stacked-VMs == v-components

v-components == v-modules

v-components == v-services

GROUP

WoL

v-components == v-apps

v-components == v-hosts

(ad-hoc) VPN

RADIUS

IPSec

LDAP

Kerberos

SSH

WoL

v-trace

v-ping

v-circuit

v-host

V-DNS

v-components == v-embedded
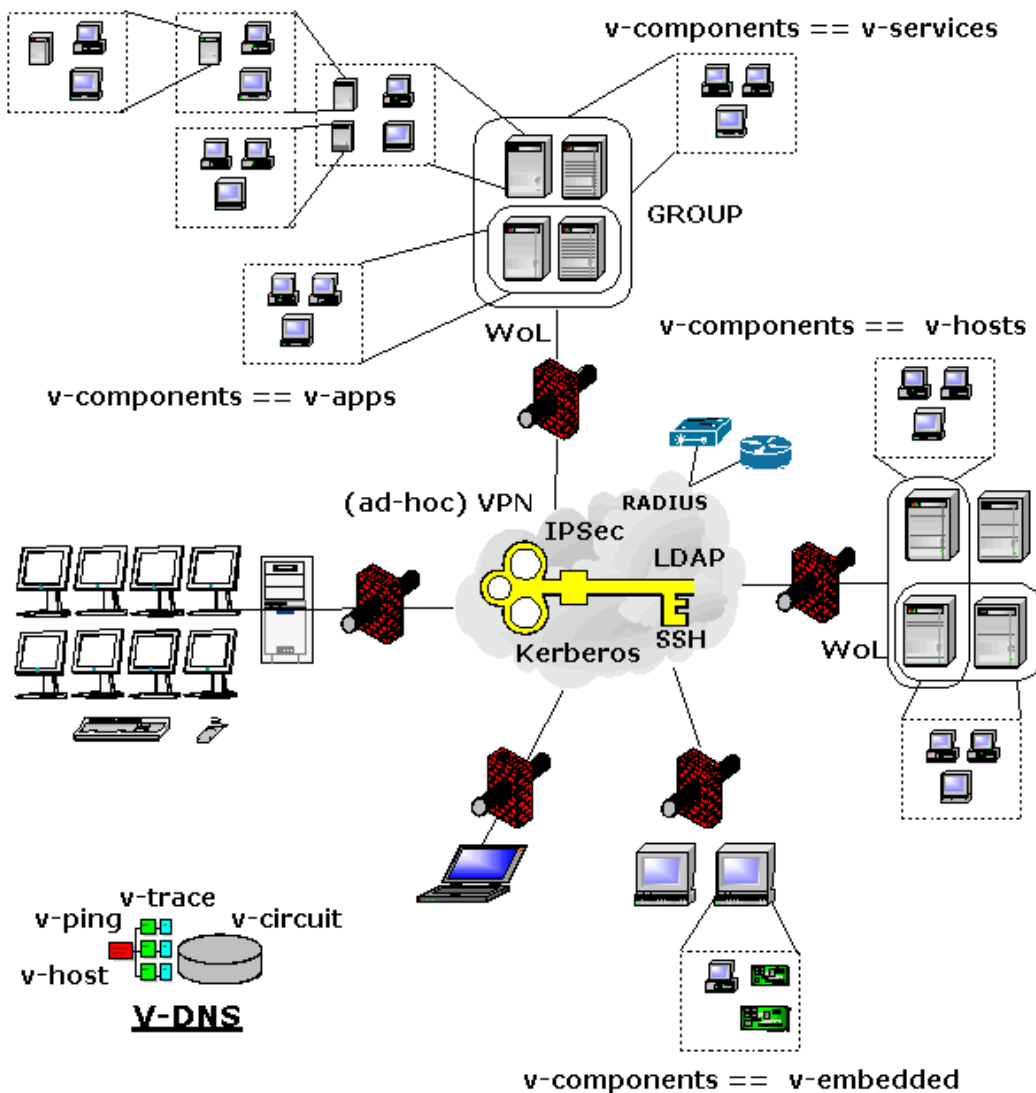
The UnifiedSessionsManager
Xen Setup and Call Guide(draft-pre-release)
Extract from the User-Manual

Contents

List of Tables

List of Figures

Licence - GPL3

```
-------------------------------------------------------------------------------
PROJECT         = Unified Sessions Manager
-------------------------------------------------------------------------------
CALLFULLNAME    = Commutate To Your Session
CALLSHORTCUT    = ctys

AUTHOR          = Arno-Can Uestuensoez - acue@UnifiedSessionsManager.org
MAINTAINER      = Arno-Can Uestuensoez - acue_sf1@sourceforge.net
VERSION         = 01_07_001b02
DATE            = 2008.08.06

COPYRIGHT       = Arno-Can Uestuensoez - acue@UnifiedSessionsManager.org
LICENCE         = GPL3
-------------------------------------------------------------------------------
EXECUTING HOST  = ws2.soho
-------------------------------------------------------------------------------
```

Chapter 1

Preface

This is just a draft extract from the User-Manual, in order to provide a shortcut for first installation.

Therefore some hyperlinks may be dengling or just reference a page referencing the user manual.

1.1   History

Version	Date	Author	Description
01.03.003.a01[144]	2008.02.11	Arno-Can Uestuensoez	Initial pre-release as embedded printable help
01.07.001.a01[145]	2008.08.03	Arno-Can Uestuensoez	First major update with numerous additions and partial review.
01.07.001.b02[146]	2008.08.11	Arno-Can Uestuensoez	Minor editorial updates. A lot of tests, some fixes.
01.07.001.b03[147]	2008.08.12	Arno-Can Uestuensoez	Minor editorial updates.
01.07.001.b04[148]	2008.08.16	Arno-Can Uestuensoez	Enhancement of documentation and Web-Site.
01.07.001.b05a[149]	2009.01.26	Arno-Can Uestuensoez	Minor editorials.

01.03.003.a01/2008.02.11
> The first basic set of features including stack-aware recursive cancel for QEMU, XEN, and VMW. This release contains almost the whole set of first-time implementations(Section ?? '??' on page ??) with personal copyright and offered license under GPL3.

01.07.001.a01/2008.08.03
> First major update with numerous additions and partial review. Additional HTML versions and subsets are generated. Still classified as preview quality, but may be stable enough for public production use, as personally applied.

01.07.001.b02/2008.08.11

> The first official stable release for flat-VM functions. The stacked VMs are present in first version, where the canonical syntax is implemented. Some more user friendly addresing with enhanced capability-recognition and validation will follow.

1.2   Contact

Public maintenance:	*acue@sf1_sourceforge.net*
Administrative contact:	*acue@UnifiedSessionsManager.org*
Commercial Services:	*i4p.com - Engineering Office Arno-Can Uestuensoez*

1.3   Legal

All mentioned Red Hat products and their registered names are Trademarks of the Company Red Hat, Inc.

All mentioned SuSE products and their registered names are Trademarks of the Company Novell, Inc.

All mentioned VMware products and their registered names are Trademarks of the Company VMware, Inc.

All mentioned Google products and their registered names are Trademarks of the Google, Inc.

All mentioned Sun products and their registered names are Trademarks of the Sun Microsystems, Inc.

