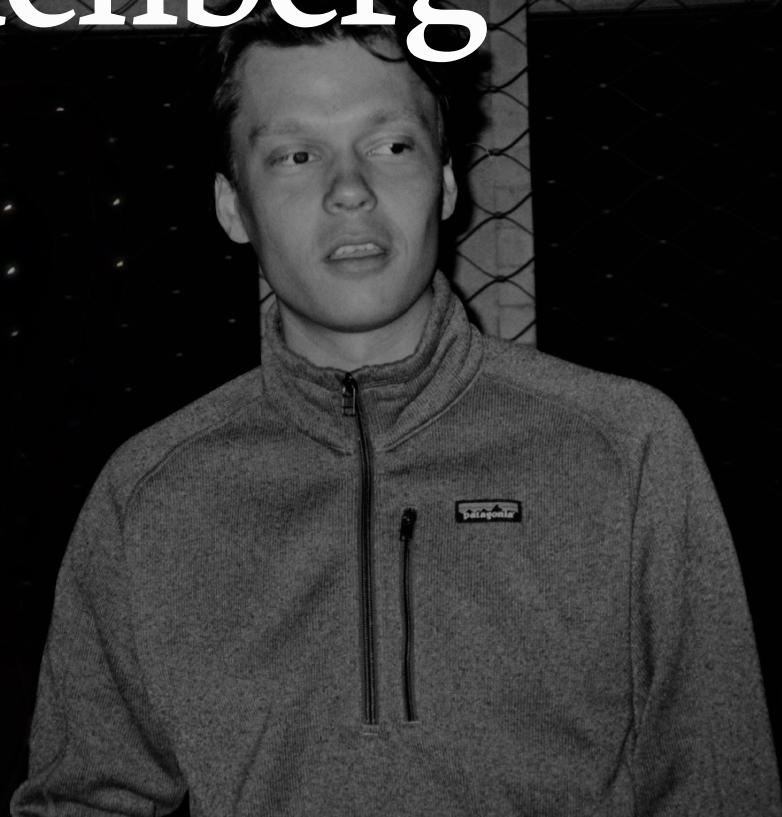


The Coming OS Revolution

Smarter Operating Systems will use **WASM**

Jonas Kruckenberg

- Previously Tauri
- TC39 Invited Expert
- ~2 years OS development
- Favorite artists: Vampire Weekend, Vulfpeck, Gustav Mahler







Thirst for compute

Do the thing faster!

- Increase clock speeds
- Bigger pipelines
- Smaller manufacturing nodes
- Problems: Heat & Cost

Growing Workloads

Do the thing faster!

- Increase clock speeds
- Bigger pipelines
- Smaller manufacturing nodes
- Problems: Heat & Cost

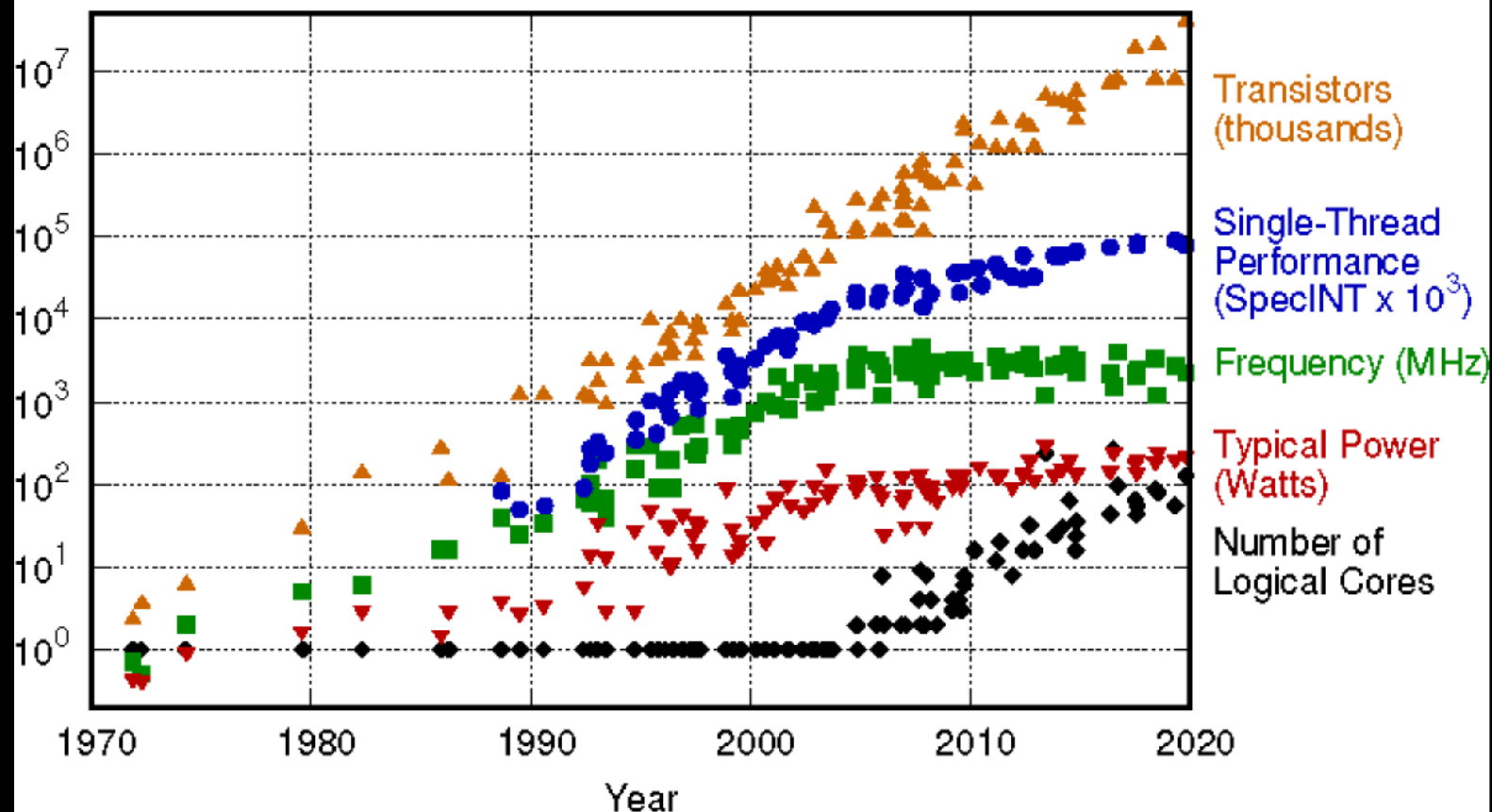


Do many things at once!

