

Can I tell you a secret?

I see dead Systems



Avishai Ish-Shalom

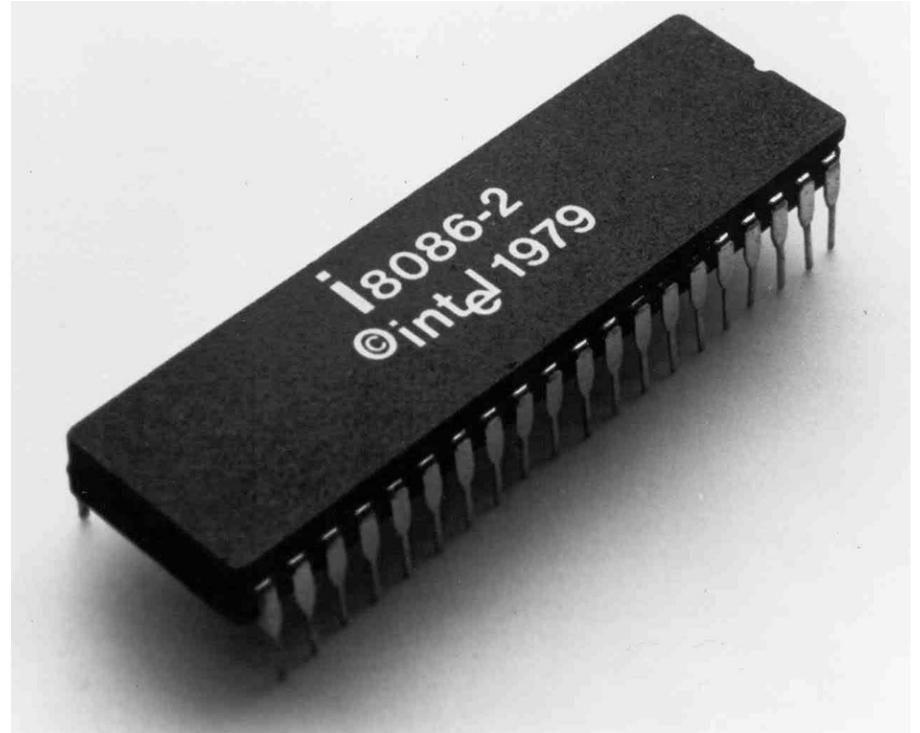
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Many many years ago

The IBM XT computer had
1MB of RAM.

It's shiny successor - AT
80286 - has just arrived and
it had whooping 16MB of
RAM

One problem: **compatibility!**



linux/arch/x86/boot/a20.c

```
int enable_a20(void)
{
    int loops = A20_ENABLE_LOOPS;
    int kbc_err;

    while (loops--) {
        /* First, check to see if A20 is already enabled
           (legacy free, etc.) */
        if (a20_test_short())
            return 0;

        /* Next, try the BIOS (INT 0x15, AX=0x2401) */
        enable_a20_bios();
        if (a20_test_short())
            return 0;

        /* Try enabling A20 through the keyboard controller */
        kbc_err = empty_8042();

        if (a20_test_short())
            return 0; /* BIOS worked, but with delayed reaction */

        if (!kbc_err) {
            enable_a20_kbc();
            if (a20_test_long())
                return 0;
        }
    }
}
```

WAT?

- A20 gate needed to be switched on/off
- The keyboard controller had a spare pin
- IBM routed A20 through the pin
- Controlled with keyboard controller interrupt

