

Linux Terminal Cluster

**High-Availability und
Loadbalancing Lösungen
für Linux Terminaldienste**

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Überblick

- ★ Motivation
- ★ Konzept und Zielsetzung
- ★ Technische Implementation

Dienstleistung

- ★ Internet Recherche Endgeräte für die Bibliotheken der Universität Hamburg
- ★ 47 Bibliotheken
- ★ 250 – 300 Endgeräte

Linux Terminal Clients - Beispiel



Verteilung der Standorte im WAN



Anforderung

- ★ Zentrales Management
- ★ Skalierbarkeit
- ★ Kosteneffizienz
- ★ Geringe TCO
- ★ Hohe Verfügbarkeit

Lösungsansatz

- ★ Linux Terminal Server (LTSP)
- ★ Diskless Clients (LDC)
- ★ Clusterverbund (LVS)
- ★ OpenLDAP als Informationsverzeichnis

Terminalserverprinzip

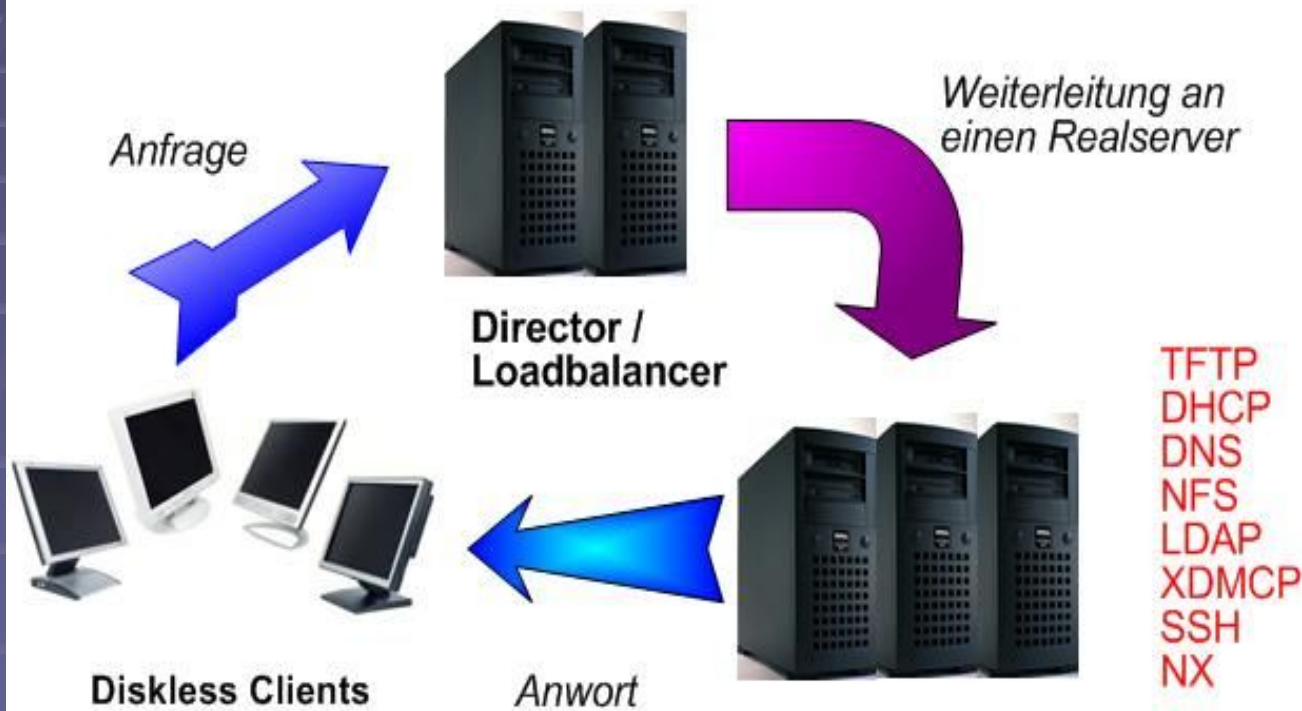
- ★ X11 ist netzwerktransparent
- ★ Anwendungen laufen auf den Terminalservern
- ★ Bildschirmausgabe erfolgt auf “diskless clients”

Diskless client

- ★ Keine Festplatten
- ★ Minimale Hardwareanforderung
- ★ Etherboot als NBP
- ★ Kernel >>> TFTP
- ★ Wurzelverzeichnis über NFS
(root_nfs)

