

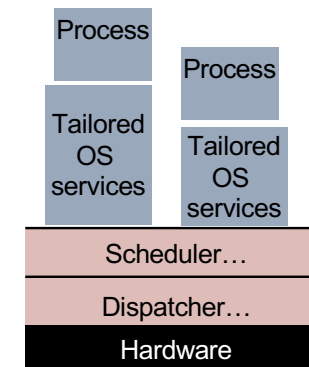
# School of Computer Science & Engineering

## **COMP3891/9283 Extended Operating Systems**

2025 T2 Week 02

## **Process Abstractions II: Library OS**

Gernot Heiser



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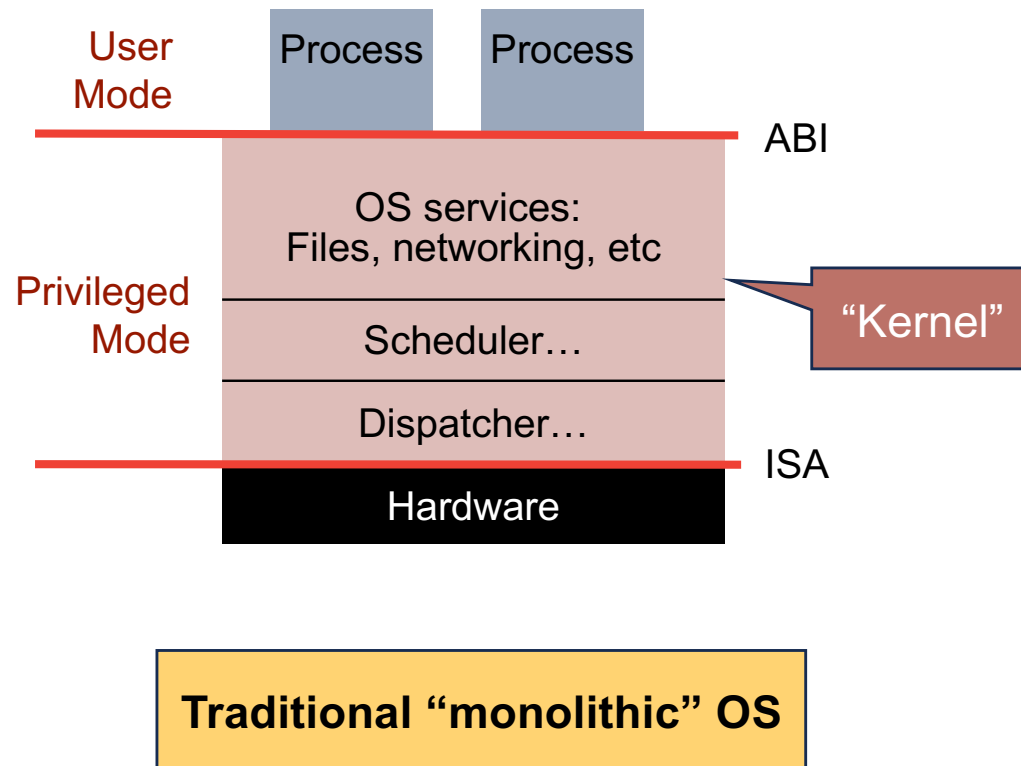
# Drawbridge

Donald E. Porter, Silas Boyd-Wickizer, Jon Howell, Reuben Olinsky, and Galen C. Hunt. 2011.

