



School of Computer Science & Engineering  
**Trustworthy Systems Group**

# LionsOS

**Fast – Secure – Adaptable**



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<https://microkerneldude.org/>

# Why LionsOS?

seL4's assurance and power are (still!) unrivalled

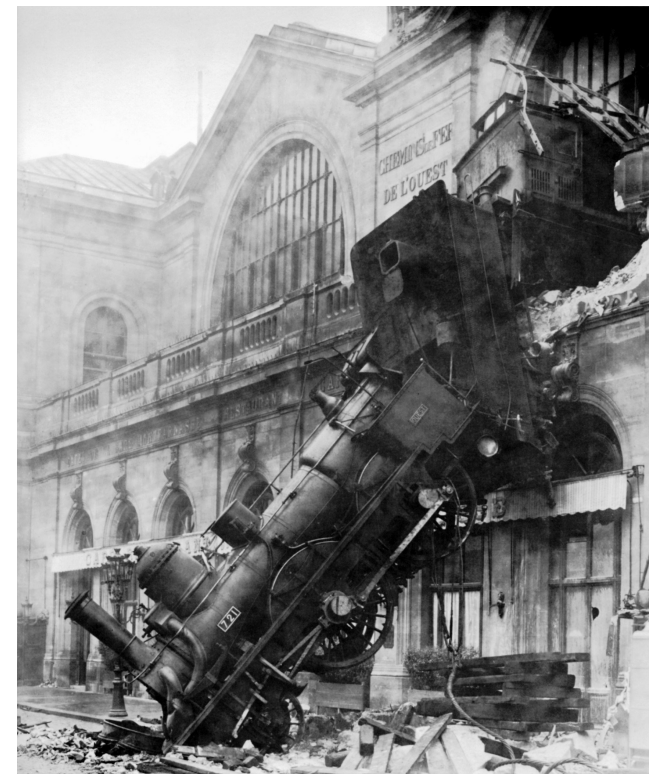
TS contributed some poor designs too!

... but good design on seL4 requires deep expertise

Rare beyond TS and ex-TSers

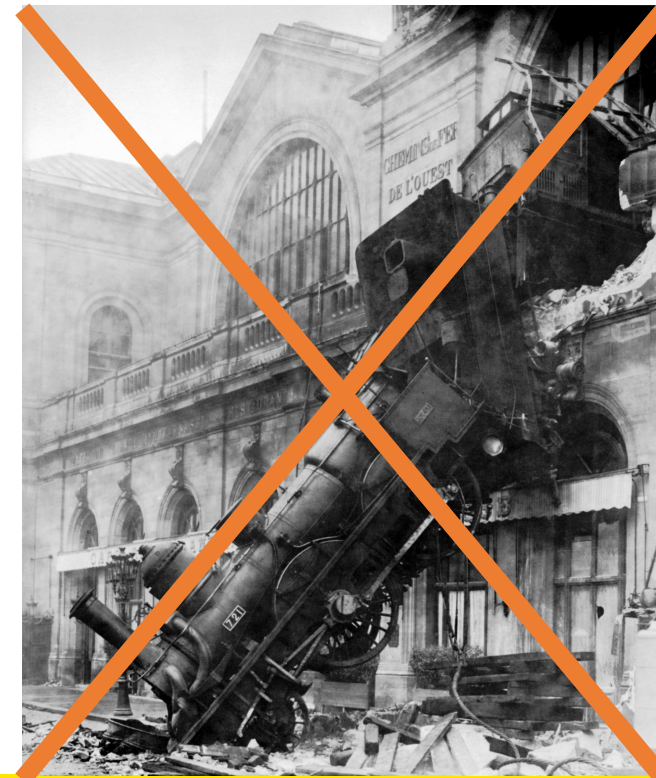
The seL4 community needs an OS that is:

- well designed
- easy to use
- open source

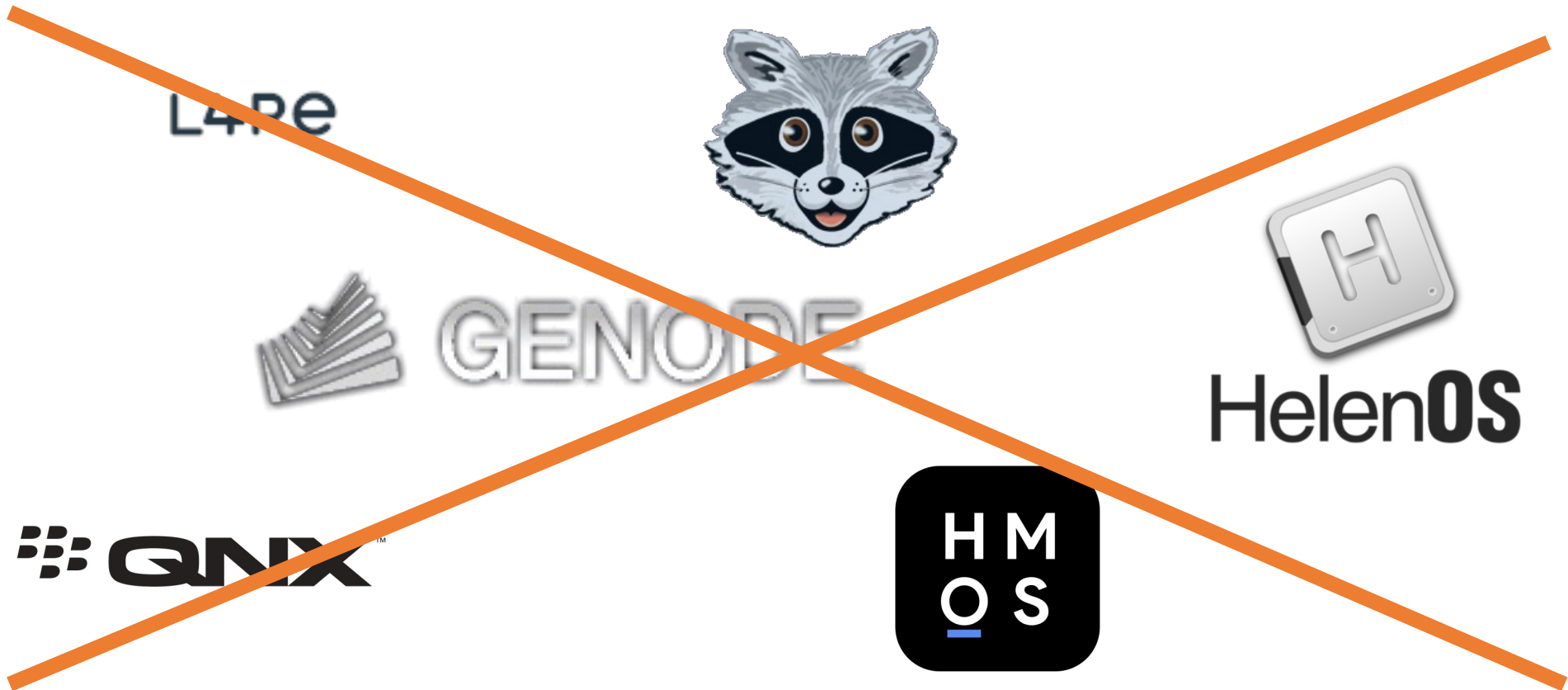


# LionsOS

Stop The Train Wrecks!



# Re-Inventing Unix (Again)?





# LionsOS Aims



**Aim 1:** *Practical, easy-to-use, open-source OS for wide range of embedded/IoT/cyberphysical use cases*

Must be well designed!

**Aim 2:** *Best-performing microkernel-based OS ever*

Can use static architecture

**Aim 3:** *Most secure OS ever*

Must be verified!



# Overarching Design Principle: KISS!



Helps development  
**and** verification!

