Hochschule **RheinMain**
University of Applied Sciences
Wiesbaden Rüsselsheim

Unikernels

No OS? No Problem!

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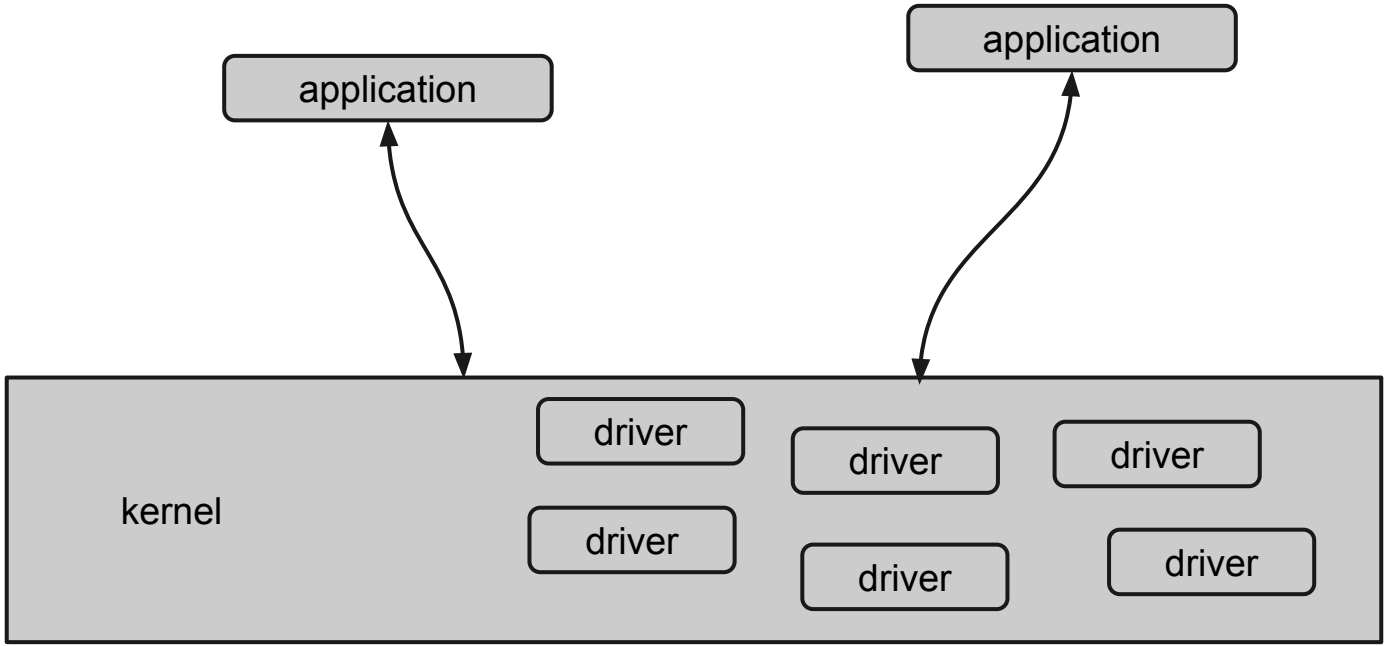
WAMOS 2015

Outline

- What is a unikernel?
- Rump Kernels
- Demo

What is a unikernel?