- Multiple cores
- Single-instruction multiple-data (SIMD)
- Cheaper to manufacture
- Problem:

Humans suck at parallelism

48 Years of Microprocessor Trend Data



Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten
New plot and data collected for 2010-2019 by K. Rupp

Cybersecurity

- “Commercial” and State-sponsored
- War and conflicts are also fought in cyberspace
- Computer adoption expected to grow worldwide

Cybersecurity will only become
more important

This is
exciting!

k23

Knowledge

- More declarative
- Easier to analyze

Sandboxing

- Tighter packing of modules/components
- Better use of machine resources

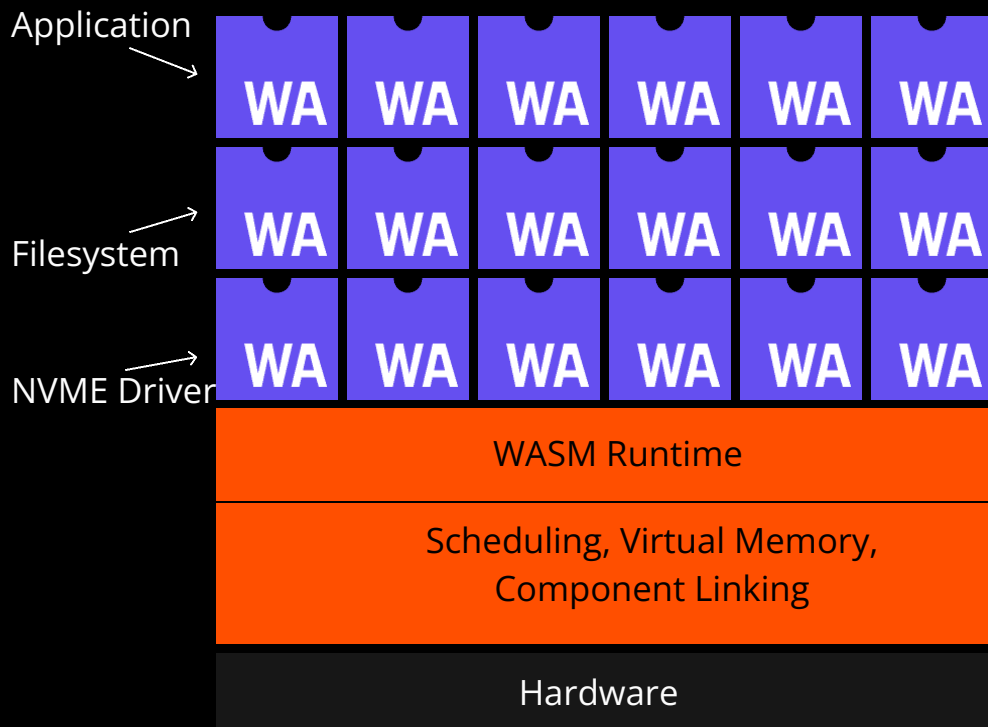
JIT Compiler

- Heterogeneous architectures
- Incredibly powerful

ELF/PE



k23



k23



WASM Runtime

Scheduling, Virtual Memory,
Component Linking

Hardware



WASM as
Executable Format

Debugging | Profiling | Observability

Microkernel
Architecture

k23

Lightweight
Tasks



Written
in Rust

Massive
Concurrency



Aarch64 | x86 | RISC-V

Project Status

Completed

- RISC-V Support
- Virtual Memory Subsystem
- Task System & Scheduler
- IO / Interrupt Reactor
- Timers
- WASM Engine
 - Cranelift
 - WASM MVP
 - Imports, Exports, Linking

Missing

- Host functions
- Drivers
- A million other things



WASM as
Executable Format

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k23

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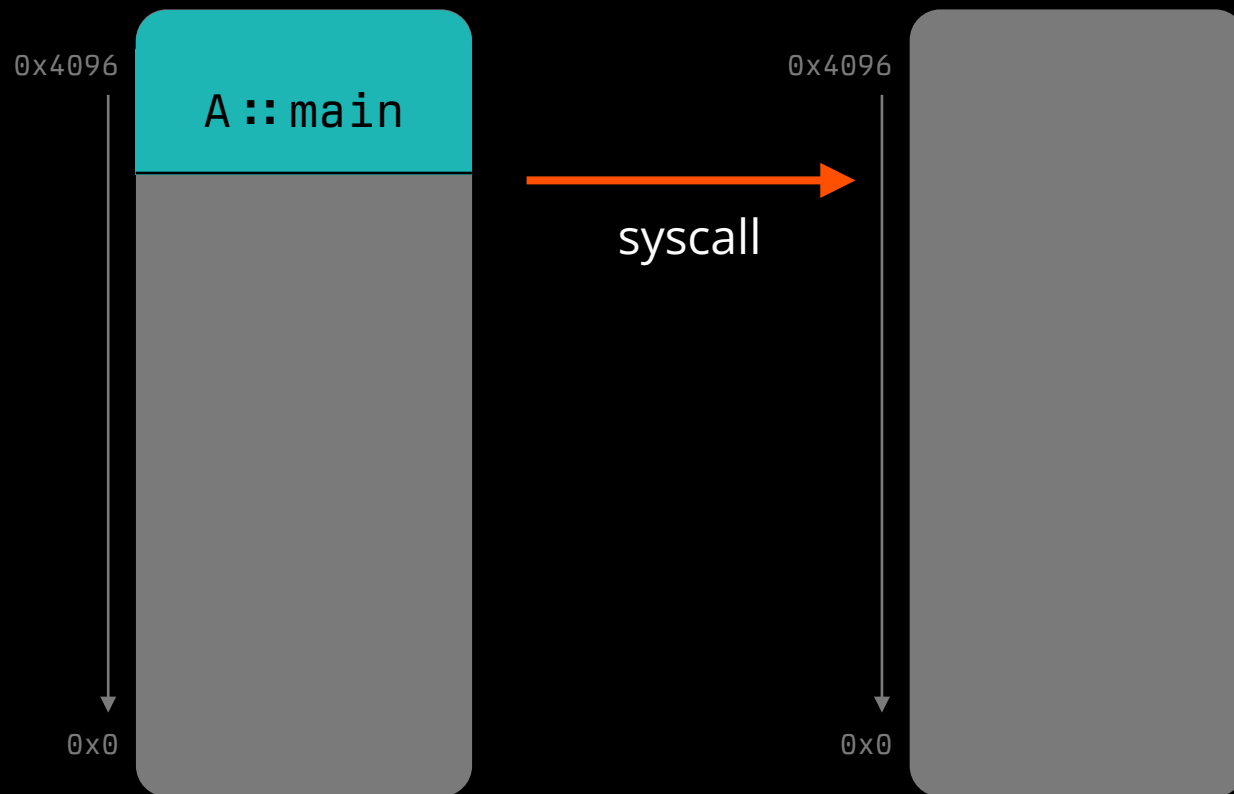
Massive
Concurrency