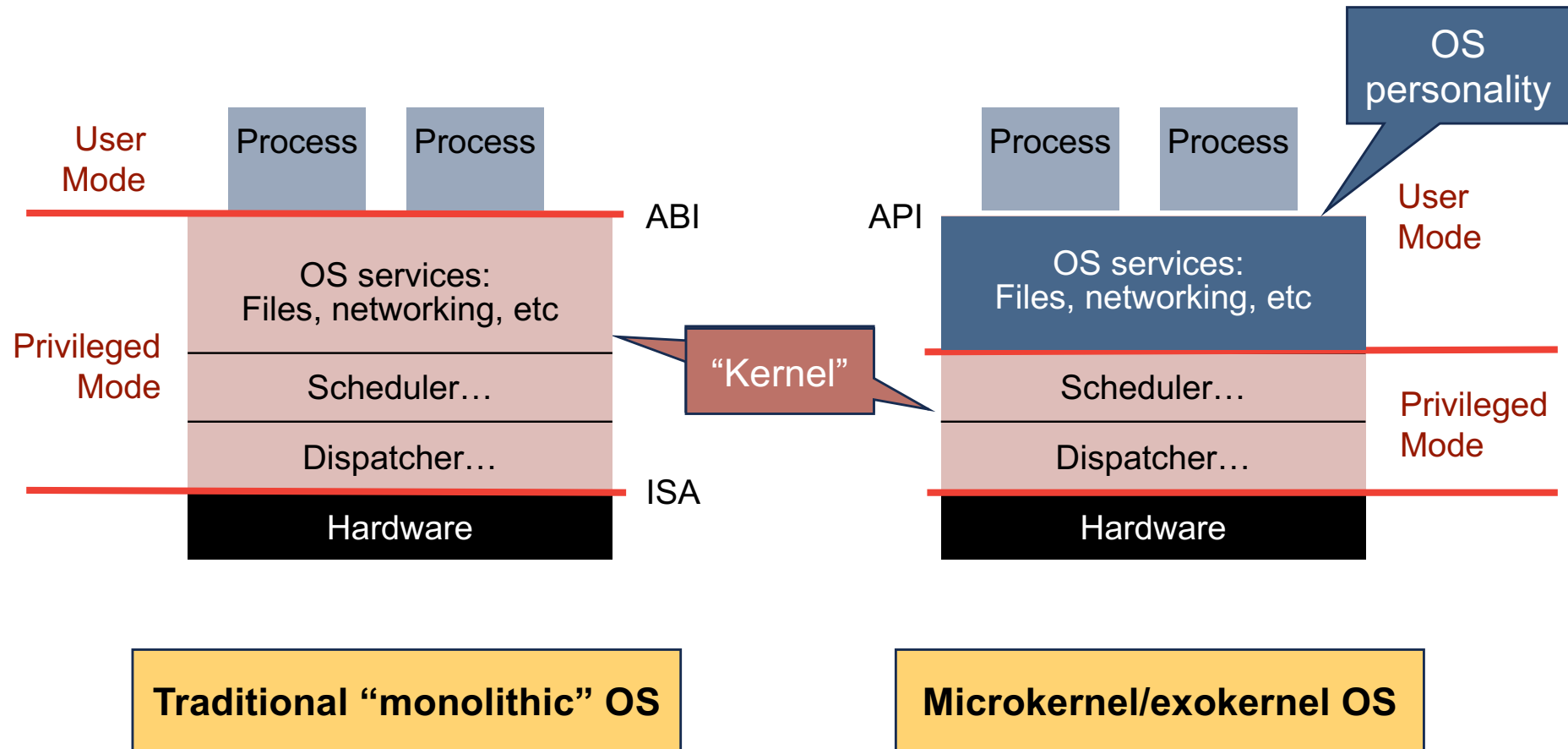
## **Rethinking the library OS from the top down.**

*In Proceedings of the sixteenth international conference on Architectural support for programming languages and operating systems (ASPLOS XVI).*

