High Availability and Load Balancing Cluster for Linux Terminal Services

by

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Who am I?

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Content

- General Concept
- Linux Terminal Services
- Clustering Linux Terminal Services
- Example: University of Hamburg
- Feedback
General Concept

Software components:

- LTSP (Linux Terminal Server Project)
- LVS (Linux Virtual Server)
- LDAP
- OpenLDAP

Cluster
What are Thin/Diskless Clients?

- Minimal system requirements
- Server based computing
- No investment costs for clients
Terminal Server - Overview

- Centralized system settings
- Centralized application server
- Centralized security management
Terminal Server - relevant services

- **DHCP:** network configuration
- **TFTP:** kernel transfer
- **NFS:** root-filesystem
- **DNS:** name to ip mapping
- **XDMCP:** remote display
- **LDAP:** centralized system settings
Concept of Clustering LT-Server: LDAP

Information (LDAP attributes)

Services (DHCP, LTS..)

Storage (NAS)

Information (LDAP)
Concept of Clustering LT-Server: LVS
Concept of Clustering LT-Server: Overview
Technical Implementation

- **LTSP:**
  Root NFS with LDAP aware startup script for the clients

- **OpenLDAP:**
  LTSP Schema extension

- **LVS:**
  Load Balancing and redundancy
Technical Implementation

- **Ldirectord:** Monitoring service availability. Modifying the LVS kernel table entries in case of services crash.

- **Heartbeat:** active stand-by for the directors
Technical Implementation

- **Ldirectord.cf example for XDMCP:**

```#xdmcp
virtual=192.168.128.231:177
  real=192.168.128.209:177 gate
  real=192.168.128.210:177 gate
  real=192.168.128.211:177 gate
#
  real=192.168.128.212:177 gate
service=xdmcp
checkpoint=177
scheduler=rr
protocol=udp```

Wolfgang Büch – High Availability and Load Balancing Cluster for Linux Terminal Services (Linux Kongress 2005)
The LDAP holds all information concerning the client configuration (e.g. monitor resolution etc.)

The standard configuration startup script is replaced by another one querying the LDAP server instead of a config file.
LTSP and LDAP

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LTS at the University of Hamburg

- **2003**: LTS for 100 diskless Linux clients
- **2005**: LTS Cluster System for 250 clients
- **2006**: LTS Cluster System for 550 clients
Why Terminal Server Cluster?

- **202,000 €** for 250 Windows clients with two AD Servers
- **32,000 €** for 250 Linux diskless clients with LTS Cluster at the University of Hamburg.

Wolfgang Büch – High Availability and Load Balancing Cluster for Linux Terminal Services (Linux Kongress 2005)
Conclusion

Network-centric computing with LT-Cluster:

- high availability
- lower TCO
- centralized system management
- high administration efficiency
- lower or even no hardware costs for clients
- scalability
Thanks for your attention!

Any Questions?