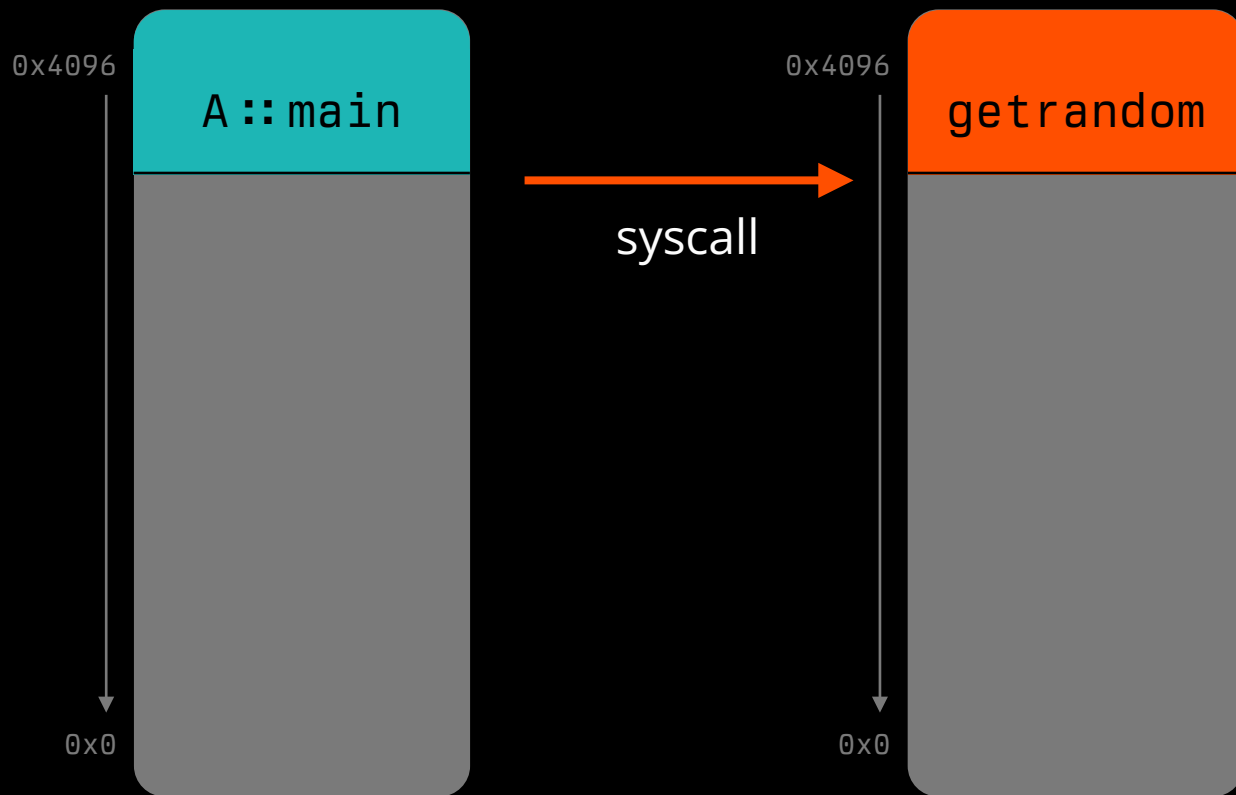


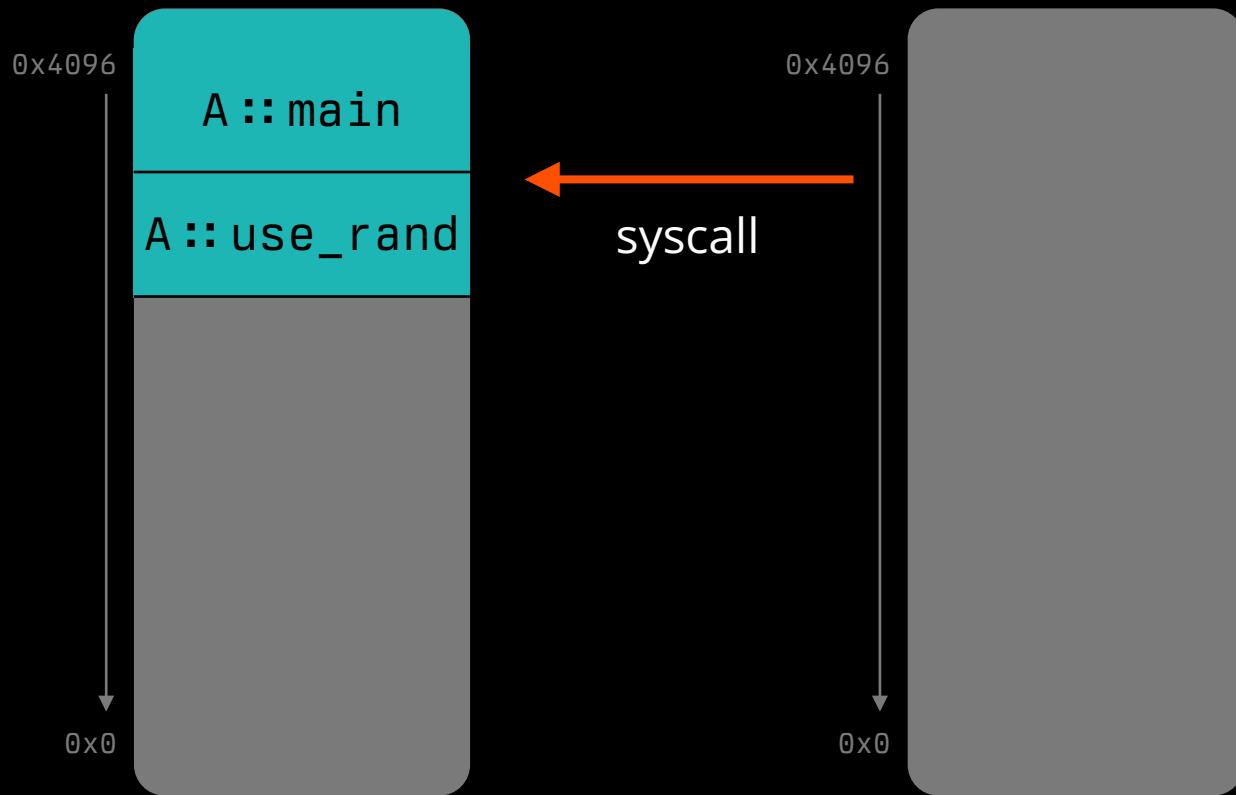
Aarch64 | x86 | RISC-V

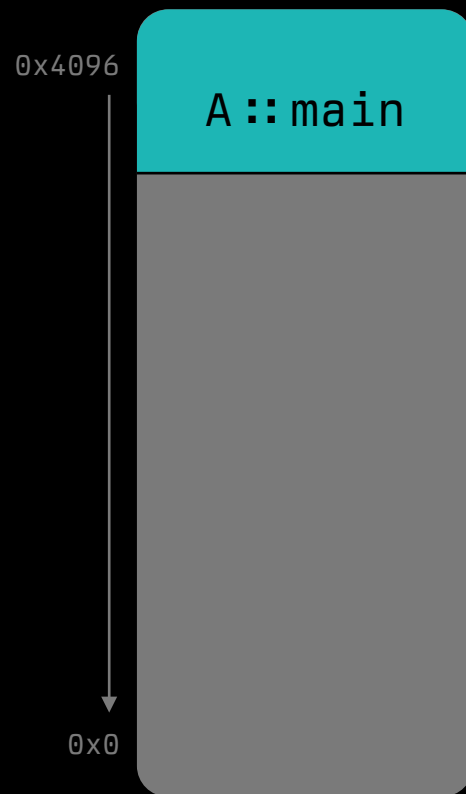




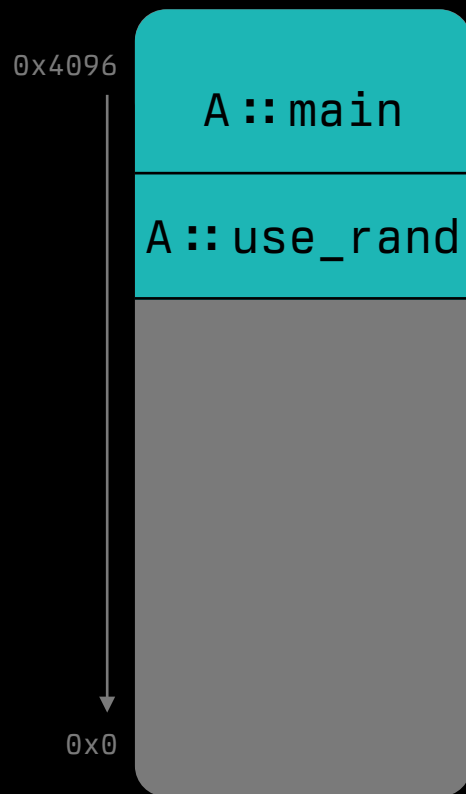