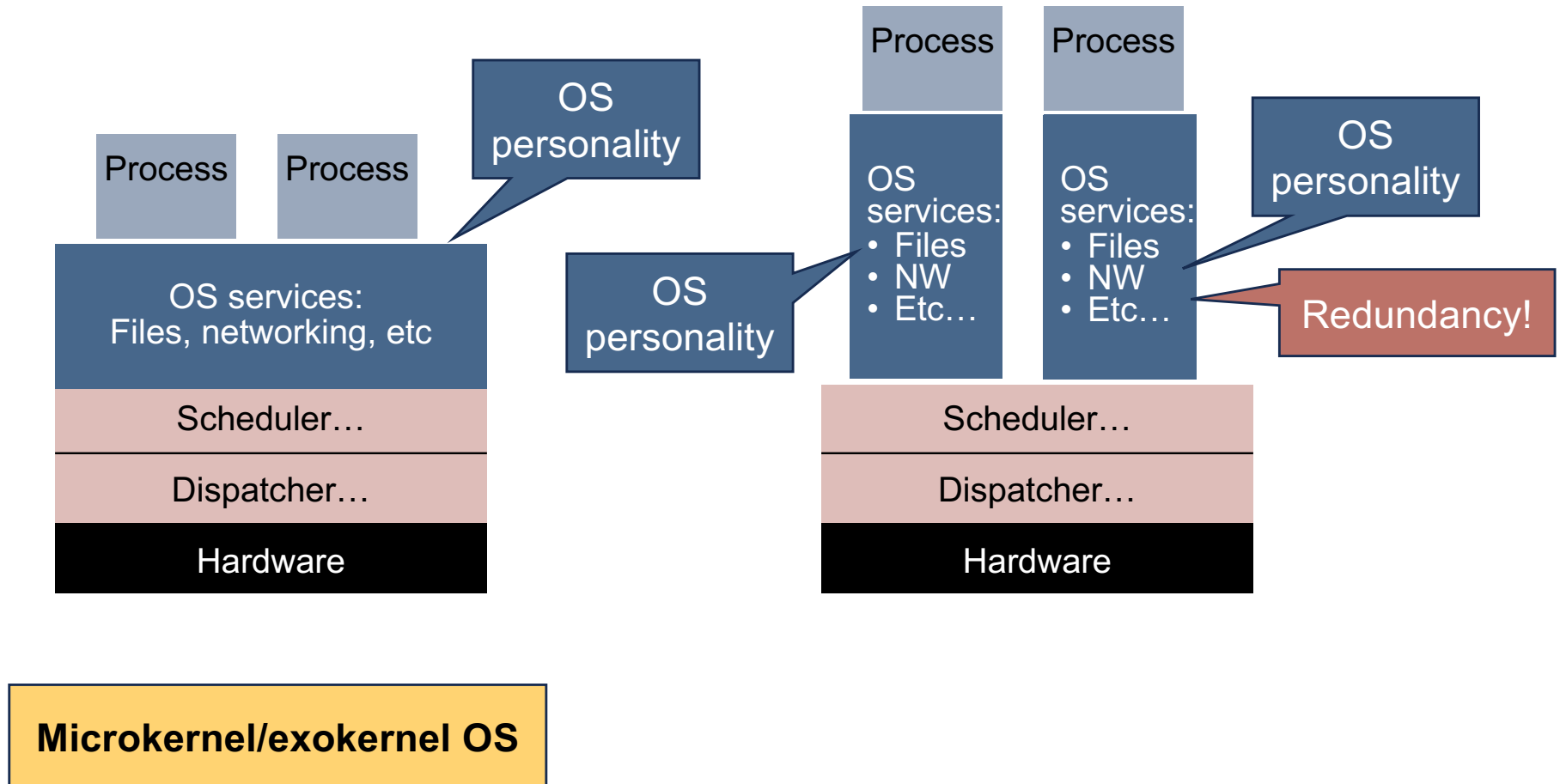
# What's a Library OS?