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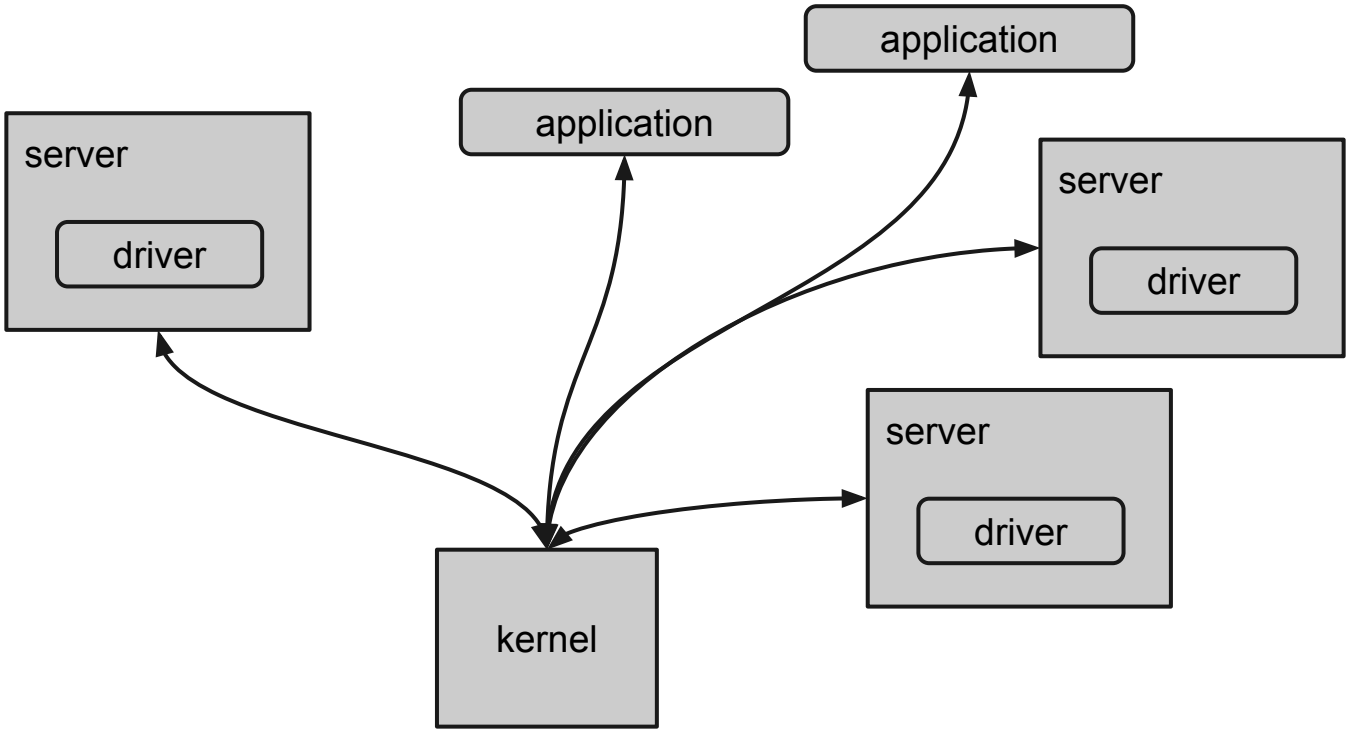

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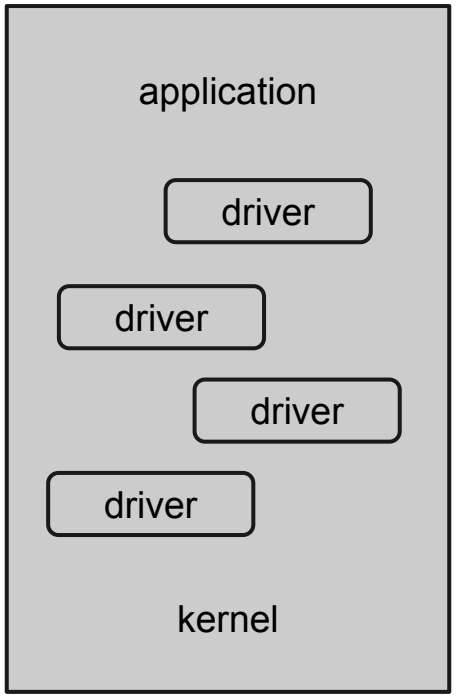


Rump Kernel

Aims to run anywhere

POSIX (and javascript)

