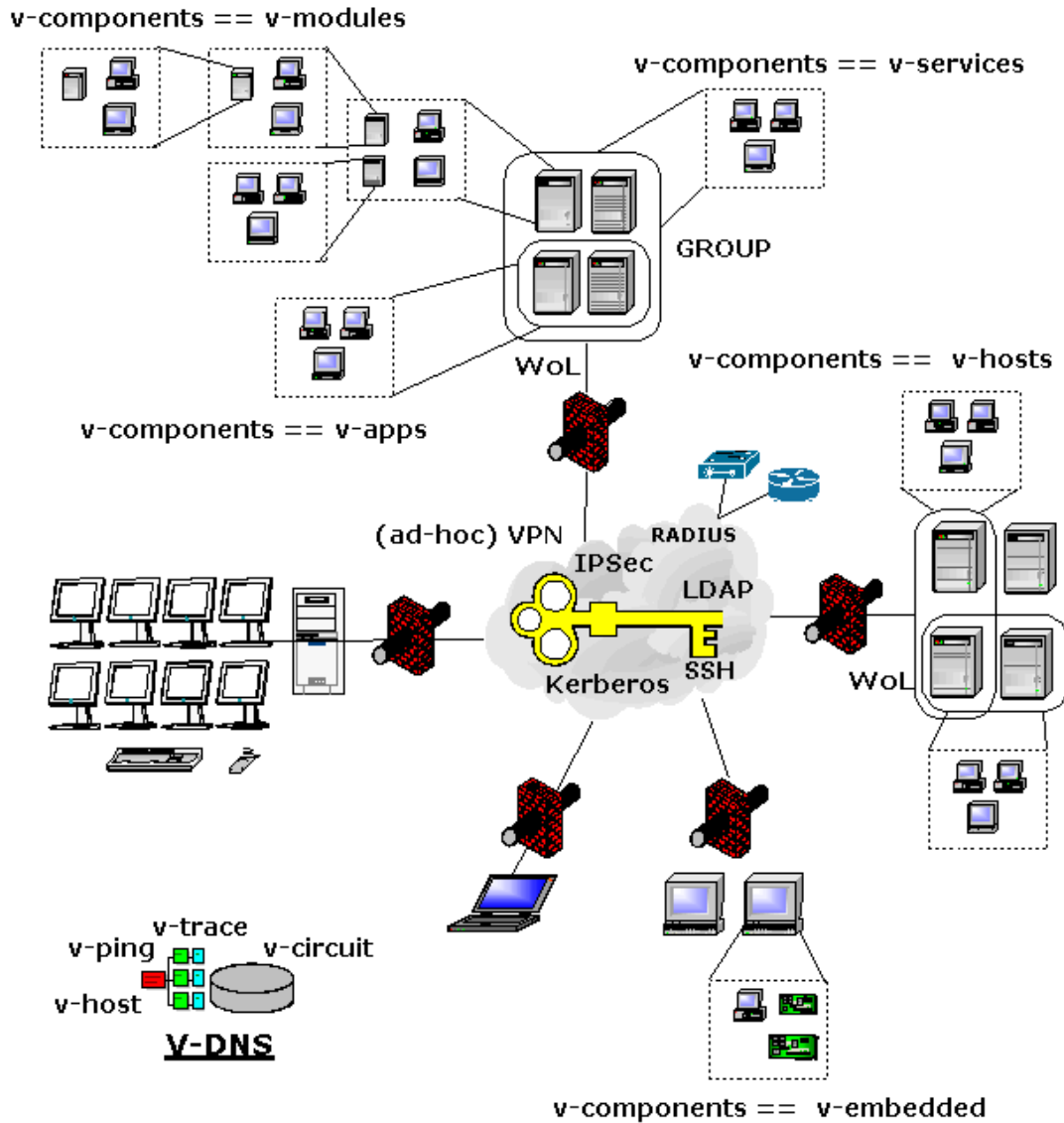


## stacked-VMs == v-components



## *The UnifiedSessionsManager*

VMware Setup and Call Guide(draft-pre-release)  
Extract from the User-Manual

Version:01.07.001b05a - 2009.01.26

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Arno-Can Uestuensoez



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```
-----  
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 dangling or just reference a page referencing the user manual.