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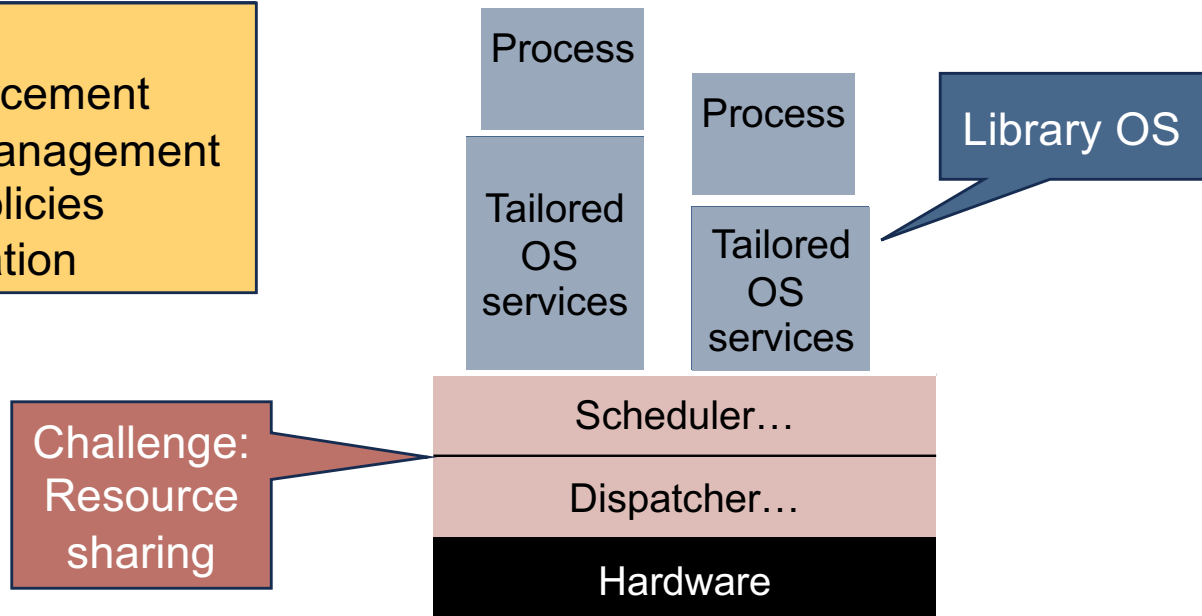
# What's a Library OS?



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## Library OS:

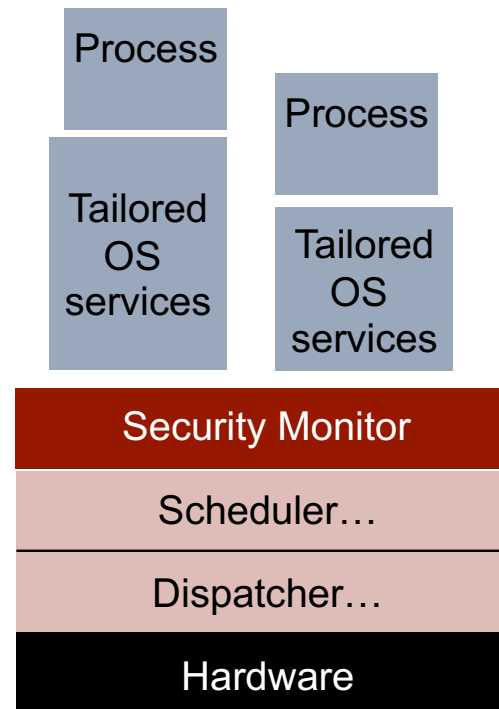
- Little/no security enforcement
- Simplified resource management
- Application-tailored policies
- Linked against application