Linux Virtual Server

Loadbalancing: dns nfs xdmcp ssh(nx) ldap



Linux Virtual Server

VIP – Director:
eth0:0
192.168.128.231



MAC-Director >>> MAC-Realserver



VIP – Realserver-1:
lo:0
192.168.128.231

VIP – Realserver-2:
lo:0
192.168.128.231



Client



Linux Virtual Server

Realserver : /etc/sysctl.conf

```
net.ipv4.conf.lo.arp_ignore = 1  
net.ipv4.conf.lo.arp_announce = 2  
net.ipv4.conf.all.arp_ignore = 1  
net.ipv4.conf.all.arp_announce = 2
```

Linux Virtual Server

Director: Steuerung und Monitoring/ldirectord.cf

```
virtual=192.168.128.231:53
    real=192.168.128.209:53 gate
    real=192.168.128.210:53 gate
    real=192.168.128.211:53 gate
#   real=192.168.128.212:53 gate
    service=dns
    request="finger_weg"
    receive="10.0.0.100"
    checkport=53
    scheduler=rr
    protocol=tcp
```

Loadbalancing Tabelle

```
Shell No. 3 - Konsole
Session Edit View Bookmarks Settings Help
IP Virtual Server version 1.2.1 (size=4096)
Prot LocalAddress:Port Scheduler Flags
-> RemoteAddress:Port Forward Weight ActiveConn InActConn
TCP 192.168.128.231:7100 rr
-> tuxltsp3:7100 Route 1 22 0
-> tuxltsp2:7100 Route 1 23 0
-> tuxltsp1:7100 Route 1 15 0
UDP 192.168.128.231:xdmcp rr
-> tuxltsp3:xdmcp Route 1 0 0
-> tuxltsp2:xdmcp Route 1 0 0
-> tuxltsp1:xdmcp Route 1 0 0
TCP 192.168.128.231:ldap rr
-> tuxltsp3:ldap Route 1 0 0
-> tuxltsp2:ldap Route 1 0 0
-> tuxltsp1:ldap Route 1 0 0
TCP 192.168.128.231:www rr
-> tuxltsp3:www Route 1 0 0
```

Linux Virtual Server

Director: NFS und LVS mit iptables
Startscript /etc/shorewall/start

```
#!/bin/bash
#VIP=192.168.128.
iptables -t mangle -flush

#Portmapper
iptables -t mangle -A PREROUTING -d 192.168.128.231 -i eth0 -p udp -s
192.168.128.0/23 -m udp --dport 111 -j MARK --set-mark 0x1

#nfs
iptables -t mangle -A PREROUTING -d 192.168.128.231 -i eth0 -p udp -s
192.168.128.0/23 -m udp --dport 2049 -j MARK --set-mark 0x1

#mountd
iptables -t mangle -A PREROUTING -d 192.168.128.231 -i eth0 -p udp -s
192.168.128.0/23 -m udp --dport 10024 -j MARK --set-mark 0x1
```

Linux Virtual Server

Director: NFS und LVS/lldirectord.cf

```
#nfs
virtual=1
  real=192.168.128.209:0 gate
  real=192.168.128.210:0 gate
  real=192.168.128.211:0 gate
#   real=192.168.128.212:0 gate
  service=sunrpc
  checkport=111
  scheduler=rr
  protocol=fwm
  persistent=300
```


