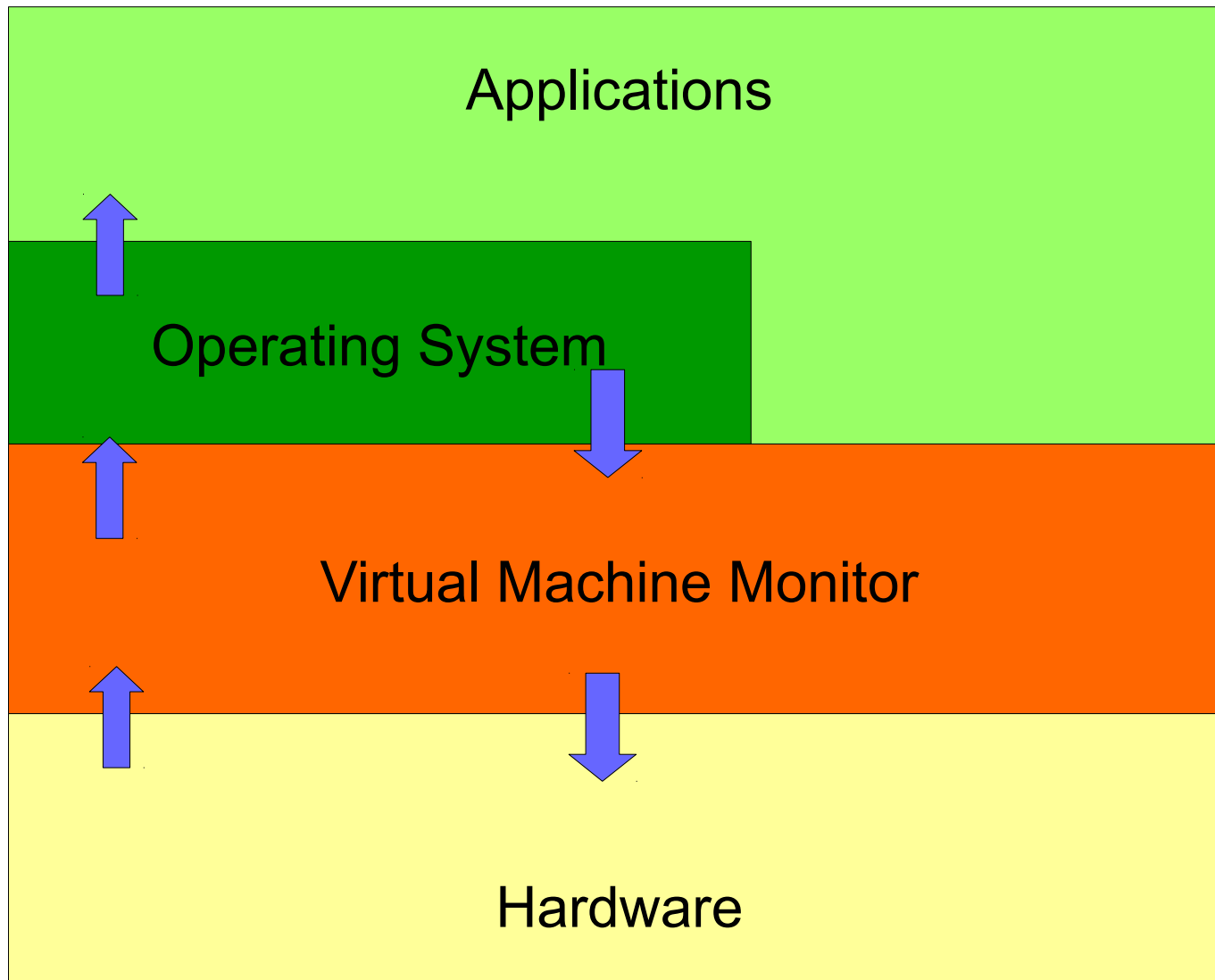




Virtualization II Recap




Recap: App Scheduling



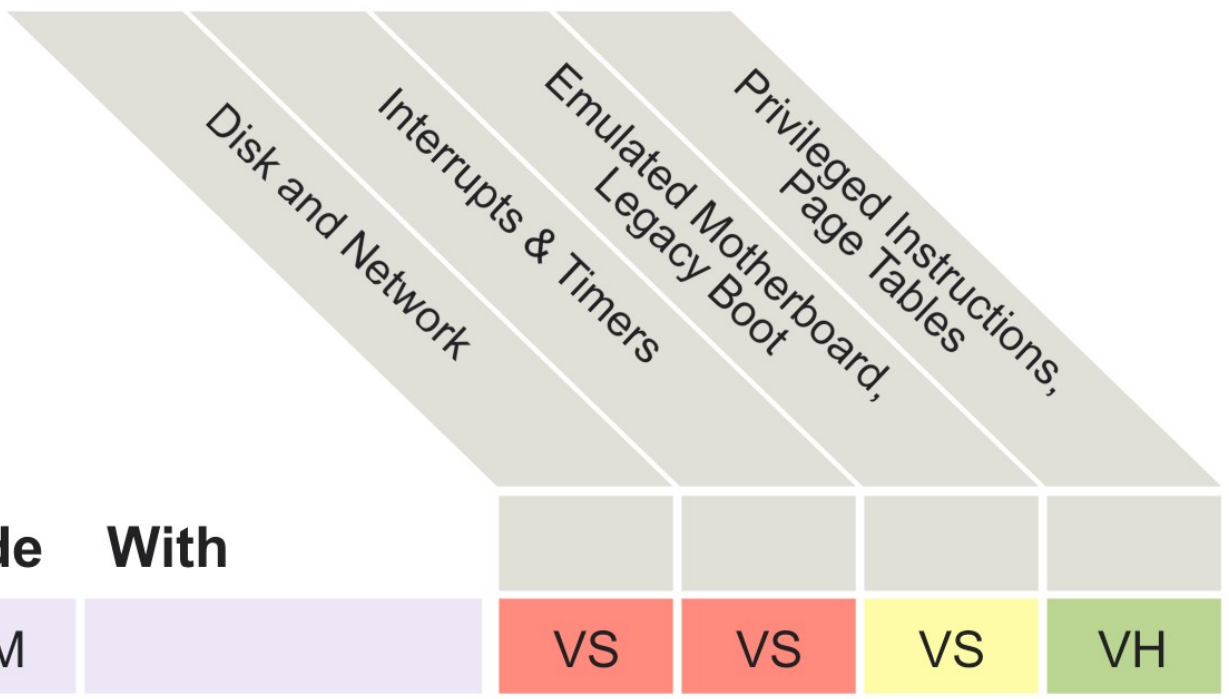
Recap 2

- What is Intel VT-x?