# What's a Library OS?

## Library OS:

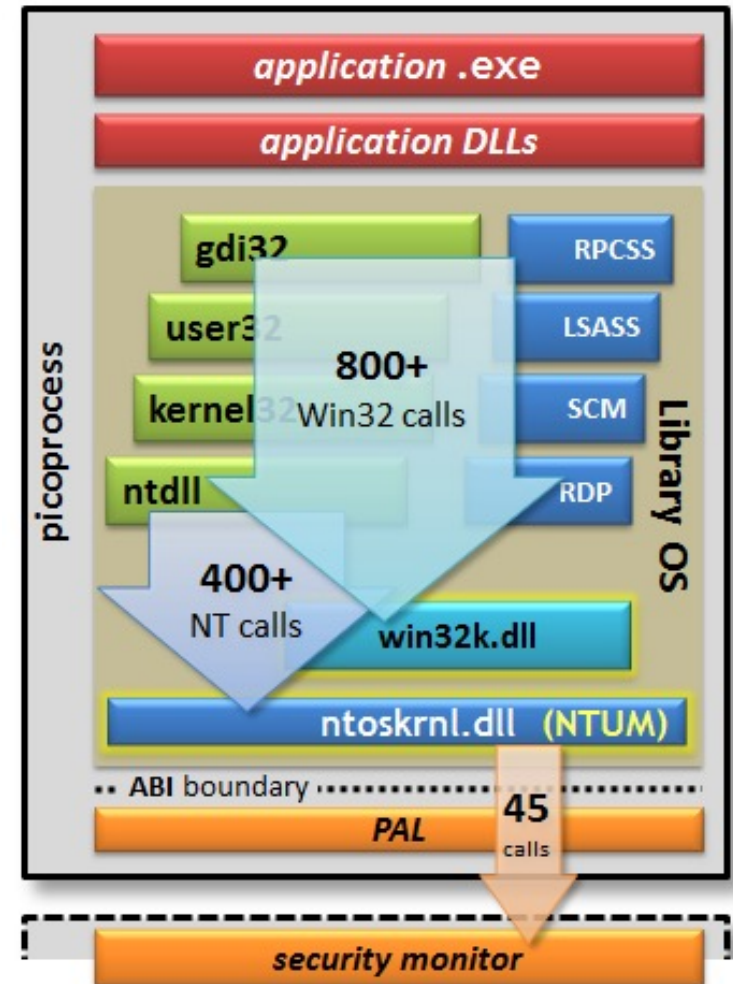
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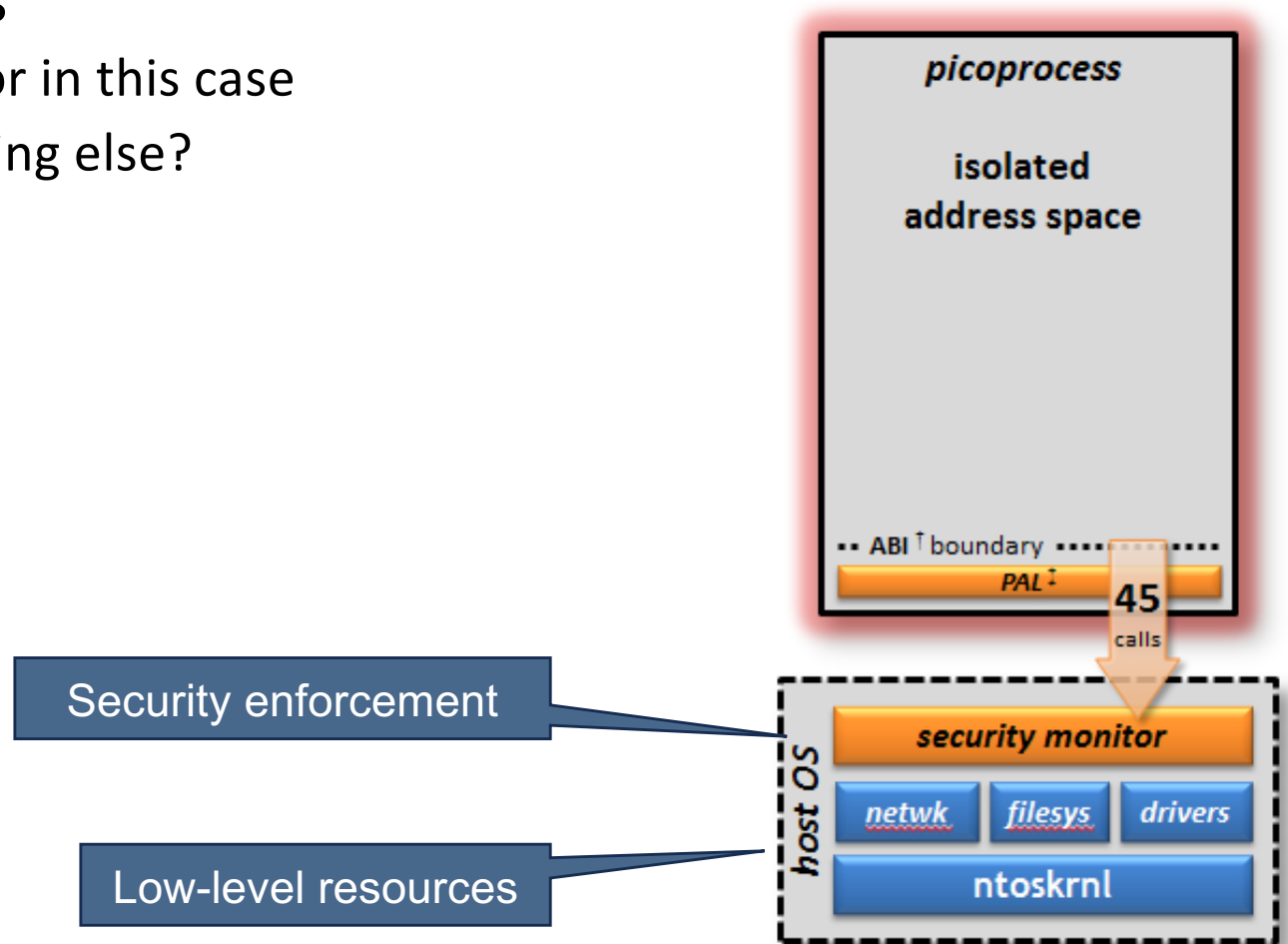
# Drawbridge Library OS