All mentioned Microsoft products and their registered names are Trademarks of the Company Microsoft, Inc.

All mentioned Intel products and their registered names are Trademarks of the Company Intel, Inc.

All mentioned AMD products and their registered names are Trademarks of the Company Advanced Micro Devices, Inc.

Xen is a trademark of XenSource Inc.

QEMU is a trademark of Fabrice Bellard.

i4p is a trademark of Ingenieurbuero Arno-Can Uestuensoez.

If some is forgotten, it will be added immediately.

Chapter 2

Installation of Xen/Dom0

The installation of the Dom0 is recommended to be based on a available distribution if not required else. A quite straight forward installation could be set up by CentOS/RHEL-5, with additional updates The used from-the-box kernel is "2.6.18-8.1.15.el5.centos.plusxen". For additional information refer to [74, CENTOS].

Chapter 3

Installation of Guests/DomU

3.1 Templates

The templates supported with ctys are based on the same environment as most of the examples.

The assumed network services are:

```
- DHCP + DNS
- FTP  + NFS
- TFTP
```

For additional services the following will be helpful:

- PXE/PXELinux

- Kerberos+LDAP+(Samba/SMB)+automount

Based on this the test environment is the CentOS-5 distribution with a yum setup and an environment for kickstart install, which could be selected by PXE-menus.

So in accordance to the PXELinux name resolution convention by MAC/host addresses (see gethostip and ctys-vhost) an easy setup based on type-templates and symbolic links is possible.

The following files support a basic install, which is performed fully automatic by simple scripts. It is based on NFS and FTP. The principle is based on the excellent CentOS HowTo: "Creating and installing a CentOS 5 domU instance" [115, XENGUESTCENTOS] available at the CentOS website.

Just a few adaptations are done and some scripting is applied.

The only required interaction for creation of a DomU with name "tst100" is:

> XMCALL="ksu -q -e "./createVM.sh default tst100.i386.anchor

or

> XMCALL="ksu -q -e "./createVM.sh default createVM.sh tst100.x86_64.anchor

The parameter XMCALL defines the way permissions to be set for access to restricted resources of Dom0. The first argument "default" defines the install pattern to be used. The second argument "tst100.<arch>.anchor" defines the predefined values for replacing the aliases within the pattern files.

Some preparations has to be done of course. But these are almost only the definitions of some pathnames and the DomU name. Anything else will be derived from the so called anchor-files, including the generation of the required image file for the virtual disk.

The whole process requires 12-20 minutes in average. Starting from the scratch by one call and ending with a running Xen-DomU with a console.

The VMM - Redhat Virtual Machine Manager will be really helpful for monitoring.

createVM.sh
> Main script, replacing own configuration entries within the templates. It generates the required directories,
> "$HOME/xen/tst-ctys/<DomUName>", the images and starts the install.

MYVM.anchor
> Anchor template and example.

MYVM.conf
> Configuration example for runtime system.

MYVM-inst.conf
> Configuration example for install system.

MYVM.ctys
> Example entries as generated by "ctys-genmconf"

MYVM.ks
> Kickstart file for first basic install

tst100.i386.anchor
> Example for 32bit-para.

tst101.x86_64.anchor
> Example for 64bit-para.

The two created VMs tst100 and tst101 are the test VMs used to perform the basic tests on the XEN plugin.

3.2 Install Procedures

3.2.1 CentOS-5

Straight forward as described in [115, XENGUESTCENTOS]. The present template includes a kickstart file for complete automated install.

3.2.2 Fedora-8

Straight forward as described in [116, XENGUESTFEDORA].

3.2.3 OpenSUSE-10.2

The installation of a SuSE GuestOS on Xen could be easily performed with the receipt given by Gerd Hoffmann [118, GHOFFMANN]. This works on CentOS-5 for Dom0 as verified for DomU-SuSE-10.2-x86_64(available from DVD). Just some specifics for post-install boot has to be considered for CentOS-5 at least.

1. Prepare the install kernel and ramdisk as decribed in [118, GHOFFMANN] and place them appropriately. You need to copy the following files into one build directory

   - script called "suse-prepare-install"
   - kernel-xen-2.6.18.2-34.x86_64.rpm(10.2)
   - install-initrd-1.0-72.x86_64.rpm(10.2)

   Than just call "suse-prepare-install"

2. Install the system e.g. by using the provided ctys-templates by calling from the directory containing the template and performing the native guest installation. The install image should be larger than about 3GBytes, 4GByte is sufficient for a test install. The allocated RAM should be larger than 512MByte, 1GByte is recommended.

   Edit the config part of the install template and adapt the generated kernel and ramdisk filepath and start the script.

   ```
   export XMCALL="ksu -q -e "&&\
     ./createVM.sh default tst153.x86_64.anchor
   ```

3. Call the install configuration a second time and boot into the system by presented menu. The post-install-boot otherwise causes missing "gfx-menu" error, which alternatively requires a modification of the "/boot/grub/menu" entry of the installed system before reboot.

   Once logged in to the guest os comment-out the gfxmenu-line and add appropriate kernel entries.

4. Now do the post-install-boot "trick" - don't like to spend more time with hd-device and noot of embedded kernel!!!

   Just copy the installed kernel and ramdisk from within your guest to the host system and use them(unchanged) with kernel and ramdisk parameter.

   Alternatively you can extract them from the rpm-files.

5. Edit the runtime configuration file of the Xen bootloader:

   - kernel=<path>/vmlinuz-2.6.18.2-34-xen
   - ramdisk=<path>/initrd-2.6.18.2-34-xen

6. Start the VM.

   That's it.

3.2.4 OpenSUSE-10.1

The installation of a SuSE GuestOS on Xen could be easily performed with the receipt given by Gerd Hoffmann [118, GHOFFMANN]. This works on CentOS-5 for Dom0 as verified for DomU-SuSE-10.1(available from DVD). It seems not to work with DomU-OpenSUSE-10.3.

1. Prepare the install kernel and ramdisk as decribed in [118, GHOFFMANN] and place them appropriately. Edit the config part of the install template and adapt the generated kernel and ramdisk filepath.

2. Call template as:

```
export XMCALL="ksu -q -e "&&\
./createVM.sh default tst153.x86_64.anchor
```

3.3 Installed Systems

OS	name	Inst-VM	Dom0	DomU
CentOS-5.0	tst100	Xen-3.0.2-Para	X	X
CentOS-5.1	tst101	Xen-3.0.2-Para	X	X
Fedora 8	tst114	Xen-3.0.2-Para	X	X
SuSE-10.1	tst153	Xen-3.0.2-Para		(X)
SuSE-10.2	tst153	Xen-3.0.2-Para		X

Table 3.1: Overview of Intsalled-Xen-VMs

For additional information refer to installed directory.

"$HOME/ctys/templates"

Chapter 4

Call Examples

4.1 CREATE a session

CREATE a session with CONSOLE:CLI

This call creates a new session by starting a DomU on the host lab00 and opening a CLI console access with the "-c" option within the caller's shell.

Due to pyGRUB an ANSI capable terminal seems to be required, thus starting it within EMACS "shell" will not work.

```
ctys \
 -t xen  \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:cli \
 -z 2 \
 -b 0,2 \
 lab00'(-Z KSU)'
```

REMARK:
>   Once a CLI console is attached from a caling shell, the focus might be released by shutdown of the attached VM only, or closing the window containing the session. In X11 environments a graphical console might be preferred for tests.
>   Using CONSOLE:NONE for delayed attachement of a console is another option.