- What problem does it solve?

Full virtualization

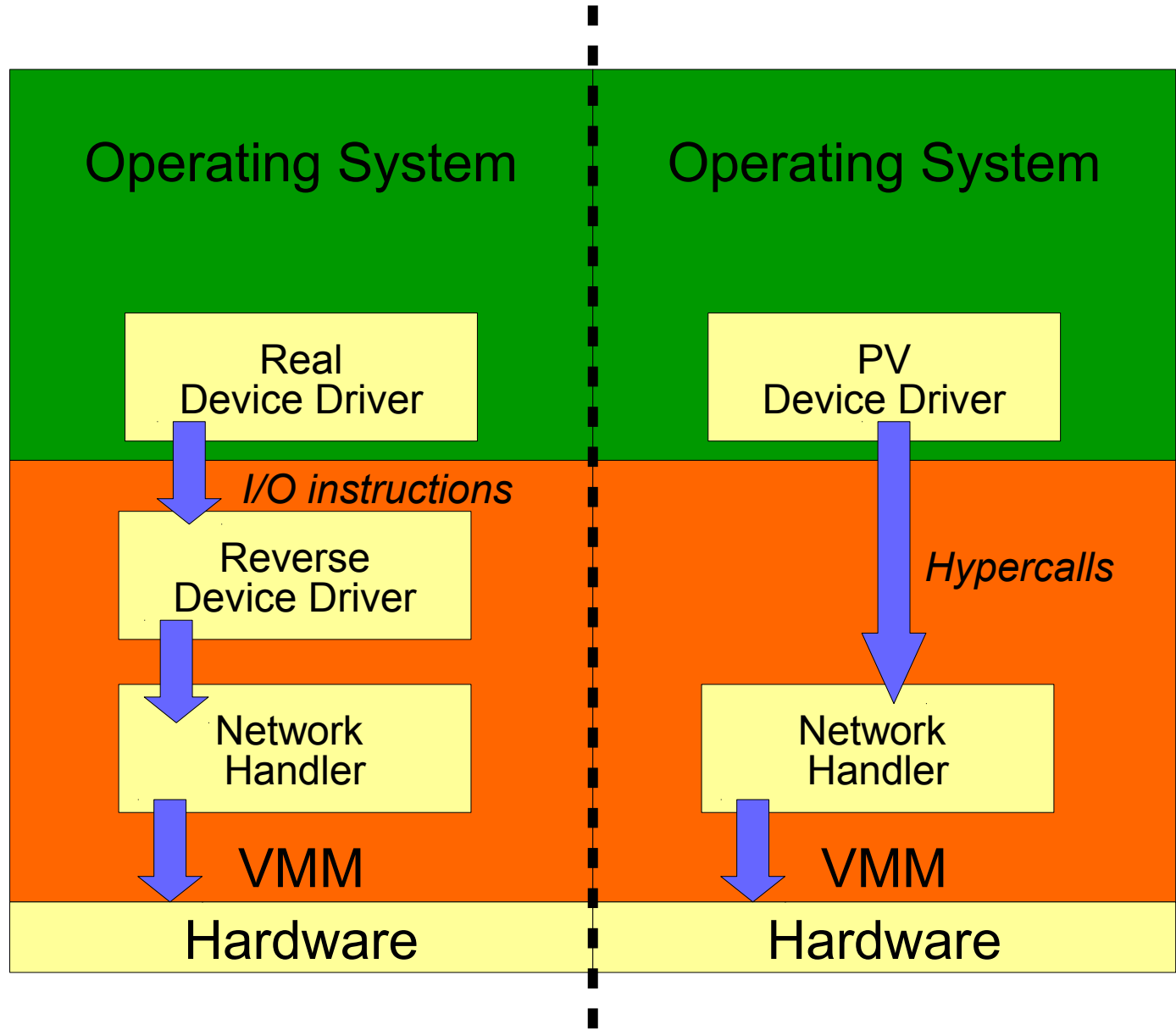
 Poor Performance
 Scope for Improvement
 Optimal Performance