- Traditional library OS changes API
  - loss of portability
- Idea: refactor OS:
  - (mostly) API-compatible OS services in library
  - uses small subset of host OS (kernel) services
- The underlying OS API is smaller
  - Easier to get correct
  - Easier to make secure

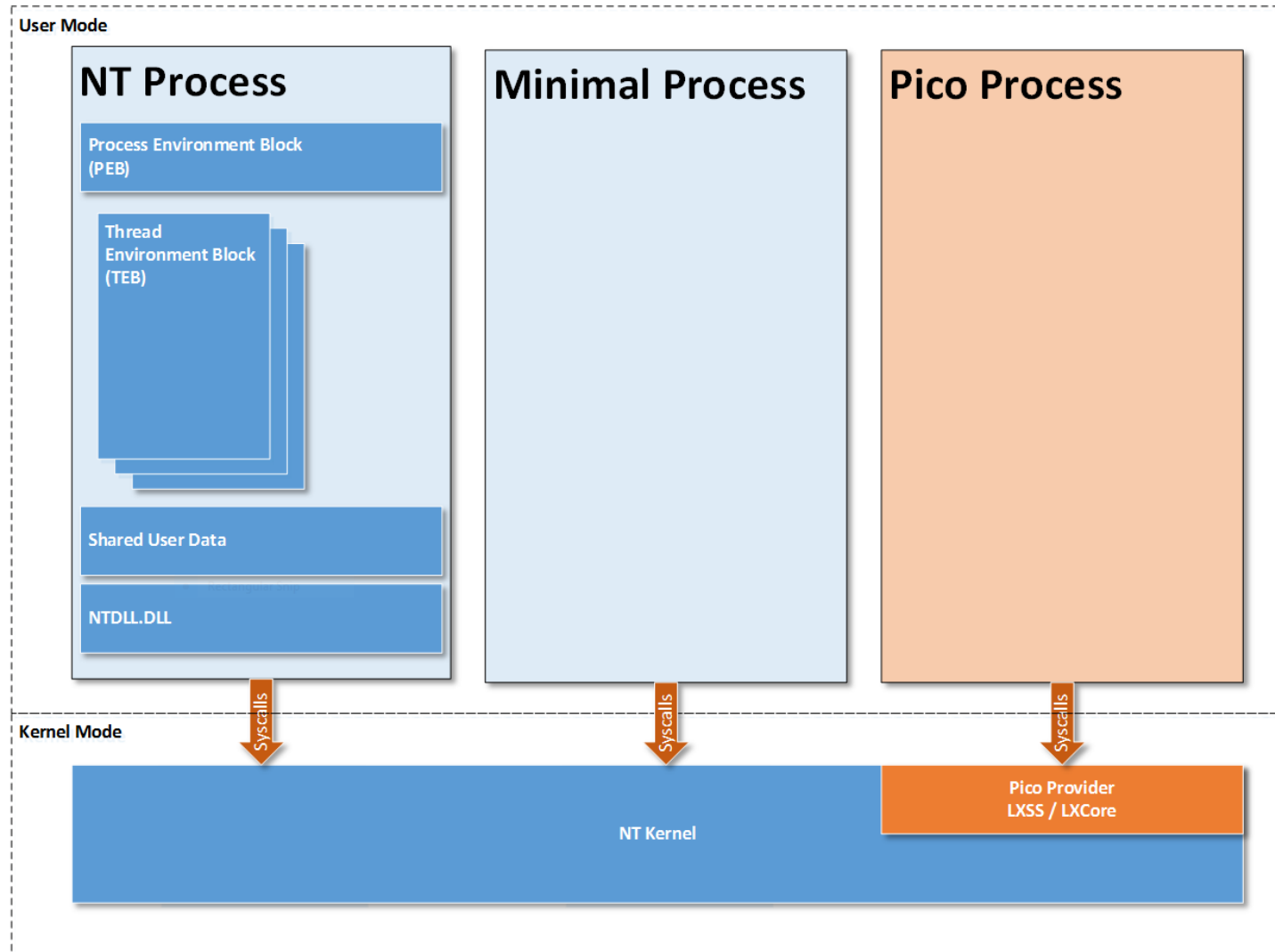