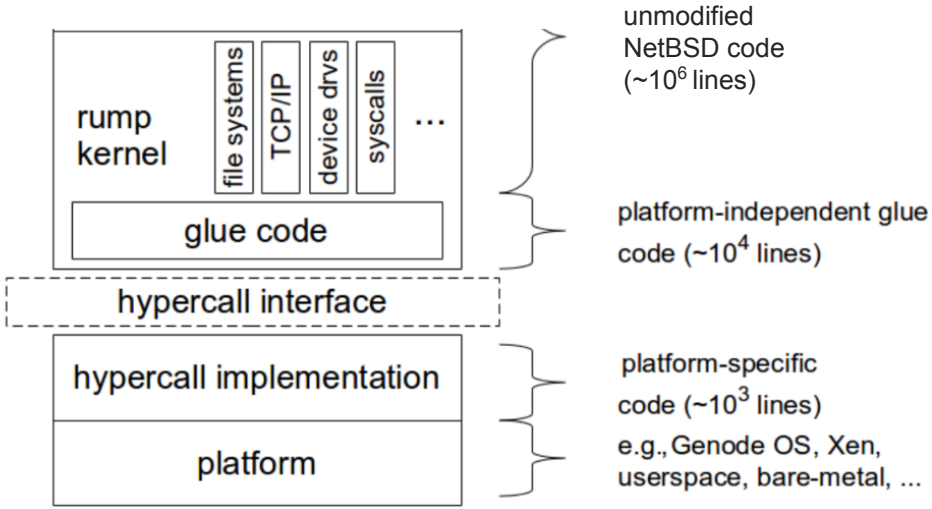
Linux

Xen

QEMU/KVM

bare-metal

Anykernel



Rump Kernel

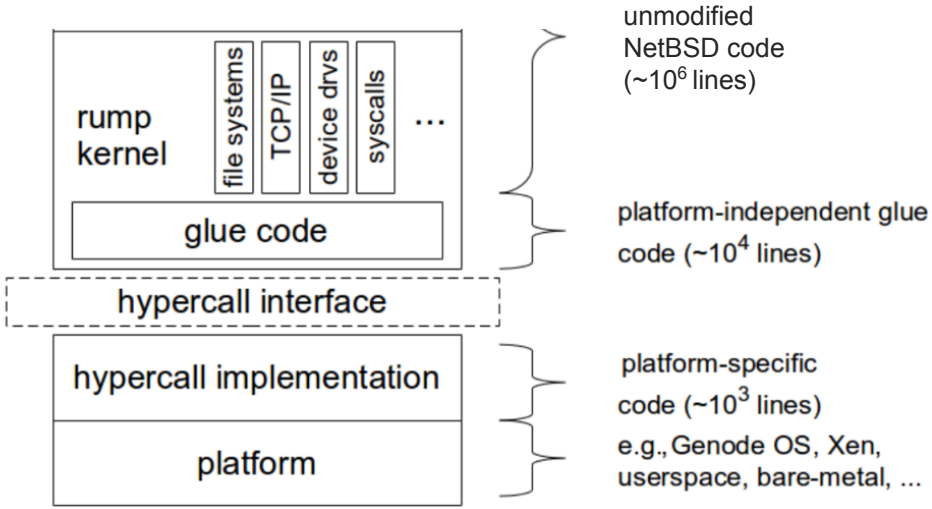
Aims to run anywhere

POSIX (and javascript)

Portable Operating System Interface
defines API for
Processes, Threads, Signals,
Timer, Pipes, I/O,
....

POSIX-compliant OS are
NetBSD, Contiki, PikeOS,
...

