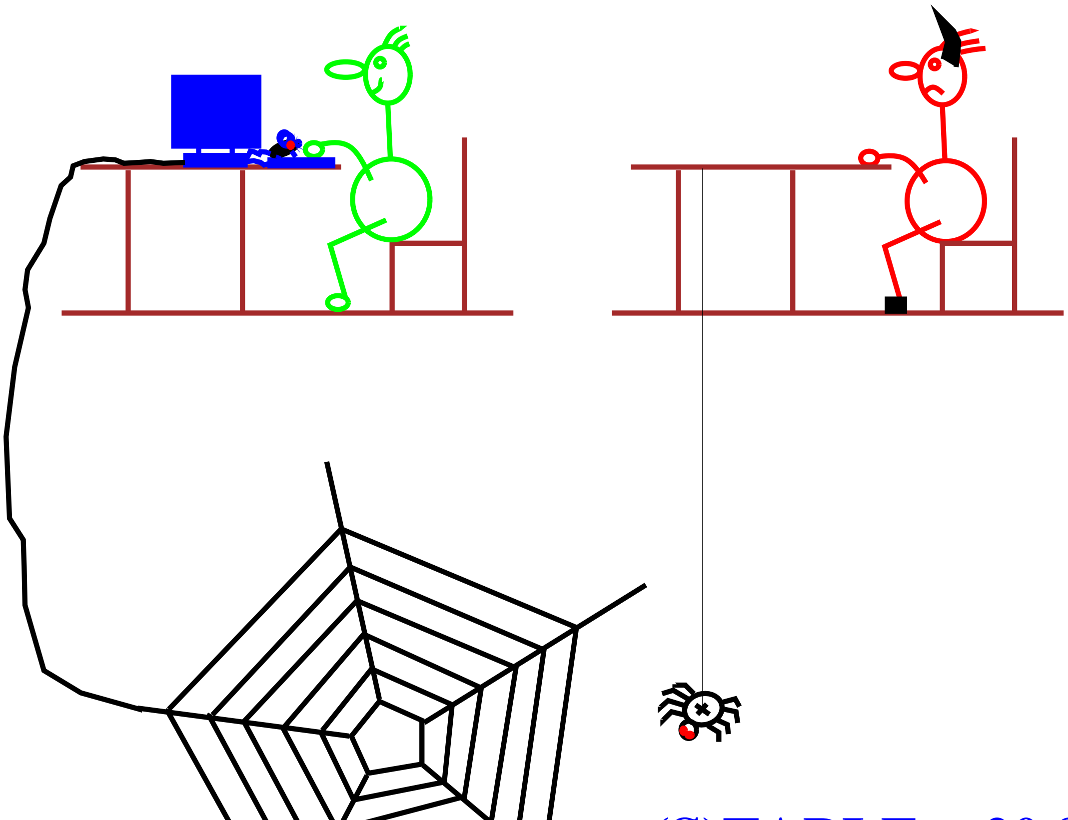
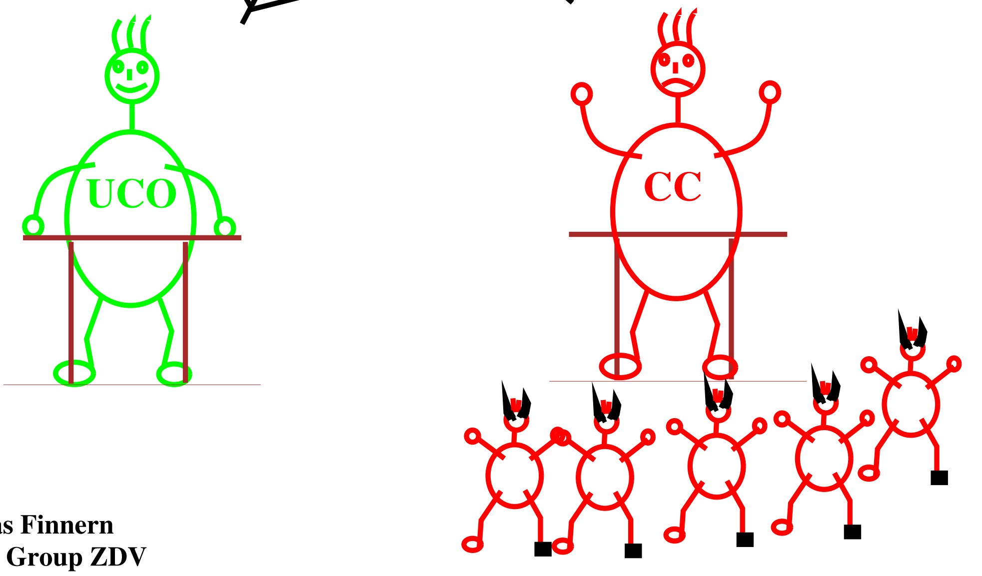
Highly Available Central Services



(S)TABLE > 20 ?