VS = Software Virtualized (QEMU)
 VH = Hardware Virtualized

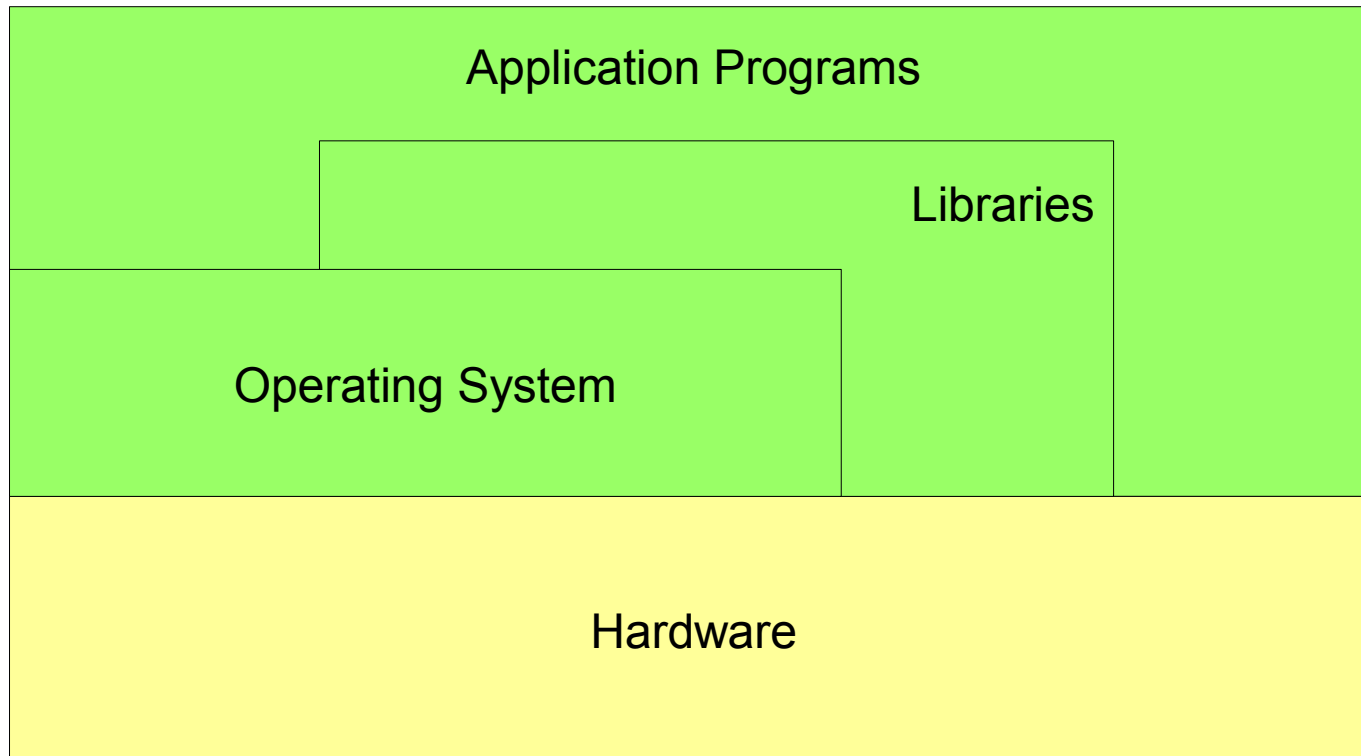


- How can we improve performance?
- What are the implications of the solutions?

