Orchestrating a brighter world NEC

# Unikraft – Crafting Unikernels

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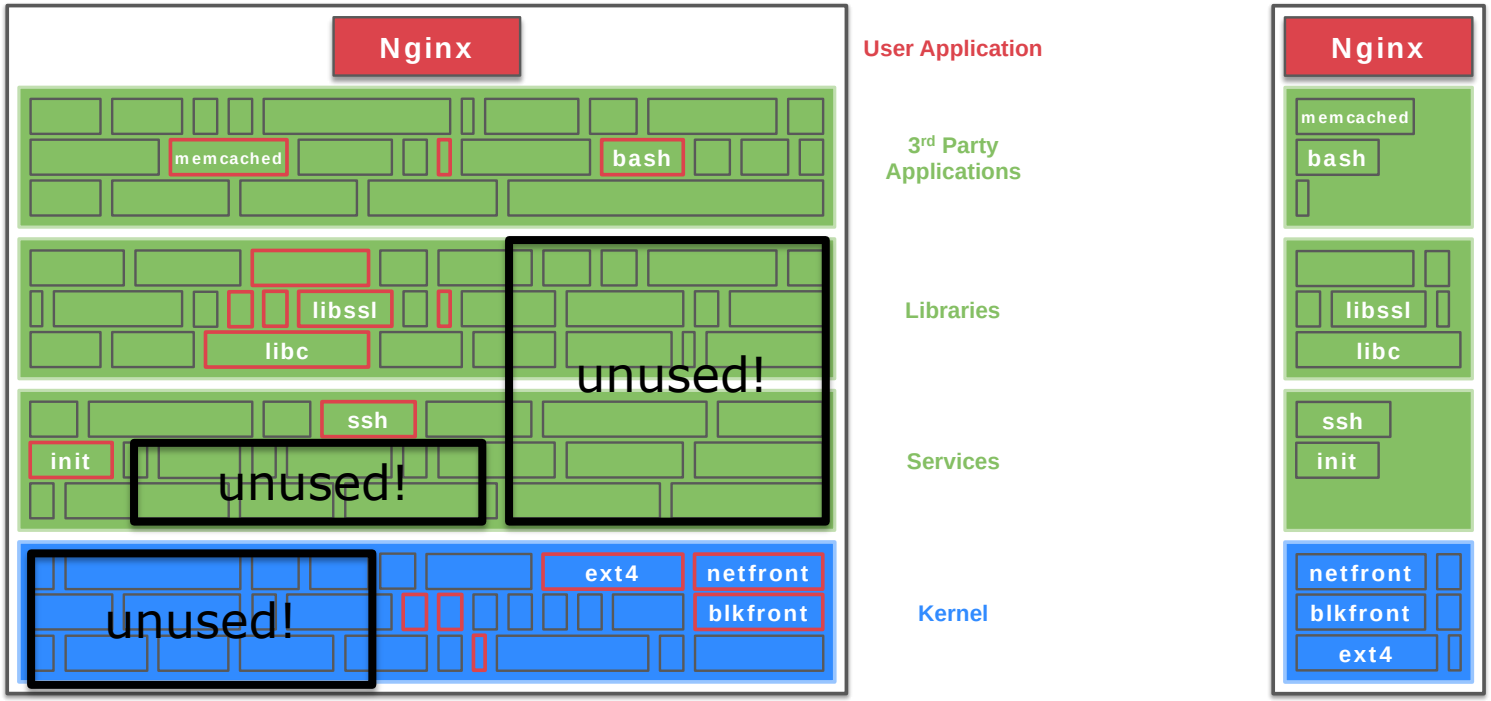
# Advantages and the Problem with Specialization

- Standard OS/VM/container image:
  - ***lots*** of unnecessary code
  - ***lots*** of overhead!

- Specialized image: only what's needed is there ***but lots*** of development time! (have to change code **by hand**



# Unikraft: The Insight

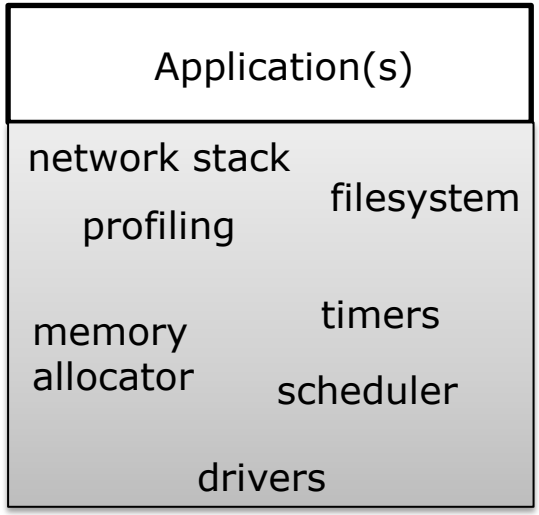
## In a perfect world…

- We would have a menu of libraries for all possible components applications might need
- We would be able to use that menu to select ***only*** the functionality needed (and possibly automate the selection process)
- A system would ***automatically*** build a lean, high performance image for the application we're interested in and the platforms we care for