### 1.1 History

Version	Date	Author	Description
01.03.003.a01 <a href="#">[144]</a>	2008.02.11	Arno-Can Uestuensoez	Initial pre-release as embedded printable help
01.07.001.a01 <a href="#">[145]</a>	2008.08.03	Arno-Can Uestuensoez	First major update with numerous additions and partial review.
01.07.001.b02 <a href="#">[146]</a>	2008.08.11	Arno-Can Uestuensoez	Minor editorial updates. A lot of tests, some fixes.
01.07.001.b03 <a href="#">[147]</a>	2008.08.12	Arno-Can Uestuensoez	Minor editorial updates.
01.07.001.b04 <a href="#">[148]</a>	2008.08.16	Arno-Can Uestuensoez	Enhancement of documentation and Web-Site.
01.07.001.b05a <a href="#">[149]</a>	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 addressing with enhanced capability-recognition and validation will follow.

## 1.2 Contact

Public maintenance:	<i><a href="mailto:acue@sfl_sourceforge.net">acue@sfl_sourceforge.net</a></i>
Administrative contact:	<i><a href="mailto:acue@UnifiedSessionsManager.org">acue@UnifiedSessionsManager.org</a></i>
Commercial Services:	<i><a href="http://i4p.com">i4p.com</a> - Engineering Office Arno-Can Uestuensoez</i>

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If some is forgotten, it will be added immediately.

## Chapter 2

# Installation of VMW

The Installation of VMware is quite forward. On Systems not supported from the box, the any-any-patch might help.

Some minor pitfalls occur for specific configurations.

- NIC-bonding - bridged

When a bonding device is utilized on Linux, the mode 6, which is the ARP-negotiation of client and server machines is not supported. The success of the support could be easily checked when using a guest system and calling ping. The effect is the lost of about the half of the ping-answers. This is somewhat a pity, because the mode-6 seems to be the fastest mode which even does not require support intermediate network equipment.

Any other mode seems to work properly.



# Chapter 3

## Installation of Guests

### 3.1 PXE-Boot

The following steps are applied to an installation by PXE. This anyhow requires the proper setup of DHCP, TFTP, and one of HTTP/FTP/NFS. For some OSs a so called "kickstart" file could be used to automate the whole procedure.

For Linux and BSD refer to [133, SYSLINUX] and [134, ETHERBOOT].

1. Create a VM by native means of a VMware product, but do not start it. When the base machine is created, close the VM.

The common convention within ctys is, that the following items are all literally the same.

- LABEL
- DisplayName
- <vmx-filenameprefix>
- <directory-containing-vmx>

2. Edit the VMX file manually and apply following changes and addons:

- Check "displayName" as mentioned before.
- Change the ethernet interface entries for the MAC-address and behaviour as required for PXE/DHCP.

The default behaviour is described as "generatedAddress", which could change and is somewhat challenging to be continuously maintained for PXE/DHCP. Therefore it should be changed to "static". The resulting entries depend on the actual product, but the essential entries seem to be common as for following example:

```
- ethernet0.present = "TRUE"
```

- ethernet0.addressType = "static"
- ethernet0.address = "00:50:56:13:11:4D"

When the cache database is already populated by values from `/etc/dhcpd.conf` or a manually created database similar to `/etc/ethers`, the utility `ctys-macmap` could be used for management of address-mappings.

- Change the UUID entries from dynamic behaviour to static values, otherwise they will change when the machine is reallocated. The values could be kept as already present, else should be generated by `uuidgen`.
  - uuid.action = "keep"
  - uuid.location = "56 4d 66 ff 5a 76 d1 19-35 11 73 3d 0f 8d 26 9a"
  - uuid.bios = "56 4d 5e 88 71 0e a5 79-59 6c 34 15 44 a7 7e 96"
- Add `ctys-meta` information as required for `ENUMERATE`. Additional values might be applied to the following example.

