What is wrong with Operating Systems? (and how do we make things better)

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From computers to computing
"artist's" rendition of all software (actual implementation may vary)
What does an OS do?

**Supporting applications**

1) enabling
2) abstracting
3) isolating
4) monitoring
+ orchestrating
What does an OS do?

**Supporting applications**

1) enabling  =>  getting ready
2) abstracting =>  drivers
3) isolating  =>  can't do
4) monitoring =>  info
+ orchestrating
I have no quarrel with you, good sir OS, but I must cross this bridge.

Monty Python
Monty Python
Handle normal and worst cases separately

The normal case must be fast.

The worst case must make some progress.

Butler Lampson
Hints for Computer System Design (1983)
Handle normal and worst cases separately

In most systems it is all right [...] even to deadlock the entire system, as long as this event is detected automatically and doesn’t happen too often. The usual recovery is by crashing some processes, or even the entire system. At first this sounds terrible, but one crash a week is usually a cheap price to pay for 20% better performance. Of course the system must have decent error recovery, but that is required in any case, since there are so many other possible causes of a crash.

Butler Lampson
Hints for Computer System Design (1983)
A good driver is hard to write
The need for drivers does not imply the need for an OS
Every problem in operating systems can be solved by removing layers of indirection.
“There's no such thing as #1”
Userspace vs Kernelspace
Microkernels vs Virtualization
A good driver is hard to write
is easy to run
Hardware

/software would be so much fun without it/
Recap

1: application('s) rules
2: when in doubt, leave it out
3: bad granularity
4: bootstrap and evolve
5: if all you have is a hammer, you'll also have a sore thumb