LionsOS is what  
Posix/Unix isn't!

## Radical simplicity:

- fine-grained modularity,  
strict separation of concerns
- event-driven programming model
- use-case-specific policies

... but we'll  
have Posix-like  
I/O wrappers

Use-case diversity by  
replacing components

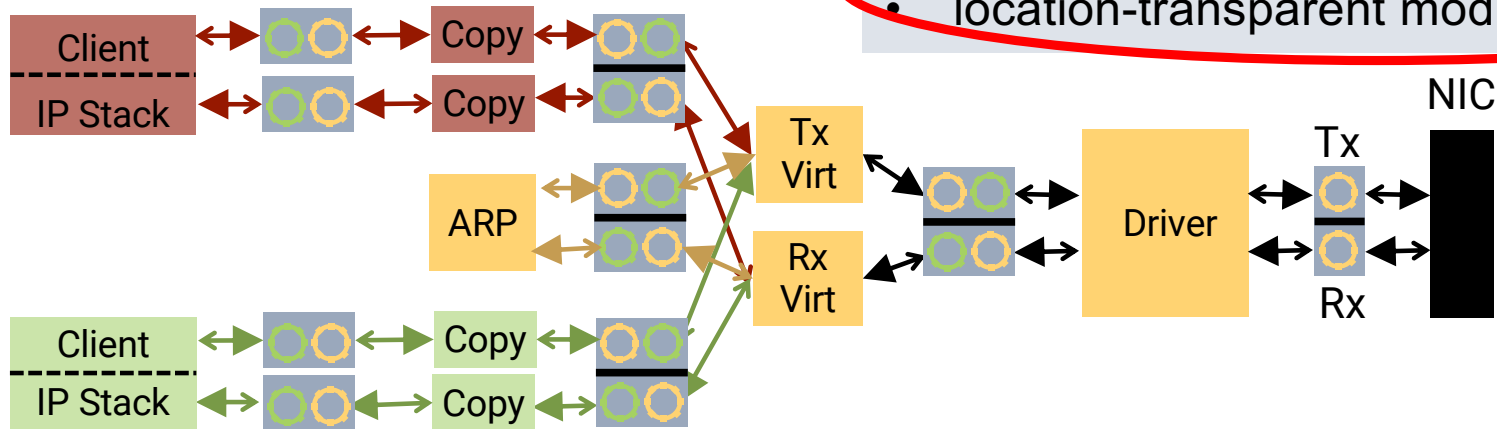


# Successfully Trialled With sDDF



## seL4 Device Driver Framework:

- fine-grained modularity
- event-driven programming model (Microkit)
- use-case-specific policies
- asynchronous, zero-copy communication
- location-transparent modules



