

```

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8
9
10 $ ed slides.txt
11
12
13 Help! No vim. No emacs. No nano.
14 Rescuing a system with a line-oriented text editor.
15
16 Jiří Navrátil
17
18 ---
19
20 :: KEN THOMPSON'S 1969 UNIX PROTOTYPE STACK ::
21
22 Ken Thompson, August–September 1969, PDP-7 at Bell Labs
23 * Kernel & UNIX File System
24 * Assembler: as
25 * The Shell: sh
26 * Text Editor: ed
27
28 ---
29
30 :: `ed` – BORN FROM TELETYPES & EXTREME CONSTRAINTS ::
31
32 * No Screens, Only Paper: Interacted via Teletype Model 33 (hardcopy printer +
33   keyboard). Every output consumed real paper and ink
34 * Built for Assembly Code: Ken Thompson designed `ed` specifically for himself
35   to write and maintain low-level PDP-7 assembly source files line-by-line
36 * Optimized for Painfully Slow Speeds: At 110 baud (~10 chars/second), redraws
37   didn't exist. You edited "blind" to avoid waiting for paper to print
38 * Extreme Memory Conservation: PDP-7 had only a few kilobytes of RAM. `ed` was
39   coded to be as tiny as possible—hence minimalist single-character commands
40   and the infamous `?` error prompt
41
42 ---
43
44 :: `ed` IS NOT OBSOLETE – IT IS THE STANDARD ::
45
46 * POSIX (IEEE Std 1003.1): `ed` is a mandatory utility in the POSIX standard
47   shell and utilities specification
48 * Single UNIX Specification (SUS): Mandatory baseline component across all
49   certified UNIX operating systems
50 * Linux Standard Base (LSB): Defined as part of the core command-line utility
51   set for base system compliance.
52 * Open Group UNIX Base: Minimum environment guarantee in single-user mode
53
54 ---
55
56 :: OpenBSD ::
57
58 OpenBSD's ed is the original ed (direct lineage, evolved in the base system):
59   $ man ed | col -b | grep -A 1 '^HISTORY$'
60   HISTORY
61       An ed command appeared in Version1 AT&T UNIX.
62
63 Editors paths on OpenBSD:
64   $ which ed vi mg sed vim emacs
65   /bin/ed
66   /usr/bin/vi
67   /usr/bin/mg
68   /usr/bin/sed
69   /usr/local/bin/vim
70   /usr/local/bin/emacs
71 Note, that editors live on different partitions.
72
73 ---

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74
75 :: MY FIRST ENCOUNTER WITH `ed` ::
76
77 * The Setup: OpenBSD on my servers and laptops
78 * The Incident: Years ago, a reboot ended in emergency single-user mode
79 * The Problem: Needed to edit `/etc/fstab`, but only root partition was mounted
80 * The Reality: Only `/bin/ed` on root partition was present
81 * The Result: Trial by fire with the standard Unix text editor
82
83 ---
84
85 :: DEMO ::
86
87 The live demo is on OpenBSD 7.9 amd64:
88 man fstab | tail -n 24 | head -n 16 > /tmp/fstab
89 ed /tmp/fstab
90 725
91 1,$n
92 1      EXAMPLES
93 2          Here is a sample /etc/fstab file:
94 3
95 4          /dev/sd0b none swap sw
96 5          /dev/sd1b none swap sw
97 6          /dev/sd0a / ffs rw 1 1
98 7          /dev/sd0e /var ffs rw,nodev,nosuid 1 2
99 8          #/dev/sd0f /tmp ffs rw,nodev,nosuid 1 2
100 9          swap /tmp mfs rw,nodev,nosuid,-s=153600 0 0
101 10         /dev/sd0g /usr ffs rw,nodev 1 2
102 11         /dev/sd0h /usr/local ffs rw,nodev 1 2
103 12         /dev/sd0i /home ffs rw,nodev,nosuid 1 2
104 13         /dev/sd0j /usr/src ffs rw,nodev,nosuid 1 2
105 14         /dev/cd0a /cdrom cd9660 ro,noauto 0 0
106 15         5b27c2761a9b0b06.i /mnt/key msdos rw,noauto 0 0
107 16         server:/export/ports /usr/ports nfs rw,nodev,nosuid,soft,intr 0 0
108 14
109         /dev/cd0a /cdrom cd9660 ro,noauto 0 0
110 d
111 9
112         swap /tmp mfs rw,nodev,nosuid,-s=153600 0 0
113 s/153600/76800/
114 p
115         swap /tmp mfs rw,nodev,nosuid,-s=76800 0 0
116 5d
117 1,3d
118 ,s/sd0/sd2/g
119 ,s/^ *//
120 ,p
121 /dev/sd2b none swap sw
122 /dev/sd2a / ffs rw 1 1
123 /dev/sd2e /var ffs rw,nodev,nosuid 1 2
124 #/dev/sd2f /tmp ffs rw,nodev,nosuid 1 2
125 swap /tmp mfs rw,nodev,nosuid,-s=76800 0 0
126 /dev/sd2g /usr ffs rw,nodev 1 2
127 /dev/sd2h /usr/local ffs rw,nodev 1 2
128 /dev/sd2i /home ffs rw,nodev,nosuid 1 2
129 /dev/sd2j /usr/src ffs rw,nodev,nosuid 1 2
130 5b27c2761a9b0b06.i /mnt/key msdos rw,noauto 0 0
131 server:/export/ports /usr/ports nfs rw,nodev,nosuid,soft,intr 0 0
132 q
133 ?
134 h
135 warning: file modified
136 wq
137 435
138
139 ---
140
141 :: `ex`/`vi` IS DESCENDANT OF `ed` ::
142
143 The singular ^^ is intentional.
144
145 * `ed`: line-oriented text editor
146 * `ex`: extended line-oriented text editor

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147 * `vi`: screen-oriented text editor
148
149
150 `ex` (extended) was written by Bill Joy in 1976. Joy took `ed` and added new
151 features, eventually adding
152 `vi` (visual) mode for the newer CRT terminals that could display a full screen
153
154 `ex` and `vi` are exactly the same program, just invoked in different modes
155
156 * Press `Q` in `vi` to enter `ex` mode
157 * Type `vi` at the `:` prompt in `ex` mode to return to visual mode
158
159 ---
160
161 :: BONUS ::
162
163 alias inbox='flock -x ~/inbox.txt ed ~/inbox.txt'
164
165 ---
166
167                                     Thank you for your attention
168
169                                     https://www.navratil.cz
170
171 ---
172 65045383ce1f8bee3ad3e16a79a40cb2253ff151
```