**Unikraft is precisely this system!**

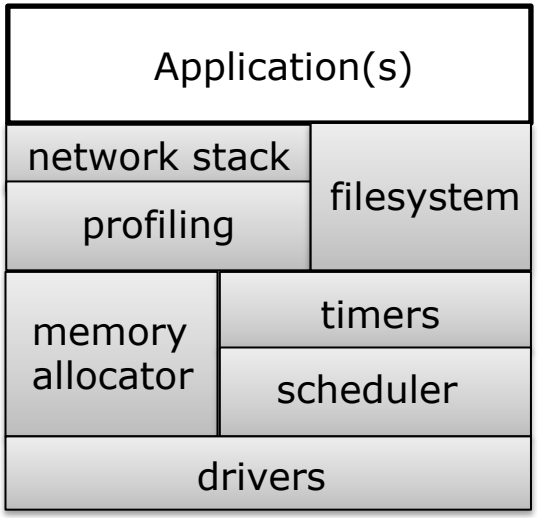
# Unikraft – Operating System Decomposition

- Standard operating systems are ***monolithic:*** they are not modular so it's ***not*** possible to separate their parts



# Unikraft – Operating System Decomposition

- Could we decompose, i.e., break apart an operating system?



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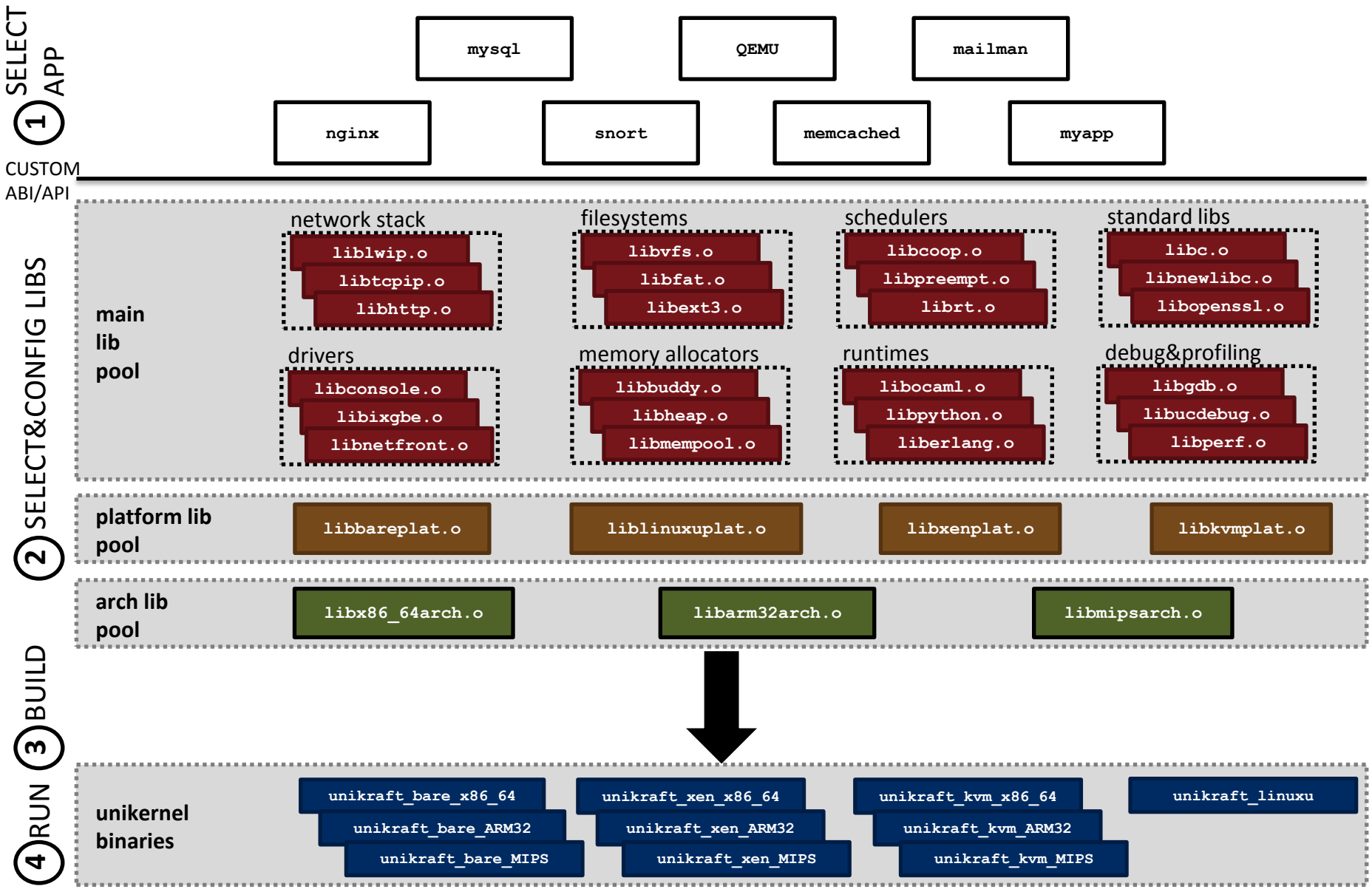
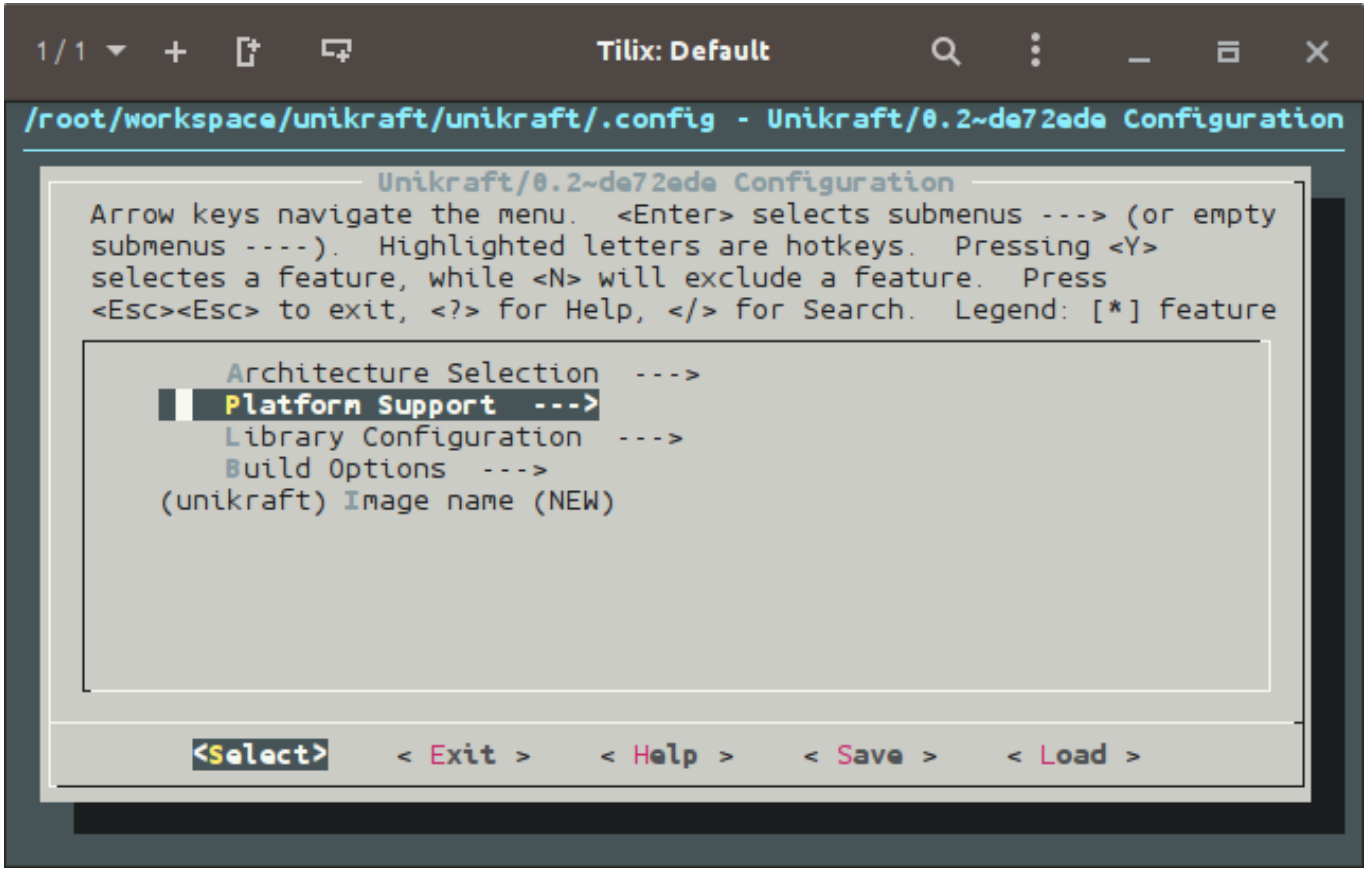
# The Unikraft Library and Build System