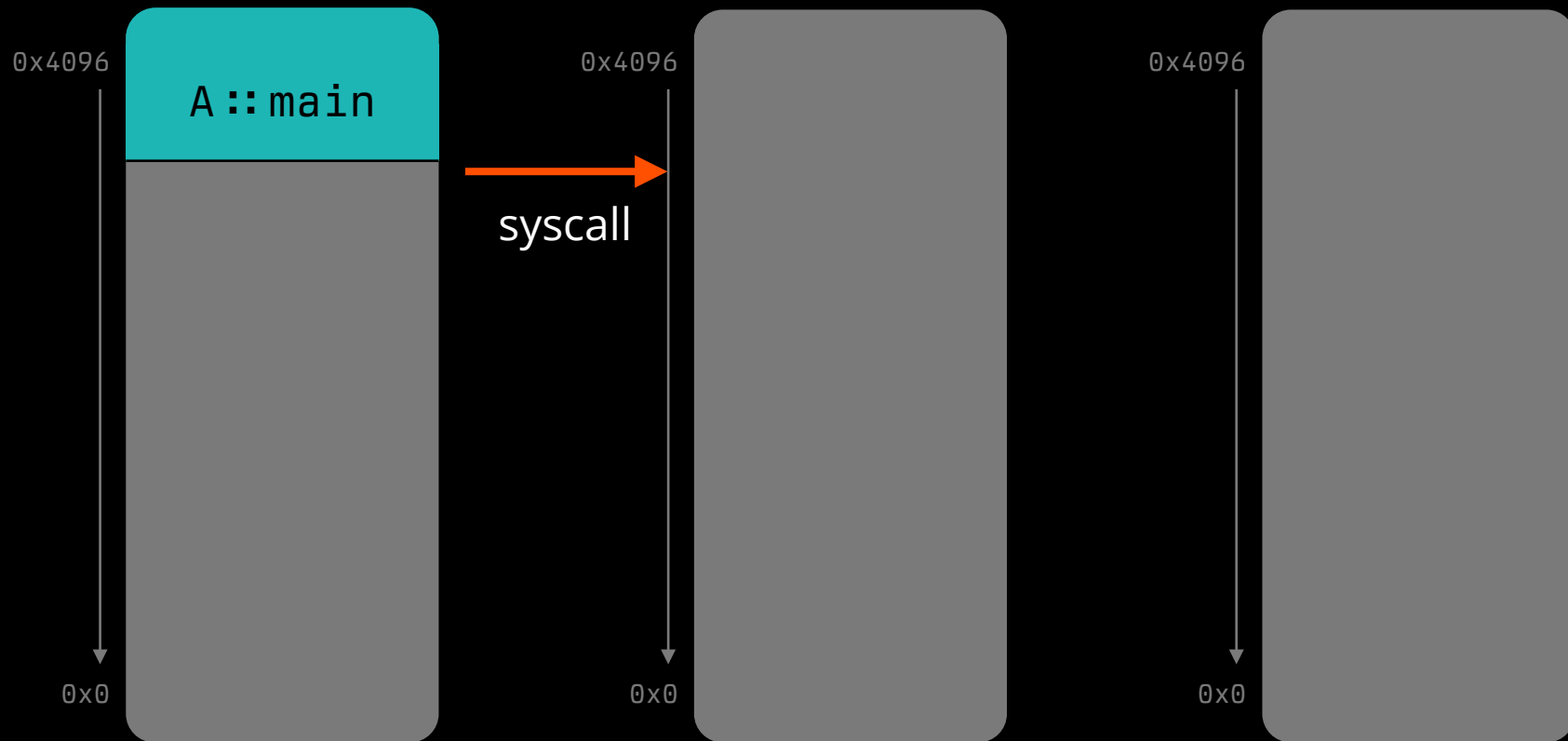


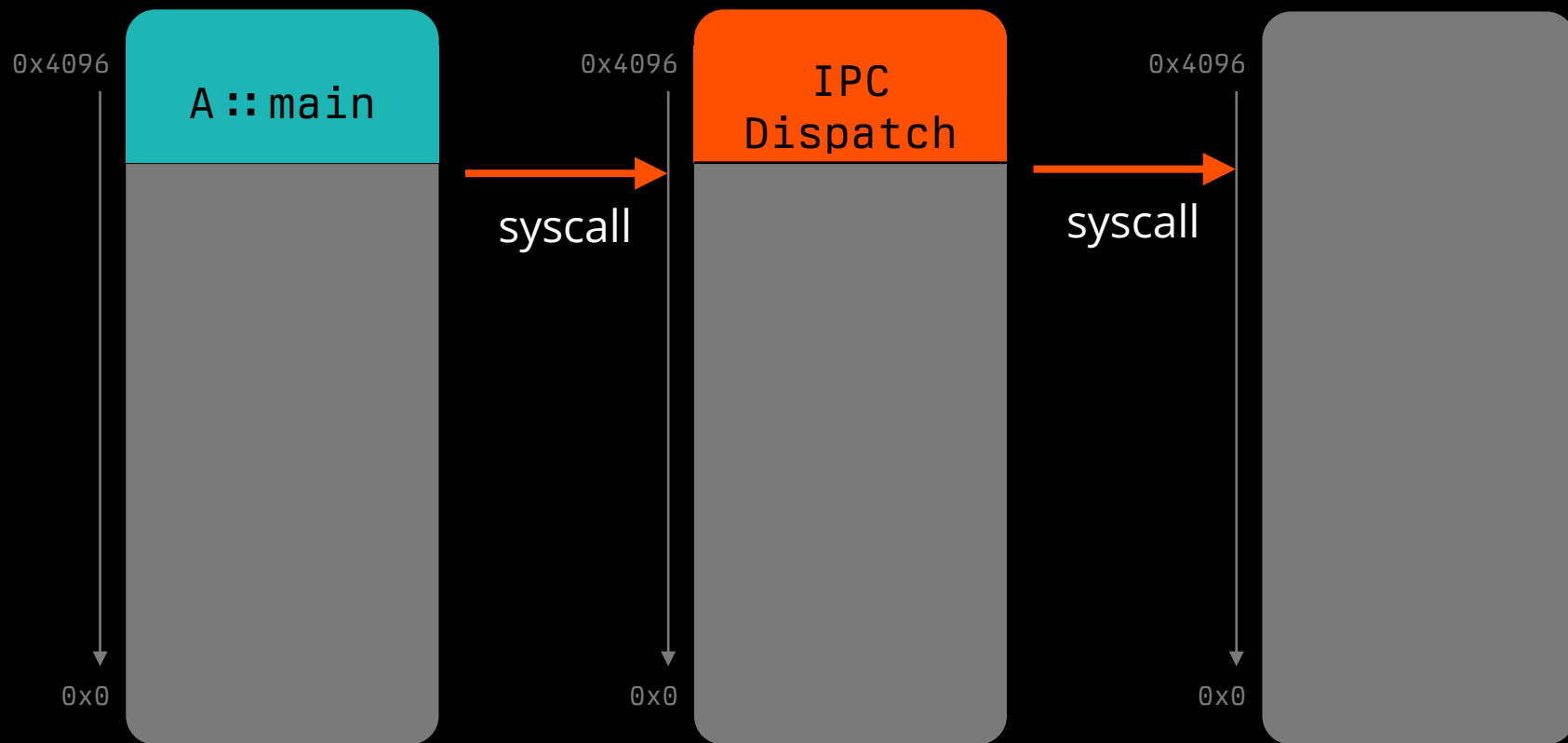


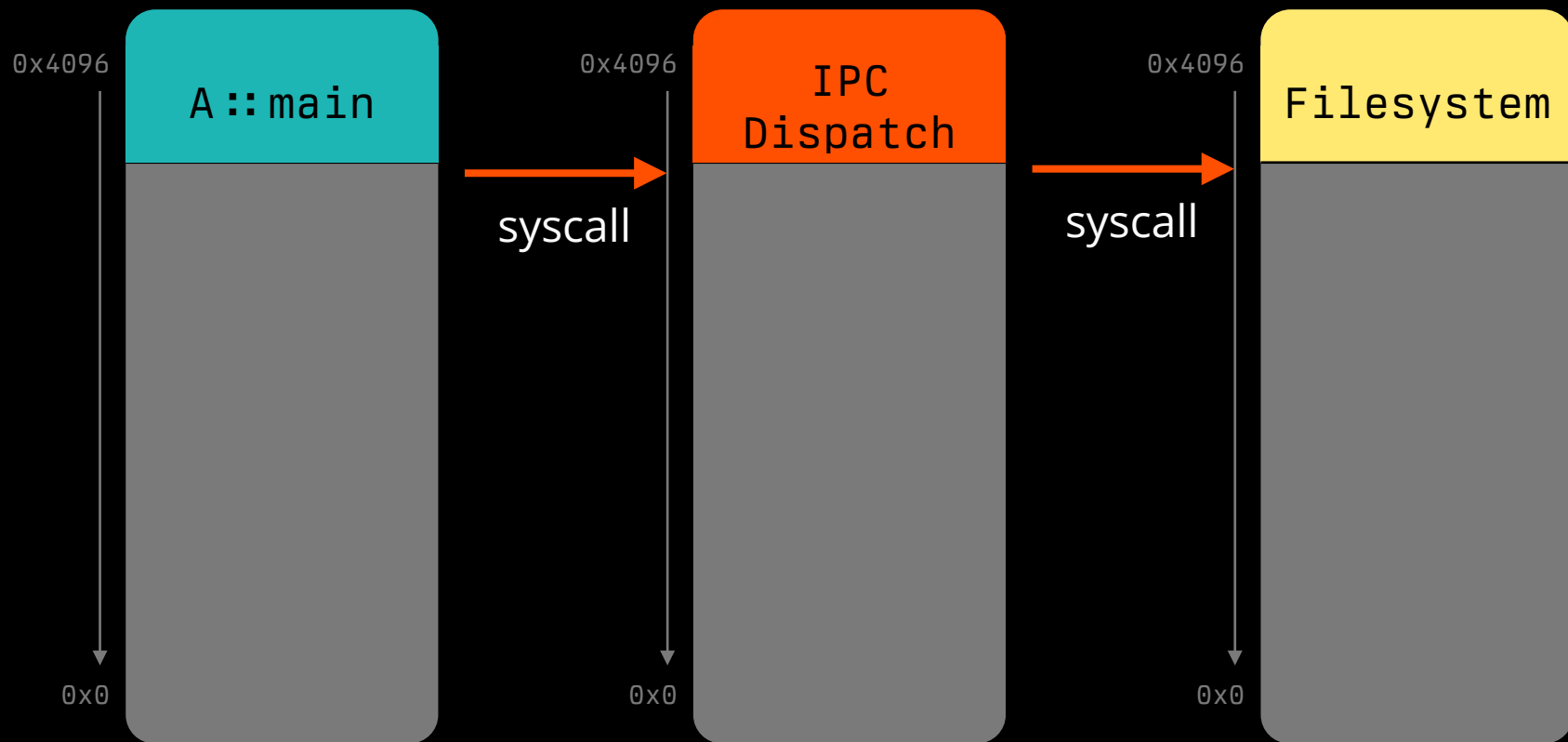


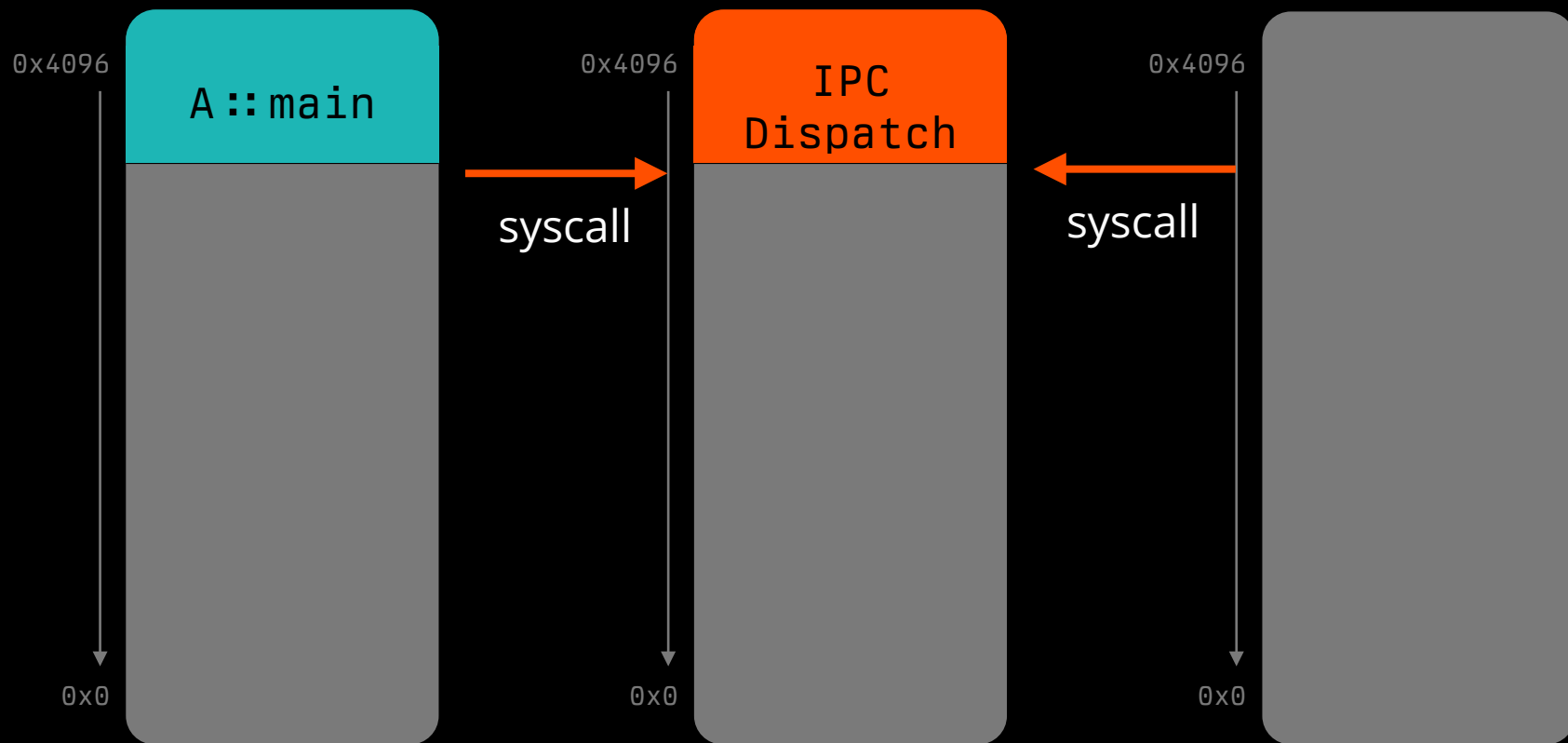