Anykernel



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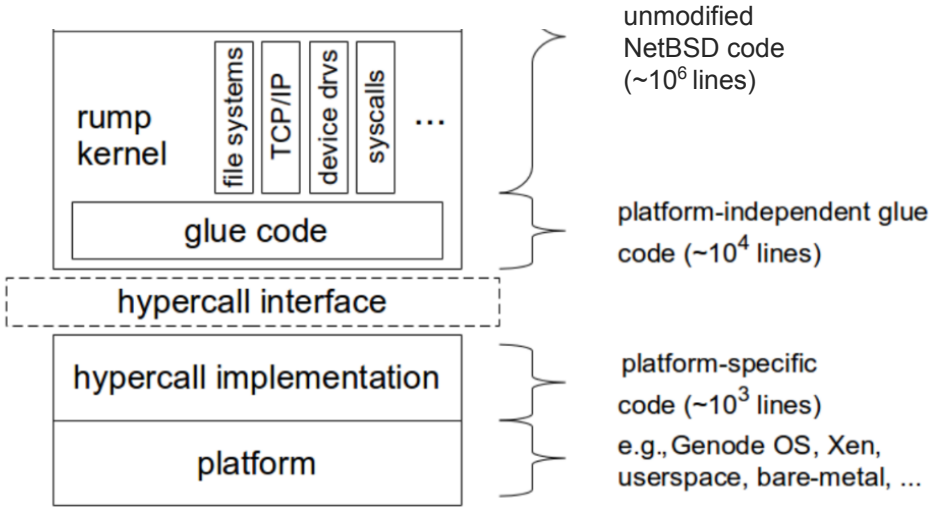
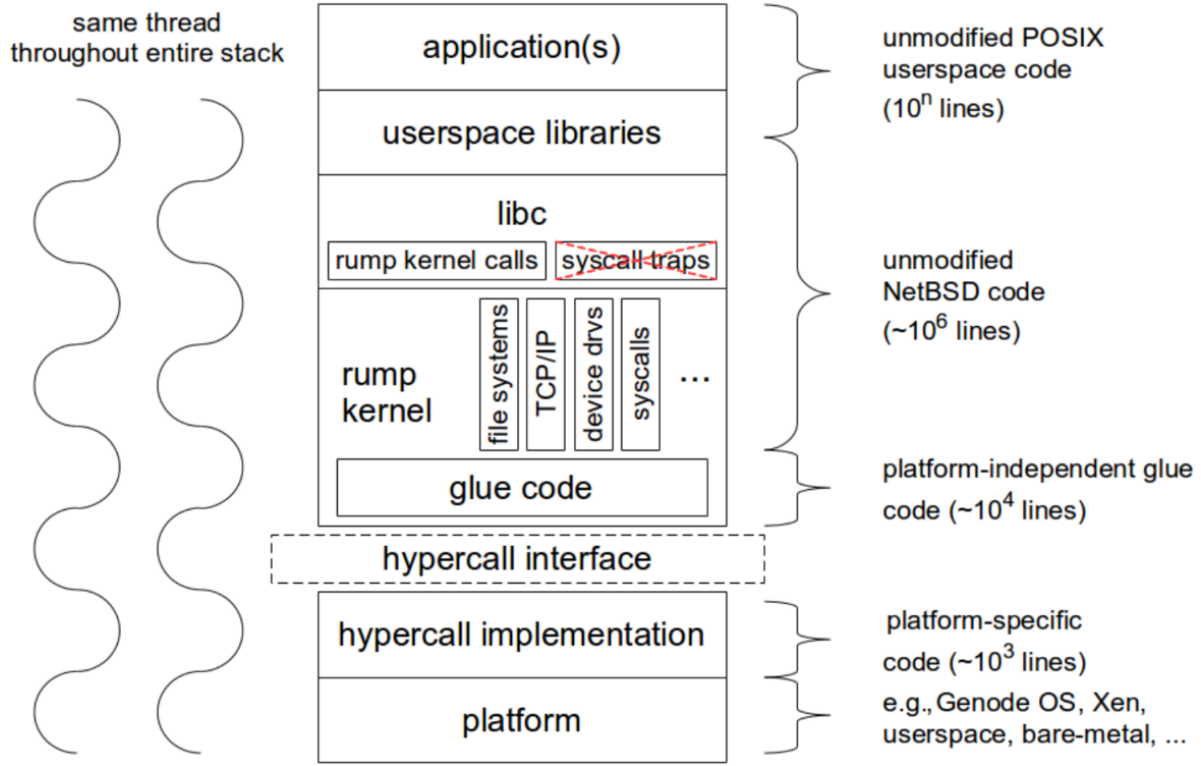


Rump Kernel


same thread
throughout entire stack
application(s)
userspace libraries
libc
rump kernel calls
syscall traps
rump
kernel
file systems
TCP/IP
device drvs
syscalls
...
glue code
hypercall interface
hypercall implementation
platform
unmodified POSIX
userspace code
(10^n lines)
unmodified
NetBSD code
(~10^6 lines)
platform-independent glue
code (~10^4 lines)
platform-specific
code (~10^3 lines)
e.g., Genode OS, Xen,
userspace, bare-metal, ...

