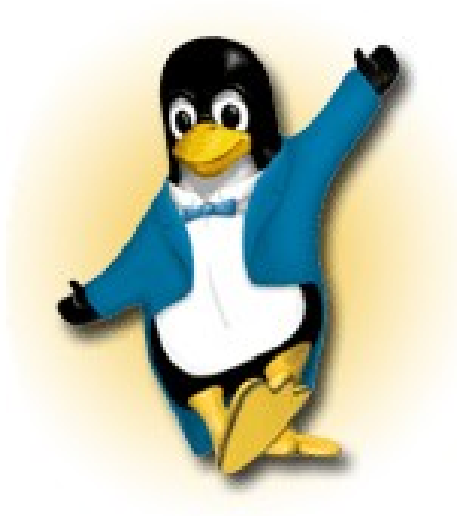
```
bob@ts-shell> connect t6313005
ts-shell: Connecting to t6313005 (terminal identifier:
lnxhvc0)...

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?



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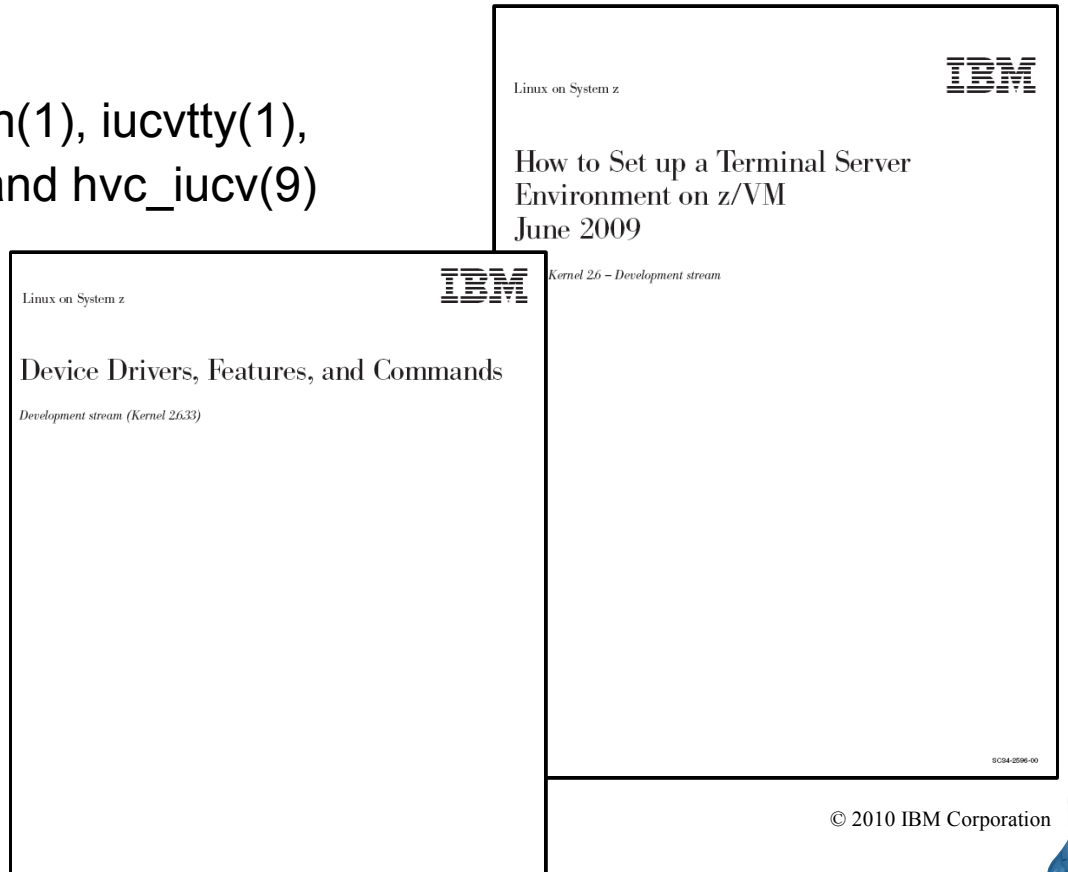
Where do you get more information?