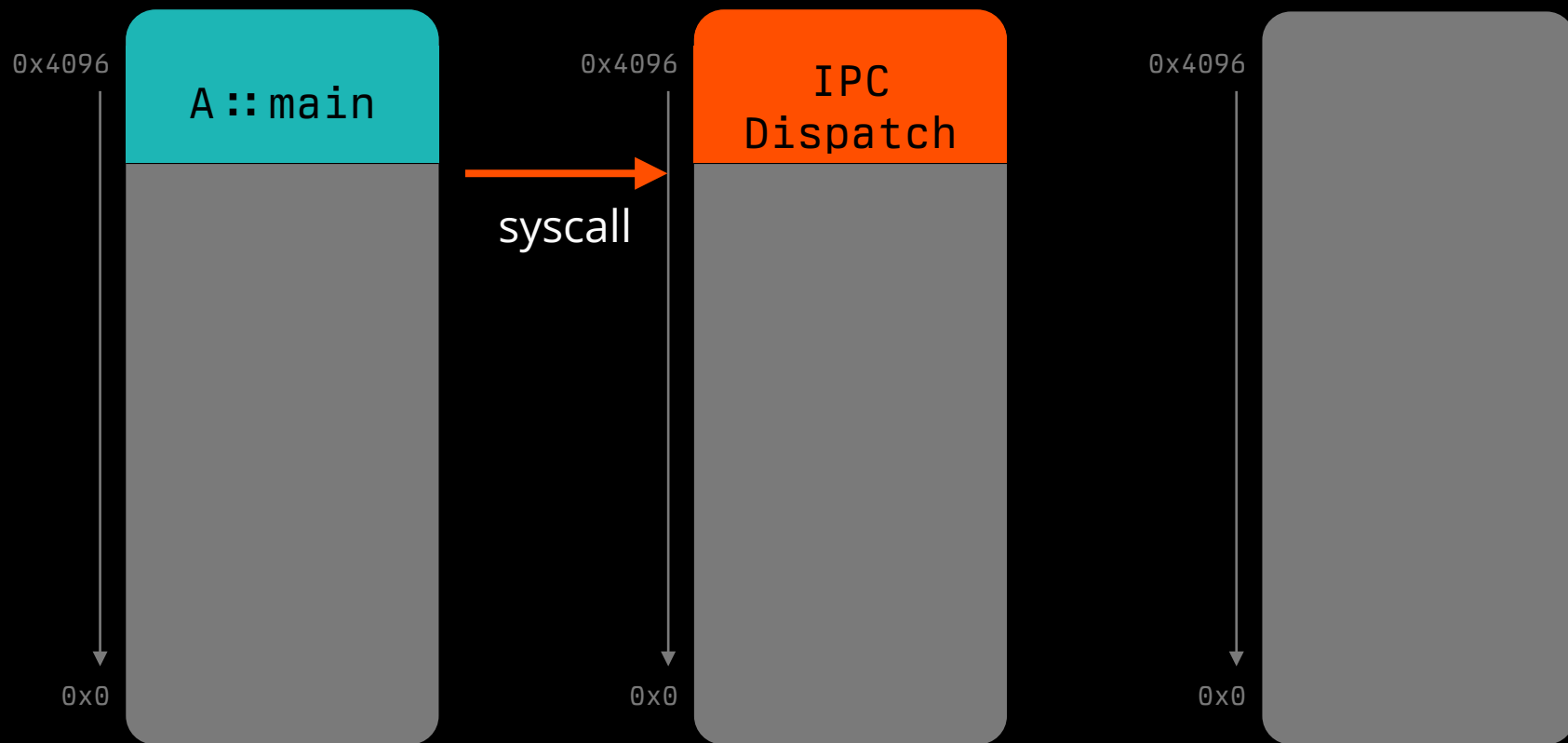


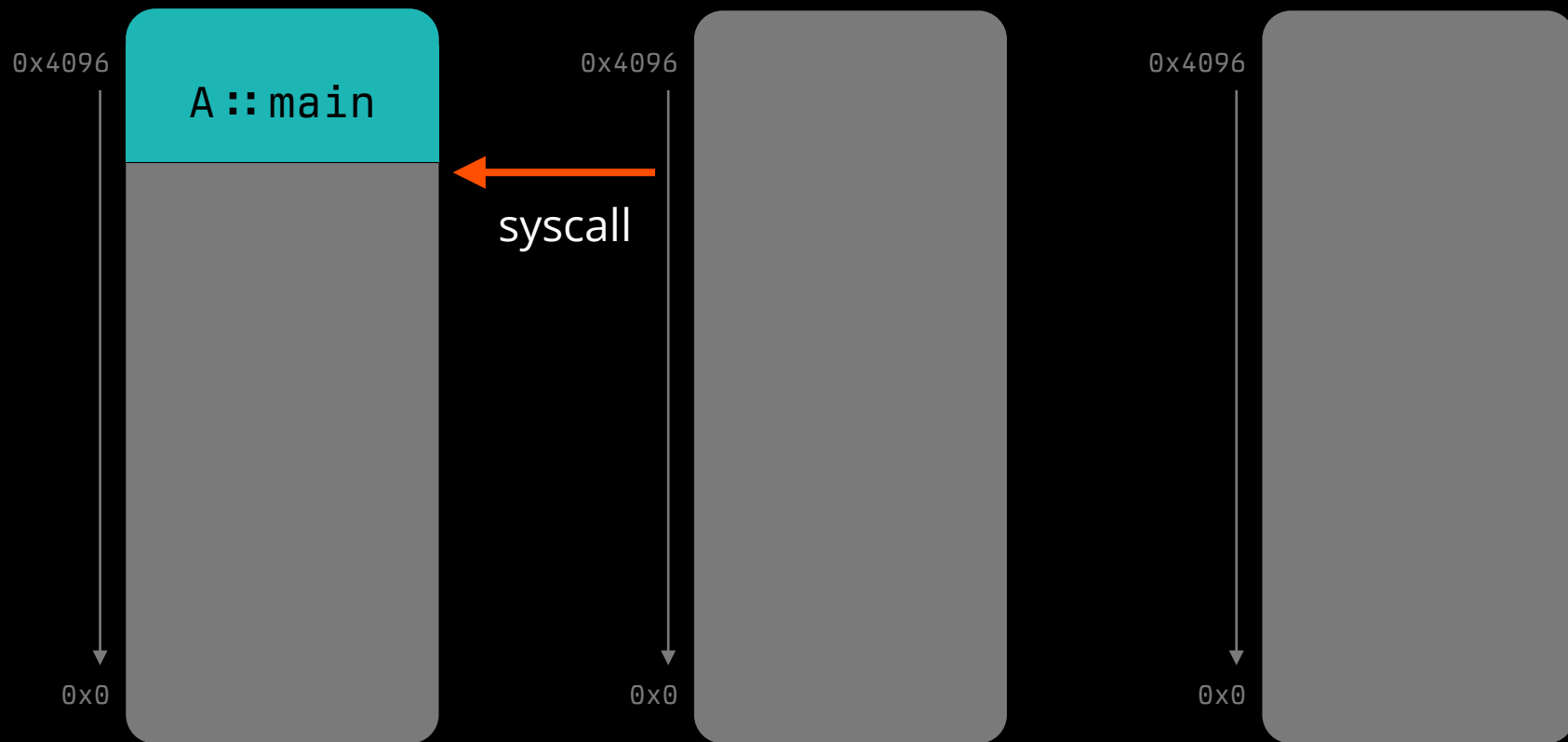


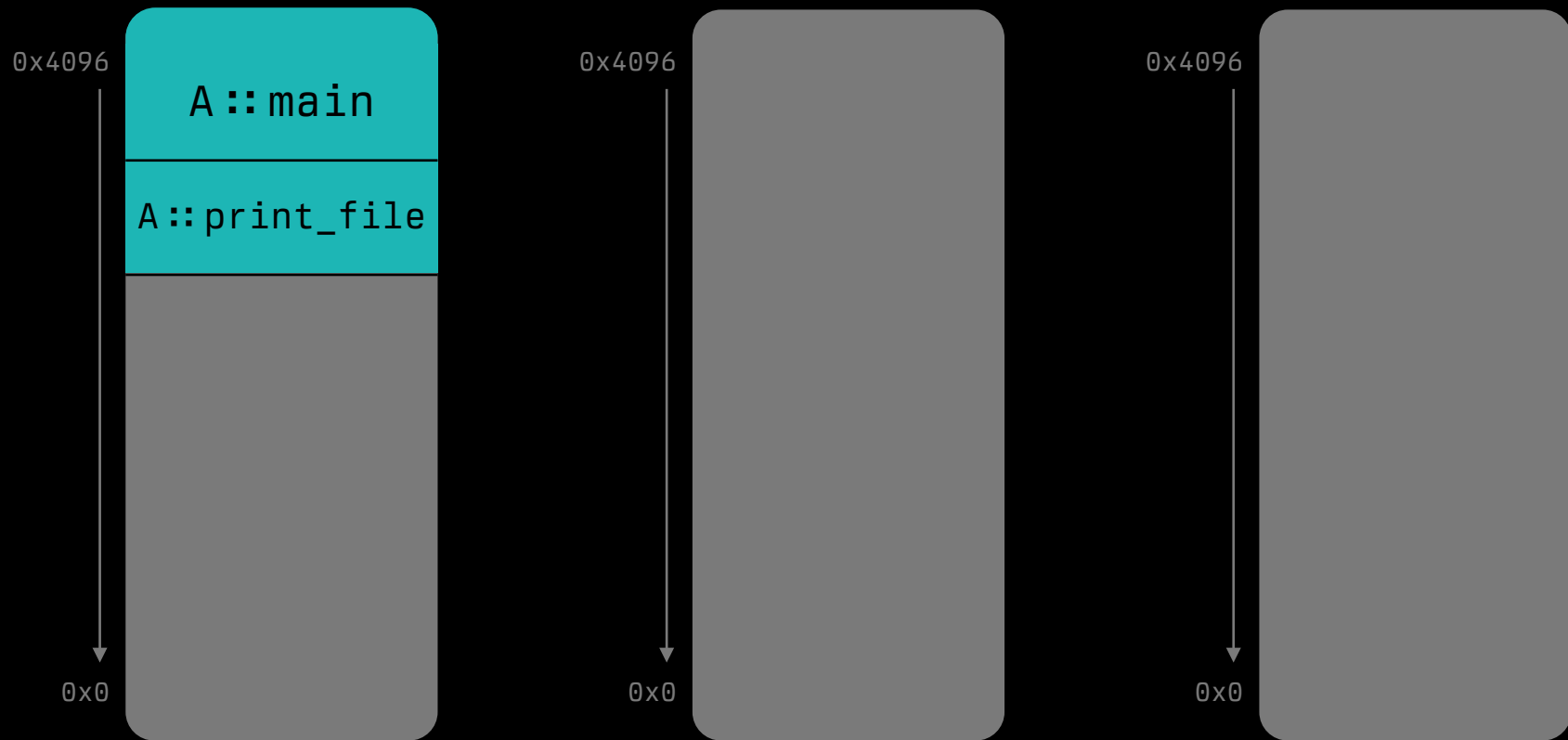


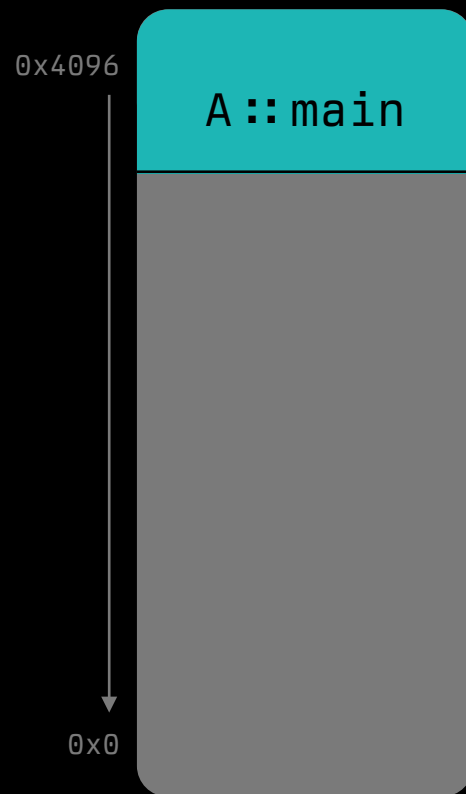


