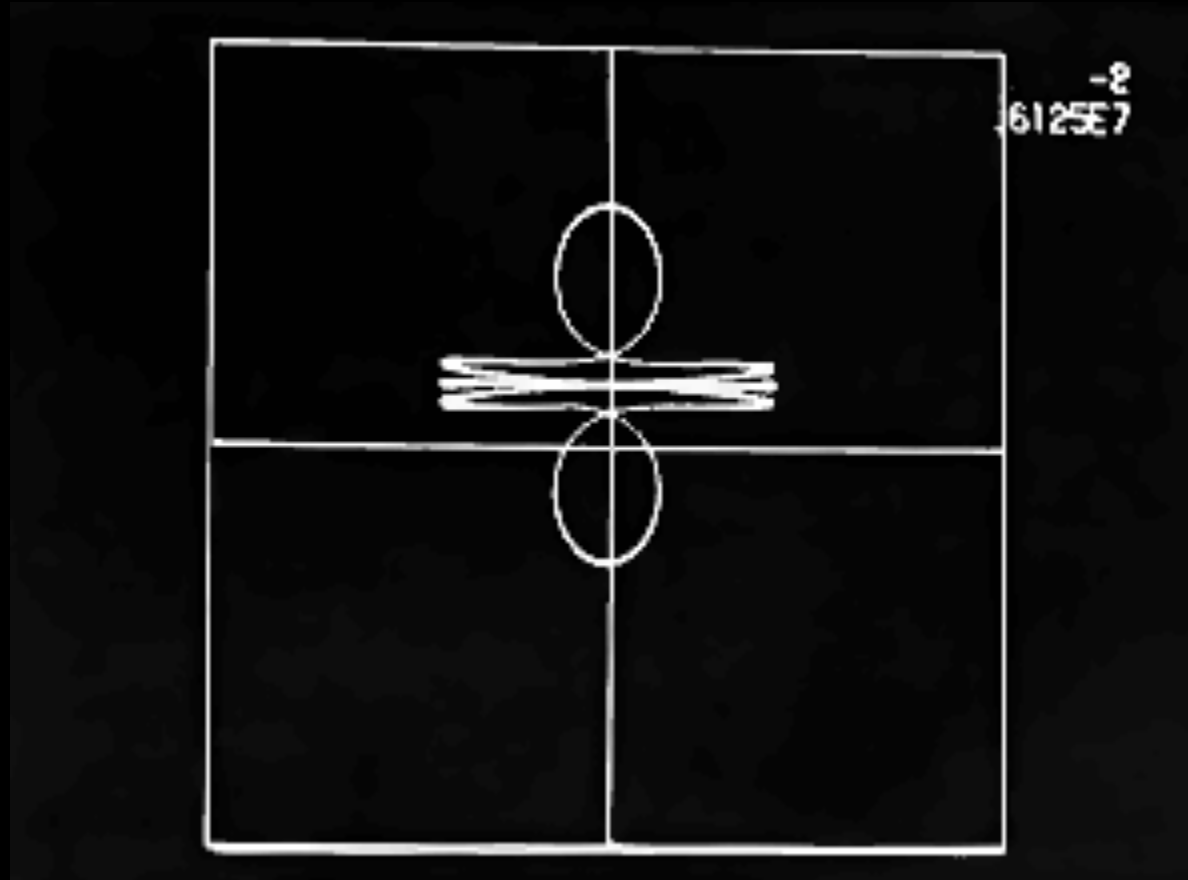# values of β may give rise to dom!