The local "-z 2" option forces a PTY to be created in any case by calling "ssh -t -t ...". This avoids the remote "TERM=dumb" causing an error of pyGRUB. This is forced by default.

The local "-b 0,2" option forces a serial and non-background mode for interactive shells. Otherwise the console might not work. This is forced by default.

The Remote option "-Z KSU" raises permission by Kerberos on target machine,
which is particularly required for the "xm create ..." call. This has to be set as
required and may vary for sudo or native root-permissions.

So, using defaults the required call is:

```
ctys \
 -t xen  \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:cli \
 lab00'(-Z KSU)'
```

The "CONSOLE:NONE" suboption just creates a server in so called headless-
mode.

```
ctys \
 -t xen  \
 -a create=l:tst100,CONSOLE:none \
 lab00'(-Z KSU)'
```

The following calls just connect to a running instance.

In this case the pathname is used.

```
ctys \
 -t xen  \
 -a create=p:$HOME/xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

As a variation a relative filename for comparison of "find" results could be used
in variable length, as long as the match is unambiguous.

```
ctys \
 -t xen  \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

Same result with:

```
ctys \
 -t xen  \
 -a create=f:tst-ctys/tst100/tst100.conf,\
    CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

Another call variation:

```
ctys \
 -t xen  \
 -a create=f:tst100/tst100.conf,\
    CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

In this case the id, which is for Xen "id==pathname", is used.

```
ctys \
 -t xen   \
 -a create=i:$HOME/xen/tst-ctys/tst100/tst100.conf,\
     CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

In the next case the label is used.

```
ctys \
 -t xen   \
 -a create=l:tst100,CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

The following call just connects to a running instance too, but uses the UUID.

```
ctys \
 -t xen   \
 -a create=u:6842caf91e3e43249ed596b8b9f2c5c2,\
     CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

The same when using MAC address.

```
ctys \
 -t xen   \
 -a create=m:00:50:56:13:11:40,\
     CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

The same when using IP address.

```
ctys \
 -t xen   \
 -a create=t:192.168.1.220,\
     CONSOLE:cli,connect \
 lab00'(-Z KSU)'
```

CREATE a session with CONSOLE:XTERM

This call creates a new session by starting a DomU on the host lab00 and opening a CLI console access with the "-c" option within a newly created xterm window.

```
ctys \
 -t xen   \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
     CONSOLE:xterm \
 lab00'(-Z KSU)'
```

The creation of PTY is not required. The Remote option "-Z KSU" raises permission by Kerberos, which is particularly required for the "xm create ..." call.

CREATE a session with CONSOLE:GTERM

Almost the same as XTERM, but a "gnome-terminal" is created instead.

```
ctys \
 -t xen  \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:gterm \
 lab00'(-Z KSU)'
```

CREATE a session with CONSOLE:EMACS

The EMACS console starts an EMACS and executes the call within a "shell"
buffer named with LABEL of current XEN instance. The "ansi-term" is for
now supported only when "ctys" is executed within as native call. The only
drawback for the "shell" buffer is the lack of ansi-color support by ctys s and
some restrictions due to lack of some ANSI terminal functions.

```
ctys \
 -t xen  \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:emacs \
 lab00'(-Z KSU)'
```

The following image shows an EMACS variant, where the ANSI-TERM mode
is choosen and the window is slitted by the call automatically into two parts.
The lower displays and prompt for the <exec-target>, whereas the top-window
shows the prompt of a shell access into the GuestOS, which is given by the
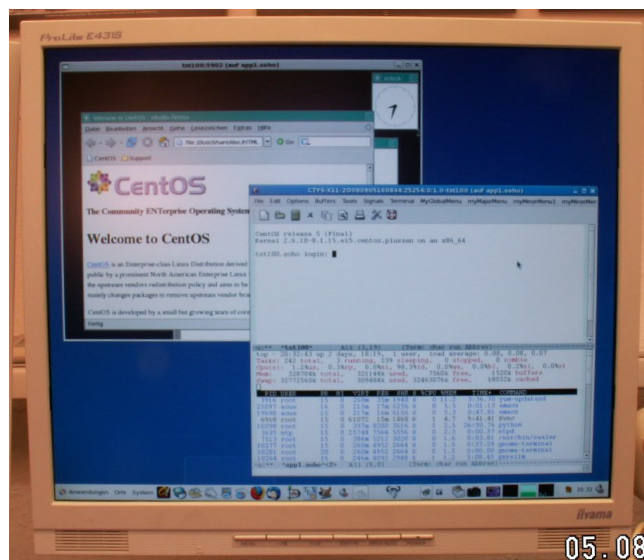<machine-address> of the call.

Figure 4.1: The "CONSOLE:EMACSAM" for a XEN Session

CREATE a session with CONSOLE:VNC

This call creates a session with an attached VNC viewer as a console. Therefore it is highly recommended to set the "vncunused=1" value in order to use a free port. When this is set to "vncunused=0" interference with native VNC servers might occur. The complete set of recommended VNC settings are:

```
vnc = 1
vncconsole = 1
vncunused = 1
```

The attachement of the console by a vncviewer is in ctys processed as a seperate step. Due to the asynchronous start of the DomU a timeout is implemented, which delays the start of the VNC console. This value coudl be configured by the user.

The resulting call for starting the session is:

```
ctys \
 -t xen   \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:vnc \
 lab00'(-Z KSU)'
```

The previous call implies the "-L DF" option for DISPLAYFORWARDING, the same call could be performed with "-L CF" for CONNECTIONFORWARDING.

```
ctys \
 -t xen   \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:vnc \
 -L CF\
 lab00'(-Z KSU)'
```

Now the advantage of a formal split for Client and Server, where the client is attached by a seperate step, should be clear.

The result could be verified by calling

    ctys -a list

on the client machine, which results e.g. to:

```
    TCP-container |TCP-guest |label    |sesstype|c|user |group
    --------------+----------+--------+--------+-+-----+----------
    ws2.soho      |-         |tst100  |VNC      |C|acue |ldapusers
    ws2.soho      |ws2.soho. |ws2     |PM       |S|-    |-
    ws2.soho      |-         |tst100  |SSH(XEN)|T|acue |ldapusers
```

The previous output is the standard table displayed, but could be completely customized by the user.

The "sesstype" representing the session type "SSH(XEN)" displays the tunnel
created by the internal DIGGER plugin and charachterizes it by "T" as a tunnel.
The label is here the same as for the the VNC session, which is characterized
by "C" as a client, attached to the sessions server, the Xen DomU tst100 on the
remote machine lab00. The client(tst100) and server(tst100) are interconnected
via the tunnel tst100. For additional customization, e.g. the SORT attribute
refer to LIST action.