The values are not recognized by VMware, thus has to be kept synchronous by the user. The main intention is to get cacheable information for off-line guests to be utilized by `ENUMERATE` and therefore by `ctys-vhost`

```
###IPO="192.168.1.235"
###DIST="CentOS"
###DISTREL="5"
###OS="Linux"
###OSREL="2.6"
###SERNR="20080415051600"
###CATEGORY="VM"
```

3. Close the file within the editor and open it again within the VMware frontend.
4. From now on the following steps could be already proceeded either by native call of `vmware`, or by usage of the `UnifiedSessionsManager`, which has some advances for monitoring and `LIST` of current active sessions.

The following example illustrates the call, when for a new machine the `<machine-adress>` is not yet registered within the `cacheDB("ctys-vdbgen")`

```
ctys -t vmw \
-a create=\
```



```
p:$HOME/vmware/tst-ctys/tst116/tst116.vmx,\
reuse\
-c off \
-C off \
host1
```

Start the VM and set the emulated BIOS appropriately, by entering with "F12".

5. Boot into PXE, which might be a simple or more advanced Menu, or just a command line for entering a boot string [133, SYSLINUX] .
6. Install by means of current GuestOS and/or any generic installer.

## 3.2 ISO-Image and DHCP

The install procedure for usage of an ISO-Image is almos the same as for PXE, just a few formal differences apply.

- Add a CD/DVD-ROM-drive with a link to an ISO-Image, similar to an actual physical drive.
- Select the appropriate boot order, where instead or in addition to PXE the CD/DVD-drive has to be registered.

The required protocols my vary little more, of course.

## 3.3 Install procedures

### 3.3.1 General Remarks

The most of the installation is performed with PXE if possible. Therefore the PXELINUX is switched to version 3.6.2 and a menu system for the management of the whole test-environment is setup.

When difficulties occur due to specific network requirement, the CD-mount on ISO files option is used, which is almost in any case experienced to be quite safe for VMware products.

### 3.3.2 CentOS

Installation is in general quite straight-forward. Here performed by PXE on a i386 machine with one CPU.

### 3.3.3 Debian-4.0\_r3

Installation is quite straight-forward, once the required additional netboot-image is downloaded and in place. The differences and additions to the pre-defined environment are:

1. Only the kernel image "linux" and the ramdisk "initrd.gz" are imported into a common boot environment with several UNIX variants as provided by [133, SYSLINUX].
2. The following key has probably to be applied

```
"debian-installer/allow_unauthenticated=true"
```

### 3.3.4 Fedora 8

Installation is quite straight-forward and very similar to CentOS.

### 3.3.5 MS-Windows-NT-4.0-S

Installed from ISO image.

### 3.3.6 MS-Windows-2000-WS

Installed from ISO image.

### 3.3.7 OpenBSD

Installation is quite straight-forward, just the two-level boot has to be considered.

### 3.3.8 SuSE

Installation is quite straight-forward.

### 3.4 Installed Systems

OS	name	Inst-VM	Media
CentOS-5.0	tst117	Server-1.0.4	PXE
CentOS-5.1	tst112	Server-1.0.4	PXE
Debian-4.0r3	tst106	Server-1.0.4	PXE
Fedora 8	tst103	Server-1.0.4	PXE
OpenBSD-[2-4]	tstXYZ	WS5/6,Server-1.0.[1-5]	PXE,ISO
OpenBSD-4.0	tst109	Server-1.0.4	PXE
OpenBSD-4.2	tst111	Server-1.0.4	PXE
OpenBSD-4.3	tst155	Server-1.0.4	PXE
SuSE-9.3	tstXYZ	WS4/5/6,Server-1.0.[1-5]	PXE,ISO
SuSE-9.3	tst003	WS6,Server-1.0.[345]	PXE,ISO
Solaris 10	tst115	WS6	ISO
Ubuntu-6.06.1-D	tst128	Server-1.0.4	ISO
Ubuntu-6.06.1-S	tst120	Server-1.0.4	PXE
Ubuntu-7.10-S	tst005	Server-1.0.4	PXE
Ubuntu-8.04-D	tst132	Server-1.0.4	ISO
Ubuntu-8.04-S	tst133	Server-1.0.4	PXE
MS-Windows-2000WS	tstXYZ	WS4/5/6,Server-1.0.[1-5]	PXE,ISO
MS-Windows-2000S	tstXYZ	WS4/5/6,Server-1.0.[1-5]	PXE,ISO
MS-Windows-NT-4.0S	tstXYZ	WS4/5/6,Server-1.0.[1-5]	PXE,ISO

Table 3.1: Overview of Installed-VMs



## Chapter 4

# Call Examples

### 4.1 CREATE a session

The following call starts a session:

```
ctys \  
-t vmw \  
-a create=f:vmware/tst-ctys/tst117/tst117.vmx,reuse\  
app2
```

The previous call contains two specifics to be mentioned.