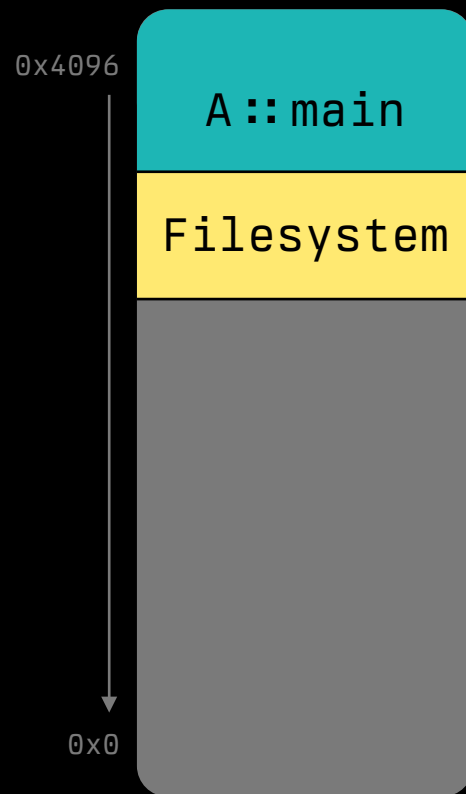


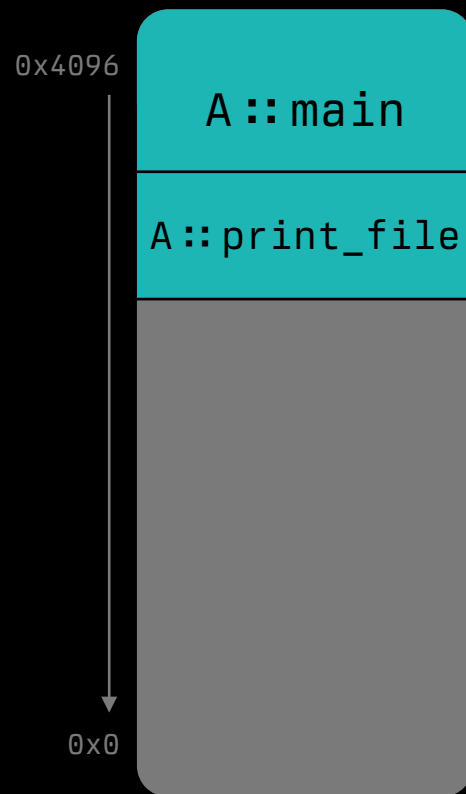


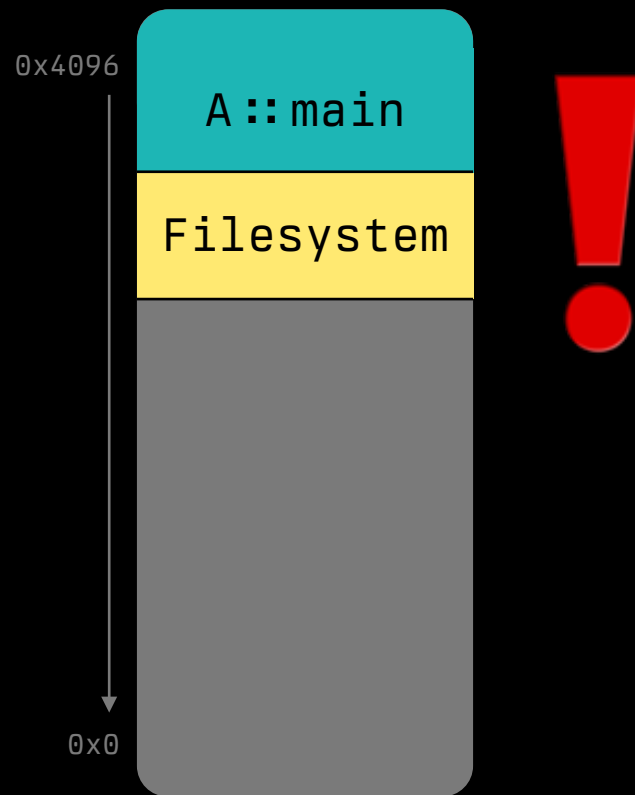












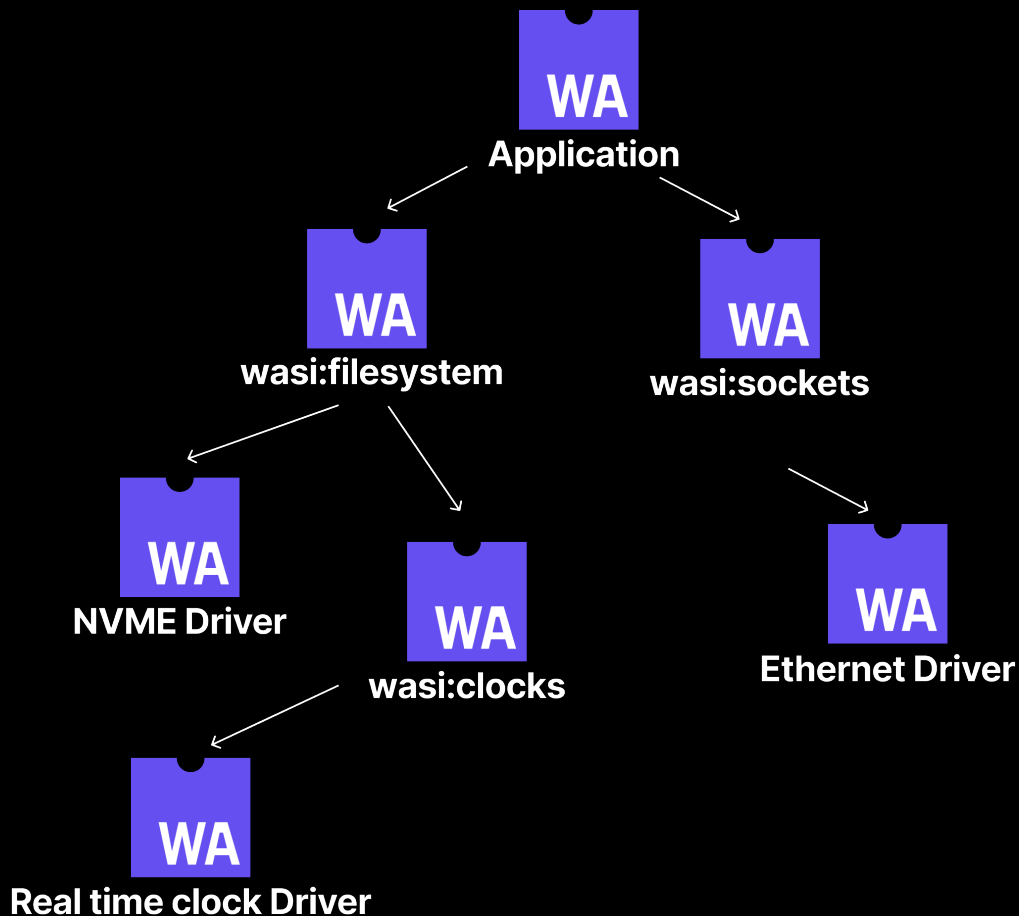
Component OS

Structured Compartments

- Composability
- Great for security

Dependency Management

- NixOS-style
- Reproducible, Reliable
- Only fetch what you need



The sales pitch

Hire me

iterpre@protonmail.com



more

Coffee!



@jonaskruckenber.de



@unsafe@webtoo.ls



@jonasKruckie

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