The following output shows both machines, the localhost as client and the lab00
as the server. The call is varied to

```
ctys -a list localhost lab00
```

and displays:

```
    TCP-container |TCP-guest   |label    |sesstype|c|user |group
    --------------+-----------+--------+--------+-+-----+----------
    ws2.soho      |-          |tst100   |VNC      |C|acue |ldapusers
    ws2.soho      |ws2.soho.  |ws2      |PM       |S|-    |-
    ws2.soho      |-          |tst100   |SSH(XEN)|T|acue |ldapusers
    lab00.soho    |-          |Domain-0|XEN      |S|-    |-
    lab00.soho    |tst100     |tst100   |XEN      |S|-    |-
    lab00.soho    |lab00.soho.|lab00    |PM       |S|-    |-
```

CREATE a session with CONSOLE:NONE

This call enters so called "headless-mode".

```
ctys \
 -t xen  \
 -a create=f:xen/tst-ctys/tst100/tst100.conf,\
    CONSOLE:none \
 lab00'(-Z KSU)'
```

CREATE a session with RESUME from stat-file

```
ctys \
 -t xen  \
 -a create=l:tst100,RESUME:mystate.stat \
 lab01
```

CREATE a session with RESUME with VNC

```
ctys \
 -t xen  \
 -a create=l:tst100,RESUME,CONSOLE:VNC \
 lab01
```

CREATE a session with RESUME with EMACS

```
ctys \
 -t xen   \
 -a create=l:tst100,RESUME,CONSOLE:EMACS \
 lab01
```

CREATE a multiple sessions

The following call creates two sessions with one call. Both sessions are here located on the physical machine lab00 and use "ksu" for raise of access permissions.

```
ctys \
 -t xen   \
 -- \
 '(-Z KSU)' \
 lab00'(\
    -a create=f:xen/tst-ctys/tst100/tst100.conf,\
       CONSOLE:none\
 )' \
 lab00'(\
    -a create=f:xen/tst-ctys/tst101/tst101.conf,\
       CONSOLE:none\
 )'
```

The same could be varied for example to use different "-Z" options with "KSU" as default:

```
ctys \
 -t xen   \
 -- \
 '(-Z KSU)' \
 lab00'(\
    -a create=f:xen/tst-ctys/tst100/tst100.conf,\
       CONSOLE:none\
  )' \
  lab00'(\
    -a create=f:xen/tst-ctys/tst101/tst101.conf,\
    CONSOLE:none -Z SUDO\
  )'
```

The same could be varied for example to use different "-Z" options with none as default:

```
ctys \
 -t xen   \
 -- \
 lab00'(\
    -a create=f:xen/tst-ctys/tst100/tst100.conf,\
       CONSOLE:none -Z KSU\
 )'
```

```
lab00'(\
  -a create=f:xen/tst-ctys/tst101/tst101.conf,\
  CONSOLE:none -Z SUDO\
)'
```

It might be obvious howto use different physical hosts:

```
ctys \
  -t xen  \
  -- \
  lab00'(\
    -a create=f:xen/tst-ctys/tst100/tst100.conf,\
       CONSOLE:none -Z KSU\
  )'
  lab01'(\
    -a create=f:xen/tst-ctys/tst101/tst101.conf,\
       CONSOLE:none -Z SUDO\
  )'
```

4.2 CANCEL a session

CANCEL a session with POWEROFF

This call stops the DomU addressed by it's PATHNAME.

```
ctys \
 -t xen \
 -a cancel=poweroff:0,\
    p:/homen/acue/xen/tst-ctys/tst100/tst100.conf\
 lab00'(-Z KSU)'
```

For the following calls caching is used by default, which could lead to errors when ambiguity of addressed targets occur. When ambiguity occurs, additional <machine-address> parts might resolve this.

As a work around for handling multiple copies, such as backups, with identical address contents, one of the following approaches might help:

- The cache could be deactivated by using the options "-c off" and/or "-C off"

- The usage of a PATHNAME might resolve ambiguity too, when resolved on the target only. Be aware, that this could be naturally ambiguous too in NFS environments with automount, of course. The latter will be frequently the case when configuring a load balancing environment by mounting VM collections.

- The cache could be rebuild by an appropriate selection in combination of a review of the contents of the filesystem.

The actual call is displayed within the trace output and could be called after cut-and-paste to command line. A listing of all actual contained instances with

ambiguous addresses is listed by the ctys-vhost option "-M all".

Same by using the LABEL as address.

```
ctys \
 -t xen \
 -a cancel=l:tst100,POWEROFF:0 \
 lab01
```

When ambiguity occurs, e.g. like depicted by followin example:

```
ctys-vhost -o machine -s -M all lab00 XEN tst100

lab00.xyz;XEN;tst100;\
    /root/xen/tst100/tst100.conf;\
    6842caf91e3e43249ed596b8b9f2c5c2;\
    00:50:56:13:11:40;192.168.1.220;;;;CentOS;Linux;5;;PM

lab00.xyz;XEN;tst100;\
    /root/xen/tst100/tst100-inst.conf;;\
    00:50:56:13:11:40;192.168.1.220;;;;;;;;;

lab00.xyz;XEN;tst100;\
    /homen/chkusr/xen/tst-ctys/tst100/tst100.conf;\
    6842caf91e3e43249ed596b8b9f2c5c2;\
    00:50:56:13:11:40;192.168.1.220;;;;CentOS;Linux;5;\
    20080427002200;VM
```

The following call resolves ambiguity by deactivating cached operations:

```
ctys \
 -t xen \
 -a cancel=l:tst100,POWEROFF:0 \
 -C off \
 lab01
```

Similar with additional deactivation of nameservice caching, which anyhow is used sparsely for LIST action in current version.

```
ctys \
 -t xen \
 -a cancel=l:tst100,POWEROFF:0 \
 -c off \
 -C off \
 lab01
```

CANCEL a session with RESET

Similar call to previous, but reboots after resetting hypervisor. When SELF is selected the hosting machine will be RESET too, else the GuestOS within the hypervisor only.

```
ctys \
 -t xen \
 -a cancel=l:tst100,RESET \
 -c off \
 -C off \
 lab01
```

The following call ignores the eventual contained VMs within a stacked XEN
instance. Actually the only VM supported to be executed nested within another
is of type QEMU.

```
ctys \
 -t xen \
 -a cancel=l:tst100,FORCE,RESET \
 -c off \
 -C off \
 lab01
```

CANCEL a session with REBOOT

Similar call to previous, but reboots after shutdown.

```
ctys \
 -t xen \
 -a cancel=l:tst100,REBOOT \
 -c off \
 -C off \
 lab01
```

The following call ignores the eventual contained VMs within a stacked XEN
instance. Actually the only VM supported to be executed nested within another
is of type QEMU.

```
ctys \
 -t xen \
 -a cancel=l:tst100,FORCE,REBOOT \
 -c off \
 -C off \
 lab01
```

Same with pathname, should be used for tests, due it's evaluation means for a
missing label.

```
ctys \
 -t xen \
 -a cancel=FORCE,REBOOT,\
    p:/homen/chkusr/xen/tst-ctys/tst100/tst100.conf \
 -c off \
 -C off \
 lab01
```

CANCEL a session with PAUSE

Currently not yet available.

```
ctys \
 -t xen \
 -a cancel=l:tst100,PAUSE \
 lab01

ctys \
 -t xen \
 -a cancel=l:tst100,FORCE,PAUSE \
 lab01
```