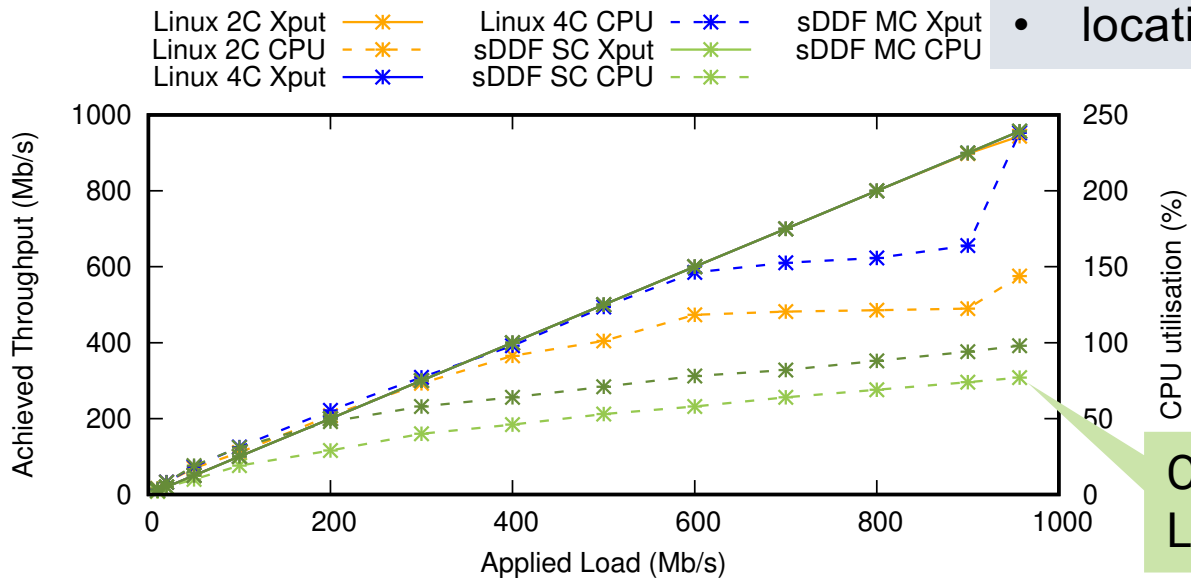


# Successfully Trialled With sDDF



## seL4 Device Driver Framework:

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Outperforms Linux!