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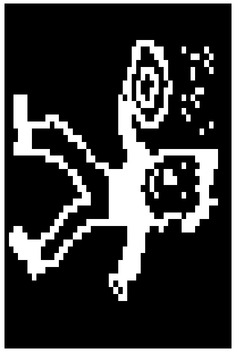
Services:



Service	Examples	Points of Failure / Comments
Network	Ethernet, FDDI, Token Ring, ...	Hardware: Plugs, repeaters / Be careful Usage: Broadcast storm / Be careful
Information	Name service BOOTP	Base service / Redundant by configuration Local broadcast / Redundant by router help
Processing	Multiuser machine	Software crashes / Systems not user resistant
Memory	Multiuser machine	Always too small / Money helps
Disk	Home directories	Always too full / Money or quota needed
Authentication	User registry	YP/NIS/AFS/DCE
Authorization	License	Software e.g. window manager or compiler
File Access	TFTP NFS AFS X11R5-FS	Only limited client count / Avoid it Multi vendor lock problems / Replace by AFS No cloneable r/w volumes / r/o volumes OK Limited client count / Needs observation

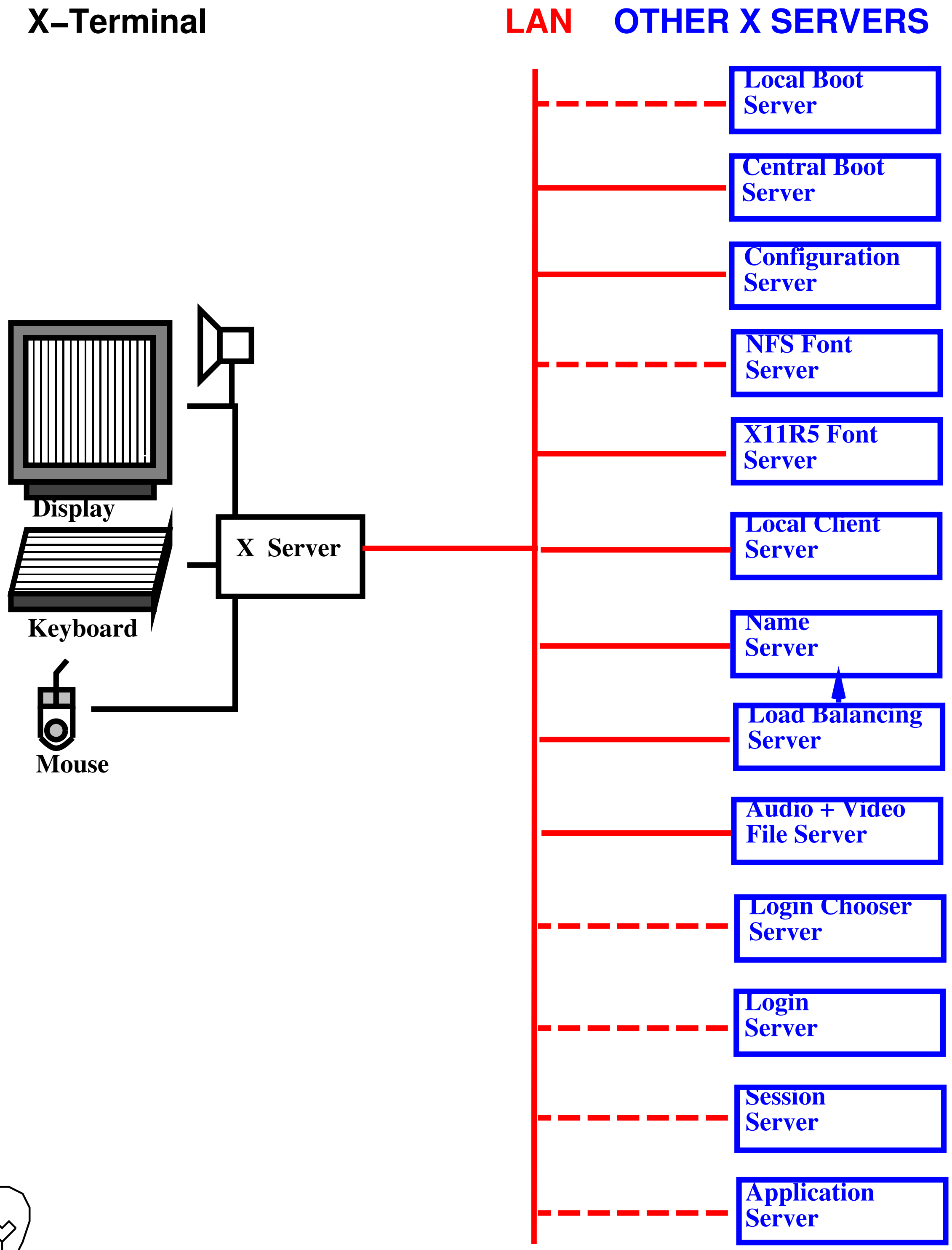
System Down Times:

