Plan 9 from Bell Labs

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MOVIE GOOFS AND INTERESTING FACTS LIST
        Version 3.9 (October 1993)
A collection of film flubs, cinematic slip-ups,
movie mistakes, Hollywood howlers, etc etc.
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   Found by the users of USENET.

# Plan 9 from Outer Space
- Bela Lugosi died two days into the
  shooting of this turkey.
  He was replaced by the director's
  wife's chiropractor,
  who was significantly taller than Lugosi,
  and played the part with a cape
  covering his face.
- Internationally recognised as the worst
  movie ever made.
```

Plan 9 from Bell Labs

- Plan 9 *from Bell Labs* is a network operating system and it is composed of separate machines acting as
  - CPU servers
  - file servers
  - terminals

- it is built from distinct specialised components
  - rather than similar general purpose components

- high performance general purpose components cost a lot of money
  - workstations are too slow and IO bound for fast compilation
  - too expensive just to be used as a windowing system

Plan 9 from Bell Labs

- Plan 9 approach is based on distributed specialisation would better address issues:
  - cost effectiveness
  - maintenance
  - performance
  - reliability and security

Plan 9 from Bell Labs

- radical steps taken
  - build a completely new system
  - C compiler, operating system, network software, command interpreter, window system and terminal!

- authors credentials?
  - Rob Pike - famous for many of UNIX concepts during the early years
  - Ken Thompson - wrote the first C compiler. Then worked on translating UNIX from assembler to C
  - AT&T - birth place of UNIX - so wealthy that the USA divided AT&T into two because of its power

Plan 9

- different from other research and commercial operating systems. It lacks features often associated with other research network operating systems
  - process migration
  - lightweight processes
  - distributed file caching
  - personalised workstations
  - support for X windows

Plan 9

- built around CPU servers (large multiprocessors)
  - file servers
  - terminals (bitmap screen, mouse & computer running a window system 8 1/2)

- sharing of computing and storage services provide a sense of community for a group of programmers
  - cost effective
  - simplifies management and administration

CPU Servers

- in 1990 the production CPU server was a Silicon Graphics Power Series machine with four 25 MHz MIPS processors
  - 128 Mbyte memory
  - no disk
  - 20 Mbyte/sec DMA interface to the file server
  - Ethernet network interface

CPU Servers

- operating system has conventional process model using
  - fork
  - exec primitives

- new processes are run on a new processor whenever possible (similar to Amoeba in this respect)
  - processors similar to disk blocks
  - buy more disk space when you run out
  - buy more processors as well

- CPU servers have *no* local disk

File Servers

- Plan 9 file server is a modest
  - two processor
  - 64 Megabyte of memory
  - 600 Megabytes of hard disk
  - **300 Gigabyte juke box of write-once optical disk (WORM)**

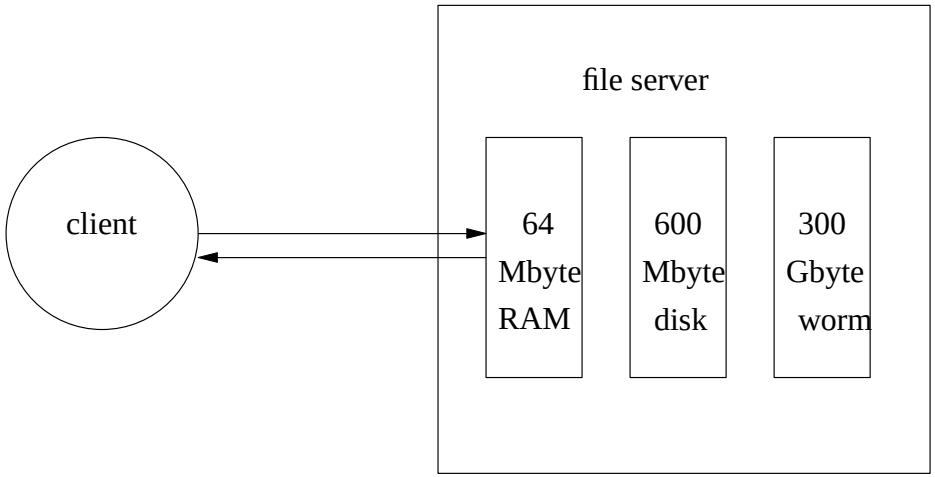
- it interfaces to the CPU servers through the 20 Mbyte/sec DMA links

File Servers

- file server interfaces to other terminals through conventional networks
- file server presents a file system to its clients *not an array of disk drives*
  - different from Windows in this respect. cf `a: b: c: d: e: f:`

File Server (continued)

- file system actually resides on WORM
  - the modest 600 Mbyte drive *only* acts as a cache

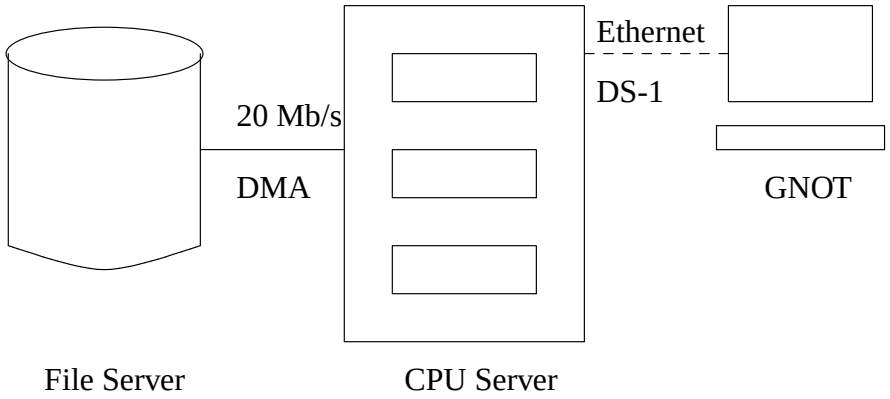


File Server Security and Backup

- once a day the file tree is frozen and split
  - old files can be accessed through normal file operations
  - `/1990/0401/usr/rob/doc/plan9.ms`

- this scheme permits users to compare files against old versions using traditional tools applied to a normal file system
  - permissions are the same
  - security remains intact

Plan 9 Network Structure



GNOT terminal

- specialist terminal whose specification is:
  - 25 MHz 68020
  - 1024x1024 4 colour display
  - keyboard and mouse
  - 4..8 Mbytes of memory
  - 2 Mbit/sec packet switched network connects a GNOT to the CPU servers
- terminal does not handle compilation
  - might run a text editor though

Plan 9 GNOT

- cheap enough so that each person can have 2
  - 1 at work
  - 1 at home

Plan 9 code size statistics

- window software written from scratch
  - 8 1/2 source is 60K bytes including source for xterm equivalent
  - roughly functionality of X windows (no colour)
  - 3860 lines of code and compiles in 10 seconds
  - compare to X windows!

- Plan 9 is small!
  - the kernel is 3647 lines of C code
  - it takes 10 seconds to compile and 10 seconds to load