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-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`⟩ and try listening to 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`⟩
- login ⟨`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`⟩
  - 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