

Linux Terminal Server Project

- started in 1999
 - thin clients on GNU/Linux
- take out cdrom, floppy, harddrive
- most applications and all file store held on servers

Linux Terminal Server Project

- clients are built from low power silent computers with typical specification
 - 1 GB RAM
 - 1 GHz processor
 - mini itx board, onboard fast Ethernet, (onboard graphics)
 - 24inch screen, keyboard, mouse
 - (maybe add higher quality pci graphics card)
 - roughly £500.00

- 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 ROM
 - the preferred method
 - floppy disk
 - CDROM

- all methods
 - first it runs the DHCP protocol to obtain the IP, netmask, gateway, tftp server addresses
 - second using TFTP/UDP/IP 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 NFS 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 NFS 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
```

Background reading and listening

- please take a look at [ltsp](http://wiki.ltsp.org/twiki/bin/view/Ltsp/Documentation) `<http://wiki.ltsp.org/twiki/bin/view/Ltsp/Documentation>` 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/minitx/6.mpg) <http://floppsie.comp.glam.ac.uk/minitx/6.mpg>
- [login](http://floppsie.comp.glam.ac.uk/minitx/7.mpg) <http://floppsie.comp.glam.ac.uk/minitx/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)

Use of LTSP

- 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

- firefox also behaves in this way - check out the movie

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
 - internally committed to replacing Windows with GNU/Linux

- sites are using LTSP with 140..170 clients per server

LTSP overseas

- Mark Shuttleworth in South Africa has organised 80,000 LTSP clients in schools

- South Korea 1 Million LTSP clients

- Brazil
 - Telecentos project: 6000 Cyber cafés which have 20 terminals each
 - 120,000 thin clients

- massive financial saving

Tutorial

- give yourself a GNU/Linux account by clicking [here](http://mcgreg.comp.glam.ac.uk/login.html) `<http://mcgreg.comp.glam.ac.uk/login.html>`
 - and follow the instructions carefully

- you will need to reply to an email using Windows to activate your GNU/Linux account
 - why is this necessary?

Remote access to GNU/Linux

- firstly open up a terminal usually found under Applications -> Accessories
- now type

```
j203-01 $ ssh mcgreg.comp.glam.ac.uk
Do you want to connect? yes
mcgreg $ vnc4passwd
Password:
Verify:
```

Remote access to GNU/Linux

- your terminal has now connected to the mcgreg GNU/Linux file server and you have command line access to your account on this machine
 - is the speed of this interaction acceptable?
 - why is this the case?

Remote access to GNU/Linux

- now, using a browser and file manager, cut and paste this

```
#!/bin/sh

[ -r $HOME/.Xresources ] && xrdb $HOME/.Xresources

vncconfig -iconic &
"$VNCDESKTOP Desktop" &
startkde &
```

- script and copy it onto your file `.vnc/xstartup` in your home directory

Remote access to GNU/Linux

- now continue to use your terminal session

```
mcgreg $ vnc4server  
Log file is /home/gaius/.vnc/mcgreg:12.log  
mcgreg $ exit
```

Remote access to GNU/Linux

- write down the log file number (in the above case it was 12)

- now find the `vncviewer` application in the pull down menus and run it
 - connect to `mcgreg.comp.glam.ac.uk:12` (notice that in this case `:12` was appended as it was the vnc value)

- now use the `vncviewer` to open another browser to read these notes
 - is the speed acceptable, for this activity?
 - what is the `vncclient` doing (roughly)?

Remote access to GNU/Linux

- now shutdown your vncserver (you can always start it up again at a later time)
 - to do this use the terminal again (which is still logged into mcgreg)

```
$ vncserver -kill :12
```

- and now log out from mcgreg

```
$ exit
```

Another method of accessing GNU/Linux remotely

- in theory if you had root access you could now shutdown your X display
- you could then login using the plain text terminal and type:
- ```
X -query mcgreg.comp.glam.ac.uk
```
- and now log in again and use this session to read the blackboard notes again
  - is the speed acceptable?
  - why?