System Down Times	Percentage
Maintenance	10 %
Crash	90 %

Reasons for Crashes	Percentage
Hardware	10 %
Software	50 %
Human Failures	40 %

- Monitor the systems
- Automate daily jobs
- Automate failure recovery
- Have some spare parts
- Have skilled operators
- Control root access
- Configure/Program with care

X-Servers:


X–Terminal
LAN
OTHER X SERVERS
Local Boot Server
Central Boot Server
Configuration Server
NFS Font Server
X11R5 Font Server
Local Client Server
Name Server
Load Balancing Server
Audio + Video File Server
Login Chooser Server
Login Server
Session Server
Application Server
Display
Keyboard
Mouse
X Server

Info Service:

• BOOTP

– Started by inetd + srcmstr

– Local broadcast + router support for hale1 + hale2

– No correlation to file service

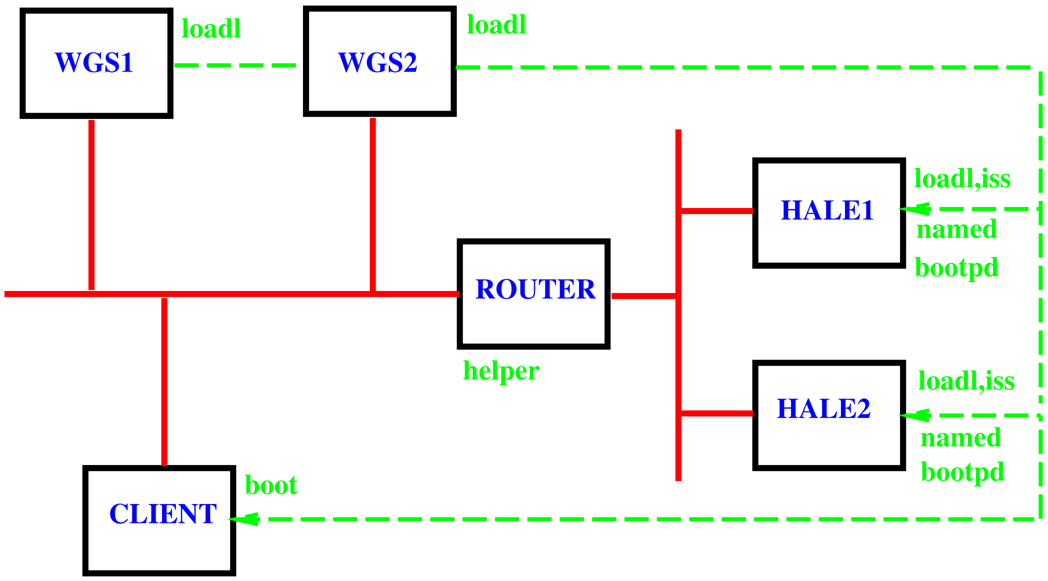
– Hostname, subnet mask, bootimage, name server(s), gateway(s), (configuration)