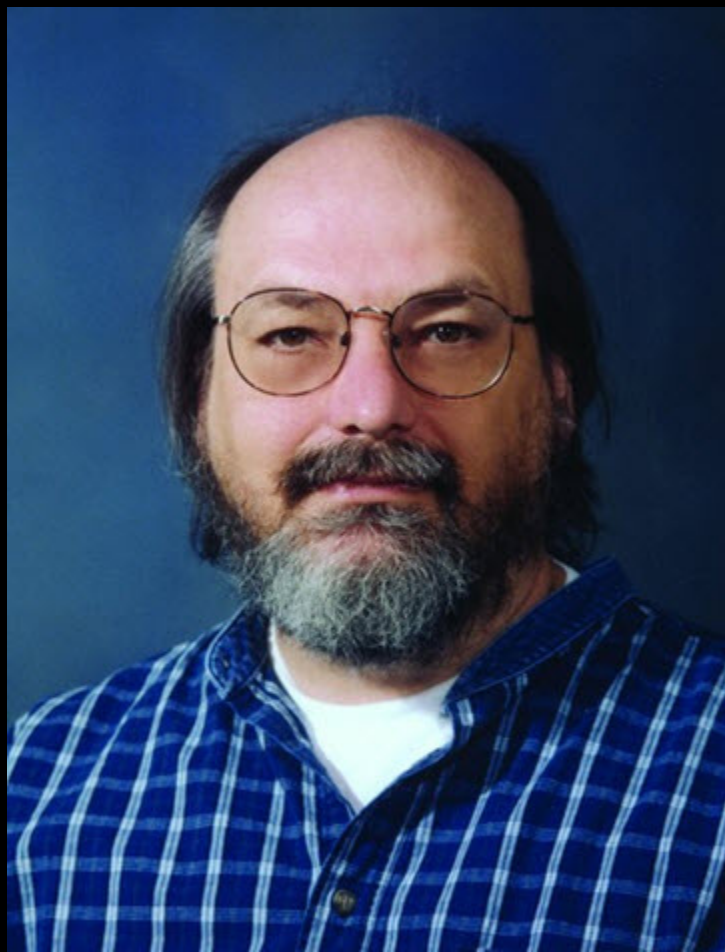
Mark Allen
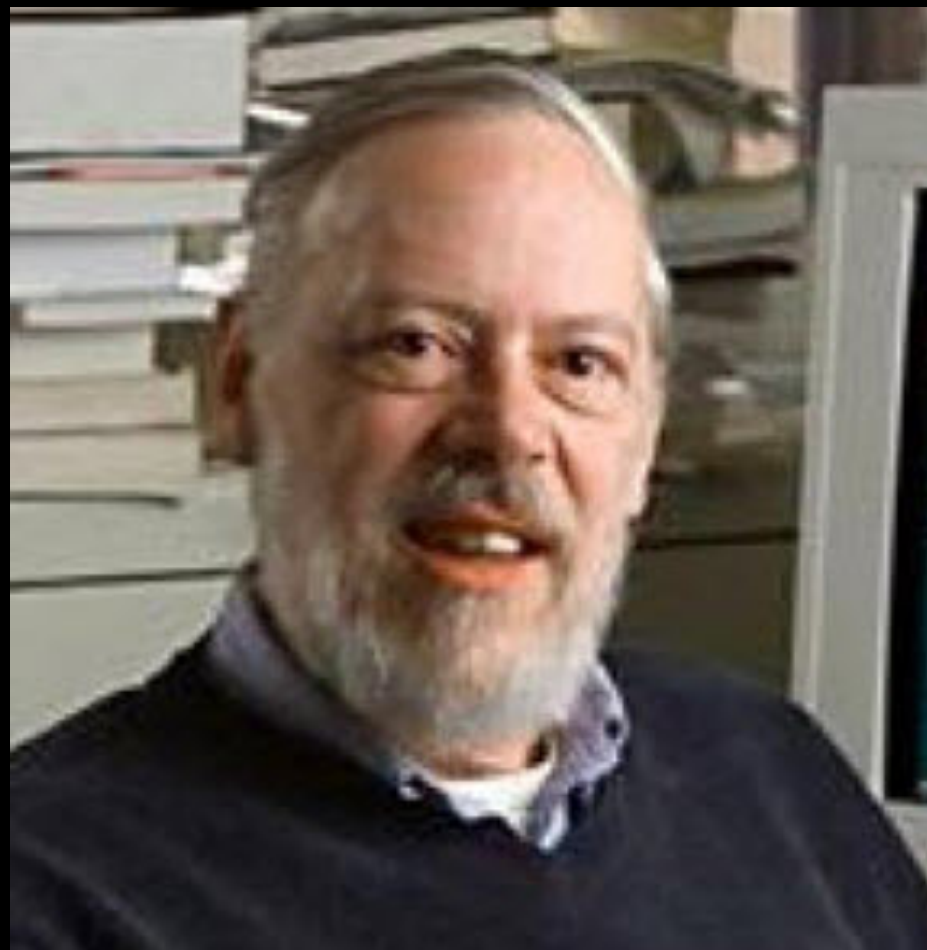
mrallen1@yahoo.com