First the filename option "f:" is used, which does a string comparison against the scanned absolute filepaths of configurations files available. The evaluation could be processed from cacheDB and/or from the native filesystem on the execution target.

Due to specific handling of filenames just by pattern matching the following call leads to the same result, if unambiguous of course:

```
ctys \  
-t vmw \  
-a create=f:vmware/tst-ctys/tst117,reuse \  
app2
```

If this is ambiguous, e.g. due to an backup directory, the following could be used too and might solve the problem:

```
ctys \  
-t vmw \  
-a create=f:vmware/tst-ctys/tst117/t,reuse \  
app2
```

The second part to be mentioned is the "reuse" flag, which initiates simply as first trial a "connect", when this fails, the VM session is created. Thus using the "reuse" flag can lead to some smart handling of sessions, where it is no longer required to remember whether a session is already present or not. Therefore of course the appropriate configuration of the VM for headless background mode

is required.

Another specific case is the usage of a VNCviewer session for a Workstation of Version-6 or later(?). The access requires to be configured by a static port as described within the VMware product manual. The UnifiedSessionsManager provides access by usage of the <machine-address> only, because it has the knowledge how to map for example the LABEL to a stored vncport. The following example shows a simple redundant access to the proprietary VMware console "CONSOLE:VMW" and the access to "CONSOLE:VNC". Anyhow, the current version of ctys supports only the enumeration of one console for each call.

```
ctys \
-t vmw \
-a create=1:tst117,console:vnc,connect\
app2
```

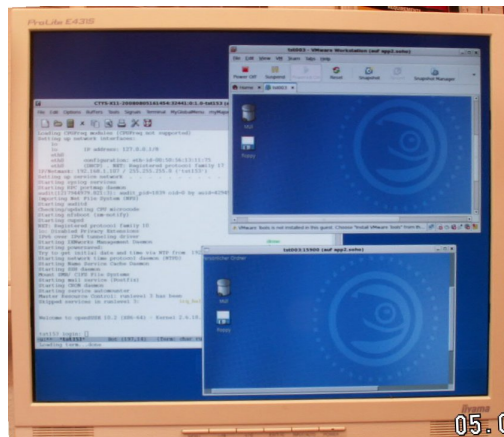


Figure 4.1: VMware WS6 with an additional VNCviewer Client Session.

## 4.2 CANCEL a session

The CANCEL behaviour could be widely configured for VMW. It is e.g. possible to configure an automatic close of the VM, once the GuestOS is shutdown, when the last VM is stopped, the frontend closes too. This could be provided by command line options of VMware and is configured as default behaviour for the UnifiedSessionsManager.

The following call CANCELS the VMW without additional user interaction, thus any number of disconnected headless servers could be CANCELED too.

The UnifiedSessionsManager implements the standard behaviour, first to try a native call to the GuestOS, if that fails or a timeout is hit, than the VMware hypervisor interface "vmrun" is called.

```
ctys \
-t vmw \
-a cancel=f:vmware/tst-ctys/tst117/t,poweroff:0 \
app2
```

Additionally variants are similar to the provided examples for XEN, this is particularly the case, because they share the most of the top-level CANCEL code.