CANCEL a session with SUSPEND

Currently not yet available.

```
ctys \
 -t xen \
 -a cancel=l:tst100,SUSPEND \
 lab01

ctys \
 -t xen \
 -a cancel=l:tst100,FORCE,SUSPEND \
 lab01
```

CANCEL a session with INIT

Calls UNIX "init" call with provided level. This call is somewhat limited for now, RESET and REBOOT should be preferred.

```
ctys \
 -t xen \
 -a cancel=l:tst100,INIT:0 \
 lab00

ctys \
 -t xen \
 -a cancel=l:tst100,FORCE,INIT:6 \
 lab00
```

4.3   LIST sessions

List sessions.
The following call lists all sessions as MACHINE format raw records, a prefix title with given raw indexes is displayed. The provided indexes are the values to be used to define custom tables to be stored as macros.

```
ctys \
 -t xen \
 -a list=machine,titleidx \
 lab00
```

A simple call with default values displays the standard output.

```
ctys -a list lab01
```

The following result is displayed.

```
    TCP-container|TCP-guest  |label    |sesstype|c|user|group
    -------------+-----------+--------+--------+-+----+-----
    lab00.soho   |-          |LAB00    |VNC     |C|root|root
    lab00.soho   |-          |LAB00    |VNC     |S|root|root
    lab00.soho   |-          |Domain-0|XEN     |S|-   |-
    lab00.soho   |tst100     |tst100   |XEN     |S|-   |-
    lab00.soho   |tst101     |tst101   |XEN     |S|-   |-
    lab00.soho   |lab00.soho.|lab00    |PM      |S|-   |-
```

When the subsystem XEN is selected the output is reduced to XEN only.

```
ctys -t xen -a list lab01
```

The following result is displayed.

```
    TCP-container|TCP-guest  |label    |sesstype|c|user|group
    -------------+-----------+--------+--------+-+----+-----
    lab00.soho   |-          |Domain-0|XEN     |S|-   |-
    lab00.soho   |tst100     |tst100   |XEN     |S|-   |-
    lab00.soho   |tst101     |tst101   |XEN     |S|-   |-
```

A running configuration with two XEN sessions, where one session tst101 is connected by DISPLAYFORWARDING and a second tst100 is connected by CONNECTIONFORWARDING is displayed with the call

```
ctys -t xen -a list localhost lab01
```

as follows.

```
TCP-container|TCP-guest   |label    |sesstype|c|user|group
-------------+-----------+--------+--------+-+----+---------
ws2.soho     |-          |tst100   |VNC     |C|acue|ldapusers
ws2.soho     |ws2.soho.  |ws2      |PM      |S|-   |-
ws2.soho     |-          |tst100   |SSH(XEN)|T|acue|ldapusers
lab00.soho   |-          |tst101   |VNC     |C|acue|ldapusers
lab00.soho   |-          |LAB00    |VNC     |C|root|root
lab00.soho   |-          |LAB00    |VNC     |S|root|root
lab00.soho   |-          |Domain-0|XEN      |S|-   |-
lab00.soho   |tst100     |tst100   |XEN     |S|-   |-
lab00.soho   |tst101     |tst101   |XEN     |S|-   |-
lab00.soho   |lab00.soho.|lab00    |PM      |S|-   |-
```

The next call lists all communication related informations by usage of the pre-defined custom table stored as macro "TAB_CPORT"

```
ctys -a list=macro:TAB_CPORT localhost lab00
```

results to:

```
Label     |stype     |cport|PM        |MAC              |TCP
---------+--------+-----+----------+-----------------+---------------
tst100    |VNC       |     |ws2.soho  |                 |
ws2       |PM        |     |ws2.soho  |00:1D:60:A5:89:06|192.168.1.70
tst100    |SSH(XEN)|5950 |ws2.soho  |                 |
tst101    |VNC       |     |lab00.soho|                 |
LAB00     |VNC       |     |lab00.soho|                 |
LAB00     |VNC       |5901 |lab00.soho|                 |
Domain-0  |XEN       |     |lab00.soho|                 |
tst100    |XEN       |5900 |lab00.soho|00:50:56:13:11:40|
tst101    |XEN       |5902 |lab00.soho|00:50:56:13:11:41|
lab00     |PM        |     |lab00.soho|00:0E:0C:35:F8:48|192.168.1.71
```

Figure 4.7: TAB_CPORT by LIST

As could be recognized, the VMs tst100 and tst101 has no TCP values displayed, even though these are present. The reason is simply the decision to only display data which could be fetched easily unambiguously. The TCP address is only in a simple 1-to-1 relation, when no additional interfaces are present, and when the mapping information of the actual TCP stack and the ctys configuration including it's cacheDB are consistent. Additionally all services has to be setup properly, e.g. when using "host" or "dig". Another point is that the VM has to be connected to the managing nameservices. Thus the complete automatic implementation is somewaht advanced and is shifted for now. In current version the user has to poll the missing information by additional tools, such as ctys-vhost, ctys-macmap, or ctys-dnsutil, or simply by "host" or "dig."

Anyhow, the ENUMERATE action displays the TCP addresses as they are configured within the configuration file, refer for the output of the same common

generic table "TAB_CPORT by ENUMERATE" as an complementary exam-
ple. Additionally the same table could be used for "ctys-vhost" with a similar
result to ENUMERATE: "TAB_CPORT by VHOST".

4.4   ENUMERATE sessions

The following call enumerates all VMs

```
ctys \
 -t xen \
 -a enumerate=machine,title,b:xen \
 localhost lab00
```

The complementary example for the common generic table "TAB_CPORT by
LIST" could be generated by the call

```
ctys \
 -a enumerate=macro:TAB_CPORT,b:xen%/etc/ctys.d
 localhost lab00
```

and displays some of the basic differences in the output strategy. As the follow-
ing output depicts, here the fields for the TCP address are filled, whereas no
cport is displayed.

The TCP addresses are ere displayed as statically configured within the con-
figuration file. The cport is the communications port for the client processes,
in this case the VNC port, which is dynamically allocated due to preconfigured
"vncunused=1". Thus the value is defined during runtime only, so it is not
displayed by ENUMERATE, which displays the statically configured data.

```
   Label |stype|cport|PM        |MAC              |TCP
   ------+-----+-----+----------+-----------------+-------------
   tst100|XEN  |     |ws2.soho  |00:50:56:13:11:40|192.168.1.220
   tst101|XEN  |     |ws2.soho  |00:50:56:13:11:41|192.168.1.221
   tst104|XEN  |     |ws2.soho  |00:50:56:13:11:44|192.168.1.224
   ws2   |PM   |     |ws2.soho  |00:1D:60:A5:89:06|192.168.1.70
   tst100|XEN  |     |lab00.soho|00:50:56:13:11:40|192.168.1.220
   tst101|XEN  |     |lab00.soho|00:50:56:13:11:41|192.168.1.221
   tst104|XEN  |     |lab00.soho|00:50:56:13:11:44|192.168.1.224
   lab00 |PM   |     |lab00.soho|00:0E:0C:35:F8:48|192.168.1.71
```

Figure 4.8: TAB_CPORT by ENUMERATE

Additionally the same table could be used for "ctys-vhost" with a similar result
to ENUMERATE: "TAB_CPORT by VHOST".

