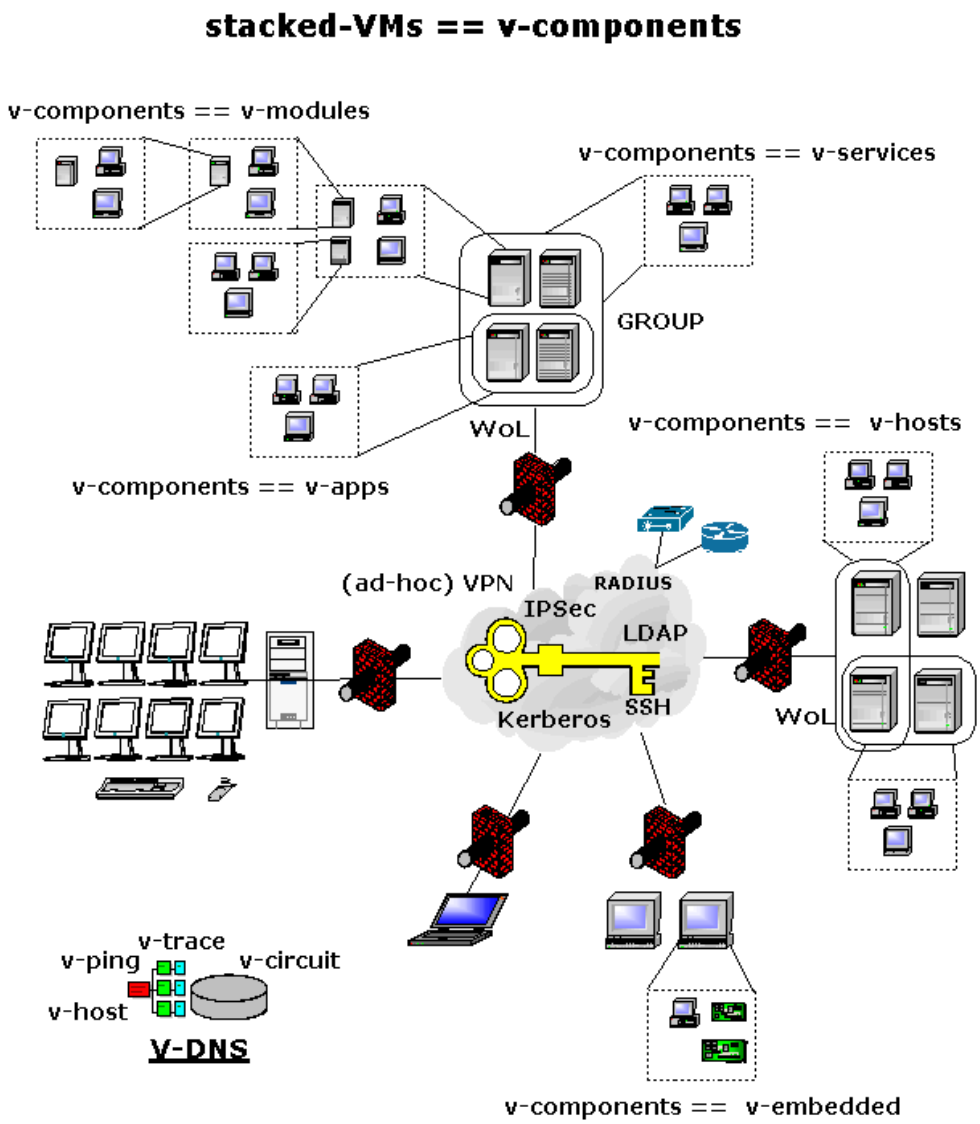

The UnifiedSessionsManager

Releasenotes
Version:01.11.015 - 2010.11.23
Release: International
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Ingenieurbuero fuer Telekommunikations und Software-Systemloesungen
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1 History

Version	Date	Author	Description
01.03.003.a01	2008.02.11	Arno-Can Uestuensoez	Initial pre-release as embedded printable help
01.07.001.a01	2008.08.03	Arno-Can Uestuensoez	First major update with numerous additions and partial review.
01.07.001.b02	2008.08.11	Arno-Can Uestuensoez	Minor editorial updates. A lot of tests, some fixes.
01.07.001.b03	2008.08.12	Arno-Can Uestuensoez	Minor editorial updates.
01.07.001.b04	2008.08.16	Arno-Can Uestuensoez	Enhancement of documentation and Web-Site.
01.11.001	2010.05.18	Arno-Can Uestuensoez	Major enhancements and updates.
01.11.002	2010.05.24	Arno-Can Uestuensoez	Documentation and web site enhancements.
01.11.003[6]	2010.05.31	Arno-Can Üstünsöz	Patch Default-Port VMware(TM)-Server-2.x, new tool ctys-beamer, add some documentation.
01.11.005[6]	2010.06.27	Arno-Can Üstünsöz	Alpha version of RDP plugin, bugfixes, added some documentation.
01.11.006[6]	2010.07.14	Arno-Can Üstünsöz	Alpha version of VBOX - VirtualBox(TM) plugin, bugfixes, added documentation, preparation of Typo3-Website.
01.11.008[6]	2010.07.30	Arno-Can Üstünsöz	Alpha-Version EnterpriseLinux, bugfixes, added documentation, First Gnome-Menues, ctys-scripts.
01.11.009[6]	2010.08.16	Arno-Can Üstünsöz	Alpha-Version gnome-starter, ctys-config, Fehlerbereinigungen, Ergänzung Dokumentation.
01.11.010[6]	2010.08.20	Arno-Can Üstünsöz	Verify GuetsOSs: ucLinux-QEMU(ARM+Coldfire), QNX-QEMU(x86), QNX-VBOX(x86),bugfixes, added documentation.
01.11.011[6]	2010.11.07	Arno-Can Üstünsöz	Verify New GuetsOSs: Android, MeeGo, RHEL, QNX. Version Updates: CentOS, Debian, OpenSUSE, OpenBSD, Ubuntu. Bugfixes, extension of documentation. menu generation.
01.11.012[6]	2010.11.16	Arno-Can Üstünsöz	Documentation and web enhancements.
01.11.013[6]	2010.11.19	Arno-Can Üstünsöz	Documentation and web enhancements.
01.11.014[6]	2010.11.22	Arno-Can Üstünsöz	Documentation and web enhancements.
01.11.015[6]	2010.11.24	Arno-Can Üstünsöz	Documentation and web enhancements.
01.11.016[6]	2010.11.26	Arno-Can Üstünsöz	Documentation and web enhancements.
01.11.017[6]	2010.11.28	Arno-Can Üstünsöz	Documentation and web enhancements.

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5 Product Structure and Application

The common model for hypervisors within ctys is designed as a Client-Server model. The focus is here the usability and flexibility. The implementation is based on a framework, where each component could be exchanged or customized.

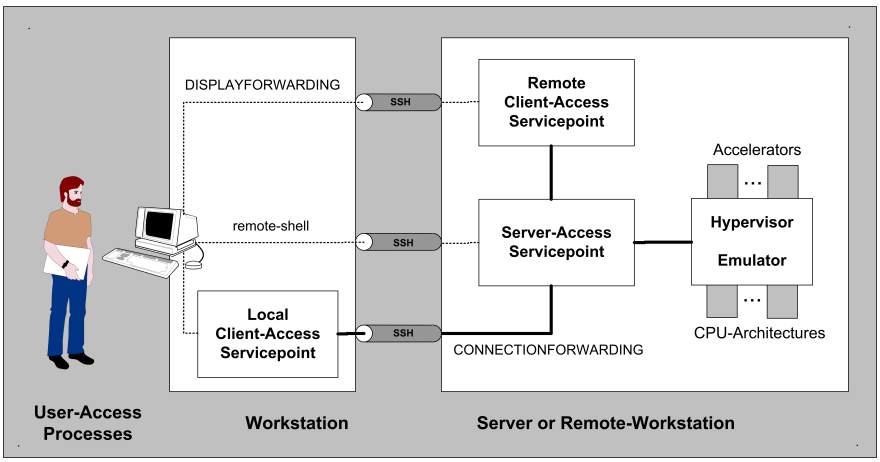

Figure 5: Unified Sessions Model

The architecture and design of the UnifiedSessionsManager is based on a plugin system similar to "Shared Libraries" or "DLLs". The components could be customized to be loaded or not by means of shell variables stored in configuration files.

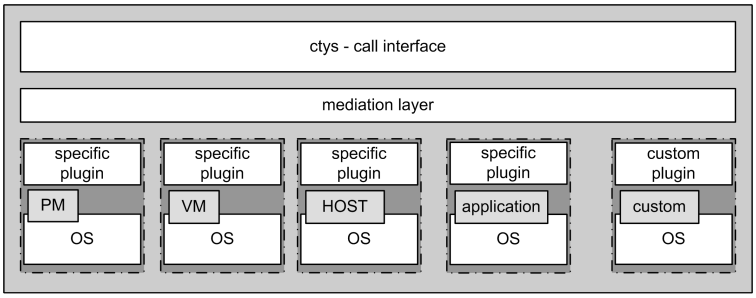

Figure 6: ctys Software Layers

The components or so called plugins supported by current release are:

- Virtual Machines/Hypervisors: KVM, QEMU, VBOX(VirtualBox(TM)), VMW(VMware Server:1.x+2.x / Player:1.x+2.x+3.x / WS:6.x+7.x)(TM), XEN(TM)

  KVM is supported as a kernel based accelerator for QEMU.

