

# A history of UNIX

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**Bell Labs**

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# Bell Labs

- R&D Lab created in 1925 as part of the Bell System (now mostly AT&T? it's complicated)
- Developed many now ubiquitous technologies
  - Transistor, solar cell, lasers
  - Research into information theory, cryptography, and networking
- Where are they now?
  - AT&T (1984), Lucent (1996), Alcatel-Lucent (2006), Nokia (2016)



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*... there would be a MULTICS plug, and you'd just plug it in and suck out whatever cycles you wanted for anything you wanted.*

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- Thompson's wife was leaving to visit family for a month, just enough time to write a kernel, shell, editor, and assembler – each in one week.

# UNIX (1969)

- Originally written in assembly like other contemporary OSes
- Version 3 of UNIX was rewritten in C, a new language developed by Dennis Ritchie and based on BCPL
- This allowed UNIX to easily be ported to new systems – quickly became popular for research
- UNIX v7 (1978) - last Bell Labs release for research use
- UNIX System V (1983) - last UNIX released by AT&T for commercial use



## What's in UNIX? (v7)

- A prepackaged system, originally distributed on magnetic tape
- Came with kernel source code and documentation
- Directories: /bin, /dev, /etc, /lib, /usr
- Various preinstalled programs (abridged):
  - ls, cat, touch, mkdir, cp, grep, sed, awk, ed
  - cc, as, ar, ld, lex, yacc, make
  - chmod, chown, chgrp, passwd, kill, ps
- Proprietary license :(

**After UNIX**

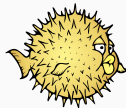
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# BSD (1978)

- Developed by UC Berkeley
- First UNIX derivative to support IP
- BSD License
- FreeBSD (1993), based on 386BSD
  - Used in TrueNAS, pfSense/OPNsense
- NetBSD (1993), also based on 386BSD
- OpenBSD (1995), forked from NetBSD
  - Security oriented
  - Developed doas, OpenSSH, others



FreeBSD



***Open*BSD**

- SunOS (1982) - proprietary UNIX developed by Sun for workstations/servers, based on BSD
- Solaris (1993) - replaced SunOS, based on BSD and System V
  - OpenSolaris - free version released by Sun in 2005
  - Discontinued after Oracle acquisition
- Illumos and OpenIndiana - based on OpenSolaris, forked in 2010



# NeXTSTEP

- Developed by NeXT
- Based on BSD and the Mach kernel (developed at CMU)
- Objective-C language, advanced windowing system
  - Drag and drop, color icons, real-time scrolling/dragging
- Apple acquired NeXT in 1997, Mac OS X based on NeXTSTEP
- Darwin: FOSS release of the kernel and core system

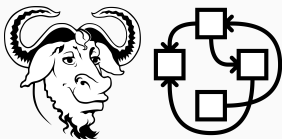


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# GNU's Not Unix

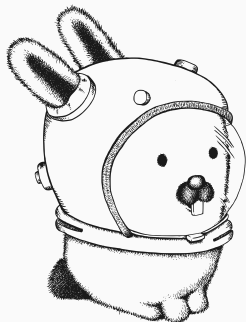
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  - This vexed him greatly.
- Soon after, declared that all software should be free
  - Started GNU in 1983 to develop a free operating system
- GNU Hurd (1990) - also based on Mach, still not 1.0





## Plan 9 (1992)

- Created by Bell Labs in the 1980s as a successor to UNIX for distributed computing
- " **Everything** is a file"
- Per-process name spacing, file access over the network
- 9front: still developed, includes improvements, a little wacky
- Inferno: Plan 9 descendant where all software runs in a VM



## MINIX (1987) and Linux (1991)

- MINIX: UNIX clone developed for education for the IBM PC
- Linux: inspired by MINIX, developed originally for the 80386
- And the rest... is history