Plan 9

A more unix—y not unix

Introduction

- Conceived by:
  - Rob Pike
  - Ken Thompson
  - Dave Presotto
  - Phil Winterbottom
  - Dennis Ritchie
- A successor to UNIX, began development in late 80s

8th Edition	Feb 1985[*citation needed*]	A modified 4.1cBSD[*citation needed*] for the VAX, with a System V shell and sockets replaced[*citation needed*] by Streams. Used internally, and only licensed for educational use.[6] Adds Berkeley DB, curses(3), cflow, clear, compress, cpio, csh,[7] cut, ksh[*citation needed*], last, netstat, netnews, seq, telnet, tset, ul, vi, vmstat. The Blit graphics terminal became the primary user interface.[3] Includes Lisp, Pascal and Altran. Added a network file system that allowed accessing remote computers' files as `/n/hostname/path`, and a regular expression library that introduced an API later mimicked by Henry Spencer's reimplementation.[8] First version with no assembly in the documentation.[3]
9th Edition	Sep 1986	Incorporated code from 4.3BSD; used internally. Featured a generalized version of the Streams IPC mechanism introduced in V8. The mount system call was extended to connect a stream to a file, the other end of which could be connected to a (user-level) program. This mechanism was used to implement network connection code in user space.[9] Other innovations include `Sam`.[3] According to Dennis Ritchie, V9 and V10 were "conceptual": manuals existed, but no OS distributions "in complete and coherent form".[6]
10th Edition	Oct 1989	Last Research Unix. Although the manual was published outside of AT&T by Saunders College Publishing,[10] there was no full distribution of the system itself.[6] Novelties included graphics typesetting tools designed to work with troff, a C interpreter, animation programs, and several tools later found in Plan 9: the Mk build tool and the rc shell. V10 was also the basis for Doug McIlroy and James A. Reeds' multilevel-secure operating system IX.[11]
Plan 9 1st Edition	1992	Plan 9 was a successor operating system to Research Unix developed by Bell Laboratories Computing Science Research Center (CSRC).

- As all things, it began in Bell Labs
- Took "everything is a file" to new extremes
- *Everything* was a file...
  - But isn't everything a file in *nix right now?

Licensing Woes

- Started like Unix —— Only available to universities
- Third edition was released under the "Plan 9" License which was open—source
  - a.k.a. the "Lucent Public License" (??)
  - Richard Stallman called it non—free
  - Theo de Raadt
- Re—licensed again in 2014 for UC Berkeley's Akaros OS
- Re—licensed for a fourth time in 2021 under the MIT license

Files

- What isn't a file in regular Unix?
  - Network programming (Berkeley sockets)
  - X Resources (Parameters of things like font used and others)
  - `ioctl` syscalls (device specific IO operations)

But wait, what is a FD then!

- A file descriptor is a file *representation* of a kernel resource, usually a bitstream of some kind
- They cannot be made by means other than using the kernel APIs (like you can't use `cat` to make a network socket)

The solution?

- 9P protocol
  - Generic
  - Medium Agnostic
  - Byte Oriented
- Software implements servers that expose interfaces on the filesystem
  - These interfaces are expected to use this 9p protocol
  - Commands like `ls`, `cat`, and other FS commands operate using 9P.

Filesystem

- The filesystem in Plan 9 is... weird.
  - Implemented using *namespaces*
  - This is where Linux inherited the idea for them!
  - This is also the foundation of UnionFS

Example

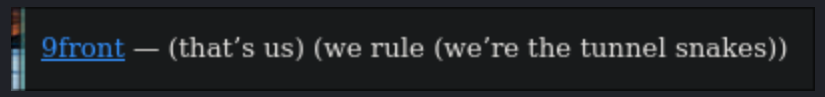
```
bind /{arch}/bin /bin
bind -a /acme/bin/{arch} /bin
bind -b /usr/ryan/bin /bin
```