### 4.3 LIST sessions

The simple LIST call

```
ctys -a list app2
```

produces the output:

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
app2.soho	-	APP2	VNC	C	root	root
app2.soho	-	APP2	VNC	S	root	root
app2.soho	tst118	tst117	VMW	S	acue	ldapusers
app2.soho	tst113	tst112	VMW	S	acue	ldapusers
app2.soho	tst118	tst117	VMW	C	acue	ldapusers
app2.soho	tst113	tst112	VMW	C	acue	ldapusers
app2.soho	app2.soho.	app2	PM	S	-	-
app2.soho	00:E0:81:2B:A1:F2	app2	PM	S	-	-

This is the default case for two VMs running on app2 with DISPLAYFORWARDING to ws2, and "still" running a local client of CLIENTFORWARDING tests for the XEN plugin. The clients and servers for VMW are now coallocated on the server app2.

The CONNECTIONFORWARDING mode is currently supported for:

Client and Server on different machines:

```
CONNECTIONFORWARDING
-> Workstation 6+ with VNC client
-> Server with CONSOLE
```

Client and Server on same machine:

```
DISPLAYFORWARDING
-> Workstation 6+ with CONSOLE
-> Workstation 6+ with VNC client
-> Server with CONSOLE
```

Thus the following call starts a native frontend with CONNECTIONFORWARDING on server 1.0.4 version:

```
ctys \  
  -t vmw \  
  -a create=f:vmware/tst-ctys/tst112/t,reuse \  
  -L CF \  
  olymp
```

The specifics for VMW is, that for the headless-mode initially a complete set with display forwarding is started on the remote host. ctys starts additionally a local client attached to the configured remote port (default=904) by an encrypted tunnel. The startup of the local client requires in this version an interactive user and password. As far as currently known this has to be a valid local user, a kerberos user seem not to work. Anyhow, for test purposes here the user "root" was used, which should not be done for productive purposes.

The following list call displays now the complete set of interconnected sessions, for completeness the XEN examples are included in the output.

```
ctys -a list localhost app2 olymp lab00
```

The following listing shows the two clients connected by CONNECTIONFORWARDING, which are a vncviewer connecting as a XEN console to tst100, and a proprietary frontend of VMW connecting to tst112. Both are interconnected by usage of a SSH tunnel implicitly created by the CORE plugin DIGGER and listed as the session type SSH(XEN) and SSH(VMW).



TCP-container	TCP-guest	label	sesstype	c	user	group
ws2.soho	-	tst100	VNC	C	acue	ldapusers
ws2.soho	tst112	tst112	VMW	C	acue	ldapusers
ws2.soho	ws2.soho.	ws2	PM	S	-	-
ws2.soho	-	tst100	SSH(XEN)	T	acue	ldapusers
ws2.soho	-	tst112	SSH(VMW)	T	acue	ldapusers
app2.soho	-	APP2	VNC	C	root	root
app2.soho	-	APP2	VNC	S	root	root
app2.soho	tst118	tst117	VMW	S	acue	ldapusers
app2.soho	tst118	tst117	VMW	C	acue	ldapusers
app2.soho	app2.soho.	app2	PM	S	-	-
app2.soho	00:E0:81:2B:A1:F2	app2	PM	S	-	-
olymp.soho	tst112	tst112	VMW	S	acue	ldapusers
olymp.soho	tst112	tst112	VMW	C	acue	ldapusers
olymp.soho	olymp.soho.	olymp	PM	S	-	-
lab00.soho	-	LAB00	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	-	-

## 4.4 ENUMERATE sessions

The following call displays the communications interfaces of the test-pool VMs. For additional information refer to User-Manual: "Display of Available Sessions".

```
ctys -a enumerate=macro:TAB_CPORT,b:vmware/tst-ctys
```

Label	stype	cport	PM	MAC	TCP
tst117	VMW			ws2.soho 00:50:56:13:11:52	192.168.1.240
tst115	VMW	0		ws2.soho 00:50:56:13:11:50	192.168.1.235
tst117	VMW			ws2.soho 00:50:56:13:11:52	192.168.1.240
tst112	VMW			ws2.soho 00:50:56:13:11:4D	192.168.1.235
tst003	VMW	0		ws2.soho 00:50:56:13:11:33	192.168.1.133
tst005	VMW	0		ws2.soho 00:50:56:13:11:35	192.168.1.135
tst103	VMW	0		ws2.soho 00:50:56:13:11:44	192.168.1.223
tst106	VMW	0		ws2.soho 00:50:56:13:11:47	192.168.1.226
tst111	VMW	0		ws2.soho 00:50:56:13:11:4C	192.168.1.234
tst120	VMW	0		ws2.soho 00:50:56:13:11:55	192.168.1.208
tst128	VMW	0		ws2.soho 00:50:56:13:11:5C	192.168.1.212
tst002	VMW	0		ws2.soho 00:50:56:13:11:32	192.168.1.132
tst111	VMW	0		ws2.soho 00:50:56:13:11:4C	192.168.1.234

## 4.5 SHOW

Same as for XEN.

