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Early Networks at UKC

Peter Collinson

Canterbury Web Services

http://www.cantweb.co.uk

Disclaimer

- This all happened a long time ago
- My memory is rubbish
- There is very little documentation
- Free free to correct my version
- What I am about to tell you may be lies
- Or it may not be ….

Beginnings

- Member of first year to graduate with a degree in Computer Science from Essex - stayed on to do Ph.D
- Joined UKC staff as a lecturer in 1973
- UNIX arrived 1976
  - PDP 11/40 - 2 x RKO5 disks (about 2.5Mbytes each)
  - 16 users
  - Serial lines - glass terminals
  - Multi-user interactive system

UNIX

- Source - but only really viable for academics
- File system
  - Hierarchical
  - Everything is a file
- Well constructed process model - close to real machine
- C
- Libraries
- Tools approach
- Unfriendly?
  - Terse
  - Not much in the way of getting started information
  - No-one to ask

UNIX - what was there to do?

- User level stuff
  - Ported BCPL compiler onto system
  - Administration
- Kernel work
  - Terminal driver
  - Floppy driver
  - Installed some go-faster fixes from Australia
  - Cambridge Ring driver
- Got involved with User groups
  - There were people to talk to…
  - Arranged a conference with Brian Kernighan and Ken Thompson @ UKC in 1979

Cambridge Ring @ UKC

- Early networking technology
  - 10 Mbits per sec
  - Single ‘minipacket’ - 38 bits - source (8), destination (8) - 16 data, some flag bits
  - PDP11 interface
  - Z80 interface
- Well defined protocol set
  - Datagram
  - Virtual circuits
  - Mapping to ‘Coloured books’

1980 VAX 11/780 Arrives

- 2nd or third VAX in the UK
- 1st to run UNIX full time
- Ran UNIX 32V initially, later moved to Berkeley UNIX
- Midi computer - Mag Tape - 160Mb of disk space
- Connected to the Cambridge Ring via KMC-11
  - Obtained assembler from Bell Labs
  - Last ‘real’ assembler program I wrote
  - KMC-11 did low level mini-packet processing and pushed packets into memory using DMA

UKC gets networked

- Coherent set of protocols over the campus
  - External access to/from JANET
- Terminal concentrators - Z80
  - 16 terminals + printer
  - Allowed user to choose machine
  - Handled all the line editing - sent one complete line to host
- Mainframe - ICL - ran EMAS
- UNIX terminal device drivers
  - Initially no ‘raw’ mode
  - Problems with ‘sessions’
- ‘Blue Book’ FTP as a UNIX client/server
- Line printer spooler

Unix to Unix Copy

- Acquired a US Modem in early ‘80s
- Ex-student was working in US - and started vax135 calling UKC
- Shipping
  - Mail
  - ‘The News’ - later became known as USENET - was the equivalent of blogs or chat sites today
- Lee McLoughlin then at Imperial College worked out how to get UUCP to talk over X25
- UKC well set up to allow these connections onto its machines
- May have had a modem or too also - but dial in only - I had no budget

UUCP Addressing

- UUCP generated a store and forward network
- Addressing was a path through the network from machine to machine
  - ukc!vax135!decvax
  - Used as a mail address by adding the user name at the end
- Mapping was important
  - Every site sent in their details and their connections - with a priority
  - Peter Honeyman wrote the program that digested the maps and worked out a route from you to anywhere
- Could take a couple of days to get mail from UK to USA West Coast - some notable hubs - decvax - whole network somewhat ‘underground’

Early ‘80s

- EUnet started 1982
  - Mcvax - line to US
- UKnet developed with QMC and UCL
  - X25 links
    - Mail via UUCP and Grey Book
    - News via UUCP and Blue Book
    - ‘ad-hoc’ .uucp domain evolved
- Summer 1984 - vax135 link died
  - 40/50 sites - commercial/academic
  - £5000 X25 bill to connect to mcvax
  - Forced to organise funding

Mid ‘80s

- Funding as a UUCP gateway
  - One member of staff
  - VAX11/750
  - Most communication over JANET/PSS
- ‘Free’ to academics
- Commercial sites pay
- JANET concerned about commercial cross-traffic
- Network gets to about 90 sites
- Need to switch to domain addressing

Domains

- JANET adopted ‘big-endian’ order
  - uk.ac.ukc
- Rest of the world - ie the US - ‘little endian’
  - cs.berkeley.edu
- EUnet decided to use ISO country codes
- Decided to generate a mail system that would gateway
  - Use MMDF - table based approach
  - Help from Steve Kille - UCL
  - Flip domains to lookup and get routing
  - Map UUCP names into site.uucp
- Idea was to create a campus wide mail system
  - One mail address - with mail internally routed to ‘correct’ machine

Domain switch 1985/6

- Agreed to use .uk and not .gb
- Agreed to use the NRS - the academic name registry
- Acted as name registrar for NRS for commercial sites
- Acted as a mail gateway
- .uucp domain phased out
- UKnet about 150 sites in ‘85

Late ‘80s

- Authorisation
- Accounting
- Growth
- New machines to support the network
- Argument and complaint about payments
  - People set up companies to ‘sell the news’
- Leased line to mcvax
- But it got boring & I left

What did we achieve?

- Cambridge Ring superseded by Ethernet
  - Did tunnel IP over Ring protocols
  - Wanted NFS
- Connected the UK UNIX community to the world
- Created an appetite for email/news
- Became ‘the establishment’
- Academics didn’t really understand or want to understand the business world
- UKC failed to get into IP early enough
- UKnet became a company - eventually bought by PSI