- Hosts: CLI, RDP, VNC, X11
- Physical Machines: PM

The following Operating Systems are supported:

- Linux(TM), FreeBSD(TM), OpenBSD(TM), OpenSolaris(TM), Solaris(TM)

For further details refer to following tables.

6 Feature-Sum-Up

The following tables present an overview of the supproted components for current release.
The listed PC, Workstation and Server based platforms with listed Hypervisors are supported and tested when marked with "OK". Additional platforms are going to be added for next versions("*").

The utility "ctys-genmconf" supports the detection and generation of relevant control data, the utility "ctys-plugins" verifies actual available operational states and resultingfeatures.

The main development and production platform for the UnifiedSessionsManager is CentOS.

The following pages show the current operational and test states of the various combinations of hypervisors, HostOS, and GuestOS. The actual operational states are visualized by specific colors as shown in next table.

Color	State
	The versions actually targeted to be supported with maximum available feature set.
	OK: Tested and operational in current release.
	NEXT: Sceduled for the next release. Probably already partly tested.
*	PLANNED: Intended for a later release.
-	OPEN: Technically possible, but for some reasons not yet planned to be implemented.

Table 3: Color coding of implementation and test states.

6.1 Supported Hypervisors

Supported Hypervisors on platforms as shown in the following tables.

Plugin	Supported Hypervisor	Versions		
		Previous	Current	InProcess
KVM	KVM		2.6.18/kvm-83 2.6.18-6/kvm-62 2.6.26-1/kvm-72	
OVZ	OpenVZ			
QEMU	Qemu	0.9.0	0.9.1,11.0.0,0.12.2	0.12.3
VBOX	VirtualBox(TM)		3.1.2	3.2.8
VMW	VMware-Player(TM)	1.0.4	1.0.5,2.5.3,3.0.1	
VMW	VMware-Server (TM)	1.0.4,1.0.6,1.0.9	1.0.10,2.0.2	
VMW	VMware-Workstation(TM)	6.0.2,6.0.4,6.5.1	6.5.3,7.0.1	
VMW	VMware-ESXi-Server(TM)			4.x.x
VMW	VMware-ESX-Server(TM)		4.1.0	
XEN	Xen(TM)		3.0.3,3.1.0	3.3.0,3.3.1,3.4.2
XEN	Citrix-XenServer(TM)		5.5.0	5.6.0

Table 4: Supported Hypervisors

6.2 Tested GuestOS support

The following table lists the already tested OS-Distribution vs. Containing Plugins. The containing plugins comprise the plugin itself as well as the required software and hypervisors.

Distribution	PMs		VMs						
	0	1+n	KVM	OVZ	VBOX	VMW	XEN	QEMU	
	x86	x86	x86	x86	x86	x86	x86	x86	ARM
BSD									
FreeBSD-7	OK	*	OK	-	*	OK	-	OK	-
FreeBSD-8	OK	*	OK	-	*	OK	-	OK	-
NetBSD-5.2	*	*	*	-	OK	*	*	*	*
OpenBSD-4[1]	OK	OK	OK	-	OK	OK	-	OK	-
Linux									
CentOS-5	OK	OK	OK	*	OK	OK	OK	OK	-
Debian-4-etch	OK	OK	-	-	-	OK	-	OK	-
Debian-5-lenny	OK	OK	OK	*	OK	OK	OK	OK	*
Enterprise Linux Server 5/ Unbreakable Linux	*	*	OK	*	OK	*	-	OK	-
Fedora-8	OK	OK	OK	-	-	OK	OK	OK	-
Fedora-10	OK	OK	OK	-	-	-	-	OK	-
Fedora-12	-	-	-	-	OK	-	-	-	-
Fedora-13	*	*	OK	-	OK	*	-	OK	-
Knoppix6.2	*	*	OK	-	*	*	*	OK	-
Knoppix-6.2.1 ADRIANE	OK	OK	OK	-	OK	*	*	OK	-
Mandriva-2010	OK	OK	OK	-	OK	OK	*	OK	-
Scientific Linux	OK	OK	OK	-	OK	OK	*	OK	-
openSUSE-10.3	OK	OK	-	-	-	OK	-	OK	-
openSUSE-11.1							OK		
openSUSE-11.2	OK	OK	OK	-	OK	OK	*	OK	-
openSUSE-11.3	OK	OK	OK	-	OK	*	*	OK	-
RedHat-Enterprise Linux 5	OK	OK	OK	-	OK	X	X	OK	-
RedHat-Enterprise Linux 6beta	OK	OK	OK	-	OK	X	X	OK	-
Slackware-13.1	*	*	*	-	*	*	*	*	*
SuSE-9.3	-	OK	-	-	-	OK	-	-	-
SuSE-10.2	-	OK	-	-	-	-	OK	-	-
Ubuntu-6.06.1-dapper	-	OK	-	-	-	OK	-	-	-
Ubuntu-7.10-gutsy	-	OK	-	-	-	OK	-	-	-
Ubuntu-8.04-hardy	OK	OK	OK	-	-	OK	OK	OK	-
Ubuntu-9.10	OK	OK	OK	*	OK	OK	*	OK	-
Ubuntu-10.10	OK	OK	OK	*	OK	OK	X	OK	-

Table 5: Getestete GuestOS

Distribution	PMs		VMs						
	0	1+n	KVM	OVZ	VBOX	VMW	XEN	QEMU	
	x86	x86	x86	x86	x86	x86	x86	x86	ARM
Solaris(TM)									
Solaris-10[2]	OK	OK	OK	-	OK	OK	-	OK	-
OpenSolaris-2009.6[4]	-	OK	OK	-	OK	OK	*	OK	-
ILLUMOS[5]	-	*	*	-	*	*	*	*	-
Nexenta[6]	-	*	*	-	*	*	*	*	-
OpenIndiana[7]	-	*	*	-	*	*	*	*	-
DOS									
FreeDOS[7]	-	-	*	-	*	*	*	OK	-
Balder[7]	-	-	*	-	*	*	*	OK	-
MS-Dos-5.x[7]	-	-	*	-	*	*	*	*	-
MS-Dos-6.x[7]	-	-	*	-	*	*	*	*	-
Windows									
MS-Windows-NT[7]	-	-	*	-	*	OK	*	*	-
MS-Windows-2000[7]	-	-	*	-	*	OK	*	*	-
MS-Windows-XP[7]	-	*	*	-	OK	OK	*	*	-
MS-Windows-2003[7]	-	*	*	-	*	OK	*	*	-
MS-Windows-7[7]	-	*	*	-	OK	*	*	*	-
MS-Windows-2008[7]	-	*	*	-	OK	*	*	*	-
Smartphone									
Android-2.2	*	*	OK	-	OK	-	-	OK	*
MeeGo-1.0	*	*	(X)	-	OK	*	-	(X)	*
Embedded									
FreeRTOS	*	*	-	-	-	-	-	-	*
QNX	*	*	*	-	OK	-	-	(OK)	*
uCLinux	*	*	-	-	-	-	-	*	(OK)

Table 6: Tested GuestOS

[5] No WoL for now.

[6] Some severe limitations may occur for Solaris, due the limitation of the "args" output of "ps" command to 80 characters. Thus the LIST action is faulty for some plugins, which means the instances are simply hidden due to argument-parts truncated by "ps". Some specific adaptations will follow. This depends on the argument ordering of the current command/wrapper and the actual contents beeing truncated. Supported Plugins: HOSTs and PM.

[7] Control by hypervisor only, no native support. Cygwin is foreseen for eventual future adaption. Tested with several versions, e.g. Windows-NT-Server, Windows-2000, and Windows-XP.

6.3 Supported Native Plugins

The next table shows the passed tests of supported native plugins vs. OS-Distribution. The plugins including required hypervisors are to be executed on the listed OSs. Other OSs and versions might work as well.

Distribution	PMs	VMs						HOSTs			
	PM	KVM	OVZ	QEMU	VBOX	VMW	XEN	CLI	RDP	VNC	X11
BSD											
FreeBSD-7	OK		-	*	-	-	*	OK	*	OK	OK
FreeBSD-8	OK		-	*	-	-	*	OK	*	OK	OK
NetBSD-5.2	*		-	*	-	-	*	*	*	*	*
OpenBSD-4	OK	-	-	X	-	-	-	OK	*	OK	OK
Linux											
CentOS-5	OK	OK	*	OK	OK	OK	OK	OK	OK	OK	OK
Debian-4-etch	OK	-	-	OK	-	OK	-	OK		OK	OK
Debian-5-lenny	OK	OK	*	OK	OK	OK	OK	OK	OK	OK	OK
Enterprise Linux Server 5 / Unbreakable Linux	OK	OK	*	OK	X	-	OK	OK	(OK)	OK	OK
Fedora-8	OK	-	-	OK	-	-	OK	OK		OK	OK
Fedora-12	OK	*	-	*	*	*	*	OK		OK	OK
Fedora-13	*	*	-	*	*	*	*	OK	(OK)	OK	OK
Gentoo	*	-	-	-	-	-	-	*	*	*	*
Knoppix	OK	*	-	*	*	*	*	OK	(OK)	OK	(OK)
Mandriva-2010	OK	-	-	-	-	-	-	OK		OK	OK
openSUSE-10.3	OK	-	-	OK	-	OK	-	OK		OK	OK
openSUSE-11.1	OK	-	-	-	-	-	OK	OK		OK	OK
openSUSE-11.2	OK	OK	-	OK	*	*	*	OK		OK	OK
openSUSE-11.3	OK	OK	*	OK	OK	*	OK	OK	OK	OK	OK
RedHat-Enterprise Linux 5.5	OK	OK	*	OK	*	OK	OK	OK	OK	OK	OK
RedHat-Enterprise Linux 6.0 beta	OK	X	*	X	*	*	*	OK	OK	OK	OK
Scientific Linux SL 5.4.1	OK	OK	-	OK	*	OK	OK	OK	*	OK	OK
Sackware-13.1	*	*	-	*	*	*	*	*	*	*	*
SuSE-9.3	OK	-	-	-	-	OK	-	OK		OK	OK
SuSE-10.2	OK	-	-	-	-	-	-	OK		OK	OK
Ubuntu-6.06.1	-	-	-	-	-	-	-	OK		OK	OK
Ubuntu-7.10	-	-	-	-	-	-	-	OK		OK	OK
Ubuntu-8.04	OK	OK	-	(OK)[8]	-	-	-	OK		OK	OK
Ubuntu-9.10	OK	*	-	*	*	*	*	OK	*	OK	OK
Ubuntu-10.10	OK	OK	*	OK	X	X	X	OK	OK	OK	OK

