

# Linux Terminal Server Project

- so far we have examined and 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
  - 
  - 
  - 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 todays 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 miniitx {
    hardware ethernet 00:40:63:e0:4c:8d;
    option root-path "192.168.0.6:/opt/ltsp/i386" ;
    filename "/tftpboot/lts/2.6.9-1tsp-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..)

## 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