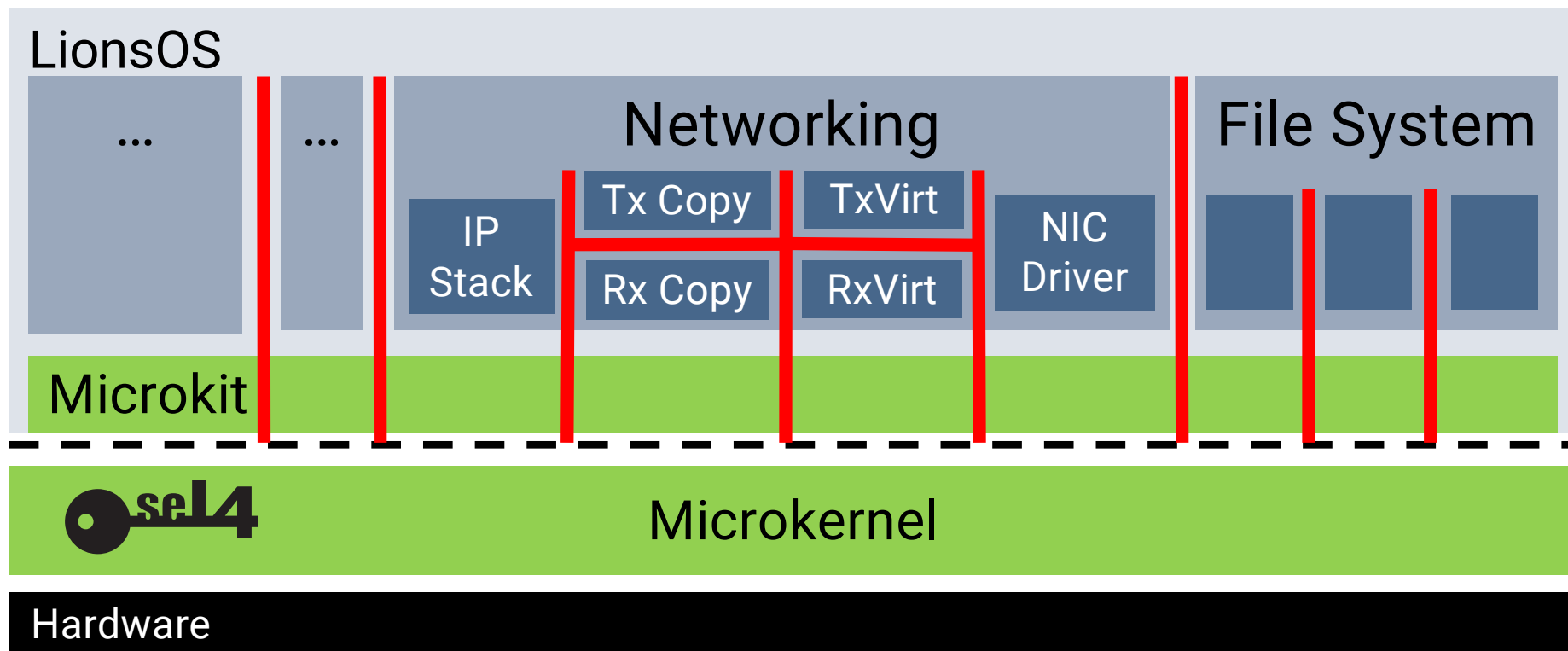




# LionsOS: Based on Microkit + sDDF

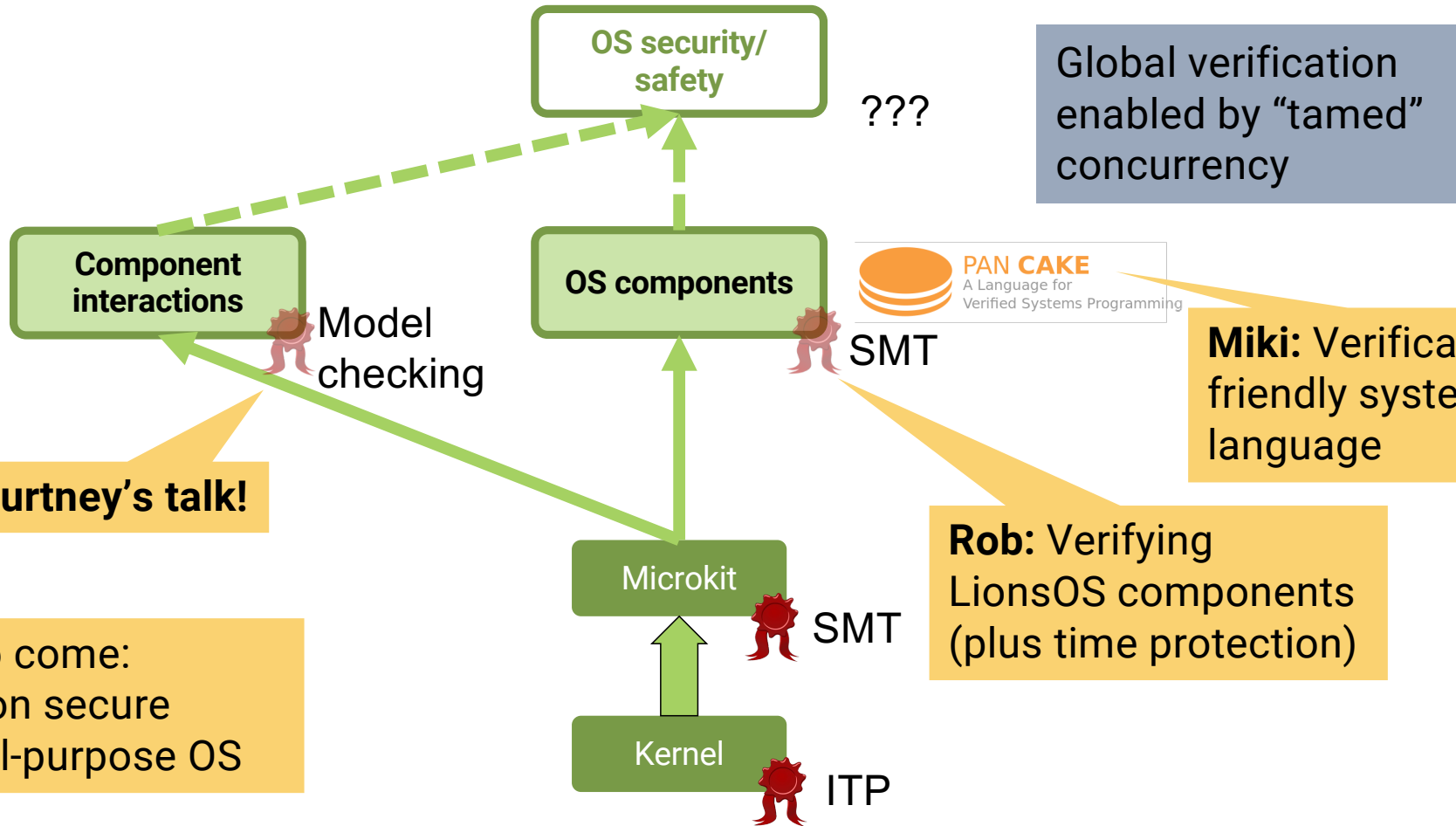


Details in Ivan's talk!





# Verifying Lions OS



Also to come:  
Alwin on secure  
general-purpose OS



# What's In a Name?

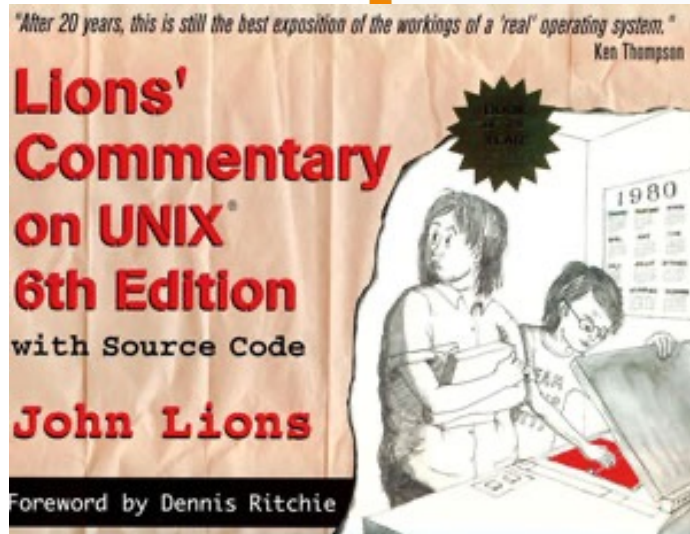