4.5   SHOW

Lists the dynamic global envvironement data on the target.

```
ctys -t xen -a show lab00
```

Same result with

```
ctys -a show lab00
```

4.6   INFO

Lists static data for configured UnifiedSessionsManager with configuration relevant resource data.

The following call lists the initialized XEN plugin with implicitly loaded additional uninitialized plugins.

```
ctys -t xen -a info lab01
```

The following call lists all available plugings with their resulting init states on the target.

```
ctys -a info lab01
```

Chapter 5

Example Appliances

FFS.

Bibliography

Books

UNIX

[1] Juergen Gulbins: *UNIX Version 7, bis System V.3,* Springer-Verlag Berlin Heidelberg; 1988; ISBN: 3-540-19248-4

[2] Maurice J. Bach: *The Design Og The UNIX Operating System,* Prentice Hall, Inc.; 1986; ISBN: 0-13-201757-1

[3] Sebastian Hetze, Dirk Hohndel, Martin Mueller, Olaf Kirch: *LINUX Anwender Handbuch,* LunetIX Softair; 1994; ISBN: 3-929764-03-2

[4] Rob Flickenger: *LINUX SERVER HACKS,* O'Reilly&Associates, Inc.; 2003; ISBN: 0-596-00461-3

[5] Olaf Kirch: *LINUX Network Administrator's Guide,* O'Reilly&Associates, Inc.; 1995; ISBN: 0-56592-087-2

[6] Daniel P. Bovet, Marco Cesati: *Understanding the LINUX KERNEL,* O'Reilly&Associates, Inc.; 2003; ISBN: 0-596-00002-2

[7] Daniel P. Bovet, Marco Cesati: *Understanding the LINUX KERNEL(2nd. Ed.),* O'Reilly&Associates, Inc.; 2003; ISBN: 0-596-00213-0

[8] Wolfgang Mauerer: *Linux Kernelarchitektur - Konzepte, Strukturen und Algorithmen von Kernel 2.6,* Carl Hanser Verlag Muenchen-Wien; 2004; ISBN: 3-446-22566-8

[9] Alessandro Rubini: *LINUX Device Drivers,* O'Reilly&Associates, Inc.; 1998; ISBN: 1-565592-292-1

[10] Alessandro Rubini, Jonathan Corbet: *LINUX Device Drivers(2nd. Ed.),* O'Reilly&Associates, Inc.; 2001; ISBN: 0-596-00008-1

[11] Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman: *LINUX Device Drivers(3nd. Ed.),* O'Reilly&Associates, Inc.; 2005; ISBN: 0-596-00590-3

[12] Juergen Quade, Eve-Katharina Kunst: *Linux-Treiber entwickeln,* dpunkt.verlag GmbH; 2004; ISBN: 3-89864-238-0

[13] Wehrle, Paehlke, Ritter, Mueller, Bechler: *Linux Netzwerkarchitektur - Design und Implementerung von Netzwerkprotokollen im Linux-Kern*, Addison Wesley, Inc.; 2002; ISBN: 3-8273-1509-3

[14] Brandon Palmer, Jose Nazario: *Secure Architectures with OpenBSD,* Addison Wesley, Inc.; 2004; ISBN: 0-321-19366-0

[15] Michael W. Lucas: *Absolute OpenBSD - UNIX for the Practical Paranoid,* No Starch Press, Inc.; 2003; ISBN: 1-886411-99-9

[16] Chris Tyler: *FEDORA LINUX,* O'Reilly&Associates, Inc.; 2006; ISBN: 1-596-52682-2

[17] Benjamin Mako Hill, Jono Bacon, Corey Burger, Jonathan Jesse, Ivan Krstic: *The Official ubuntu Book,* Pearson Education, Inc.; 2007; ISBN: 0-13-243594-2

[18] Jonathan Oxer, Kyle Rankin, Bill Childers: *UBUNTU Hacks - Tips&Tools for Exploring, Using, and Tuning Linux,* O'Reilly&Associates, Inc.; 2006; ISBN: 1-596-52720-9

[19] Tim Schã$\frac{1}{4}$rmann: *(K)Ubuntu - Installieren - Einrichten - Anwenden,* Open Source Press; 2006; ISBN: 3-937514-30-9

[20] Michael Urban, Brian Thiemann: *FreeBSD 6 Unleashed,* Sams Publishing, Inc.; 2006; ISBN: 0-672-32875-5

[21] Marshall Kirk McKusick, George V. Neville-Neil: *The Design and Implementation of the FreeBSD 6 Operating System,* Addison Wesley, Inc.; 2005; ISBN: 0-201-70245-2

Security

[22] Guenter Schaefer: *Netzsicherheit - Algorithmische Grundlagen und Protokolle,* dpunkt.verlag GmbH; 2003; ISBN: 3-89864-212-7

[23] Alexande Geschonneck: *Computer Forensik - Systemeinbrueche erkennen, ermitteln, aufklaeren,* dpunkt.verlag GmbH; 2004; ISBN: 3-89864-253-4

[24] Jonathan Hassel: *RADIUS - Securing Public Access to Privaze Resources,* O'Reilly&Associates, Inc.; 2002; ISBN: 0-596-00322-6

[25] Jason Garman: *Kerberos - The Definitive Guide,* O'Reilly&Associates, Inc.; 2003; ISBN: 1-596-00403-6

[26] Daniel J. Barret, Richard E. Silverman & Robert G.Byrnes: *SSH The Secure Shell - The Definitive Guide,* O'Reilly&Associates, Inc.; 2005; ISBN: 1-596-00895-3

[27] John Viega, Matt Messier & Pravir Chandra: *Network Security with OpenSSL,* O'Reilly&Associates, Inc.; 2002; ISBN: 0-596-00270-X

[28] Jonathan Hassel: *RADIUS,* O'Reilly&Associates, Inc.; 2002; ISBN: 0-596-00322-6

[29] Gerald Carter: *LDAP - System Administration,* O'Reilly&Associates, Inc.; 2003; ISBN: 1-596592-491-6

[30] Matthias Reinwarth, Klaus Schmidt: *Verzeichnisdienste - Telekommunikation Aktuell,* VDE Verlag GmbH; 1999; ISBN: 3-8007-2373-5

[31] Dieter Kluenter, Jochen Laser: *LDAP verstehen, OpenLDAP einsetzen,* dpunkt.verlag GmbH; 2003; ISBN: 3-89864-217-8

[32] Daniel J. Barret, Richard E. Silverman & Robert G.Byrnes: *LINUX Security Cookbook,* O'Reilly&Associates, Inc.; 2003; ISBN: 1-565-00391-9

[33] Charlie Scott, Paul Wolfe & Mike Erwin: *Virtual Private Networks,* O'Reilly&Associates, Inc.; 1999; ISBN: 1-565592-529-7

[34] Bill McCarty: *SELINUX - NSA's Open Source Security Enhanced Linux,* O'Reilly&Associates, Inc.; 2004; ISBN: 1-565-007161-7

[35] Rober L. Ziegler: *Linux Firewalls,* New Riders Publishing, Inc.; 2000; ISBN: 0-7357-0900-9

[36] D. Brent Chapman and Elisabeth D. Zwicky: *Einrichten von Internet Firewalls,* O'Reilly&Associates, Inc.; 1996; ISBN: 3-930673-31-2

