TNE30019/TNE80014 – Unix for Telecommunications

History of Unix

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There is more than Windows

- Many(most?) laptop or desktop computers run MS Windows
- Well, these days quite a number run Apple MacOS
- But there are lot's of "other types" of computers
  - Can you identify some?
  - Mainframes
  - Smart phones
  - ...
- Many of those run Unix Operating Systems (OSs)

History of Unix

Late 1960's/early 1970's

- Multiple platforms
- No common Operating System
- Programmers wrote everything
  - Boot loading code
  - Direct access to hardware
- Lead to development of Operating System software
  - Manage boot-strapping of computer hardware
  - Manage access to underlying hardware through common APIs
  - Manage basic book-keeping tasks of computer

History of Unix

Dennis Ritchie

Ken Thompson

AT&T Bell Research Labs – 1969

- MultICS (*Multiplexed Information and Computing Service*) project canned – Ritchie and Thompson left without project
- Management decided **NO MORE OS PROJECTS**
- Thompson found PDP-7 sitting unused in corner
- With his wife on holiday Thompson started programming OS

History of Unix – PDP-7

Source: http://en.wikipedia.org/w/index.php?title=PDP-7&oldid=619635714

History of Unix

Name – team in-joke

- Like MultICS, but only one user – Thompson
- UnICS (*Un-multiplexed Information and Computing Service*)
- Name morphed to **UNIX**

Thompson and others created OS with basic tools

- Kernel
- Hardware IO Management
- File management
- Shell
- Programming tools (notably **C** language)

History of Unix

- Thompson and Ritchie needed more processing power, but AT&T would not support any OS development

The Plan

- Proposed to management to buy PDP-11
- Proposed to develop tools to edit and format text
- Mentioned as footnote they also *needed* to write new OS to support those tools
- Management gave green light

The Outcome

- Trial with three typists in patents department – they loved it
- Management were happy, bought newer, better PDP-11
- Unix lived on

History of Unix

Ground Breaking

- Hierarchical file system
- Multi tasking/user
- System administration tools – backup, removable storage
- Multiple programming languages (including C)
- All in only 4,200 lines of code that needed 16kB of RAM

Public Exposure

- Paper published in Communications ACM, 1974
- Multiple requests for copy of OS
- But there was a problem

History of Unix

Problem

- AT&T were bound by decree not to sell products related to telephones or telecommunications (price for legal monopoly)
- AT&T **could not** sell Unix
- Forced to release code for a nominal fee (reproduction costs)
- License stated, no support, no bug fixes

Explosion

- Release contained source for 'C' Compiler – language of OS
- Became OS of choice at Universities and Research Labs
  - Source code and compiler were provided
  - Could develop device-drivers, new versions, new hardware
  - Could explore and experiment with OS implementation

History of Unix

User Revolt

- Users had to provide their own support and banded together
- Thompson and Ritchie wanted to help, but were not allowed to release updated code – *it might be seen as support*
- Magic cookie box – user groups told "*Go here, at this time, and you might find something useful*"

Eventually – The Takeover

- Berkeley Unix strain (BSD) became first default Unix
- Regular public releases (updates)
- Berkeley University created
  - New editor **vi**
  - New Shell **csh**
  - New compilers **Pascal, Lisp**
  - Virtual memory
  - TCP/IP stack and sockets API

History of Unix

Legal Issues

- AT&T filed law suit against Berkeley over intellectual property
- Berkeley filed counterclaim against AT&T for license breaches
- Legal uncertainty slowed development of BSD for Intel PCs
- GNU (GNU's Not Unix!) project started developing open-source license-free UNIX

New Kid on the Block

- By 1990 GNU had userspace apps but no kernel in sight
- In 1991 Linus Torvalds released open-source Unix-like OS for Intel PCs – **Linux**
  - New kernel inspired by Tanenbaum's MINIX
  - Userspace applications from GNU
- Since early 2000s support for several new (low-cost) CPUs
- Google released Linux-based **Android** in 2008

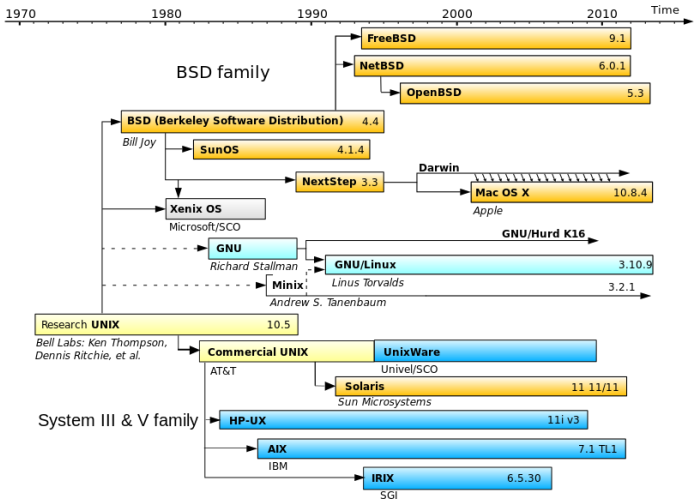
History of Unix

- UNIX fragmented
- Many versions, some licensed, some free
- AT&T Bell still held original license
- Hardware manufacturers were releasing their own versions

For many years

- Predominately used in research institutions
- Used to run large server-type computer systems
  - More stable, scalable, secure

History of Unix



Source: http://en.wikipedia.org/w/index.php?title=Linux&oldid=619755530

Unix – Today

BSD

Turned into several products

- OpenBSD
- FreeBSD / PC-BSD
- NetBSD
- Parts of Mac OS X, e.g. network stack

Linux

Huge number of distributions

- Red Hat, Debian, Ubuntu, openSuSE, ...
- Same Linux kernel and core GNU tools
- Different file-system layouts
- Different setup/management tools
- Different user-level applications

Unix – Today

Unix is everywhere

- Many BSD or Linux servers
- Linux fairly common on desktops
- Mac OS X (partially)
- Network routers
- Embedded systems
  - Smart phones
  - Smart TVs
  - Set-top boxes
  - Navigation systems
  - Medical instruments