# Building a Specialized Image in One Minute

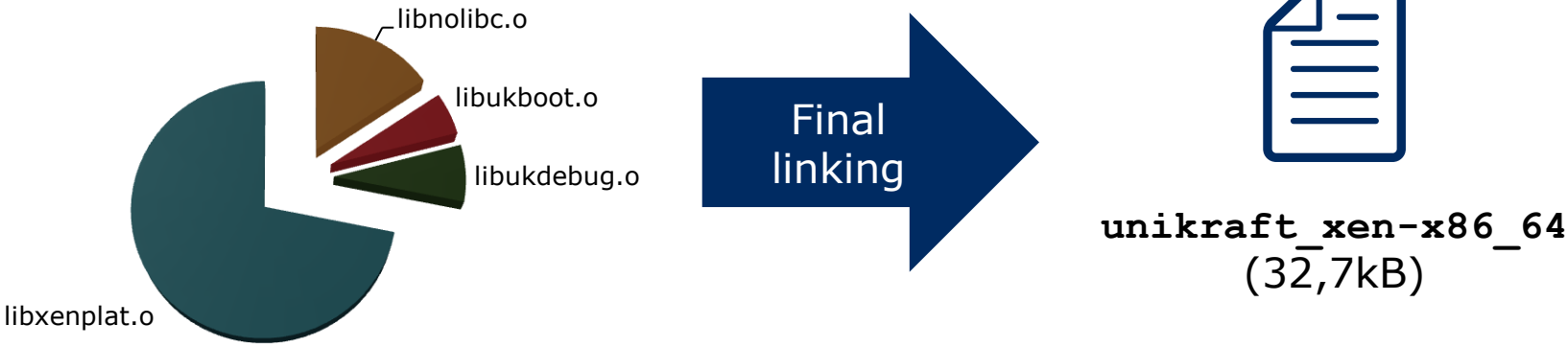
- Type “make menuconfig”
- Choose options in the menu that you want for your application
- Choose your target platform(s) (e.g., Xen, KVM, Linux, baremetal)
- Save config and type “make”