Linux Virtual Server

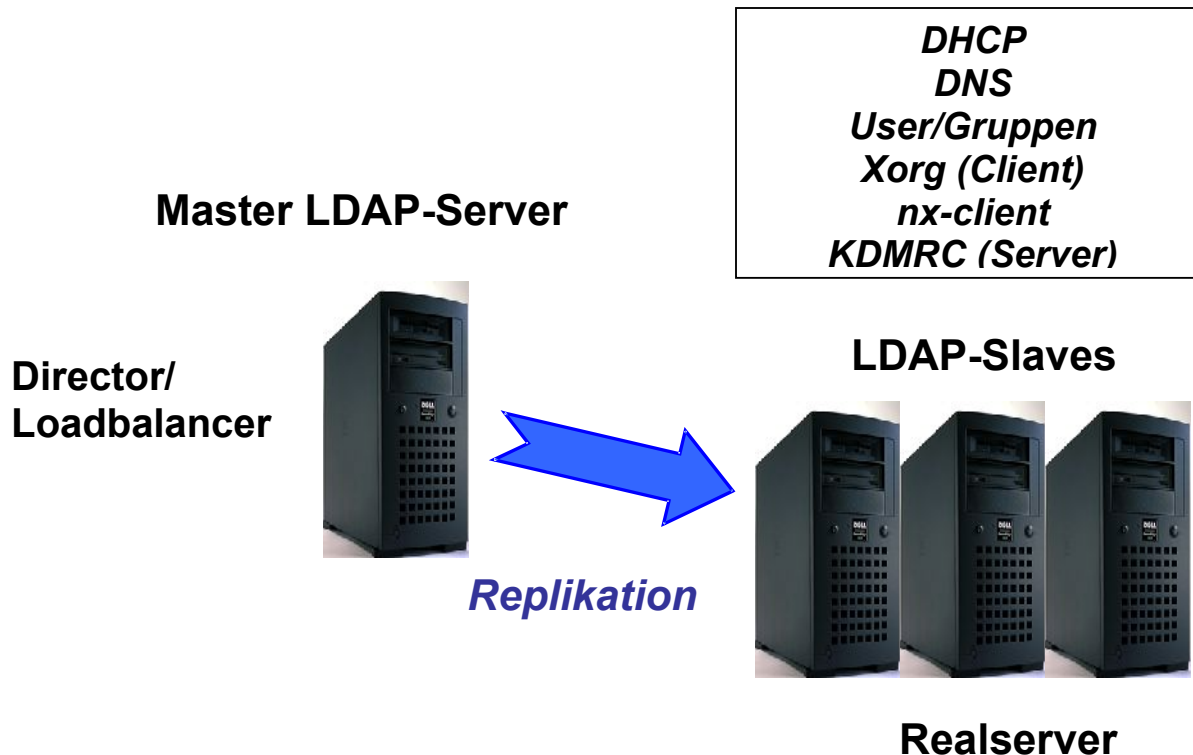
Director: NFS/LVS

```
/etc/sysctl.conf: net.ipv4.vs.expire_nodest_conn = 1
```

Realserver: NFS/LVS >>> identische inodes

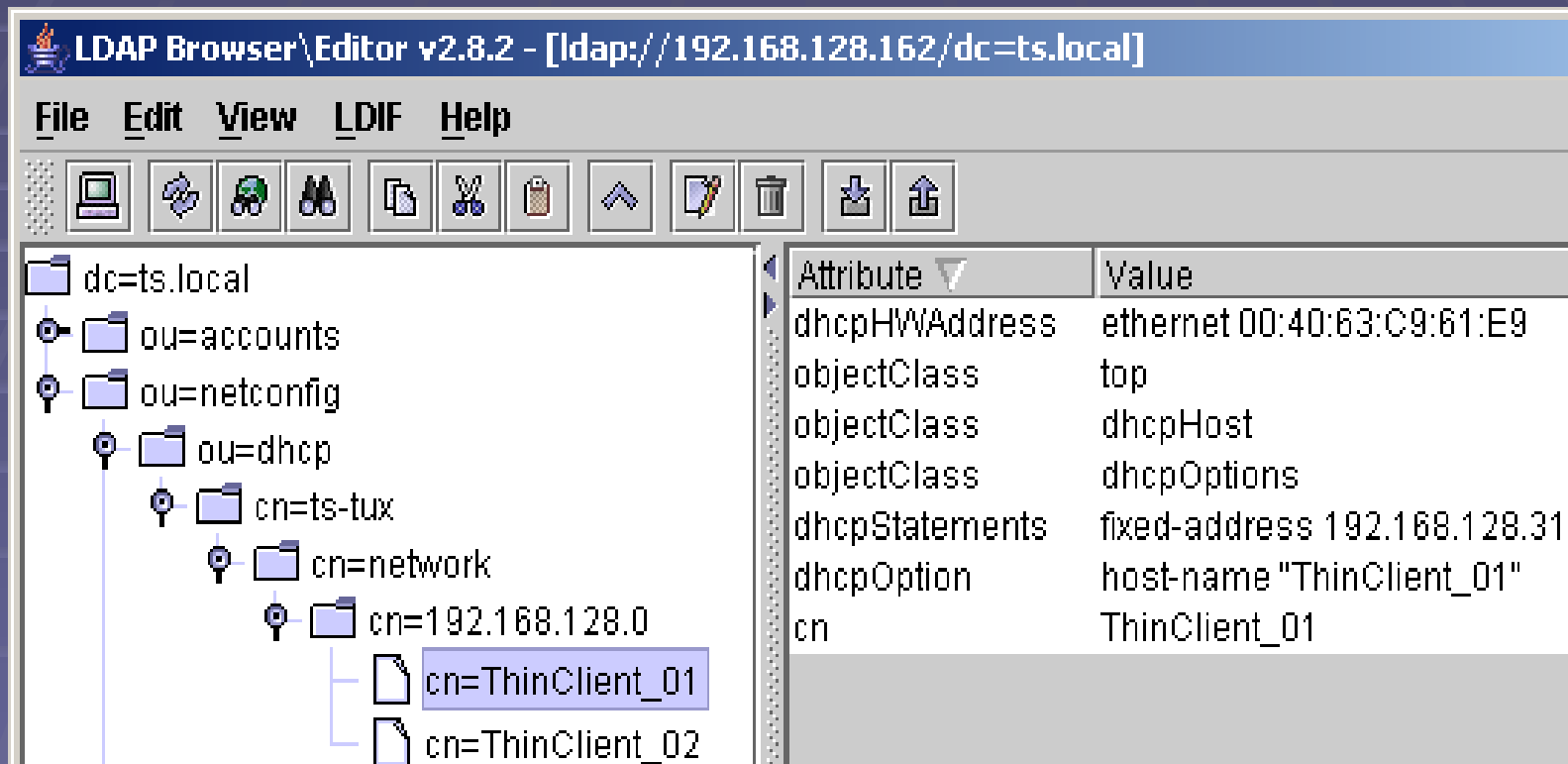
- Eigene Partition für das LTSP Directory mit ext2
- Image mit „dd“ auf Realserver verteilen