## 4.6 INFO

Same as for XEN.

## 4.7 Display of Available Sessions

Once the basic installation and setup is accomplished, first a "PATHNAME/PNAME" based start of a VM should be performed. The option "-c off" deactivates the use of the nameservice cache for an initially empty cacheDB, thus suppresses several warnings and error messages of internally called tools.

The next step - after successful installation and configuration of the UnifiedSessionsManager and a populated cacheDB by usage of "ctys-vdbgen" - might be to list the actually available instances.

The following call of "ctys-vhost" lists all available VMs with given constraints, in this case all instance of VMW which could be started by the user "acue" on the host "app2". The set displayed has to be additionally of the set "tst-ctys", which is the testpool for the UnifiedSessionsManager.

```
ctys-vhost -o pm,label,ids app2 vmw acue tst-ctys
```

The "pm", the "ids" and the "label" are displayed as result.

The additional string "app2 vmw acue tst-ctys" is used as a awk-regexpr and is evaluated as an AND based filter for each word. The whole query requires in this case about 1.4seconds and the following result is displayed.

```

app2.soho;tst117;/homen/acue/vmware/tst-ctys/tst117/tst117.vmx
app2.soho;tst115;/homen/acue/vmware/tst-ctys/tst115/tst115.vmx
app2.soho;tst117;/homen/acue/vmware/tst-ctys/tst117.centos/tst117.vmx
app2.soho;tst111;/homen/acue/vmware/tst-ctys/tst111.OpenBSD-4.2/tst111.vmx

```

### 4.7.1 Custom Tables

The previous output, which is by default displayed in TERSE format could be formatted by a generic custom table.

The following call displays the required canonical field indexes.

```

ctys-vhost \
-o pm,label,ids,titleidx \
app2 vmw acue tst-ctys

```

The indexes are prefixes as an extended table title by "TITLEIDX".

```

ContainingMachine(1);Label(3);ID(4)
app2.soho;tst117;/homen/acue/vmware/tst-ctys/tst117/tst117.vmx
app2.soho;tst115;/homen/acue/vmware/tst-ctys/tst115/tst115.vmx
app2.soho;tst117;/homen/acue/vmware/tst-ctys/tst117.centos/tst117.vmx
app2.soho;tst111;/homen/acue/vmware/tst-ctys/tst111.OpenBSD-4.2/tst111.vmx

```

This values could be now used to define the output table as:

```

ctys-vhost \
-o pm,label,ids,tab_gen:1_PM_7%%3_label_4%%4_ID_30 \
app2 vmw acue tst-ctys

```

As could be seen in the following output, this table configuration is not really helpful. The field sizes are too short, and the common leading part of the pathnames for the ID fields is quite long.

```

PM      |label|ID
-----+-----+-----
app2.so|tst1|/homen/acue/vmware/tst-ctys/ts
app2.so|tst1|/homen/acue/vmware/tst-ctys/ts
app2.so|tst1|/homen/acue/vmware/tst-ctys/ts
app2.so|tst1|/homen/acue/vmware/tst-ctys/ts

```

The following changes might help in advance of usability:

```
ctys-vhost \  
-o pm,label,ids,tab_gen:1_PM_11%%3_label_9%%4_ID_30_L \  
app2 vmw acue tst-ctys
```

Although this is much more helpful, the raise of the ID value should help some more.