@bytemeorg

It Started with...

Project MAC / MULTICS

Joint venture between MIT, GE and Bell Labs.

- Bell Labs dropped out in 1969
- GE's computer business acquired by Honeywell in 1970.
- Went on to become a commercial product.

PDP-7

PDP-11

$100,000.00
(1974)

$483,000.00
(2016)

runoff

- Probably written by Robert Morris (but maybe not, according to [2])

- J.F. Ossanna extended roff for photo typesetting (in assembler)

- B. Kernighan rewrote roff in C in 1977 (also collaborated on eqn and pic)

Users!

- The first users of Unix were typists in the patent department.

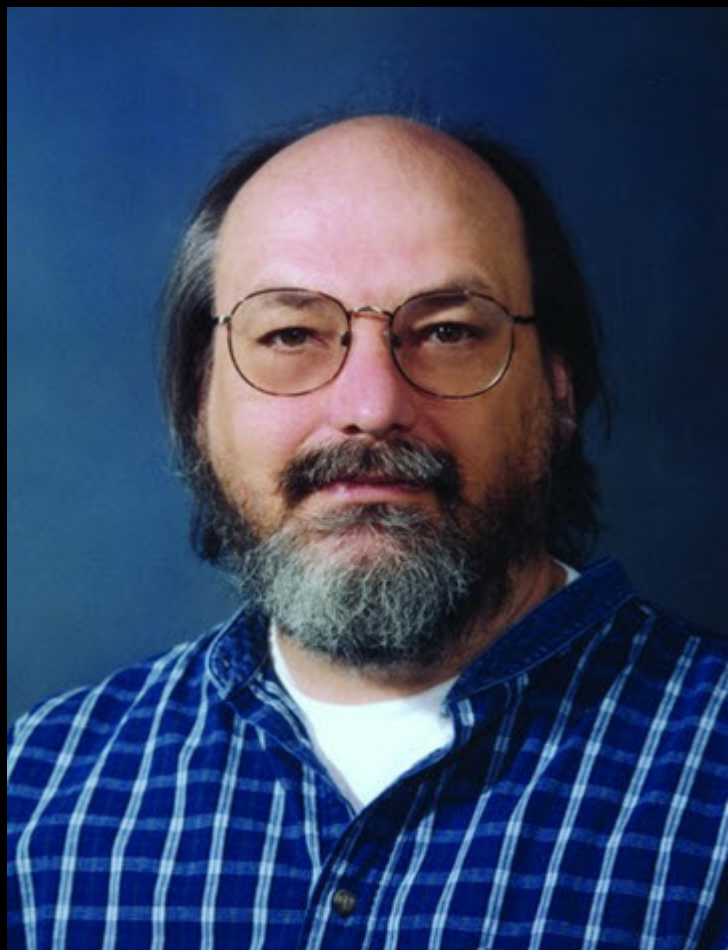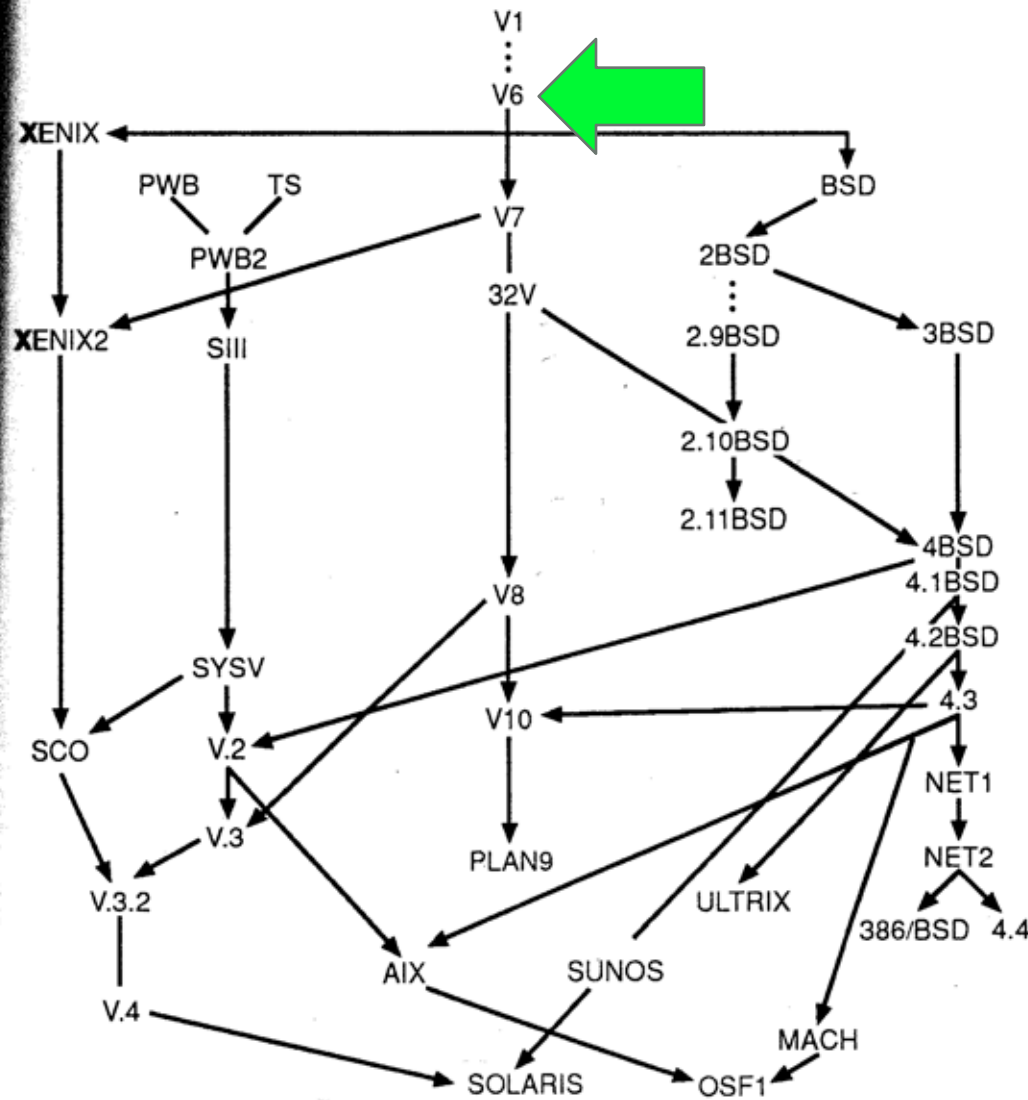- That's where the funding for the first PDP 11 came from.