Rump Kernel

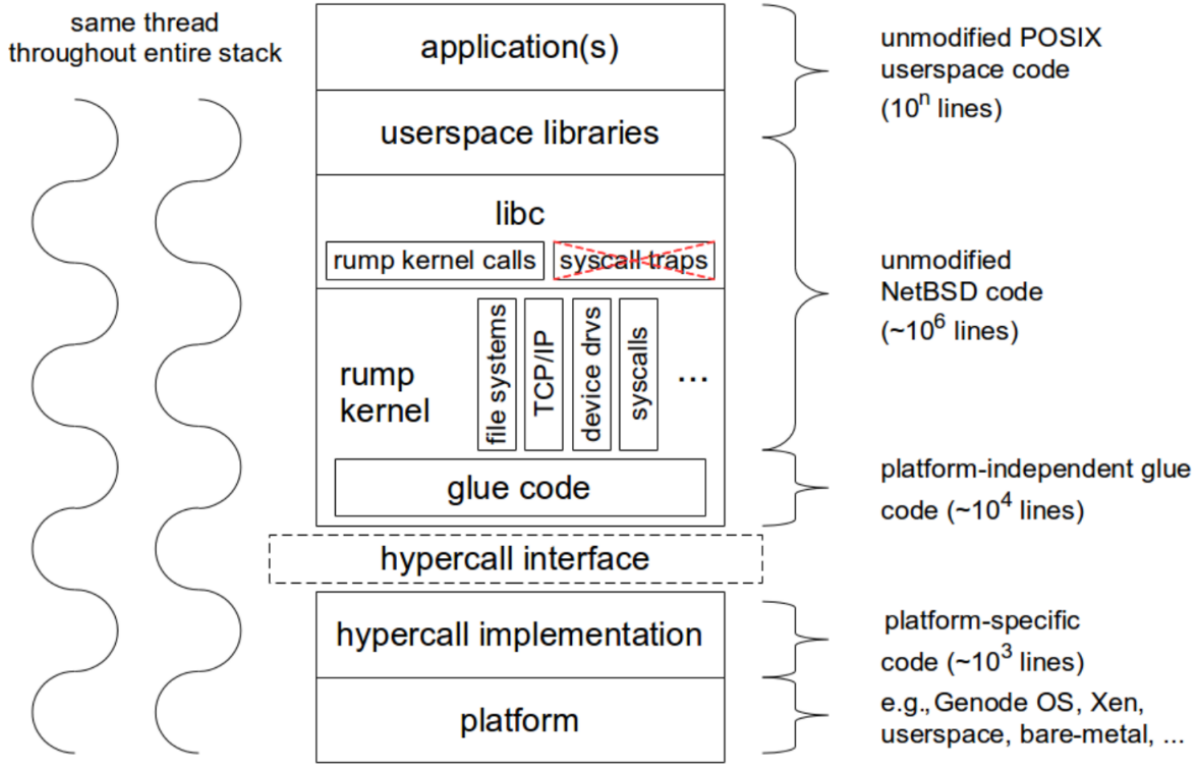
Can run **unmodified** POSIX applications.

No interrupts -> run to completion

Rump Kernels **CANNOT**:

- execute binaries
- schedule threads
- deal with privileged instructions
- use virtual memory
- handle page fault