Table 7: Native Plugins vs. OS-Distribution

Distribution	PMs	VMs						HOSTs			
	PM	KVM	OVZ	QEMU	VBOX	VMW	XEN	CLI	RDP	VNC	X11
Hypervisor-Distributions											
ESXi	*	-	-	-	-	-	-	*		*	-
ESX-4.1.0	X	-	-	-	-	X	-	OK	X	OK	OK
XenServer-5.5.0[9]	X	-	-	-	-	-	X	OK	X	OK	OK
Solaris(TM)											
Solaris-10	(OK)	-	-	-	-	-	-	(OK)		(OK)	(OK)
OpenSolaris 2009.6	OK	-	-	X	X	-	*	OK	X	OK	OK
ILLUMOS	*	-	-	*	*	-	*	*	*	*	*
Nexenta	*	-	-	*	*	-	*	*	*	*	*
OpenIndiana	*	-	-	*	*	-	*	*	*	*	*
MS-Windows(TM)											
MS-W2K	*	-	-	-	-	-	-	*		*	-
MS-WXP	*	-	-	-	-	-	-	*		*	-
MS-W2K3	*	-	-	-	-	-	-	*		*	-
MS-W2K8	*	-	-	-	-	-	-	*		*	-
Smartphone											
Android-2.2	*	-	-	-	-	-	-	*	*	*	*
MeeGo-1.0	OK	*	-	*	-	-	-	OK	*	*	*
Embedded											
FreeRTOS	*	-	-	-	-	-	-	*	*	*	*
QNX	*	-	-	-	-	-	-	*	*	*	*
RTEMS-Dev	-	-	-	*	*	-	-	*	*	*	*
uCLinux	*	-	-	-	-	-	-	*	*	*	*

Table 8: Native Plugins vs. OS-Distribution

[9] Compilation of 'qemu-system-x86_64' with support for '-name' option required.

Unterstützte Produkte und Versionen für die jeweiligen Plugins. Diese varirieren z.T. für die verschiedenen Plattformen.

Plugin / Toolset	Unterstütztes Produkt	Versionen		
		Vorversion	Aktuell	InBearbeitung
CLI	bash		3.2.39.1, >3.x	
RDP	rdesktop		1.6	
	krdc		ffs.	
	tsclient		ffs.	
VNC	RealVNC		3.x	
			4.1.1, 4.1.2	
	TigerVNC		x.x	
	TightVNC		x.x	
	krdc		ffs.	
	tsclient		ffs.	
X11	gnome-terminal		x.x	
	xterm		x.x	
	emacs		21.x, 22.x	

Table 9: Unterstützte HOSTs Plugins

Plugin / Toolset	Unterstütztes Produkt	Versionen		
		Vorversion	Aktuell	InBearbeitung
Desktop	Gnome		x.x	
	KDE		x.x	
	fvwm		x.x	
	xfce		x.x	
Shells	bash		3.2.39.1, >3.x	

Table 10: Unterstützte HOSTs-Plugin Sub-Komponenten

Plugin / Toolset	Unterstütztes Produkt	Versionen		
		Vorversion	Aktuell	InBearbeitung
QEMU	Qemu	0.9.0	0.9.1,0.11.0,0.12.2	0.12.3
	KQEMU			
	KVM			
VBOX	VirtualBox(TM)		3.1.2	3.2.8, 3.2.10
VMW	VMware-Player(TM)	1.0.4	1.0.5,2.5.3,3.0.1	
	VMware-Server (TM)	1.0.4,1.0.6,1.0.9	1.0.10,2.0.2	
	VMware-Workstation(TM)	6.0.2,6.0.4,6.5.1	6.5.3,7.0.1	
XEN	Xen(TM)		3.0.3,3.1.0	3.3.0,3.3.1,3.4.2,4.0.0

Table 11: Unterstützte Server basierte VMs plugins

Plugin / Toolset	Unterstütztes Produkt	Versionen		
		Vorversion	Aktuell	InBearbeitung
VMW	VMware-ESX-Server(TM)		4.1.0	
	VMware-ESXi-Server(TM)			4.0.0
XEN	Citrix-XenServer(TM)		5.5.0	5.6.0

Table 12: Unterstützte Host basierte VMs plugins

6.4 Supported Client Plugins

The following table lists the already tested client OSs.

Distribution	ctys			GUI						
	GROUP	DF	CF	X11		WM				
				X11	Xinerama	Gnome	KDE	fvwm	xfce	ffs.
BSD										
FreeBSD-7										
FreeBSD-8	X	X	X	X	*	X	X	X	-	
NetBSD-5.2	X	X	X	X	*	X	X	X	-	
OpenBSD-4	X	X	X	X	*	X	X	X	-	
Linux										
CentOS-5	OK	OK	OK	OK	OK	OK	X	X	X	
Debian-5-lenny	OK	OK	OK	OK	OK	OK	X	X	X	
Enterprise-Linux Server	*	*	*	*	*	*	*	*	*	
Fedora-8										
Fedora-10	X	X	X	X	*	X	X	X	X	
Fedora-12	*	OK	*	OK	*	OK	*	-	*	
Fedora-13	*	*	OK	OK	*	OK	*	-	*	
Knoppix	X	X	OK	OK	*	OK	X	X	X	
Mandriva-2010	*	OK	*	OK	*	OK	*	*	*	
Scientific Linux	OK	OK	OK	OK	*	OK	OK	-	-	
openSUSE-11.2	OK	OK	OK	OK	*	OK	OK	OK	OK	
openSUSE-11.3	*	*	*	*	*	*	*	*	*	
RedHat-Linux Server 5.5	*	OK	*	*	*	OK	*	*	*	
RedHat-Linux Server 6.0 beta	*	*	*	*	*	*	*	*	*	
Ubuntu-6.06.1-dapper										
Ubuntu-7.10-gutsy										
Ubuntu-8.04-hardy	OK	OK	(OK)	OK		OK	OK	OK	OK	
Ubuntu-9.10	X	X	X	X	X	X	X	X	X	
Ubuntu-10.10	X	X	X	X	X	X	X	X	X	
Hypervisor-Distributions										
ESXi										
ESX	X	X	X	X	*	X	X	X	X	
XenServer-5.5.0	X	OK	X	OK	*	OK	X	X	OK	

Table 13: Getestete ClientOS

Distribution	ctys			GUI						
	GROUP	DF	CF	X11		WM				
				X11	Xinerama	Gnome	KDE	fvwm	xfce	ffs.
Solaris(TM)										
Solaris-10	*	*	*	*	*	*	*	*	*	
OpenSolaris-2009.6	X	X	X	X	*	X	X	X	X	
ILLUMOS	*	*	*	*	*	*	*	*	*	
Nexenta	*	*	*	*	*	*	*	*	*	
OpenIndiana	*	*	*	*	*	*	*	*	*	
Windows										
MS-Windows-NT										
MS-Windows-2000	*	*	*	*	*	*	*	*	*	
MS-Windows-XP	*	*	*	*	*	*	*	*	*	
MS-Windows-200x	*	*	*	*	*	*	*	*	*	
Smartphones										
Android	*	*	*							*
MeeGo	*	*	*							*
Embedded										
QNX	*	*	*	-	-	-	-	-	-	*
uCLinux	*	*	*	-	-	-	-	-	-	*
FreeRTOS	*	*	*	-	-	-	-	-	-	*

Table 14: Getestete ClientOS

[8] Kein WoL.
[9] Einige Einschränkungen bei LIST.
[10] Unter ausschließlicher Kontrolle des hypervisors. Getested mit diversen Versionen, z.B. Windows-NT-Server, Windows-2000, und Windows-XP.

7 Install Options

7.1 Packages

The provided distribution packages are as listed, for supported platforms refer to the table "Supported Native Plugins" :

Title	Release	Language		Format			
		de	en	tgz/scp	rpm	deb	pkg
BASE	ctys-base-01.11.011	-	X	X	X	-	-
DOC	ctys-doc-01.11.011	-	X	X	X	-	-

Table 15: Distribution Packages

The available package types are:

1. **tgz/scp**
   An archive created by tar+gzip. Unpack this archive and execute the contained tool "ctys-<version>/bin/ctys-distribute". The unpacked directory could either be installed locally or remote by **scp** based filecopy-and-install.

2. **rpm**
   The standard procedure for rpm has to be applied. The architecture is "noarch", the default install location is "Prefix=/opt".

7.2 Installation of the UnifiedSessionsManager

The reworked installation procedure is one of the main enhancements. Current version supports rpm based installation and the "scp" of SSH based file-copy-installer.