OpenLDAP als Informationsverzeichnis



OpenLDAP als Informationsverzeichnis

LDAP Einträge für DHCP Server



The screenshot shows the LDAP Browser Editor v2.8.2 interface. The title bar indicates the connection to [ldap://192.168.128.162/dc=ts.local]. The menu bar includes File, Edit, View, LDIF, and Help. The toolbar contains icons for home, refresh, search, zoom, print, copy, paste, up, edit, delete, add, and refresh. The left pane shows a tree view of the LDAP directory structure:

- dc=ts.local
 - ou=accounts
 - ou=netconfig
 - ou=dhcp
 - cn=ts-tux
 - cn=network
 - cn=192.168.128.0
 - cn=ThinClient_01
 - cn=ThinClient_02

The right pane displays the attributes and values for the selected entry:

Attribute	Value
dhcpHWAddress	ethernet 00:40:63:C9:61:E9
objectClass	top
objectClass	dhcpHost
objectClass	dhcpOptions
dhcpStatements	fixed-address 192.168.128.31
dhcpOption	host-name "ThinClient_01"
cn	ThinClient_01

OpenLDAP als Informationsverzeichnis

LDAP Einträge Login Manager KDM (kdmrc) des Servers

The screenshot shows the LDAP Browser/Editor v2.8.2 interface. The title bar indicates the connection to [ldap://192.168.128.162/dc=ts.local]. The left pane displays the LDAP tree structure, with the entry **cn=AllCore** selected under the **ou=kdmrc** container. The right pane shows the details of this entry in a table format.

Attribute	Value
confSectionPriority	4
objectClass	top
objectClass	confSection
confSectionHeader	[X-*-Core]
confSectionLine	# OpenDelay=15
confSectionLine	# OpenTimeout=120
confSectionLine	# OpenRepeat=5
confSectionLine	# StartAttempts=4
confSectionLine	# PingInterval=5
confSectionLine	# PingTimeout=5
confSectionLine	# AuthFile=
confSectionLine	# Resources=
confSectionLine	# Xrdb=
confSectionLine	Setup=/usr/kde/3.4/share/config/kdm/Xsetup
confSectionLine	Startup=/usr/kde/3.4/share/config/kdm/Xstartup
confSectionLine	Reset=/usr/kde/3.4/share/config/kdm/Xreset

OpenLDAP als Informationsverzeichnis

LDAP Einträge für die X Server Konfiguration der diskless clients

The screenshot shows the LDAP Browser/Editor v2.8.2 interface. The title bar indicates the connection to [ldap://192.168.128.162/dc=ts.local]. The left pane displays a tree view of LDAP entries under dc=ts.local, including organizational units (ou) for accounts, netconfig, dhcp, dns, kdmrc, xorg, and xorgDefaultConfig. The right pane shows the details of the selected entry, 'xorgIdentifier=Mouse0', with a table of attributes and values.

Attribute	Value
xorgOption	"Protocol" "auto"
xorgOption	"Device" "/dev/input/mouse0"
xorgDriver	"mouse"
xorgOverlayModus	"ON"
objectClass	top
objectClass	xorgInputDevice
xorgIdentifier	Mouse0

Anschaffungskosten Vergleich

am Beispiel der Zentralbibliothek Recht (UNI-Hamburg)