• NAMED

– Caching name server for main domain

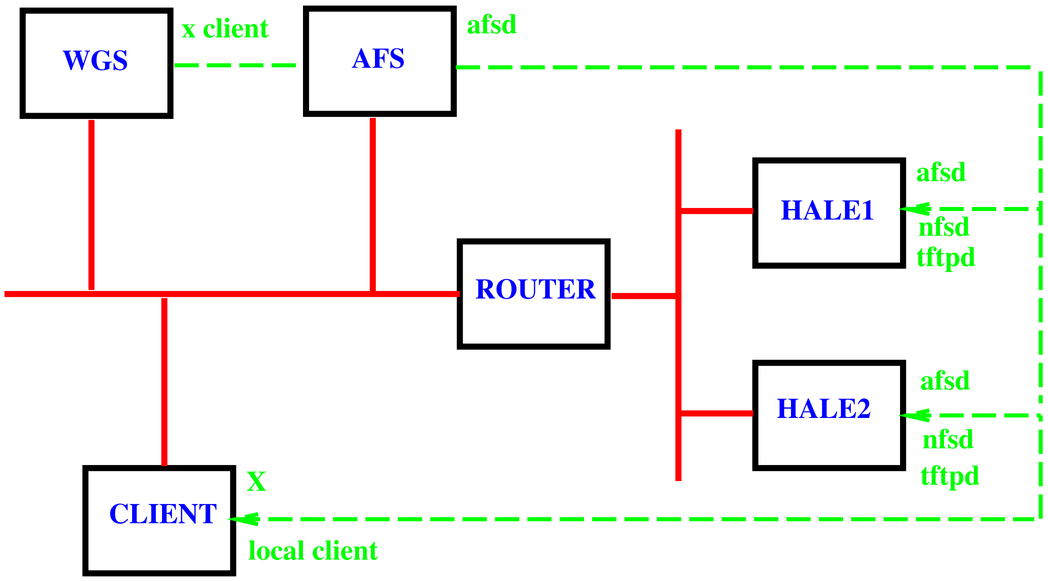
– ISS = IBM's Interactive Session Support

– Generic names for hale and wgs



File Service:

- **TFTP**
  - Started by inetd + srcmstr
  - Critical client count, may corrupt HALE
  - Switch to NFS during configuration (Old terminals only server load)
  - Replacing boot proms to support full NFS boot
- **NFS**
  - Started by srcmstr
  - Boot and configuration
  - Local client service (e.g. wm), long history
- **AFS**
  - AFS/NFS translation
  - Access read only
  - Read user files for fonts, audio, video



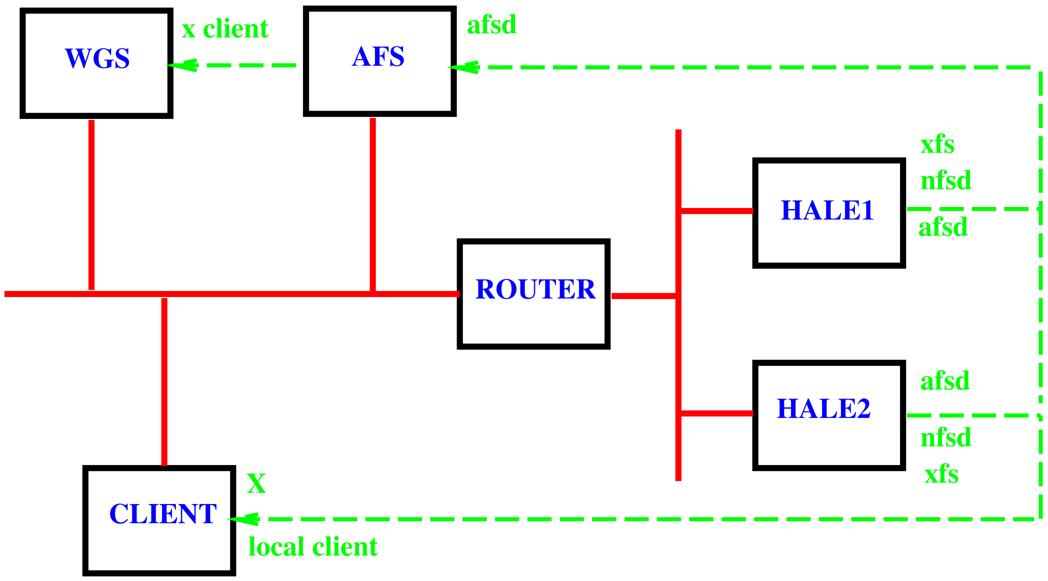
Font Service:

• NFS-FS

- No NFS font service from HALE disks
- AFS/NFS translation under test

• X11R5-FS

- Multiple server (75dpi, 100dpi, languages, sp, ...)
- ncdfs replaced by xfs + srcmgr
- Single point of failure for unsmart terminals
- Boot history: Service must be available during boot
- Number of connections not controllable
- No memory limits configurable (as e.g. with lpd)
- Memory consumption depends on history (factor 1 - 25)

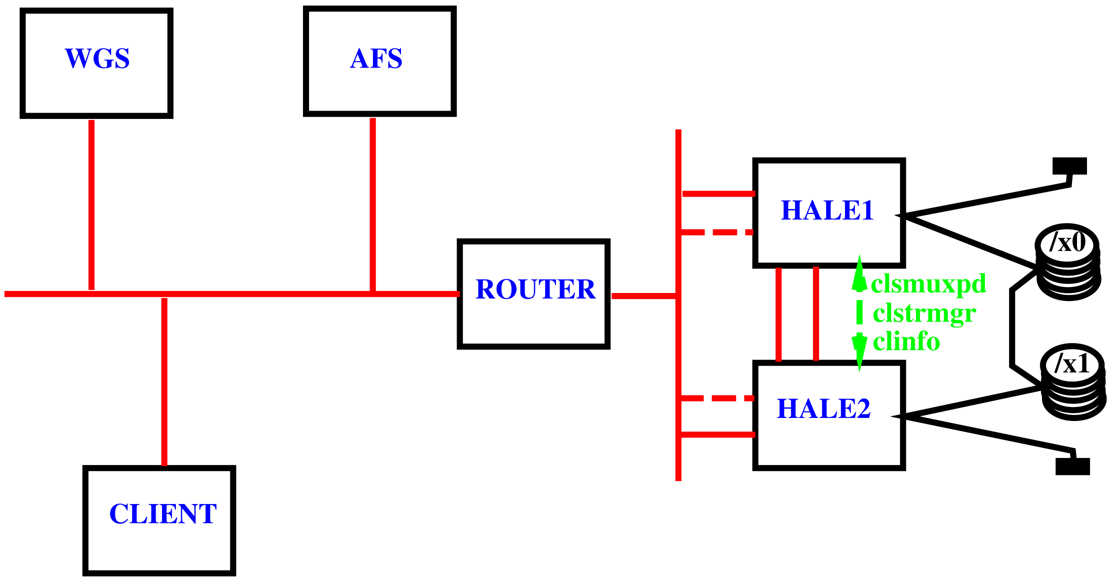


High Availability:

- Mutual takeover with different tasks
- Non-concurrent shared disk access
- IP-Number swapping on FDDI
- Disks manually mirrored
- NFS uses /x0/file or /x1/file notation

  with same id's on both machines
- TFTP uses /file notation

  with link from /file to /x0/file or /x1/file
- Takeover time about 120 seconds



Status September 95:

• Terminals, PC's and Printers

- Ready: NCD and newer TEK terminals with symmetric configurations (210 Terminals are running in production)
- Ready: PCXware support with same configurations as xterminals (Going into production soon)
- Ready: HPNP (70 HP-Printer running in production)
- Planned: TEK XP20 support
- Planned: IBM xstation support

• Fonts

- Solved: Stability of font servers
- Ready: 100dpi font service (fonts must be a little bit smaller)
- Ready: 75dpi font service (fonts must be changed from scalable to scaled)
- Not ready: 125dpi fonts
- Not ready: Some 3270 font configurations
- Planned: Reconfiguration to HEPiX defined ports

• Miscellaneous

- Solved: GIGA Router packet splitting bugs
- Not solved: GIGA Router hardware address caching and updating (Upgrade of GIGA Router software end of the year ?)
- Under test: ISS tested with rsh mode (to be tested with queue mode)
- Not ready: Load balancing from main domain desy.de
- Problems: Loadleveler and AFS service with moving/changing IP's
- Under Test: AFS/NFS translation

Near Future:

- Fully reliable HALE services
- Operatorless operation
- High quality base login services

Conclusions:

- Effort acceptable for greater numbers
- Standard services for 40 $ per client
- Add 10 $ for high availability
- No need for special fault tolerant hardware