The rpm package is to be installed by standard procedures. The relocatable target directory is '/opt/ctys-current-version', e.g. '/opt/ctys-01.11.007'. The directory structure is identical to a local installation within the HOME directory of the user. The link for calling the excutables could be either established by setting the PATH variable onto the "/opt/ctys-01.11.007/bin" directory or by executing the call

```
ctys-distribute -P UserHomeLinkonly localhost
```

This call creates a copy of the configuration files within the HOME directory of current user. Additionally the basic directory structure is created and within the "$HOME/bin" directory symbolic links for the executables are created.

The alternative is the installation by call of "ctys-distribute" only. This tool provides several options and uses for the transfer of files "scp" only.

The following platform dependent install packages are available.

OS	Package Types					
	scp	tgz tar	rpm	deb	pkg BSD	pkg Sol
CentOS-5	X	X	X			
debian-4	X	X				
debian-5	X	X		*		
Fedora-12	X	X	X			
FreeBSD-7	X	X				
FreeBSD-8	X	X			*	
mandriva-2009	X	X	*			
OpenSUSE-10	X	X				
OpenSUSE-11	X	X	*			
OpenBSD-4	X	X			*	
ScientificLinux-5.4.1	X	X	X			
Solaris-10	X	X				*
OpenSolaris-2009.6	X	X				*
SuSE-9	X	X				
Ubuntu-6.0.6-LTS	X	X				
Ubuntu-7.10	X	X				
Ubuntu-8.04-LTS	X	X		*		
Ubuntu-9.10	X	X		*		

Table 16: Supported Install Packages

A typical workflow is

1. **Download and unpack**
   Download and unpack the compressed tar-gzip archive within a temporary directory.

2. **ctys-distribute**
   Call the utility "ctys-distribute" with **prefixed path**, "./" when executing it from within the directory. The location of the tool is "<TEMP-Unpack-Directory>/ctys-<version>/bin/ctys-distribute.sh".

   ATTENTION: The path prefix is here important, because the real path is resolved and just the actual container version of the actual call is copied.

   A typical call for creation of a full copy within the HOME directory of the current user is:

   <TEMP-Unpack-Directory>/ctys-distribute.sh -F 1 -P UserHomeCopy localhost

3. **Remote Installation**
   For a remote installation the call is as follows:

   <TEMP-Unpack-Directory>/ctys-distribute.sh -F 1 -P UserHomeCopy user@remotehost

   Multiple hosts could be installed as, bash-shell expansion could be applied:

```
<TEMP-Unpack-Directory-PATH>/ctys-distribute.sh  -F 1 -P UserHomeCopy \
   user@remotehost01 \
   user@remotehost02 \
   user@remotehost{02,12,33} \
   ...
```

   After installation just open a new shell, so the new environment is set by the modified "$HOME/.bashrc".

4. **ctys-plugins - Check Components State**
   Once the installation is complete check the installation status by calling:

ctys-plugins.sh -T all

for check of relay or client functions. The next call checks the current machine as final execution location for server functionality.

ctys-plugins.sh -T all -E

This call displays the actual status of installed components and the available capabilities.

5. **ctys-plugins - Verify System Calls**
For required installation of dependent packages the call

ctys-plugins.sh -T all -E -d 64,P

displays a detailed list for all required system calls with their actual availability and access permissions.

6. **Inspect Online-Help**
When missing system components are resolved the UnifiedSessionsManager is ready for operations. The next recommende call is:

ctys -h

and

ctys -H help

What provides available online help and access options. The following call displays a list of all installed documents and available formats.

ctys -H list

First recommended reading is the User-Manual. Following the HowTo and required Use-Cases.

The documents are available in two versions, the "print" and "online" version. The "online" version has an extended table of contents for quick navigation by PDF bookmarks.

7. **Remote Sessions**
The unified sessionsmanager could be applied for local desktop management only, but unveils it's advantage when used for remote sessions. Thus - if available - install a second machine as described before, for establishing remote connections.

8. **Start with X11 and VNC**
The plugins for first steps should be X11 and VNC.

ctys -t vnc -a create=label:test1,reuse host01

This creates either a new session or reuses an existing server and opens a local VNC desktop. The default connection mode is "shared", thus a second call will just open another identical VNC desktop.

The call

ctys -t x11 -a create=label:test2,console:gterm host01

creates a X11 terminal session, where the "gnome-terminal" is used. The session is labeled with the name "test2", which could be in all further calls used as the valid address.

Positions and sizes could be varied with the "-g" parameter, which supports the combination of multiple monitors by the X11-Xinerama mode.

9. **First Commands**
When a session is established the call

ctys -a list localhost remotehost01

lists all types of active sessions on the localhost and the remotehost. The default output table can be customized by any of the available fields, the call

ctys -a list=machine,titleidx localhost remotehost01

distplays the complete dynamically collected raw records.

Connections to remote hosts are supported only by SSH encryption, where the default mode is DISPLAY-FORWARDING. Alternatively the CONNECTIONFORWARDING mode could be activated by the "-L" option. This manages the complete set of actions required for establishing an SSH tunnel and interconnecting the client process to the requested service.

The installation and setup of supported products is described within the following chapters on base of CentOS-5.4 only, but should work similar on other OSs and releases too, particularly within the RedHat(TM) based distributions.

The proposed custom directories should be kept as given, else in some cases the configuration files has to be updated. In case of required patches and subcomponents these are currently installed preferably within the "/opt" directory for "quick" visibility. When spec-files or rpm-packages are provided the are relocatable by "Prefix" of rpm.

7.3 Installation of Hypervisors

Attention: For the described approaches in the following sections and the provided patches no liability could be provided. Even not the functional applicability could be guaranteed. The application is completely within the own responsibility of the user. The collection is just a tool-free assembly of various approaches for the supported products, when you do not agree, the following must not be applied.

7.3.1 Installation of QEMU(TM) and KVM

The QEMU plugin supports the "native" QEMU installation, with compiled in KVM support as well as any derivative version. The former component "kqemu" is not supported explicitly yet, but should work in anyway.

Due to the design of KVM as a "kernel-module" - what it is - delivered with a x86-resticted QEMU package by standard, the QEMU plugin supports basically "two plugins" at once. These are two variations of compilation only.

Therefore two sets of configuration variables are included within the configuration files. The configuration of specific variants requires the setup of directory paths for some variables of type "QEMU_*BASE" and "QEMU_*KVM" wihtin the file "qemu.conf-<yourOS>.sh".

The installation of a VM requires the setup of a mandatory configuration file with actual pathnames. Additionally the wrapper script could be customized when non-standard workflow is required.

The whole process is automated by the interactive utilits **ctys-createConfVM** with two stage-process. The tool generates as a first stage a complete configuration and a generic standard wrapper script for initial steup of a VM. The second stage could be performed either by the call of the wrapper script from the command line or by calling ctys with the BOOTMODE set to INSTALL or PXE. This boots the configured install media and starts the installation of the GuestOS. The whole procedure is described within the document **ctys-QEMU-configuration**.
The documentation of KVM and QEMU are joined within the QEMU documentation.

KVM-83/QEMU-0.9.1
The installation of KVM depends on the used kernel. The installation of the standard kernel requires just the installation of the KVM modules within the virtualization group of the install menu. This includes a specific QEMU version QEMU-0.9.1.

The installation of a new kernel (here **linux-2.6.32**) requires the compilation with activated HVM support. The standard KVM packages should be pre-installed for contained QEMU-components.

QEMU-0.12.2
The "native" QEMU version could be downloaded from *Qemu-0.12.2*. It is recommended to configure the install directory different from standard in order to avoid eventuallly interference and colliding dependency when rpms are used. The current release scans among standard directories for QEMU within "/opt/qemu" and enumerates all installed variants within "/opt/qemu/bin". In case of execution of process the components are taken from within the specific subtree.

When the source packages are installed a build is required, which is straight forward.

VDE2-2.2.3
The current implementation of QEMU/KVM plugin uses user-space components of the *VirtualSquare* project, from the network part *Virtual Distributed Ethernet - VDE at "vde.sourceforge.net"* which includes the "vde_switch" and "vde_tunctl". The call of QEMUBASE as well as QEMUKVM is encapsulated by the wrapper "vdeq" for ease of network setup. Therefore VDE2 has to be downloaded and compiled, which is straight forward with standard procedures. The PREFIX could be varied, but is expected by default to be

set to "/opt" and the path "/opt/vde2-2.2.3" should be set to "/opt/vde" with a symbolic link. Binaries are scanned for beneath others within "/opt/vde/bin". Additional information fo setup is provided within the man pages of "ctys-steupVDE", the **ctys-HowTo**, and the plugins documentation of **ctys-QEMU**.

The whole procedure of network setup - including a user-land switch is

ctys-setupVDE [-u <owner-of-switch>] create

That's it! This is the only call requiring root permissions.

7.3.2 Installation of VirtualBox(TM)

Informations for installation related use-cases are available by the document **cts-configuration-VBOX.pdf**. The current release has alpha status and is tested with version 3.1.2.

7.3.3 Installation of VMware(TM)

For use-cases related to the installation of VMware(TM) components refer to the document ctys-configuration-VMW.pdf . Current version provides guidance for the products:

- Server-1.0.10
- Server-2.0.2
- Player-1.0.5
- Player-2.5.3
- Player-3.0.1
- Workstation-6.5.3
- Workstation-7.0.1

7.3.4 Installation of Xen(TM)

For use-cases related to the installation of XEN(TM) components refer to the document cts-configuration-XEN.pdf . Current version provides guidance for the products:

- Xen-3.0.3

7.4 Installation of Guest-OSs

The installation of GuestOSs is described examplary for some OS, primarily for CentOS. The standard systems are CentOS-5.4 and Debian-5.0.