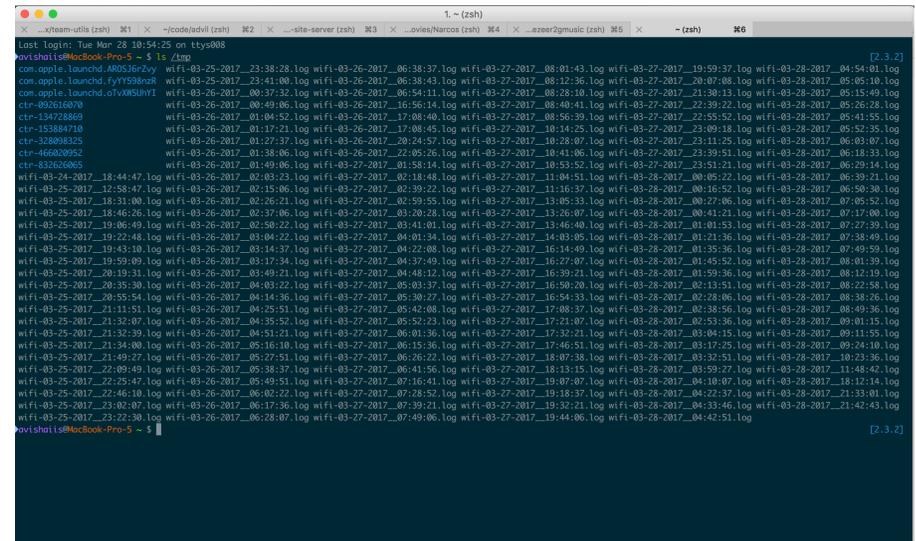
Yes, we still do this today - on every boot!

Remember this?



Let's talk about terminals

- The "terminal window" is in fact a terminal emulator
- It works with a 40 years old protocol
- Based on the 1869 *stock ticker*



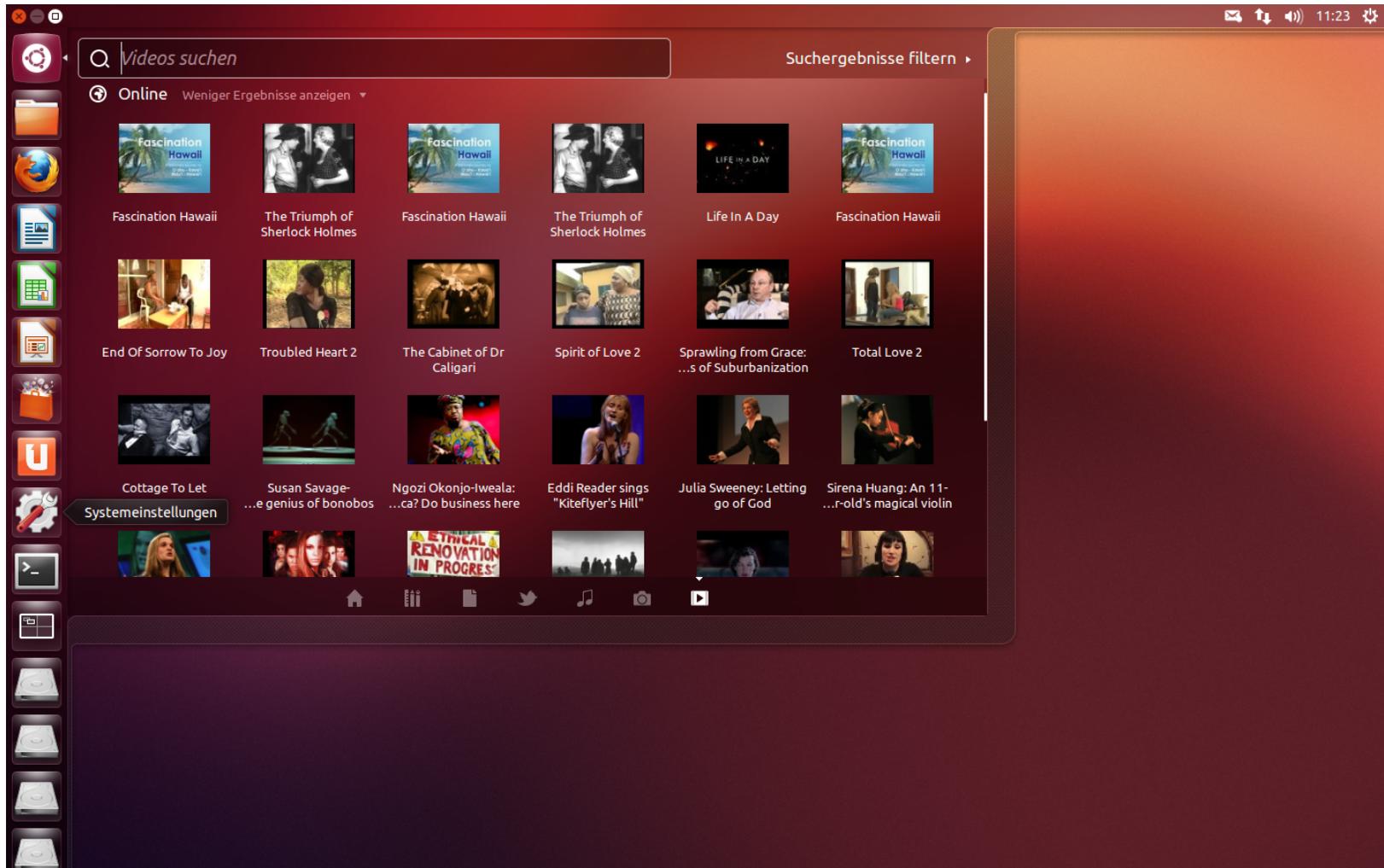
The image shows a terminal window with a dark background and light text. The window title is "1. ~ (zsh)". The terminal content shows a prompt "root@shahid:~# ls -l /var/log" followed by a list of log files. The files are listed in a single column, with their permissions, owner, group, size, and filename. The filenames are all "wfi-03-25-2017_...log" or "wfi-03-26-2017_...log". The list is truncated at the bottom with "[...]".