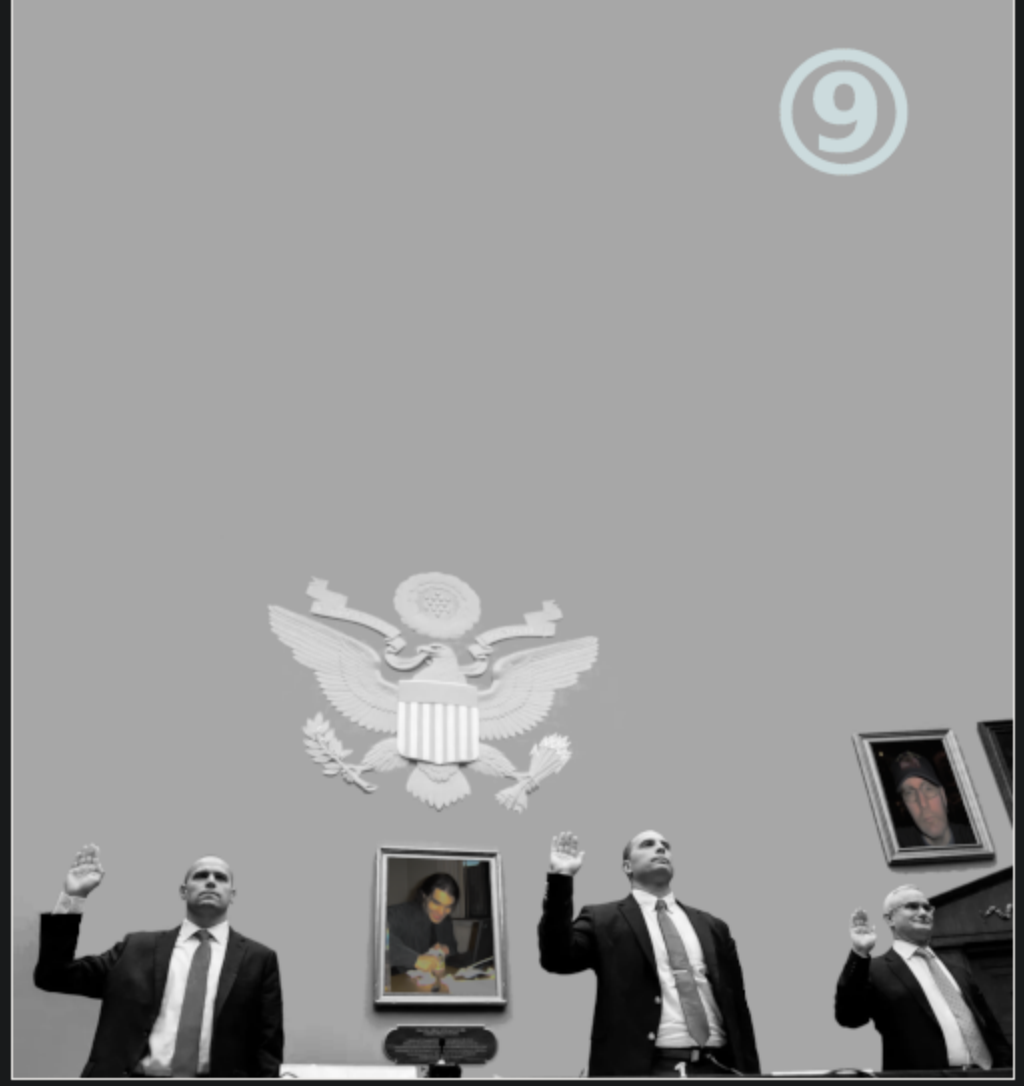
- This mounted three separate folders to `/bin`
  - Allows binaries of multiple architectures to be stored, mounting the correct one on boot
  - Allows programs to expose their own binaries to the system
  - Allows users to add binaries to their path.
- Speaking of path, there is no official "path"
  - There is a variable, but it is discouraged to use it
  - Just continue bind mounting on `/bin`

Quick Aside

- Plan 9 is no longer developed outside of multiple forks
- The "official" fork is Inferno, developed by Vita Nuova Holdings
- The most popular fork is 9 Front
  - At this point, it's essentially a big shitpost
  - The community is... interesting.

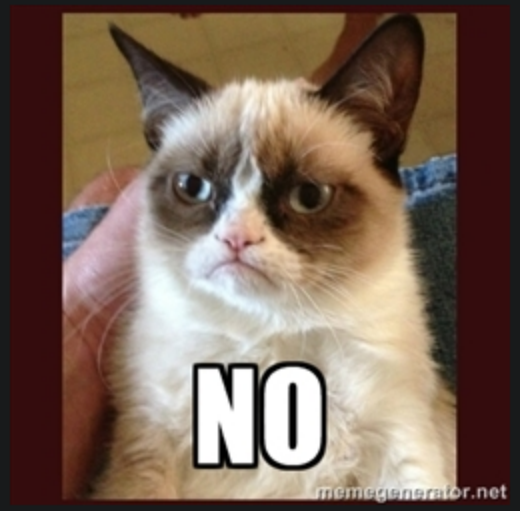

I WAS
YOUR PILOT


9front — (that’s us) (we rule (we’re the tunnel snakes))



Only eight remote holes in the default install, in a heck of a long time!

Alternatives



- bullshit(1) — print out a stream of bullshit

The United States of Plan 9

Plan 9 from Bell Labs — The original Plan 9. Effectively dead, all the developers have been run out of the Labs and/or are on display at Google.

Good luck, you may need it.

Russ Cox:

> I ran Plan 9 from Bell Labs as my day to day work environment until around 2002. By then two facts were painfully clear. First, the Internet was here to stay; and second
> work, so instead I ported almost all the Plan 9 user level software to FreeBSD, Linux, and OS X.

Ties with golang

- Many of the original developers (like Ken Thompson and Rob Pike) also made Golang
- Many aspects of Golang were inspired by developments of Plan 9
  - The assembler is based on Plan 9's

Namespaces

- Considering each process runs within its own namespace, every process has a unique view of the FS
  - What are the implications of this?
  - First Example