UNIX VERSIONS TREE

[2]

values of β may
give rise to dom!

[5]

```
if((stbuf[0].imode & 060000) == 040000){
/*

        The source is a directory, so
        we do lots of checking and
        messing around so as not to get
        into trouble.  This patch of
        code contains administrative
        policies rather than system
        restrictions.
*/

        if(stat(argp[2], stbuf) >= 0){
                write(1,"Directory target exists.\n",25);
                exit();
        }
        argp1 = argp[1];
        argp2 = argp[2];
        while(*argp1 == *argp2){
                argp1++;
                if(*argp2++ == 0){
                        write(1,"???\n",4);
                        exit();
                }
        }
        while(*argp1)if(*argp1++ == '/'){
                write(1,"Directory rename only\n",22);
                exit();
        }
        while(*argp2)if(*argp2++ == '/'){
                write(1,"Directory rename only\n",22);
                exit();
        }
        if(*--argp1 == '.'){
                write(1,"values of B will give rise to dom!\n",37);
                exit();
        }
}else{
```

```
if((stbuf[0].imode & 060000) == 040000){
/*

        The source is a directory, so
        we do lots of checking and
        messing around so as not to get
        into trouble.  This patch of
        code contains administrative
        policies rather than system
        restrictions.
*/

        if(stat(argp[2], stbuf) >= 0){
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        }
        argp1 = argp[1];
        argp2 = argp[2];
        while(*argp1 == *argp2){
                argp1++;
                if(*argp2++ == 0){
                        write(1,"???\n",4);
                        exit();
                }
        }
        while(*argp1)if(*argp1++ == '/'){
                write(1,"Directory rename only\n",22);
                exit();
        }
        while(*argp2)if(*argp2++ == '/'){
                write(1,"Directory rename only\n",22);
                exit();
        }
        if(*--argp1 == '.'){
                write(1,"values of B will give rise to dom!\n",37);
                exit();
        }
```

```
2200    /*
2201     * Search for highest-priority runnable process
2202     */
2203    i = NPROC;
2204    do {
2205            rp++;
2206            if(rp >= &proc[NPROC])
2207                    rp = &proc[0];
2208            if(rp->p_stat==SRUN && (rp->p_flag&SLOAD)!=0) {
2209                    if(rp->p_pri < n) {
2210                            p = rp;
2211                            n = rp->p_pri;
2212                    }
2213            }
2214    } while(--i);
2215    /*
2216     * If no process is runnable, idle.
2217     */
2218    if(p == NULL) {
2219            p = rp;
2220            idle();
2221            goto loop;
2222    }
2223    rp = p;
2224    curpri = n;
2225    /* Switch to stack of the new process and set up
2226     * his segmentation registers.
2227     */
2228    retu(rp->p_addr);
2229    sureg();
2230    /*
2231     * If the new process paused because it was
2232     * swapped out, set the stack level to the last call
2233     * to savu(u_ssav).  This means that the return
2234     * which is executed immediately after the call to aretu
2235     * actually returns from the last routine which did
2236     * the savu.
2237     *
2238     * You are not expected to understand this.
2239     *
2240    if(rp->p_flag&SSWAP) {
2241            rp->p_flag =& ~SSWAP;
2242            aretu(u.u_ssav);
2243    }
```

WAT?!

2230: The comment which begins here is not encouraging. We will return to this point again towards the end of this chapter;

[3]

The question is "if the values stored in "u.u_ssav" at line 2284 are the same as values stored in "u.u_rsav" at line 2281, how did they get to be different?"

Presumably this is what "you are not expected to understand" (line 2238) ... clearly "xswap" should be investigated ... the trail finally ends at Chapter Fifteen ... in the meantime you may wish to investigate for yourself so that you may join the "2238" club that much sooner.

The Ethos of Unix

1. Do one thing – do it well!

2. Tool composition

3. Text is a universal interface (well until 💩)

4. Documentation

The Aesthetics of Unix

1. Simplicity
2. Elegance
3. Openness

If designers of a system are forced to use that system, they quickly become aware of its functional and superficial deficiencies and are strongly motivated to correct them before it is too late. Since all source programs were always available and easily modified on-line, we were willing to revise and rewrite the system and its software when new ideas were invented, discovered, or suggested by others.

–Dennis Ritchie, [1]

Thank you!

References

- [1] "The Unix Time Sharing System", D. M. Ritchie, K. Thompson, Comm. ACM, July 1974. http://dx.doi.org/10.1145/361011.361061

- [2] A Quarter Century of Unix, P. Salus, Addison-Wesley Professional, 1994.

- [3] Commentary on Unix, J. Lions, Peer-to-Peer Communications, 1996.

- [4] https://github.com/dspinellis/unix-history-repo/blob/Research-V6-Snapshot-Development/usr/source/s2/mv.c

- [5] https://www.bell-labs.com/usr/dmr/www/odd.html

- [6] https://en.wikipedia.org/wiki/Space_Travel_(video_game)

- [7] http://amturing.acm.org/award_winners/ritchie_1506389.cfm and http://amturing.acm.org/award_winners/thompson_4588371.cfm

For the Uninitiated

we can now return to complete an investigation started in Chapter Eight concerning "aretu" and "u.u_ssav":

After setting "u.u_ssav" (2284),
"expand" calls (2285) "xswap",
which calls (4380) "swap",
which calls (5215) "sleep",
which calls (2084) "swtch",
which resets "u.u_rsav" (2189).

Thus in fact "u.u_rsav" finally gets reset to a value appropriate to four procedure calls deeper than that for "u.u_ssav".