Ever tried colors in the terminal?



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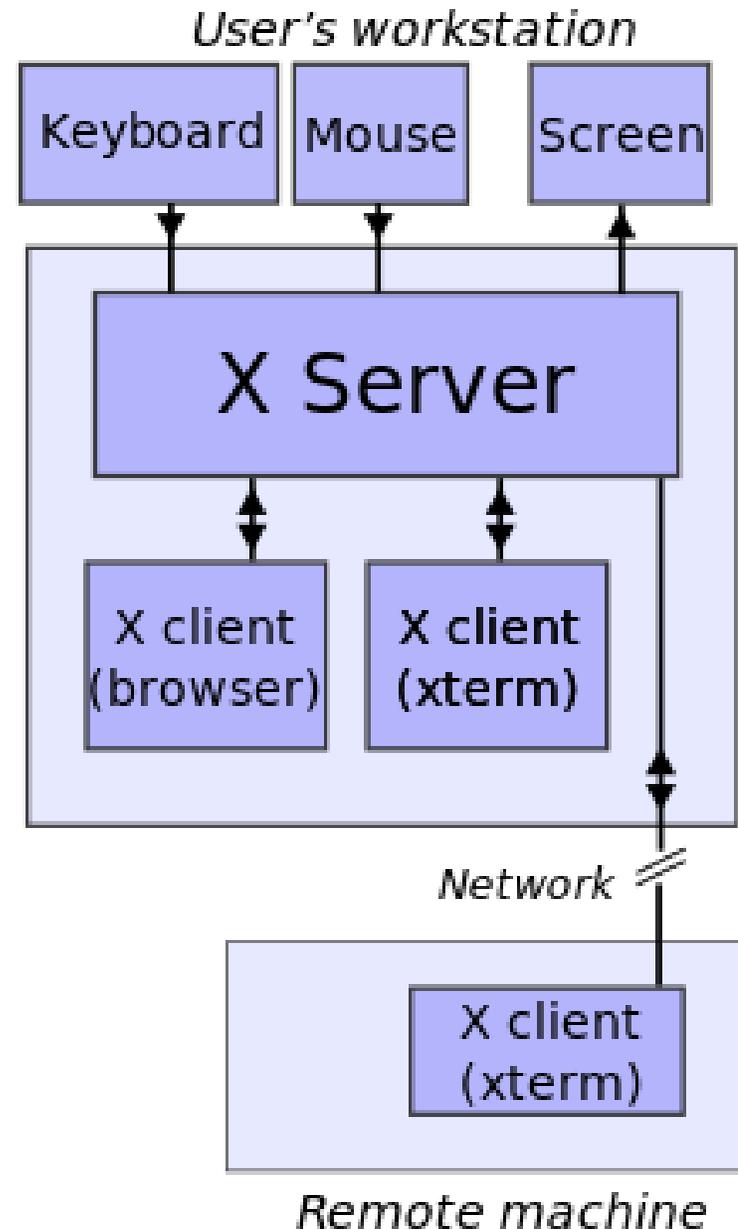
This is also a terminal