Paravirtualization



Recap 3



- In OS-level virtualization, where is the VMM?
- What are the risks of OS-level virtualization?

Episode V

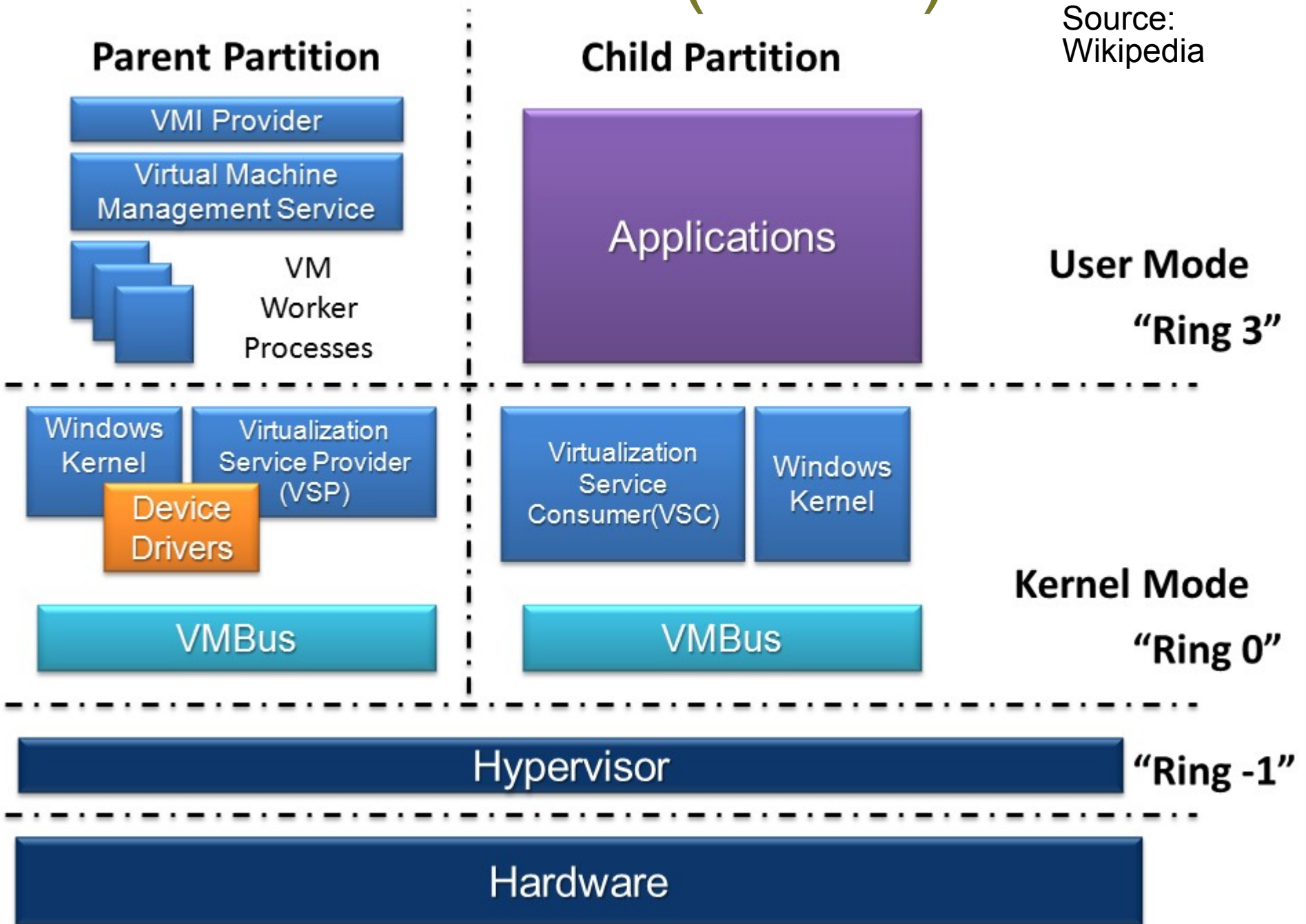
THE EMPIRE STRIKES BACK

Virtualization on Windows

- Hypervisor:
 - Hyper V
- Containers:
 - Windows Server Containers
 - Hyper V Containers
 - Docker integration

Windows (cont'd)

Source:
Wikipedia



Windows (cont')

- **Windows Server Containers:**
 - provide application isolation through process and namespace isolation technology.
 - shares a kernel with the container host and all containers running on the host.
- **Hyper-V Containers:** like Server Containers but
 - expand on the isolation by running each container in a highly optimized virtual machine.
 - kernel of the container host is not shared with the Hyper-V Containers.