For QEMU/KVM and XEN install scripts for automation are provided. For VMW the required addon-parameters for ctys are generated, which could be supplied by manual edition too.

The major tool is here "**ctys-createConfVM(1)**". This provides for all provided hypervisors either a dialogue based interactive creation or when appropriate defaults are in place the fully automated creation is supported for QEMU/KVM und XEN(PARA+HVM). E.g. for CentOS kickstart files are provided, for debian a debootstrap wrapper is created. The creation of a complete base-VM of a para virtualized Xen VM requires for CentOS-5.4 about 7Minutes, for debian-5.0 about 3Minutes

The installation creates a configuration file, a wrapper script and additional installation files. The required virtual devices are created too. The created wrapper scripts could either be started from the common interface ctys, or for debugging purposes directly from teh commandine. The resulting calls after assembly of parameters could be traced by the debugging flag '-d printfinal' and executed by cut-and-paste. Additionally a test option '–check' is provided vor test purposes.

7.4.1 Guest on QEMU and KVM

The following example shows the application of **ctys-createConfVM**.

1. **Creation of the Configuration of a Virtual Machine**
   The call of 'ctys-createConVM' creates interactively an directory named by the choosen label. This contains the configuration file and an adaptable standard wrapper script.

   ```
   ACCELERATOR=KVM DIST=CentOS RELEASE=5.4 OS=Linux OSVERSION=2.6.18 \
     ctys-createConfVM --label=tst488 -t QEMU -d printfinal
   ```

   The required virtual hdd device is created too.

2. **Execution of the installation of a GuestOS**
   The installation of a guest OS is performed by the call

   ```
   ctsy -t qemu -a
   create=1:<VM-NAME>,instmode:ks%default%hdd%default%init,\
     b:<absolute-pathname> \
     -d printfinal <RECHNERNAME> -c off
   ```

   Alternatively the standard wrapper script could be called directly, e.g. for 'VM-NAME=tst488':

   ```
   tst488.sh --console=sdl --console=CLI \
     --instmode=KS%default%HDD%default%init \
     -d printfinal
   ```

   or the Python script

   ```
   xm create <absolute-pathname>/tst488/tst488.conf install='y' \
    con=nographic boot='d'
   ```

   In all previous cases actually the installation procedure of the guest OS is executed within the virtual machine.

7.4.2 Gastsystem auf VBOX

For information on installation refer to **cts-configuration-VBOX.pdf**.

7.4.3 Guest on VMW

The VMW plugin requires an installed machine. The install procedure is has to be handeled by the standard procedures of the product. Once the VM is installed, some additional configuration parameters about the contained GuestOS could be optionally provided for ctys. When provided the automated data collector "ctys-vdbgen" stores the data on each scan into a centralized database. If not provided the available basic data from the product configuration is collected only.

An additional configuration file is created by the tool 'ctys-createConfVM' with information about the GuestOS.

```
ctys-createConfVM --label=tst488 -t VMW  -d printfinal --no-create-image
```

or when default values are available automatic:

```
DIST=CentOS RELEASE=5.4 \
ctys-createConfVM --label=tst488 -t VMW \
--no-create-image --auto-all \
-d printfinal
```

The present vmx configuration file is extended by a ctys file 'tst488.ctys'.

7.4.4 Guest on XEN

The following example shows the work flow for the installation of 'CentOS' and 'debian' based paravirtualized VMs by usage of **ctys-createConfVM**.

1. **Creation of the Configuration for a Virtual Machine**
   The call of 'ctys-createConVM' creates interaktively a directory with teh label as the name. This contains teh configuratin file and a wrapper script. In addition a generic Pyhthon script as a conf-file is created. Depending form the options ACCELERATOR and DIST some additional files may be created:

   (a) ACCELERATOR==PARA and DIST=debian
   Additional file 'vm-name-PARA-debian-5.sh' as a debootstrap-wrapper. This script creates a complete virtual machine with a debian-5.0 installation. The prerequisite is the access to a repository and the installation kernel/initrd.

   The runtime kernel for the DomU is stored within the subdirectory 'boot' of the VM -Verzeichnis, thus the execution on non-native systems e.g. by NFS mounts is provided.

   As default 'ctys-createConVM' for debian no image is created, this is proceeded by the wrapper script, which is executable on debian only. The scrip creates 2 virtual devices, a system-hdd "vxhda.img" and a swap device 'vxhdb.img'. Thus "kpartd" is not required to be applied.

   (b) ACCELERATOR==PARA und DIST=CentOS
   This creates the additional file '(vm-name)-centos-5.ks' for the kickstart installation.
   The call of the runtime wrapper-script by INSTMODE in combination with the kickstart file creates a complete virtual machine with a basic CentOS-5 installation. Prerequisite is the access to a repository, the installation kernel/initrd are by default stored within the image.

   For the kickstart installation the network parameters are essential. When DHCP is available the default could be used.

2. **Installation of a guest system with debian-5.0.0**
   This is an example installation, where a http based repository for debootstrap is required.

   (a) The two possible call variants are depicted here, but for first steps the dialogue based variant should be preferred.

      i. The dialogue is particularly required when defaults for some mandatory parameters are missing.
      `ctys-createConfVM -t XEN`

      ii. The automation could be activated by the options '–auto' and '–auto-all'. The option '–auto' confirms all optional parameters, whereas the option '–auto-all' in addition confirms the mandatory options. This is performed onyl for available defaults, else the script cancels.

      In addition to the command line based call options for 'ctys-confCreateVM' several options provided by environment variables, these could be listed by the '–levo' option.
      ```
      ACCELERATOR=PARA DIST=debian RELEASE=5.0 ctys-createConfVM -t XEN \
      --label=tst489  --auto-all
      ```
      The complete automated execution requires about 7seconds for the complete generation.

   The genereated files contain hard-coded resolved parameters and PATHs as choosen either by default values or by dialogue. Some parts add some dynamic value evaluation.

   (b) Execution of the prepared installation wrapper for debootstrap:
   ```
   sh tst489-PARA-debian-5.sh
   ```
   This requires about 2-3Minutes.

   (c) Test call of the runtime wrapper scripts with the '–check' option:
   ```
   sh tst489.sh --console=CLI -d printfinal --check
   ```

This creates also a screen display for the resulting calls of 'xm'.

(d) Actual start of the VM by the runtime wrapper-scripts:

```
sh tst489.sh --console=CLI -d printfinal
```

(e) Alternatively the Python script could be called as displayed by the previous call:

```
/usr/sbin/xm create {absoluter-pfad}/tst489/tst489.conf -c con=nographic
```

The provided console types are sdl, vnc, and nongraphic. The selection of 'nographic' results in a pure text-based installation and start of the VM in teh current terminal as console.

(f) That's it!

3. **Installation of a guest system with CentOS-5.4**
The following shows an example installation of 'CentOS-5.4' in a paravirtualized VM. The following steps are reuired. The prerequisite is an available repository for teh kickstart, preferably a HTML server. Alternatively the by omitting of the 'ks=' parameters in teh saved conf-Parameter 'extra=' the dialogue installation will be initated.

(a) Two call variants are depicted:

i. The manual dialogue based execution :

```
ctys-createConfVM -t XEN
```

ii. The automated execution is:

```
ACCELERATOR=PARA DIST=CentOS RELEASE=5.4 ctys-createConfVM -t XEN \
--label=tst489  --auto-all
```

The complete execution requires about 7Seconds.

The call creates complete set of files with resolved path and network parameters.

(b) The execution of the runtime wrapper scripts in 'INSTMODE':

```
sh tst489-PARA-debian-5.sh
```

This requires about 2-3Minutes.

(c) Test call of the runtime wrapper scripts with '–check' option:

```
sh tst489.sh --console=CLI -d printfinal --check
```

This creates the screen display of 'xm' call options.

(d) Actual execution of the VM with the runtime wrapper scripts:

```
sh tst489.sh --console=CLI -d printfinal
```

(e) Alternatively the Python script could be called as displayed in teh previous call:

```
/usr/sbin/xm create {absoluter-pfad}/tst489/tst489.conf -c con=nographic
```

the provided 'con' are sdl, vnc, and nongraphic.

(f) That's it!

8 Documents

The documentation could be integrated now seamless with the runtime system and accessed from the common commandline option "-H".

1. **Bundled Manuals**
   Manuals containing a set of task-oriented subdocuments for specific workflows and/or collections of features with some additional glue-ware.
   (a) **User Manual**
   The User Manual contains the description of the architecture and the concepts including application patterns.
   (b) **Command Reference**
   The Command Reference contains mainly the Call interface and the syntax of the configuration files.
   (c) **HowTo**
   Basic and advanced procedures including installation and configuration of Hypervisors.
2. **Component Interfaces and Use-Cases**
   Almost atomic documents for specific tasks and/or objects.
   (a) **Configuration**
   Instruction for installation and configuration of components including supported hypervisors and guest OS.
   (b) **Use-Cases**
   Contain installation and basic procedures. They are located in the local man7 section within the installation directory.
   (c) **Man Pages**
   Man pages are now available as online help.

The MANPATH variable is set during installation within the '.bash' and '.profile' file. The naming convention for the Use-Cases is 'ctys-uc-<Name>'.

The Online-Help system supports now the display of the complete documentation in the formats

PDF, HTML, and MAN

Options for the listing of available documents are included. For development support the listing of functions and headers is provided.