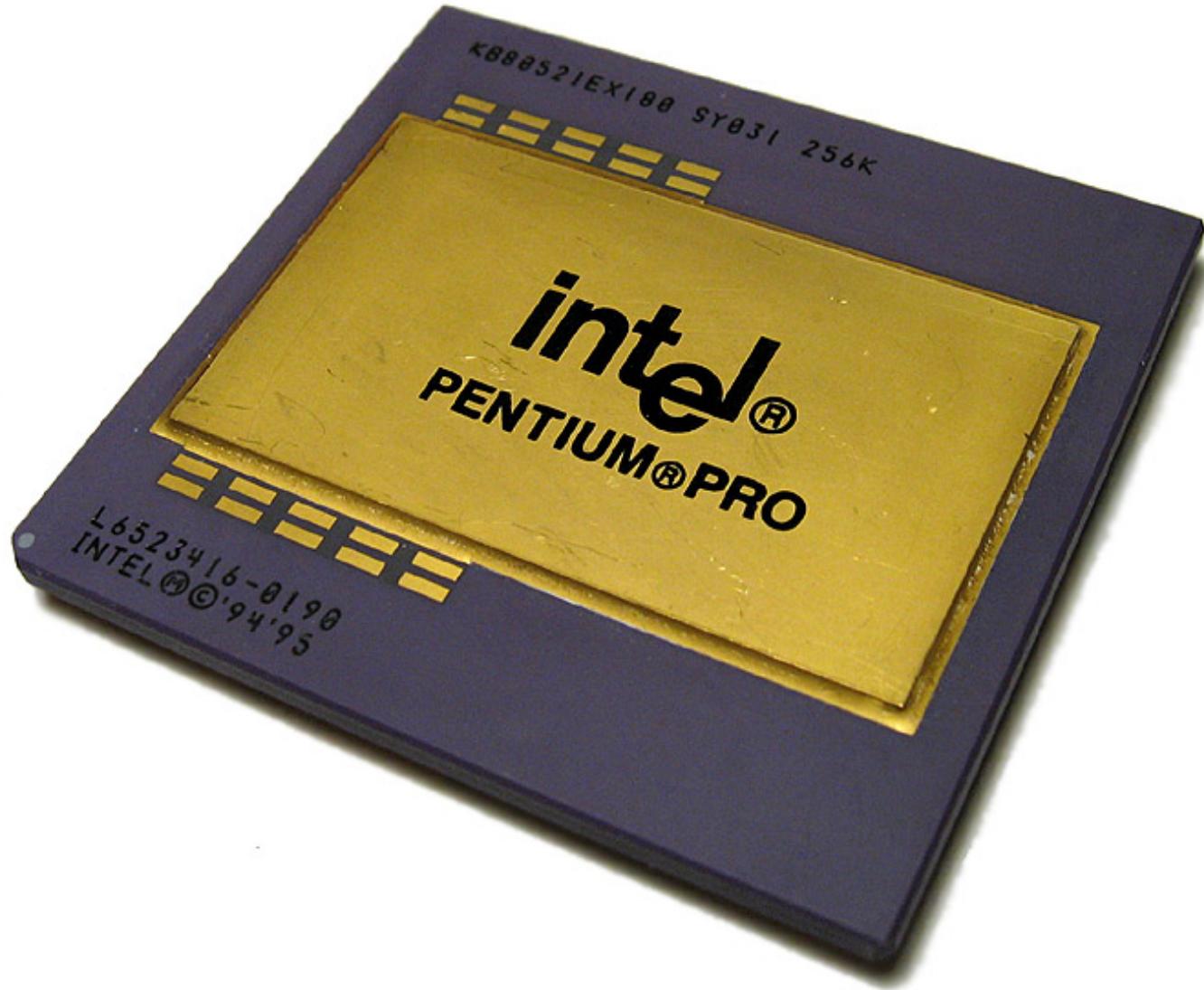
X Windows

- 1st version: 1984
- Your app is an "X client"
- "X server" provides KVM
- They communicate over a network
- Yes, you can run remote!
- But it's also slllooooowww

(and yes, it's still used in
ubuntu 18.04)



Want more?