# “Pico Process”

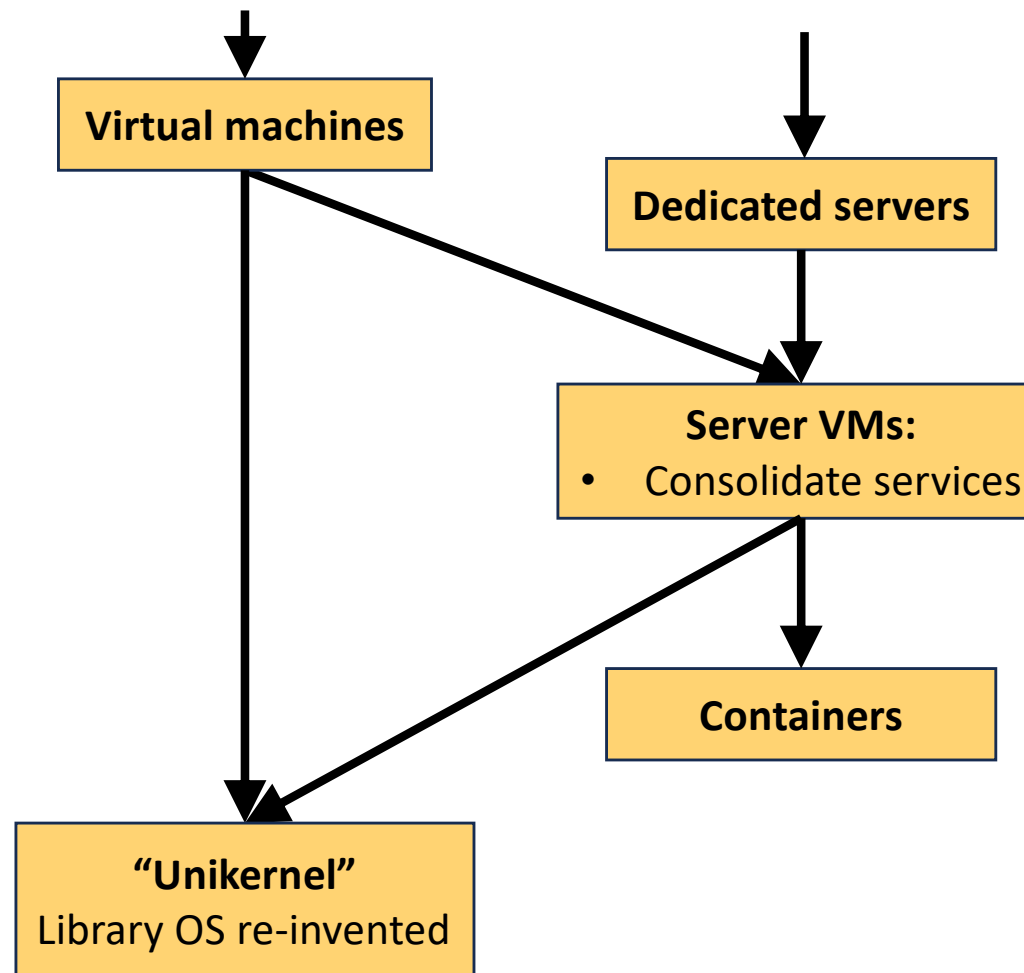
- An isolated process with different system call interface to normal processes
  - A security monitor in this case
  - Could be something else?



# Windows Subsystem for Linux



# The Return of the Virtual Machines



# Unikernel

## Unikernel:

- A library OS running in a VM
- Also “rump kernel” etc...