The interface is available within the call interface of all provided tools, for further information refer to "-h" and "-H" options.

The standard distribution contains the runtime system and the required documents as man pages by GPL3 and FDL-1.3 licenses. The complete documentation could be installed additionally with manualy, PDF and HTML man pages by a CCL-3.0 license.

Title	Language		Formats-Licences							
			FDL-1.3				CCL-3.0			
	de	en	txt	man	pdf	html	txt	man	pdf	html
Release - License										
Releasenotes	X	X			X					
Licenenses	X	X			X					
Introduction										
datasheet-overview	X	X			X					
ctys-about	X	X				X				
firstView	X	X				X				
ctys-gui-automation	X	X				X				
User Manuals										
ctys-help-on	X	X		X	X	X				
base - Online Manuals	X	X				X				
doc - Online Manuals	X	X								X
User Manual		X							O/X	
HowTo		X							O/X	
Command Reference		X							O/X	
Installation and Configuration										
ctys-configuration-Gnome(7)		X						X	X	X
ctys-configuration-KDE(7)		X						X	X	X
ctys-configuration-QEMU(7)		X						X	X	X
ctys-createConfVM(1)		X	X					X	X	X
ctys-configuration-Gnome(7)								X	X	X
ctys-configuration-VBOX(7)		X						X	X	X
ctys-configuration-VMW(7)		X						X	X	X
ctys-configuration-VMWE(7)		X						X	X	X
ctys-configuration-XEN(7)		X						X	X	X
ctys-configuration-XENS(7)		X						X	X	X
ctys-distribute(1)		X	X	X	X	X				
ctys-genmconf(1)		X	X					X	X	X
ctys-install(1)		X	X					X	X	X
ctys-install1(1)		X	X					X	X	X
ctys-plugins(1)		X	X	X	X	X				
ctys-setupVDE(1)		X	X					X	X	X
ctys-vdbgen(1)		X	X					X	X	X
ctys-xdp(1)		X	X					X	X	X
Operational Use-Cases for Hypervisors and Plugins										
ctys-uc-CLI(7)		X		X	X	X				
ctys-uc-X11(7)		X		X	X	X				
ctys-uc-RDP(7)		X		X	X	X				
ctys-uc-VNC(7)		X		X	X	X				
ctys-uc-PM(7)		X						X	X	X
ctys-uc-QEMU(7)		X						X	X	X
ctys-uc-VBOX(7)		X						X	X	X
ctys-uc-VMW(7)		X						X	X	X
ctys-uc-XEN(7)		X						X	X	X
ctys-uc-WoL(7)		X						X	X	X

Table 17: Documentation(Table 1 of 2)

Title	Language		Formats-Licences							
			FDL-1.3				CCL-3.0			
	de	en	txt	man	pdf	html	txt	man	pdf	html
Operational Use-Cases for VM and Guest-Setups										
ctys-uc-Android(7)		X						X	X	X
ctys-uc-CentOS(7)		X						X	X	X
ctys-uc-Debian(7)										
ctys-uc-Fedora(7)										
ctys-uc-FreeBSD(7)										
ctys-uc-MeeGo(7)		X						X	X	X
ctys-uc-MS-Windows-2008(7)										
ctys-uc-MS-Windows-7(7)										
ctys-uc-MS-Windows-XP(7)										
ctys-uc-OpenBSD(7)										
ctys-uc-OpenSUSE(7)										
ctys-uc-RHEL(7)										
ctys-uc-Solaris(7)										
ctys-uc-Ubuntu(7)										
Runtime Components										
ctys(1)		X	X	X	X	X				
ctys-CLI(1)		X	X	X	X	X				
ctys-RDP(1)		X	X	X	X	X				
ctys-VNC(1)		X	X	X	X	X				
ctys-X11(1)		X	X	X	X	X				
ctys-PM(1)		X	X	X					X	X
ctys-QEMU(1)		X	X	X					X	X
ctys-VBOX(1)		X	X	X					X	X
ctys-VMW(1)		X	X	X					X	X
ctys-XEN(1)		X	X	X					X	X
ctys-beamer(1)		X	X	X					X	X
ctys-config(1)		X	X	X					X	X
ctys-dnsutil(1)		X	X	X					X	X
ctys-extractARPlst(1)		X	X	X					X	X
ctys-extractMAClst(1)		X	X	X					X	X
ctys-getNetInfo(1)		X	X	X					X	X
ctys-groups(1)		X	X	X					X	X
ctys-macmap(1)		X	X	X					X	X
ctys-macros(1)		X	X	X					X	X
ctys-scripts(1)		X	X	X					X	X
ctys-smbutil(1)		X	X	X					X	X
ctys-utilities(1)		X	X	X					X	X
ctys-vboxutils(1)		X	X	X					X	X
ctys-vhost(1)		X	X	X					X	X
ctys-vmw2utils(1)		X	X	X					X	X
ctys-vping(1)		X	X	X					X	X
ctys-wakeup(1)		X	X	X					X	X
ctys-xen-network-bridge(1)		X	X	X					X	X

Table 18: Documentation(Table 2 of 2)

Contained in DOC-Pakage by CCL-Licse:Non-Commercial,No-Derivs. Commercial extension are available.

9 New Features

The following new features are added:

9.1 Version-01.11.001-002

1. **Documentation**
   The basic man pages are included within the standard software distribution. Additional availabe documentation and online help can be downloaded as an extra package by CCL LICENSE AGREEMENT.

   (a) **User Manual(*)**
   The User Manual contains the description of the architecture and the concepts including application patterns.

   (b) **Command Reference(*)**
   The Command Reference contains mainly the Call interface and the syntax of the configuration files.

   (c) **HowTo(*)**
   Basic and advanced procedures including installation and configuration of Hypervisors.

   (d) **Use-Cases(*)**
   Contain installation and basic procedures. They are located in the local man7 section within the installation directory. The MANPATH variable is set during installation within the ".bash" file. The naming convention for the Use-Cases is "ctys-uc-<Name>".

   (e) **Man Pages - Extended HTML and PDF(*)**
   Man pages are now available by standard as man-format and additionally as html and pdf formatted extended online help.

2. **Online-Help**
   The Online-Help system supports now the display of the complete documentation in the formats

   PDF, HTML, and MAN

   Options for the listing of available documents are included. For development support the listing of functions and headers is provided.

   The interface is available within the call interface of all provided tools, for further information refer to "-h" and "-H" options.

3. **Facility-Model**
   The model for the runtime facilities is enhanced by introduction of base structure for **Accelerator** and **CPU-Architecture**. This provides the unified management of hypervisor variations. The first applications for this are KVM and QEMU, HVM/PARA and XEN.

4. **XEN-PARA/HVM**
   The complete support for XEN with para and harware based virtualizetion is provided now. Therefor a runtime generic python script is generated, which supports relocation of the machine and some runtime-dynamic configuration. this provides particularly the storage of the kernel and initrd within the VMs directory, thus some platform dependency is elimnated for NFS based network execution.

5. **KVM**
   Support of the accelerator KVM for QEMU is added.

6. **VMware Player 2.5.3 + 3.0.1**(TM)
   Support for 2.x and 3.x versions of VMware Player added.

7. **VMware Server-2.0.2**(TM)
   Support for 2.x versions of VMware Server is introduced. This includes the Web-Browser based consoles as well as the standalone version of the browser plugin. Refer to the console types **FIREFOX** and **VMWRC**.

8. **VMware Workstation 7.0.1**(TM)
   Support for 7.x versions of VMware Workstation added.

9. **rpm**
   RPM packages are provided.

10. **ctys-distribute**
    New installer with versatile simplified interface. Supports local and remote, single and bulk installation.

11. **ctys-createConfVM**
    A generic installer as a common interface for creation of VMs. The complete installation of QEMU/KVM for ARCH=i386/x86_64/amd64 and XEN are supported. For VMW ctys specific configuration files with guest OS information are created. The installation has to be performed by supplier tools.

    E.g. for debian a complete debootstrap encapsulation for the creation of a VM, and for CentOS a kickstart file is created.

12. **User defined Group-Objects**
    The group class supports now qualified paths relativ to any of the entries within the GROUPS search path. E.g. the following group instance could be used as a fully aqualified address.

    ```
    ctys netscan/ctys-all'(-a info)'
    ```

    This also comprises the context call options to be permutated. The previous call replaces thus the following call variants:

    ```
    ctys -a info host1 host2 host3
    ctys -- host1'(-a info)' host1'(-a info)' host2'(-a info)' host3'(-a info)'
    ctys -- host1'(-a info)' host2 host3
    ...
    ```

    A list of the available groups could be displayed in several formats by the tool 'ctys-groups'.

13. **ctys-groups**
    The functionality for group objects is enhanced by offering substructured groups of hosts. E.g.

    ctys -a list merlin@desktops/workspace1/java-environment

    or for enhanced test configurations

    ctys -a list terminator@testcases/database-backend/case3315/workspace1/import-servers

    Options for tree display are included.

14. **Export-Filter Data Formats**
    The export filter supports now additional formats to the tables. The new formats are record oriented and supply the formats

    TAB_GEN/TAB, REC_GEN/REC, XML_GEN/XML, und SPEC_GEN/SPEC

    The current version supports the output of the actions LIST and ENUMERATE, and in addition 'ctsy-vhost' as the major database frontend for the stored inventory.