The CPU wars

CISC

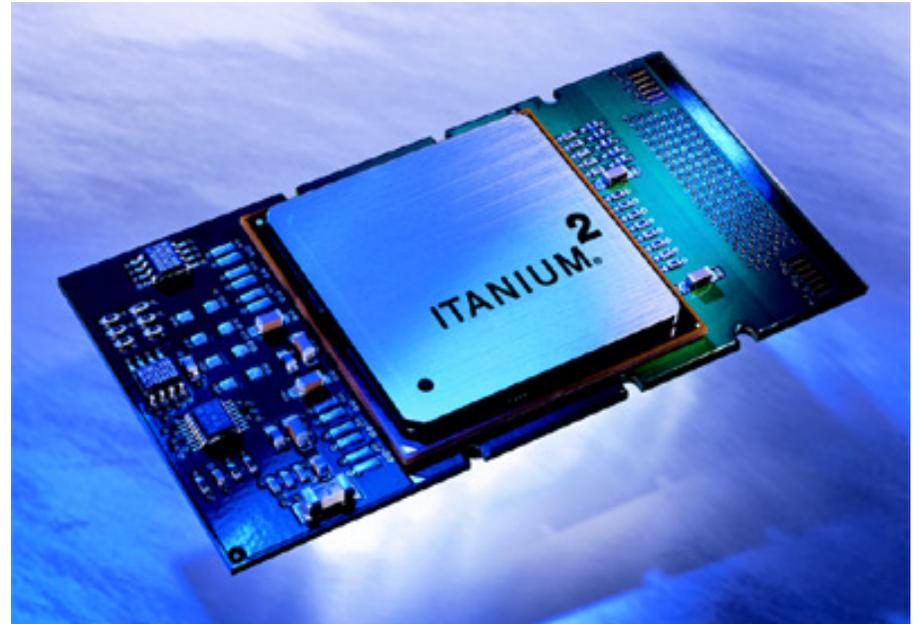
- high level instruction set
- Easy to program assembly with
- Intel sold cheap x86 CISC chips

RISC

- Low level instruction set
- Fast
- Easy to optimize
- High-end CPUs were mostly RISC

And then Intel won

- By the mid 90s Intel decided to move to RISC
- Everyone were using x86 instruction set
- Lots of proprietary (compiled) software
- Itanium shipped in 2001 and was a bust



Guess what Intel did



You guessed it

- Internal interpreter compiles CISC to RISC on the fly
- CPU works with compiled RISC microcode internally
- x86 instruction set compatibility
- Originally in Pentium Pro (1995)

So now we have RISC CPUs with CISC interface. Brilliant.

Had enough?

- QWERTY
- tar
- DNS
- Email (SMTP)
- NTP



Bonus points:

What is a CR-LF ?

What is Caps Lock?



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You think that's bad?

- Airplanes
- SMS
- Credit Cards
- F*cking nuclear missiles

VOIP running over DSL over analog phone line

I wasn't kidding about the nuclear missiles



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How the #\$\$@% did
this happen

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Infrastructure

- Physical
- Logistics nightmare
- Common dependency
- Hardware, no SW upgrade

Protocols

- Hard to replace
- No attention to *compatibility*
- Standards (or lack of)
- Abstractions
- "Network effect"

Deprecation

- No deprecation plan
- Deprecation was never a feature
- What if the 3rd parties refuse?

For the love of God

Build Deprecatable systems

Or a at least upgradable



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Every good thing must come to an end

- Have a deprecation plan
- Extensible protocols
- Data export
- If it's active, it should be maintained
- Upgradable or Replaceable

Thank you

