

Linux Terminal Server Project

- so far we have examined and the development model
- what about the future and integrating these ideas together?

Linux Terminal Server Project

- Linux Terminal Server Project started in 1999
 - thin clients on GNU/Linux
- take out cdrom, floppy, harddrive

Linux Terminal Server Project

- build low power silent computers with typical specification
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 - mini itx board, onboard fast
 - screen, keyboard, mouse
 - (maybe add higher quality pci graphics card)
 - roughly £
- this is almost certainly an over specified machine and built with premium components
 - obviously another technique is to use old machines and remove the hard disk

Concept

- ease of configuration
 - one file `/opt/ltsp/i386/etc/lts.conf` which describes all client configurations
- includes, graphics, various kernel modules, mouse type, mouse buttons, server, ramdisk size, nfs server, extra config files if really necessary, sound

Resources

- by default everything a user runs, executes on the server
 - ideal in today's environment
 - multi core 64 bit server (Opteron Quad/Dual Core) with multiple processors
 - huge hard drive on server
 - protect server against physical attacks and networked attacks
- users sit at thin client and effectively log into server using say, KDM
 - someone unacquainted with LTSP will think they are logging in normally

Resources

- by default all applications run on the server
- Linux is very good at disk caching and code sharing
 - so good that the LTSP project estimates you need
 - 250MB ram for the first user and only 50MB ram for subsequent users
- so how many users can you support with 1GB ram?
 - what about 4GB ram?

Resources

- LTSP is used at a call center and the server is one high end Dell machine
 - it serves 170 members of staff who are typically running OpenOffice and FireFox
- ideal also for exhibitions which want to provide Internet access
 - configure the networking on the server and plug in 100 thin clients..

LTSP client initialisation

- the client is diskless, so it boots using either
 - network interface card boot
 - the preferred method
 - floppy disk
 -
- all methods
 - first it runs the protocol to obtain the netmask, gateway, tftp server addresses
 - second using it downloads pxelinux.0
 - third it runs pxelinux.0 which downloads the linux kernel from the tftp server
 - fourth it runs the kernel and uses to download the root filesystem

LTSP client initialisation

- note it uses pxelinux.0 as the linux kernel is too large to fit into base memory
- it configures itself from the root filesystem and starts an X server which connects to an XDM server which provides a graphical login screen
- the XDM server is where the application programs are run
 - normally this should be a powerful machine
 - ie multiprocessor quad core Opteron

Example /etc/lts.conf file

- this file is located at:
/opt/ltsp/i386/etc/lts.conf on the server

Example /etc/lts.conf file

```
[Default]
SERVER          = 192.168.0.6
XSERVER         = auto
X_MOUSE_PROTOCOL = "IMPS/2"
X_MOUSE_DEVICE  = "/dev/psaux"
X_MOUSE_RESOLUTION = 400
X_MOUSE_BUTTONS = 5
X_ZAxisMapping  = "4 5"
USE_XFS         = N
SCREEN_01       = startx
SCREEN_02       = shell
X_COLOR_DEPTH   = 24
SOUND           = Y
LOCAL_DEVICE_01 = /dev/hdc:cdrom
HOTPLUG         = Y
```

Sample of the /etc/dhcp3/dhcpd.conf file

```
option domain-name "example.org";
option domain-name-servers 192.168.0.1;

default-lease-time 600;
max-lease-time 7200;

subnet 192.168.0.0 netmask 255.255.255.0 {
  range 192.168.0.21 192.168.0.200;
  option routers 192.168.0.1;
}

host minitx {
  hardware ethernet 00:40:63:e0:4c:8d;
  option root-path "192.168.0.6:/opt/ltsp/i386" ;
  filename "/tftpboot/lts/2.6.9-ltsp-3/pxelinux.0";
  server-name "192.168.0.6";
  next-server 192.168.0.6 ;
}
```

Sample of the `/etc/exports` file

- ```
/etc/exports: the access control list for filesystems
which may be exported
to NFS clients. See exports(5).
#
server dir client addresses
#
/opt/ltsp/i386 192.168.0.0/255.255.255.0(rw, sync)
```

## Background reading and listening

- please take a look at [ltsp](http://www.ltsp.org/documentation/ltsp-4.1/ltsp-4.1-en.html) (<http://www.ltsp.org/documentation/ltsp-4.1/ltsp-4.1-en.html>) and try listening to [linux-terminal-09-2005.ogg](http://floppsie.comp.glam.ac.uk/ogg/linux-terminal-09-2005.ogg) (<http://floppsie.comp.glam.ac.uk/ogg/linux-terminal-09-2005.ogg>)
- this ogg file is an edited version of a VoIP conference (the original had a huge non ltsp intro - waiting for someone to turn up..)

## Film of LTSP client booting

- apologies for camera shake..
- [boot](http://floppsie.comp.glam.ac.uk/miniitx/6.mpg) (<http://floppsie.comp.glam.ac.uk/miniitx/6.mpg>)
- [login](http://floppsie.comp.glam.ac.uk/miniitx/7.mpg) (<http://floppsie.comp.glam.ac.uk/miniitx/7.mpg>)

## Use of LTSP

- LTSP allows full X windows, so for example the KDE, GNOME desktop
- applications by default run on server
  - can run applications on client
- typically client side programs include
  - dvd player (`mplayer`, `xine`)
  - VoIP applications (`kphone`)
- small text editors (`vi`)
- OpenOffice runs exceptionally well on the server
  - first instance takes 3 seconds to start
  - subsequent instances have an almost instant start up time

## Use of LTSP

- over 50% of users are educational establishments
  - greater 100,000 users
- popular use is to keep a Windows 2003 server on the network
  - and provide users with `kdesktop`
  - users have access to both GNU/Linux and Windows
- use 30 boot floppy disks to convert a Windows lab into a GNU/Linux lab
  - provides schools, Universities with low risk experimentation with GNU/Linux

## Use of LTSP

- LTSP is available in the Ubuntu distribution ([Breezy Badger](http://www.ubuntu.com/download)) (<http://www.ubuntu.com/download>)
  - and Debian (Etch/Sarge)
  - LTSP is being placed into Fedora and should lead to Redhat
- IBM is using LTSP
  -
- sites are using

## LTSP overseas

- Mark Shuttleworth in South Africa has organised 80,000 clients in schools
- South Korea
- Brazil
  - Telecentos project: 6000 Cyber cafés which have 20 terminals each
  - 120,000 thin clients
- massive financial saving