    Call examples are

    ```
    ctys -a list=spec
    ctys -a list=spec:1%%3%%21
    ctys -a list=rec
    ctys -a list=rec:1%%3%%21
    ctys -a list=xml
    ctys -a list=xml:1%%3%%21
    ```

    ATTENTION: The TAB_GEN-Format requires in the current version the complete definition for each field, alternatively some fixed Values are provided:

    ```
    ctys -a list=tab
    ctys -a list=tab:1%%3%%21
    ```

Ceates columns with the titles '1,3,21' and the columns widths of 10 characters.

15. **Selection of Preconfigured VNC Desktops**
The preconfiguration of dynamicly assembled destops is provided by the REATE suboption VNCDESKTOPIDLIST in combination with the xstartup file for the arbitrary selection of prepared desktop elements. These could be assembled as modular elemts in order to use the virtual desktop as a modular pluggable application GUI.

16. **DISPLAY-Option**
The generic option '-D' provides the dynamic assembly of predefined desktops. This option is available due to security reasons for local application only.

17. **CentOS-5.4**
Support added for CLI, X11, VNC, KVM, QEMU, VMW, XEN, and PM.

18. **Debian-5-lenny**
Support added for CLI, X11, VNC and PM.

19. **Fedora-12**
Support added for CLI, X11, VNC and PM.

20. **FreeBSD-7**
Support added for CLI, X11, VNC and PM.

21. **Mandriva-2010**
Support added for CLI, X11, VNC and PM.

22. **OpenSUSE-11.2**
Support added for CLI, X11, VNC and PM.

23. **Scientific Linux-5.4**
Support added for CLI, X11, VNC and PM.

9.2 Version-01.11.003

1. **ctys-beamer**
The 'ctys-beamer' transforms a comman to a remote host before actual execution. The 'ctys-beamer' replaces the former options '-L' and '-R' for the remaining commands. Some additionals to the pure remote execution are supported, though not only the remote execution, but also the duplicated parallele execution is provided. The usage of an arbitrary number of gateways for usage as hops of an encrypted SSH tunnel is supported.

   The 'ctys-beamer' is applicable to any command line executable, providing additionally X11 display forwarding.

   The standard address extensions of the UnifiedSessionsManagers are supported.

2. **Port-Parameter for 'access-point'/'machine-address'**
The defined port option is introduced, but due to the involved base design probably some unexpected errors may be caused.

   The prot option is applicable to hosts and GROUP objects.

3. **Documentation**
Several reviews, QEMU/KVM replaced old installation style in 'ctys-configuration-QEMU', enhanced online documentation.

9.3 Version-01.11.005

1. **ctys-RDP**
   The new plugin ctys-RDP supports initially the client 'rdesktop' for remote access. The current state is alpha-release with contained base features. Additional clients and extension of the interface is going to follow.

   Two base modes are supported by ctys-RDP:

   (a) **localhost**
   Only local access on the host is allowed, remote connections are provided by SSH tunnels only.

   (b) **INSECURE: ext-host**
   It is possible to access remote services by native RDP protocol.

   This is particularly suitable for access to MS-Windows based desktops. For unsafe transit networks a SSH based relay should be foreseen.

9.4 Version-01.11.006

(a) VirtualBox - Alpha
The first alpha release.

(b) Preparation of Typo3
First step of introducing a structure targeted for an advanced online presentation.

9.5 Version-01.11.007

1. **getGeometry**
   Converter for application of geometryExt on standard executables for Xinerama calculations.

2. **ctys-vhost**
   The option '-S' is extended with 'Hosts' and 'Accounts'.

3. **ctys-group**

   (a) **-m**
   The option '-m' is extended with 'Hosts' and 'Accounts'.

   (b) **-e**
   New option '-e' for calling Emacs on provided group.

4. **ctys-macros**

   (a) **-e**
   New option '-e' for calling Emacs on provided macro files.

5. **ctys-help-on**
   Set default order for HTMLVIEWER: 1.konqueror - 2.firefox.

6. **ctys-plugins**
   Added quick overview options '–quick-tab' and '–quick-list', for display of sumups for remote plugins states. For performance enhancement the execution is performed on all targets in parallel.

7. **lib/base.sh**
   In order to avoid post-install faults, and some initialization errors, the variable **CTYS_INI** is now checked in general before startup.

9.6 Version-01.11.008

1. **ctys-scripts**
   Display and edit of scripts.

2. **Enterprise Linux**
   Added support for Oracle(TM) Enterprise Linux Server 5.

3. **ENUMERATE:UID/GID**
   Added UID and GID to enumerate data record.

4. **ENUMERATE:MATCHVSTAT**
   Parameter MATCHVSTAT:ENABLED added for ENUMERATE. Hosts with actually installed hypervisors only are filtered.

5. **ctys-vping**
   Parallel scan.

9.7 Version-01.11.009

1. **Central Data**
   The central data is extended by UID, GID, default console, and d efault HOSTs for native login.

2. **gnome-starter**
   New tool for simplified listing of all registered machines and point-and-click-start.

3. **ctys-config**
   New tool for browsing and editing of configuration files.

4. **ctys-vhost**
   additional selection criteria for output of the incremental record counter.

   ```
   R:<index-match>
   ```

   or

   ```
   R:<index-low>:<index-high>
   ```

   Where the values support either a specific record, or a range including both delimiter-records.

9.8 Version-01.11.010

1. **ucLinux**
   Verified as GuestOS on QEMU with ARM+Coldfire.

2. **QNX**
   Verified as GuestOS on QEMU and VBOX with x86.

9.9 Version-01.11.011

1. **XenServer**
   Added XenServer-5.5.0 support for Hosts(CLI, X11, VNC).

2. **VMware-ESX**
   Added VMware-ESX4.1.0 support for Hosts(CLI).

3. **Default-Plugin**
   The default plugin is set from **VNC** to **CLI**, which is in any case mandatory.

4. **Android**
   Android is tested as GuestOS for QEMU/KVM and VBOX.

5. **MeeGo**
   MeeGo is tested as GuestOS for QEMU/KVM and VBOX, with native HOSTs.

6. **RHEL-5.5 + 6.0beta**
   RHEL is tested as GuestOS for QEMU/KVM, VBOX, VMWare, and Xen, also as PM with QEMU/KVM, VBOX, VMware, and Xen.

7. **Freedesktop-XDP-Menus**
   Menu handling for Gnome and limited support for KDE is introduced.

8. **Stub-Mode**
   The stub-mode provides logins without remote installations. OpenSSH and a shell, eventually an X-Terminal and VNC is required.

9. **VNC-Client only**
   The client only installation and execution is supported now.

10. **OS-Updates**
    Several OSs updates are tested. E.g. CentOS, Debian, Ubuntu, and OpenSUSE.

9.10 Version-01.11.012

1. **Documentation**
   A very basic 'round-trip' Masada.

2. **Minor Document Enhancements**
   Some Minor Document Enhancements.

9.11 Version-01.11.013

1. **Documentation**
   Enhancement of the description for addressing b <machine-address> and GROUPS.

9.12 Version-01.11.014

1. **Documentation**
   Added whitepaper and made some minor editorial.

9.13 Version-01.11.015

1. **Documentation**
   Some Minor Document Enhancements.

9.14 Version-01.11.015

1. **ctys-groups**
   New option '-m 5x' for overall enumeration.

2. **Documentation**
   Some Minor Document Enhancements.

9.15 Version-01.11.016

N.A.

9.16 Version-01.11.017

1. **Documentation**
   Some Minor Document Enhancements.

10 Solved Issues

Several bugs were removed, thus here are just a few mentioned within this update.

10.1 01.11.001

1. Nameserver
   The previous version required a properly setup nameservice by DNS server. Current version should no longer require this mandatory.

2. RealVNC4 - Broken Path for fonts
   For debian-5.0.0 the configuration file 'vnc.conf-Linux.sh' is adapted for vncserver with '-fp /usr/share/font/X11/misc'. In case of side-effects this should be removed.

3. Additional...

10.2 01.11.002

1. xstartup
   Explicit Shell-Call for xinitrc.

2. VNC-CONNECT-Error for DISPLAYFORWARDING
   Fix of an 'introduced' error in 01.11.001, which supressed the connection of VNC clients to pre-existing VNC-Sessions/Server in case of DISPLAYFORWARDING due to immediately closed SSH channel.

3. Minor text adaptions.

10.3 01.11.003

1. VMWRC-Default-Port
   For VMWRC the default port is changed from 8222 to 8333. This is now supporting the Configuration of VMWare-Server-2.x(TM) for Kerberos on debian-5.0.0. Details see www.i4p.com .

2. Intermediate patch of remote access
   Intermediate patch of 'ctys-beamer' and a update of documentation for missing '-R' option. Some additional work out will follow soon.

3. Minor text adaptions.

10.4 01.11.005

1. ctys-vping
   Timeout and repetition parameter –ping-trials, –ping-timeout, –ssh-trials und –ssh-timeout introduced. For pure ping without access check by SSH a simplified list is implemented. Documentation updated.

2. GROUPS
   Errors in inclusion of groups fixed - comma as seperator replaced by SPACE.

3. ctys-vdbgen
   Error in ctys-vdbgen fixed - wrong PATHs omitted startup.

4. ctys-beamer
   Bugs fixed in ctys-beamer for mode CTYS-CHAIN.

10.5 01.11.006

1. ctys-vdbgen
   Parameter '–stdio' and '–append' reworked.

2. ctys-VMW
   Lost module added.

3. ctys-QEMU
   Set default ACCELERATOR to KVM if present.

4. GROUP
   Bugfixes.

5. ctys-macmap
   Uppercase-only option '-u' for output.

10.6 01.11.007

1. '-D' Parameter-Checks
   The '-D' option is restricted to local display redirection only.