- [https://en.wikipedia.org/wiki/John\\_Lions](https://en.wikipedia.org/wiki/John_Lions)

## John Lions

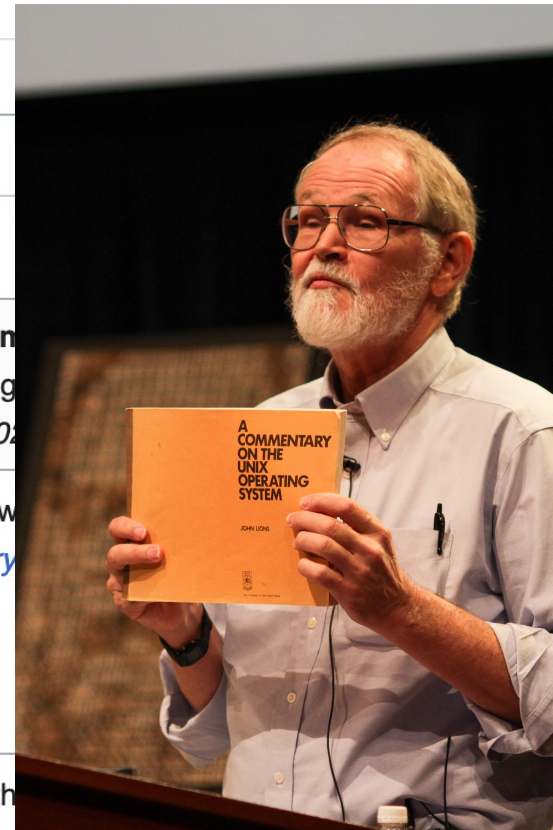
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ew of all important aspects

**John Lions**





Security is no excuse  
for bad performance!



<https://trustworthy.systems>