- **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



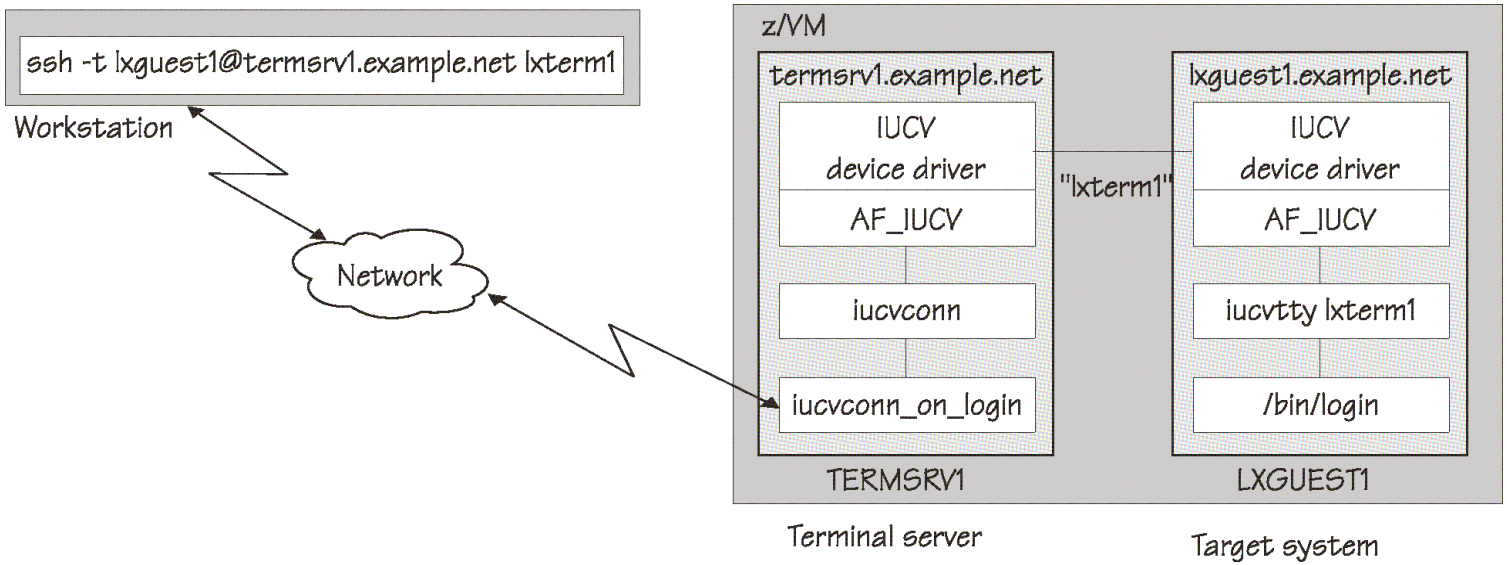
Which Linux distributions include IUCV terminals?

- **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?

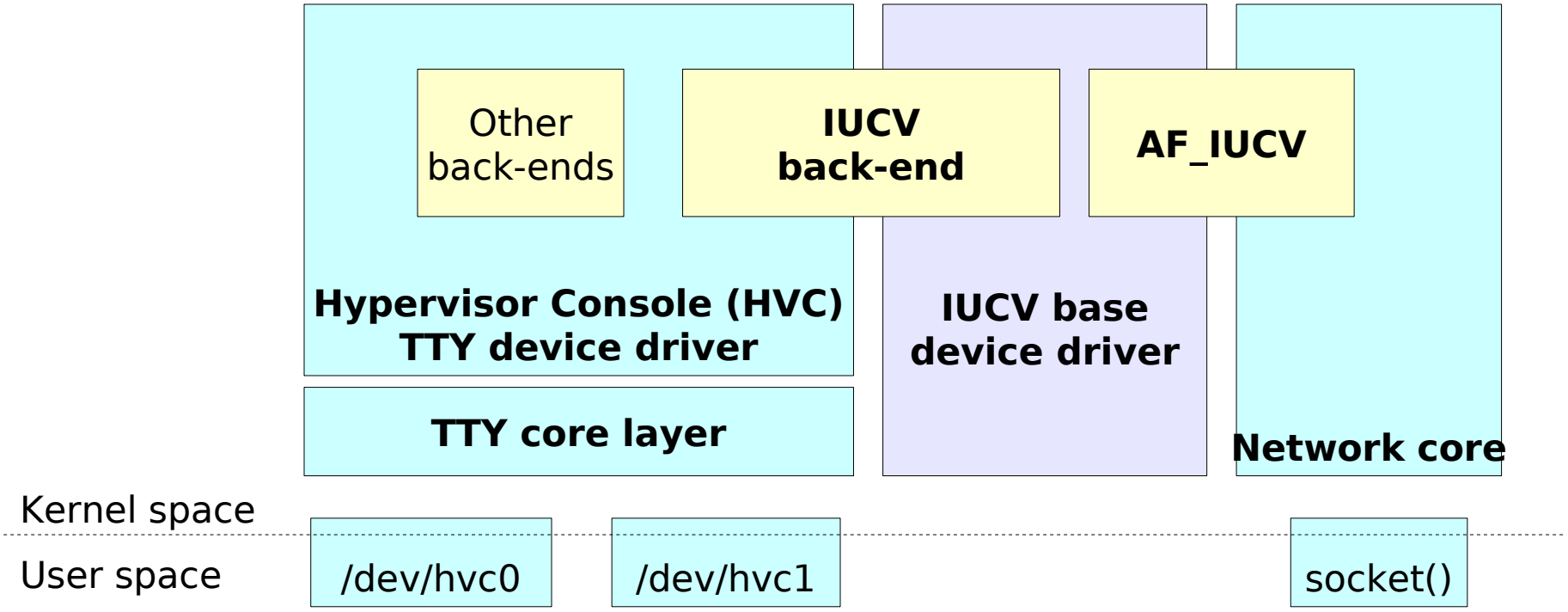
- **iucvconn_on_login is an alternative login shell for setting up a terminal server**
  1. Log in to Linux with a user ID that matches the z/VM user ID of the target system
  2. After a successful login, a terminal session is established and the user is prompted to log in to the target system
- **Creating a user for iucvconn_on_login**
  - `useradd -m -s /usr/bin/iucvconn_on_login lxguest1`



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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