[37] Wolfgang Barth: *Das Firewall-Buch,* Nicolaus Millin Verlag GmbH; 2004; ISBN: 3-89990-128-2

[38] Joseph Kong: *Designing BSD Rootkits - An Introduction to Kernel Hacking,* No Starch Press, Inc.; 2007; ISBN: 978-1-593271-142-8

[39] Cyrus Peikari, Anton Chuvakin (Peter Klicman, Andreas Bildstein, Gerald Richter): *Kenne deinen Feind - Fortgeschrittene Sicherheitstechniken,* O'Reilly&Associates, Inc.; 2004; ISBN: 3-89721-376-1

[40] Ryan Russel et al.: *Die mitp-Hacker-Bibel,* mitp-Verlag/Bonn; 2002; ISBN: 3-8266-0826-3

[41] Wallace Wang: *Steal This Computer Book 4.0 - What They Won't Tell You About The Internet,* No Starch Press, Inc.; 2007; ISBN: 1-59327-105-0

[42] Johnny Long: *Google Hacking - For Penetration Testers,* Syngress Publishing, Inc.; 2005; ISBN: 1-931836-36-1

[43] Thomas Bechtold, Peter Heinlein: *Snort, Acid & Co. - Einbruchserkennung mit Linux,* Open Source Press; 2004; ISBN: 3-937514-01-3

[44] Syngress Autorenteam: *Snort 2.0 Intrusion Detection,* mitp-Verlag/Bonn; 2003; ISBN: 3-6266-1304-X

Networks

[45] Charles E. Spurgeon: *Ethernet - The Definitive Guide,* O'Reilly&Associates, Inc.; 2000; ISBN: 1-56592-660-9

[46] Olaf Kirch: *LINUX - Network Administrators Guide,* O'Reilly&Associates, Inc.; 1995; ISBN: 1-56592-087-2

[47] Hal Stern, Mike Eisler & Ricardo Labiaga: *Managing NFS and NIS,* O'Reilly&Associates, Inc.; 2001; ISBN: 1-56592-510-6

[48] Paul Albitz & Cricket Liu: *DNS and Bind,* O'Reilly&Associates, Inc.; 2001; ISBN: 1-596-00158-4

[49] James M. Kretchmar: *Open Source Network Administration,* Pearson Education, Inc.; 2004; ISBN: 0-13-046210-1

[50] Douglas R. Mauro, Kevin J. Schmidt: *Essential SNMP(1.nd Ed.,* O'Reilly&Associates, Inc.; 2001; ISBN: 0-596-00020-0

[51] Douglas R. Mauro, Kevin J. Schmidt: *Essential SNMP(2.nd Ed.,* O'Reilly&Associates, Inc.; 2005; ISBN: 0-596-00840-6

[52] James D. Murray: *Wimdows NT SNMP,* O'Reilly&Associates, Inc.; 1998; ISBN: 1-56592-338-3

[53] Marshall T. Rose: *The Simple Book(2nd. Ed.),* Prentice Hall, Inc.; 1996; ISBN: 0-13-451659-1

[54] David Perkins, Evan McGinnis: *Understanding SNMP MIBs,* Prentice Hall, Inc.; 1997; ISBN: 0-13-437708-7

[55] Mathias Hein, David Griffiths: *SNMP Simple Network Management Protocol Version 2,* International Thomson Publishing GmbH; 1994; ISBN: 3-929821-51-6

[56] Peter Erik Mellquist: *SNMP++ An Object-Oriented Approach to Developing Network Management Applications,* Hewlett-Packard(TM) Professional Books; 1997; ISBN: 0-13-264607-2

[57] Marshall T. Rose: *The Open Book - A Practical Perspective on OSI,* Prentice Hall, Inc.; 1990; ISBN: 0-13-643016-3

[58] Uyless Black: *Network Management Standards(2nd.Ed.),* McGraw-Hill, Inc.; 1994; ISBN: 0-07-005570-X

[59] Wolfgang Barth: *NAGIOS - System and Network Monitoring,* No Starch Press, Inc.; 2006; ISBN: 1-59327-070-4

[60] Heinz-Gerd Hegering, Sebastian Abeck, Bernhard Neumair: *Integriertes Management vernetzter Systeme,* dpunkt.verlag; 1999; ISBN: 3-932588-16-9

[61] Walter Gora, Reinhard Speyerer: *ASN.1 Abstract Syntax Notation One(2nd.Ed.),* DATACOM-Verlag; 1990; ISBN: 3-89238-023-6

[62] Klaus H. Stoettinger: *Das OSI-Referenzmodell,* DATACOM-Verlag; 1989; ISBN: 3-89238-021-X

Embedded Systems

[63] Derek J. Hatley,Imtiaz A. Pirbhai: *Strategien fuer die Echtzeit-Programmierung,* Carl Hanser Verlag Muenchen-Wien; 1988; ISBN: 3-446-16288-7

[64] Edmund Jordan: *Embedded Systeme mit Linux programmieren - GNU-Softwaretools zur Programmierung ARM-basierender Systeme,* Franzis Verlag GmbH; 2004; ISBN: 3-7723-5599-4

[65] Michael Barr, Anthony Massa: *Programming Embedded Systems(2nd.Ed.),* O'Reilly&Associates, Inc.; 2006; ISBN: 1-596-00983-6

[66] John Lombardo: *Embedded Linux,* New Riders Publishing; 2001; ISBN: 0-7357-0998-X

[67] Craig Hollabaugh, Ph.D.: *Embedded Linux - Hardware, Software, and Interfacing,* Addison Wesley, Inc.; 2002; ISBN: 0-672-32226-9

[68] Bob Smith, John Hardin, Graham Phillips, and Bill Pierce: *LINUX APPLIANCE DESIGN - A Hands-On Guide to Building Linux Appliances,* No Starch Press, Inc.; 2007; ISBN: 978-1-59327-140-4

[69] David E. Simon: *An Embedded Software Primer,* Addison Wesley, Inc.; 1999; ISBN: 0-201-61569-X

[70] John Waldron: *Introduction to RISC Assembly Language Programming,* Addison Wesley, Inc.; 1999; ISBN: 0-201-39828-1

[71] Steve Furber: *ARM System Architecture,* Addison Wesley, Inc.; 1996; ISBN: 0-201-40352-8

Online References

Obvious, but to be written due to German-Law:
"It should be recognized, that the given links within this and following sections are solely owned by and are within the exclusive responsibility of their owners. The intention to reference to that sites is neither to take ownership of their work, nor to state commitment to any given statement on their sites. It is much more to honour the work, and thank to the help, the author advanced from by himself. Last but not least, the intention is to support a short cut for the users of UnifiedSessionsManager to sources of required help."