   ```
   [localhost|127.[0-9].[0-9].[0-9]|[0-9]{1,2}]:][0-9]{1,3}
   ```

2. ctys-beamer
   Set default background-mode for '–mode=ch' to '-b 1,2'. Added INFO-text for avoidance of difficulties with foreground/background mode.

3. GROUPS
   Leading spaces for a closing context braces no longer prohibit startup.

4. lib/groups.sh
   Error fixed for multiple groups with and without intermixed with context option.

5. ctys-vping
   Redundancy reduction extended to accounts and groups.

10.7 01.11.008

1. ctys-macros
   Adaption of default output to 'ctys-macros' and definition of TERSE mode with '-X'.

2. VBOXManage
   VBOXManage macaddress index chynged from increment start of 1 to 0.

3. VMW:VMRC
   For client VMRC in ctys-plugins introduced '–quick-tab' with 'C2' output, MAGICID adated.

4. KVM-QEMU
   KVM is displayed with QEMU in ctys-plugins.

10.8 01.11.009

1. ctys-vhost
   Error in output of '-o ...' for SSHPORT, HYPERRELRUN, ACCELERATOR und EXEPATH fixed.

2. STACK
   First tests since a lot of code changes fo VMW in VM-Stacks.

3. Diverse
   Miscellaneous errors fixed.

10.9 01.11.010

1. Init chained plugins
   Error in initialisation of post-loaded plugins fixed.

2. Last-Minute-Error for gnome-starter
   A required ne DB query for record indexes introduced an error, preventing the GUI based starter to success. Fixed.

10.10 01.11.011

1. install-warning missing .bashrc
   A prophylactic message is displayed when the file '.bashrc' is missing.

2. ctys-vhost - Canonical Field Index for Combined Queries
   The field index is applied to the canonical index when multiple queries are applied. The 'complement' is fixed too. This corrects also the internal dependecies like broken cache flag 'local'.

3. ctys-beamer
   Miscellaneous bugs fixed.

4. X11-Display Channel
   The close of the SSH session after a fork before the graphical display channel is established is now avoided.

5. MAC-Addresses
   The internal database now uses uppercase MAC addresses only.

10.11 01.11.012

1. N.A.

10.12 01.11.013

1. N.A.

10.13 01.11.014

1. N.A.

10.14 01.11.015

1. **ctys-help-on**
   Search error for '-H man=<filename>'.

10.15 01.11.016

1. **ctys-groups**
   Corrected the displayed values for group lists.

10.16 01.11.017

1. **ctys-vdbgen**
   Corrected minor error, when '-c' or '-C' are set at the command line.

11 Open Issues - 01.11

The following new features will follow soon within a **post-update**:

1. Support for**IPMI**(TM)
2. **01.11.008**:~~Support for **Oracle Enterprise Linux Server/Unbreakable Linux**(TM)~~
3. (**01.11.006**:~~Support for**VirtualBox**(TM)~~).
4. A new wrapper script (**01.11.001**:~~and interactive installation utility for Xen will be introduced~~).
5. Support for german man-pages in BASE.
6. Introduction of dynamic selection of ACCELERATOR.
7. Introduction of support for KQEMU on Linux.
8. Introduction of support for QEMU/KQEMU on FreeBSD and OpenBSD.
9. Change from Qemu-Wrapper 'vdeq'.
10. Introduction of deb packages.

The following new features are planned:

1. Support for **Enhancement of Stack Operations**
2. Support for **ESXi-Server**(TM)
3. **01.11.011-partly**:Support for **ESX-Server**(TM)
4. Support for **FreeOS**
5. **01.11.001**:~~Support for **OpenSolaris**~~
6. Support for **OpenVZ**(TM)
7. Support for **QNX**
8. **01.11.005**:~~Support for **RDP protocol**~~
9. **01.11.003**:~~Support for Relay Based Communications~~
10. Support for **uCLinux**
11. **01.11.011-partly**:Support for **XenServer**(TM)
12. Port of parts to C/C++ and Python, add Java based GUI parts.
13. Management of **RTEMS** development environment.
14. Integration of DejaGNU and Tcl/Tk for Multiplatform Unit Tests.

The following bugs are found:

1. In groups files the CONTEXT is applied to the last host only when multiple hosts are listed on one line. The workaround is to write in case of CONTEXT options one host per line only.
2. Auto register for VMware Server 1.x(TM) doen not succeed, new VMs have to be registered manually.
3. The display of generic tables is erformed by fixed values for missing format assignement.
4. VNC based sessions frequently produce some errors such as 'rect too big', which could be safely ignored. E.g. in case of 'rect too big' the server side is not effected, thus a new start with 'REUSE' option for create is sufficient.

5. ctys-setupVDE - cancel/create
   When multiple interfaces are present, and the first interface in the enumeration order is up, but not yet configured for TCP/IP, the automatic detection fails. This is due to the rule of taking the first interface as default, but not skipping this if not operational - configured.

   Workaround: Force the interface for creation by '-i' option, force the bridge for cancel by the '-b' option.

6. netcat - nc - unixterm - On Ubuntu
   For Ubuntu the situation with **netcat** also named **nc** is very-very special, much more than anyway! One of the listed tools is required mandatory for communications purposes with the virtual switch provided by vde2 - vde_switch. The contained tool within vde2 had some difficulties on i386 platforms, where the netcat/nc tool should be prefered. But anyhow, the communication is due to security by so called 'UNIX domein sockets' only! This requires a netcat variant with the common '-U' option, seems easy, ... but is not!

   The proposal is to install the sources of **vde2-2.2.3** and make an own build into the '/opt/vde2-2.2.3' directoy and set a symbolic link(download siehe [7]):

   ```
   cd <source-of-vde2-2.2.3>
   ./configure --prefix=/opt/vde2-2.2.3
   make
   make install
   cd /opt
   ln -s /opt/vde2-2.2.3 /opt/vde
   ```

   An alternative is to install an appropriate version of netcat, this could be particularly on Ubuntu somewhat challanging.

   For Ubuntu the package 'nc.openbsd' or 'netcat-openbsd' should be installed, which depends on the version of distribution, I personally use the debian packages. Because of the complete download and local offline-caching feature by ISO images.

   Well, I am now going to implement an own UNIX-domain socket terminal for one of the next versions, which is equal for all platforms! But introduces some 'compile-code' by C++.

7. VNC - Client Site
   VNC requires in any case the VNCserver to be installed, will be changed in future version.

8. Never ending - Documentation enhancements.

9. GROUPS
   Error in CONTEXT options, is permutated multiple times, seems harmless.

10. Remote call some times fail
    On some machines the last spaces for context options before the braces result in failing of execution. Within the current test-field this is 1 of about 40 installed machines. For now just avoid spaces before closing brace for context options. This error will be cleared soon.

11. Extension of the host address by interfaces
    The addressing of non-routed or deviating addresses may require the explicit selection of an outgoing interface. This particularly could be helpful in case of VLAN configurations when these are hidden and chained by multiple hops for security reasons.

    For now the 'next-hop' hosts in the 'shadow' of VLANs has to be set by explicit routes.

12. Extension of ctys-beamer
    Options applicable to ctys-chain mode for asynchronous background operations and the usage of ctys based ssh-tunnels will be added.

13. VMRC mit CONNECTIONFORWARDING
    The standalone-client VMRC currently works with DISPLAYFORWARDING only, when using CONNECTIONFORWARDING the connection is rejected during login procedure.

14. ctys-vhost
    The record selector for now has to be the last argument.

15. CANCEL
    Check CANCEL with new parameter DBREC, seems to make some trouble. The old parameters still work, thus no high priority.

16. Xen timeout with VNC
    Xen on some real slow machines requires a manual 'sleep 120' addition to the call. Otherwise the ssh channel for the display may close.

17. ctys-vdbgen on autofs for debian
    Debian seems to require an previous access into the scanned directories when the 'find' command is applied. Even worst, changes call-by-call! This is the case when the '–ghost' option is used with auto-files. Other OSs seem to be fine. For now the workaround is 'ls -R' in the search root, will be corrected later.

12 LICENSES

Due to the amount of the applied licenses the documents are assembled to a seperate collection-document. These are contained within the distribution packages.

ctys-Licenses-01.11-print.pdf

13 Appendices

References

[1] First public version 2008.02.11, Author Arno-Can Üstünsöz. Edition as online-help by "ctys -H print"(more than 230 pages of ASCII):
UnifiedSesionsManager - *http://sourceforge.net/projects/ctys*

[2] The second public version of 2008.07.10, Author Arno-Can Üstünsöz:
UnifiedSesionsManager - *http://sourceforge.net/projects/ctys*

[3] The third public version with minor correction of 2008.08.06, Author Arno-Can Üstünsöz:
UnifiedSesionsManager - *http://sourceforge.net/projects/ctys*

[4] The fourth public version with minor Correktion of 2008.08.12, Author Arno-Can Üstünsöz:
UnifiedSesionsManager - *http://sourceforge.net/projects/ctys*

[5] Enhancements of the documentation of 2008.08.16, Author Arno-Can Üstünsöz:
UnifiedSesionsManager - *http://sourceforge.net/projects/ctys*

[6] Major enhancements by bug-fixes as well as introduction of new functionality, Author Arno-Can Üstünsöz:
UnifiedSesionsManager - *http://sourceforge.net/projects/ctys*

[7] VDE2 is the mandatory base for the application of QEMU and KVM.
The release tests are proceeded with vde2-2.2.3.
http://vde.sourceforge.net - *http://sourceforge.net/projects/vde*

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