Uses host threads and scheduling policy



Rump Clients

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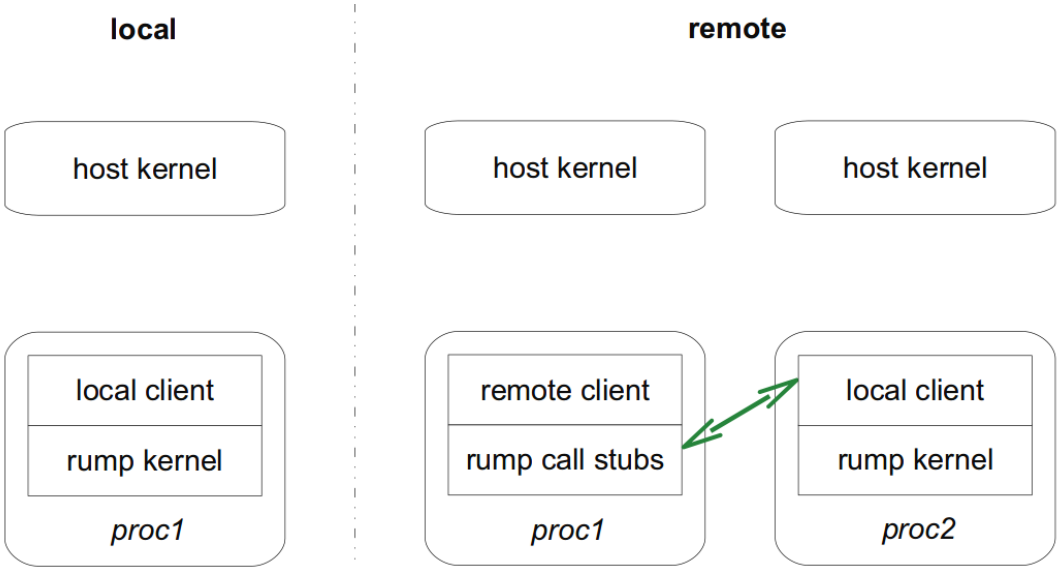

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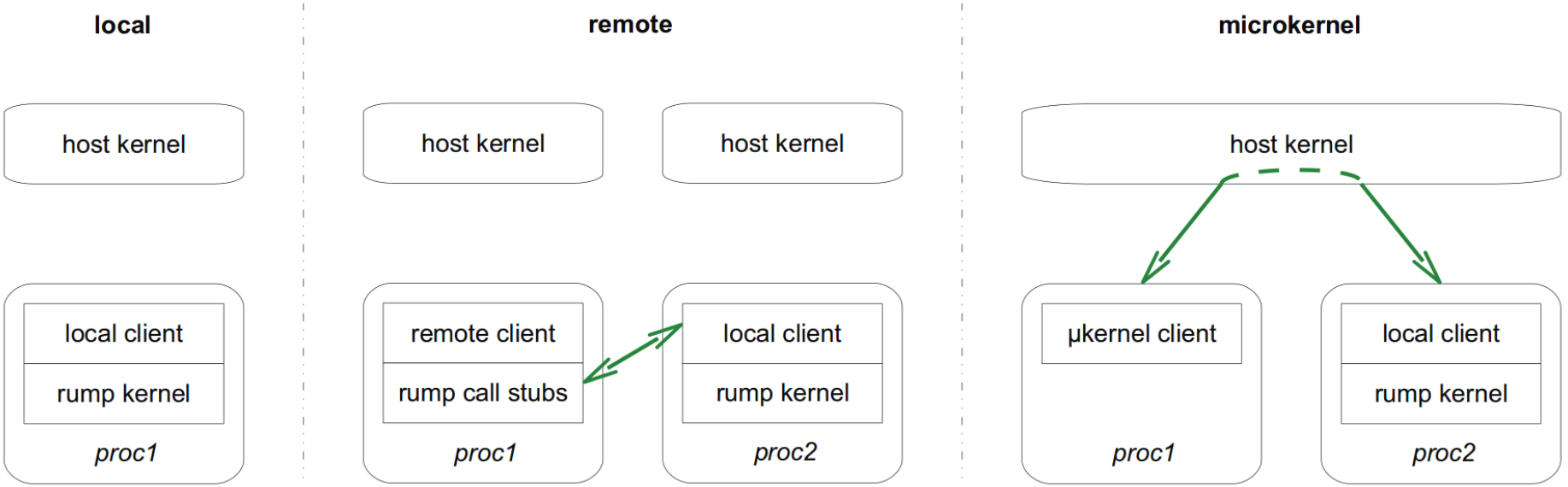

Demo

local client

- Hello World
- Filesystem access
- Network access

remote client

- buildrump.sh (kernel + server)
- rumpctrl (userland utilities)

Q&A