PM	label	ID
app2.soho	tst117	are/tst-ctys/tst117/tst117.vmx
app2.soho	tst115	are/tst-ctys/tst115/tst115.vmx
app2.soho	tst117	-ctys/tst117.centos/tst117.vmx
app2.soho	tst111	/tst111.OpenBSD-4.2/tst111.vmx

Thus the final trial for usage and probably storage as a predefined MACRO is:

```
ctys-vhost \  
-o pm,label,ids,tab_gen:1_PM_11%%3_label_9%%4_ID_50_L \  
app2 vmw acue tst-ctys
```

The final result is:

PM	label	ID
app2.soho	tst117	/homen/acue/vmware/tst-ctys/tst117/tst117.vmx
app2.soho	tst115	/homen/acue/vmware/tst-ctys/tst115/tst115.vmx
app2.soho	tst117	omen/acue/vmware/tst-ctys/tst117.centos/tst117.vmx
app2.soho	tst111	acue/vmware/tst-ctys/tst111.OpenBSD-4.2/tst111.vmx

For getting some additional information on the actual installed distributions within the VMs the following call is used:

```
ctys-vhost \  
-o tab_gen:3_label_9%%11_Distro_15%%12_OS_17%%7_TCP_18 \  
app2 vmw acue tst-ctys
```

The final result is:

label	Distro	OS	TCP
tst117	CentOS-5.0	Linux-2.6	192.168.1.240
tst115	Solaris-10	Solaris-10	192.168.1.235
tst117	CentOS-5.0	Linux-2.6	192.168.1.240
tst112	CentOS-5.0	Linux-2.6	192.168.1.235
tst003	SuSE-9.3	Linux-2.6	192.168.1.133
tst005	Ubuntu-7.10-S	Linux-2.6	192.168.1.135
tst103	Fedora-8	Linux-2.6	192.168.1.223
tst106	Debian-4.0r3	Linux-2.6	192.168.1.226
tst111	OpenBSD-4.2	OpenBSD-4.2	192.168.1.234
tst120	FreeBSD-6.1	FreeBSD-6.1	192.168.1.208
tst128	NetBSD-4.0	NetBSD-4.0	192.168.1.212
tst002	SuSE-9.3	Linux-2.6	192.168.1.132
tst111	OpenBSD-4.2	OpenBSD-4.2	192.168.1.234

The decision is now to use tst117 as test machine.

#### 4.7.2 MACROs for Custom Tables

The previous examples could be stored as MACROs and called just by their macro name. Several preconfigured macros are available and could be listed with the utility "ctys-macros". Additional information on MACROs is available within the User-Manual.



## 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(3rd. 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 Implementierung 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 Oxeer, 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 SchÄ¼rmann: *(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: *Netzicherheit - Algorithmische Grundlagen und Protokolle*, dpunkt.verlag GmbH; 2003; ISBN: 3-89864-212-7
- [23] Alexandre Geschonneck: *Computer Forensik - Systemeintrübe erkennen, ermitteln, aufklären*, dpunkt.verlag GmbH; 2004; ISBN: 3-89864-253-4
- [24] Jonathan Hassel: *RADIUS - Securing Public Access to Private 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 & Pravar 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 Klünter, 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: *Windows 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] Uyles 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:

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## 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.wikipedia.org/wiki/Kernel\\_based\\_Virtual\\_Machine](http://de.wikipedia.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](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"*

### UnifiedSessionsManager 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": *"UnifiedSessionsManager"* *<http://sourceforge.net/projects/ctys>*
- [145] The second public version of 2008.07.10, by Arno-Can Uestuensoez: *"UnifiedSessionsManager"* *<http://sourceforge.net/projects/ctys>*
- [146] The second public version with minor updates of 2008.08.6, by Arno-Can Uestuensoez: *"UnifiedSessionsManager"* *<http://sourceforge.net/projects/ctys>*

- [147] Minor editorial updates of 2008.08.12, by Arno-Can Uestuensoez: "*UnifiedSessionsManager*" <http://sourceforge.net/projects/ctys>
  
- [148] Enhanced documentation, 2008.08.16, by Arno-Can Uestuensoez: "*UnifiedSessionsManager*" <http://sourceforge.net/projects/ctys>
  
- [149] Minor editorial changes, 2009.01.26, by Arno-Can Uestuensoez: "*UnifiedSessionsManager*" <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>

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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>