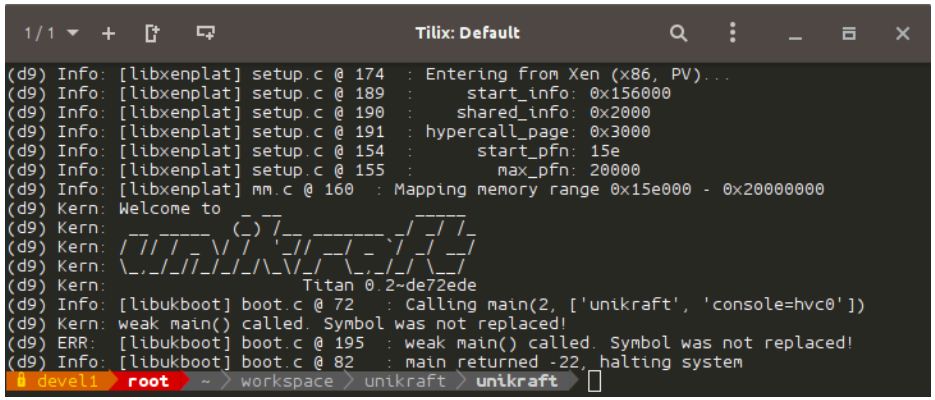
# An Unikraft Image Example

- *Xen PV x86_64 binary*
- Compiles to a 32.7kB image

**`unikraft_xen-x86_64.o`** (50,2kB)

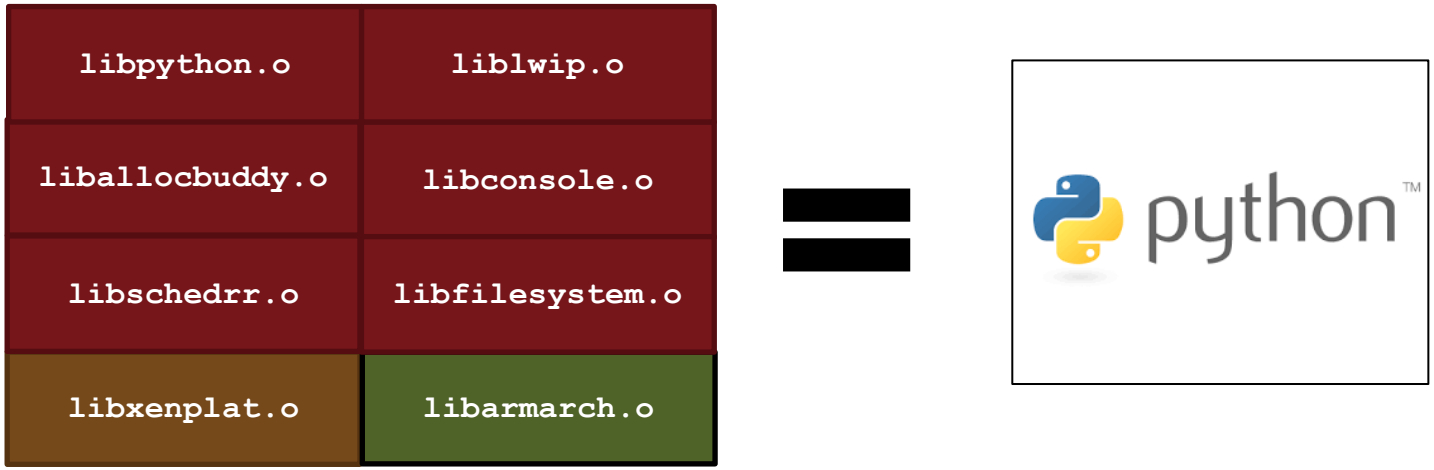



- Boots and prints message to debug console (with min. 208kB RAM)



# Potential Unikraft-built Systems

## Specialized Python images for Xen, KVM and ARM, x86_64

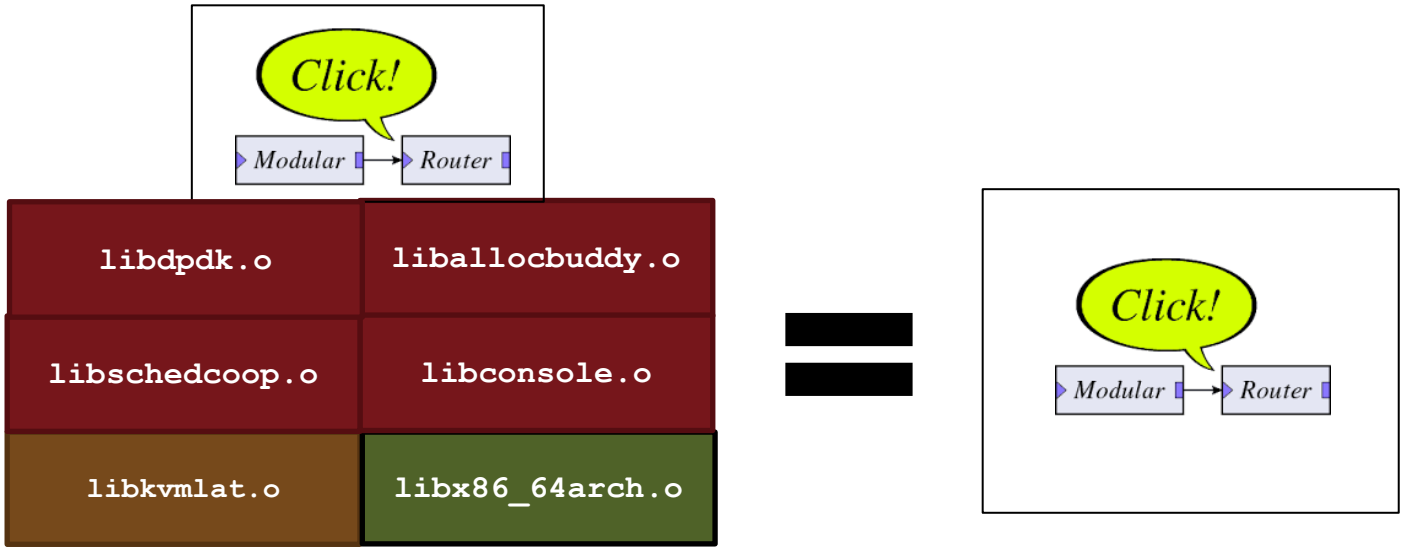



## Verticals:

- IoT gateways
- Smart city gateways
- Cloud computing platforms (e.g., AWS Lambda)

# Potential Unikraft-built Systems

## Specialized NFV image for KVM on x86_64




## Verticals:

- vCPE
- vRouters
- vBRAS
- Your network application here!