OSs

[72] RedHat(TM) Enterprise Linux: *http://www.redhat.com*

[73] RedHat(TM) Enterprise Linux-Doc:
http://www.redhat.com/docs

[74] CentOS: *http://www.centos.org*

[75] CentOS-Doc: *http://www.centos.org/docs*

[76] Scientific Linux: *http://www.scientificlinux.org*

[77] Debian: *http://www.debian.org*

[78] OpenSuSE: *http://www.opensuse.org*

[79] OpenBSD: *http://www.openbsd.org*

[80] OpenBSD-FAQ: *http://www.openbsd.org/faq/index.html*

[81] OpenBSD-PF: *http://www.openbsd.org/faq/pf/index.html*

[82] FreeBSD: *http://www.freebsd.org*

[83] NetBSD: *http://www.netbsd.org*

[84] uCLinux: *http://www.uclinux.org*

[85] Linux on ARM: *http://www.linux-arm.com*

[86] eCos: *http://ecos.sourceware.org*

Hypervisors/Emulators

kvm

[87] KVM: *http://de.wikipadia.org/wiki/Kernel_based_Virtual_Machine*

QEMU

[88] QEMU(TM): *http://www.qemu.org*

[89] QEMU-CPU support: *http://fabrice.bellard.free.fr/qemu/status.html*

[90] QEMU-User Manual:
http://fabrice.bellard.free.fr/qemu/qemu-doc.html

[91] QEMU-OS support: *http://www.claunia.com/qemu*

[92] QEMU-Debian: *http://909ers.apl.washington.edu/ dushaw/ARM*

[93] QEMU-Debian on an emulated ARM machine; Aurelien Jarno:
http://www.aurel32.net

[94] QEMU-Debian kernel and initrd for qemu-arm-versatile; Aurelien Jarno:
http://people.debian.org/ aurel32

[95] QEMU-Debian ARM Linux on QEMU; Brian Dushaw:
http://909ers.apl.washington.edu/ dushaw/ARM

[96] QEMU-Ubuntu-Installation/QemuEmulator:
http://help.ubuntu.com/community/Installation/QemuEmulator

[97] QEMU-Ubuntu-VMwarePlayerAndQemu:
http://wiki.ubuntu.com/VMwarePlayerAndQemu

[98] QEMU-OpenBSD: *http://141.48.37.144/openbsd/qemu.html - Dag Leine Institut fuer Physikalische Chemie, Martin Luther Universitaet Halle*

[99] QEMU-NetBSD - Running NetBSD on emulated hardware:
http://www.netbsd.org/ports/emulators.html

[100] QEMU-OpenSolaris: *http://www.opensolaris.org/os/project/qemu/host*

[101] QEMU-OpenSolaris Networking:
http://www.opensolaris.org/os/project/qemu/Qemu_Networking

[102] QEMUlator: *http://qemulator.createweb.de*

SkyEye

[103] SkyEye: *http://skyeye.sourceforge.net*

VMware

[104] VMware(TM) Inc.: *http://www.vmware.com*

[105] VMware-OpenBSD - HowTo Install VMWare-Tools:
http://openbsd-wiki.org

[106] VMware-Communities: *http://communities.vmware.com*

[107] VMware-Forum: *http://vmware-forum.de*

[108] VMware-Any-Any-Patch from Petr Vandrovec:
http://kinikovny.cvnt.cz/ftp/pub/vmware

[109] Open Virtual Machine Tools: *http://open-vm-tools.sourceforge.net*

Xen

[110] RED HAT(TM) ENTERPRISE LINUX 5.1 - Virtualization:
http://www.redhat.com/rhel/virtualization

[111] Virtual Machine Manager - VMM:
http://virtual-manager.et.redhat.com

[112] libvirt: *http://www.libvirt.org*

[113] Xen(TM): *http://www.xen.org*

[114] XenWiki - Xen-Networking: *http://wiki.xensource.com/xenwiki/XenNetworking*

[115] Xen-CentOS: *Creating and Installing a CentOS5 domU instance*

[116] Xen-Fedora: *http://fedoraproject.org/wiki/FedoraXenQuickstartFC6*

[117] Xen-OpenSolaris: *http://www.opensolaris.org/os/community/xen*

[118] Gerd Hoffmann: *"Install SuSE as Xen guest."*

Security

[119] OpenSSH: *http://www.openssh.org*

[120] SSH Communications Security(TM): *http://www.ssh.com*

[121] SSH Tectia(TM): *SSH Tectia*

[122] OpenSSH-FAQ: *http://www.openbsd.org/openssh/faq.html*

[123] OpenSSL: *http://www.openssl.org*

[124] OpenLDAP: *http://www.openldap.org*

[125] MIT-Kerberos: *http://web.mit.edu/kerberos/www*

[126] Heimdal-Kerberos: *http://www.h5l.org*

[127] sudo - "superuser do"(check google for actual link): *http://www.sudo.ws*

Specials

Dynagen/Dynamips

[128] Dynagen, by Greg Anuzelli:
Dynagen

[129] Dynamips, Cisco(TM) 7200 Simulator:
Dynamips, Cisco(TM) 7200 Simulator

QEMU-Networking with VDE

[130] VDE-Virtual Distributed Ethernet:
http://sourceforge.net/projects/vde

[131] VirtualSquare: *http://virtualsquare.org*

[132] VirtualSquare: *Basic Networking*

PXE

[133] By H. Peter Anvin: *SYSLINUX - PXELINUX -ISOLINUX*

[134] PXE-ROM-Images: *Etherboot*

Routing

[135] "Linux Advanced Routing&Traffic Control", by Bert Hubert: *LARTC-HOWTO*

Scratchbox

[136] *Scratchbox*

Serial-Console

[137] By van Emery: *"Linux Serial Console HOWTO"*

[138] By David S. Lawyer / Greg Hawkins: *"Serial-HOWTO"*

[139] By David S. Lawyer: *"Text-Terminal-HOWTO"*

Miscellaneous

[140] IEEE: *http://www.ieee.org*

[141] The GNU Netcat: *Netcat*

[142] Netcat Wikipedia: *Netcat Wikipedia*

[143] By van Emery: *"Linux Gouge"*

UnfiedSessionsManager Versions

[144] The first public version of 2008.02.11, by Arno-Can Uestuensoez. Available with online ASC-II help only by "ctys -H print": *"UnifiedSesionsManager" http://sourceforge.net/projects/ctys*

[145] The second public version of 2008.07.10, by Arno-Can Uestuensoez: *"UnifiedSesionsManager" http://sourceforge.net/projects/ctys*

[146] The second public version with minor updates of 2008.08.6, by Arno-Can Uestuensoez: *"UnifiedSesionsManager" http://sourceforge.net/projects/ctys*

[147] Minor editorial updates of 2008.08.12, by Arno-Can Uestuensoez: *"Uni-fiedSesionsManager" http://sourceforge.net/projects/ctys*

[148] Enhanced documentation, 2008.08.16, by Arno-Can Uestuensoez: *"Uni-fiedSesionsManager" http://sourceforge.net/projects/ctys*

[149] Minor editorial changes, 2009.01.26, by Arno-Can Uestuensoez: *"Unified-SesionsManager" http://sourceforge.net/projects/ctys*

Sponsored OpenSource Projects

[150] UnifiedSessionsManager:
http://www.UnifiedSessionsManager.org
http://sourceforge.net/projects/ctys
http://ctys.berlios.de

[151] zamklibant:
http://sourceforge.net/projects/zamklibant

Commercial Support

Commercial support and additional services are available exclusively from:

[152] Arno-Can Uestuensoez:
http://www.uestuensoez.com

[153] Ingenieurbuero Arno-Can Uestuensoez:
http://www.i4p.com