Source:

https://msdn.microsoft.com/en-us/virtualization/windowscontainers/about/about_overview

<https://azure.microsoft.com/en-us/blog/containers-docker-windows-and-trends/>

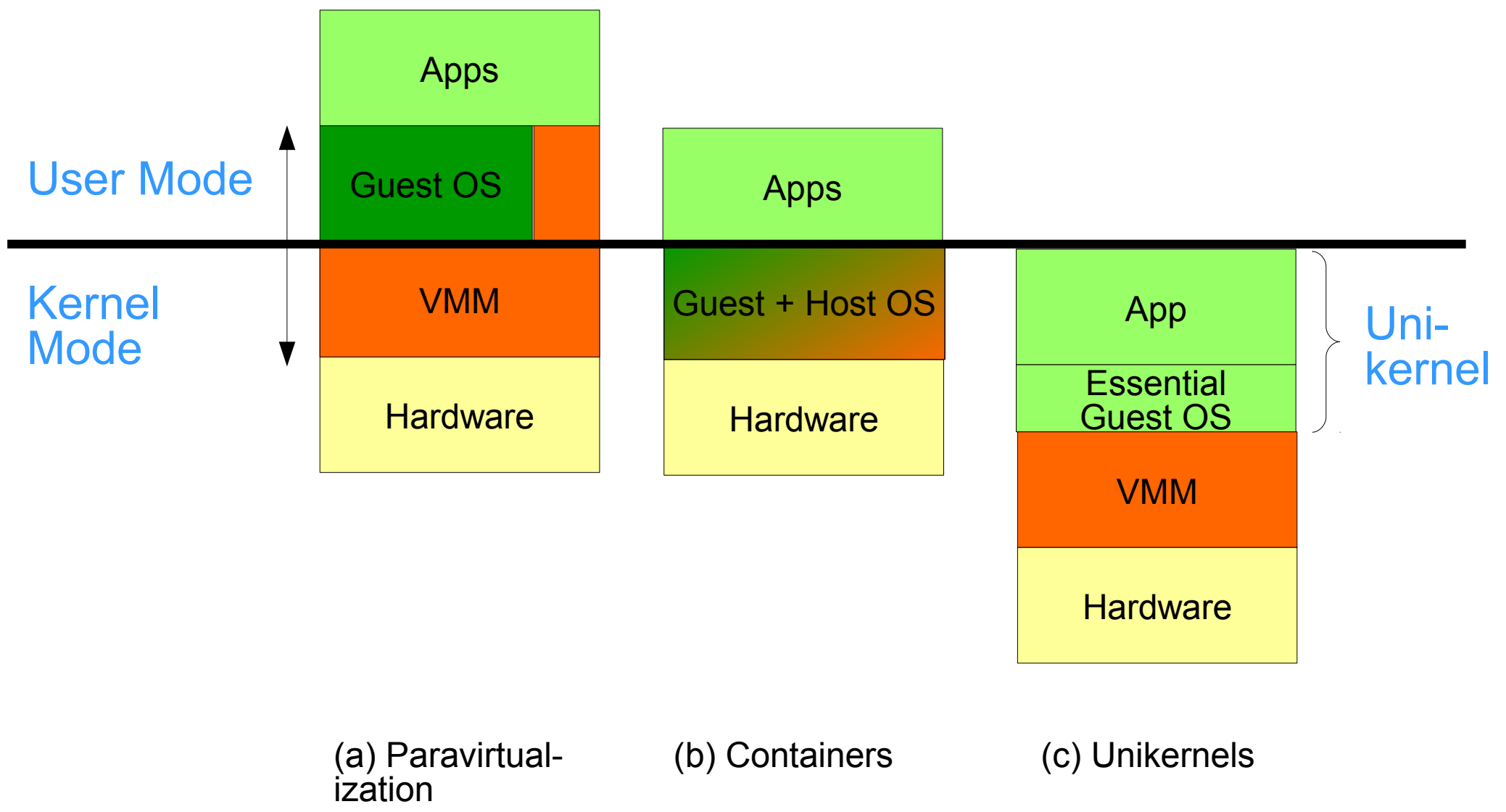


VMs without Operating Systems

Unikernels

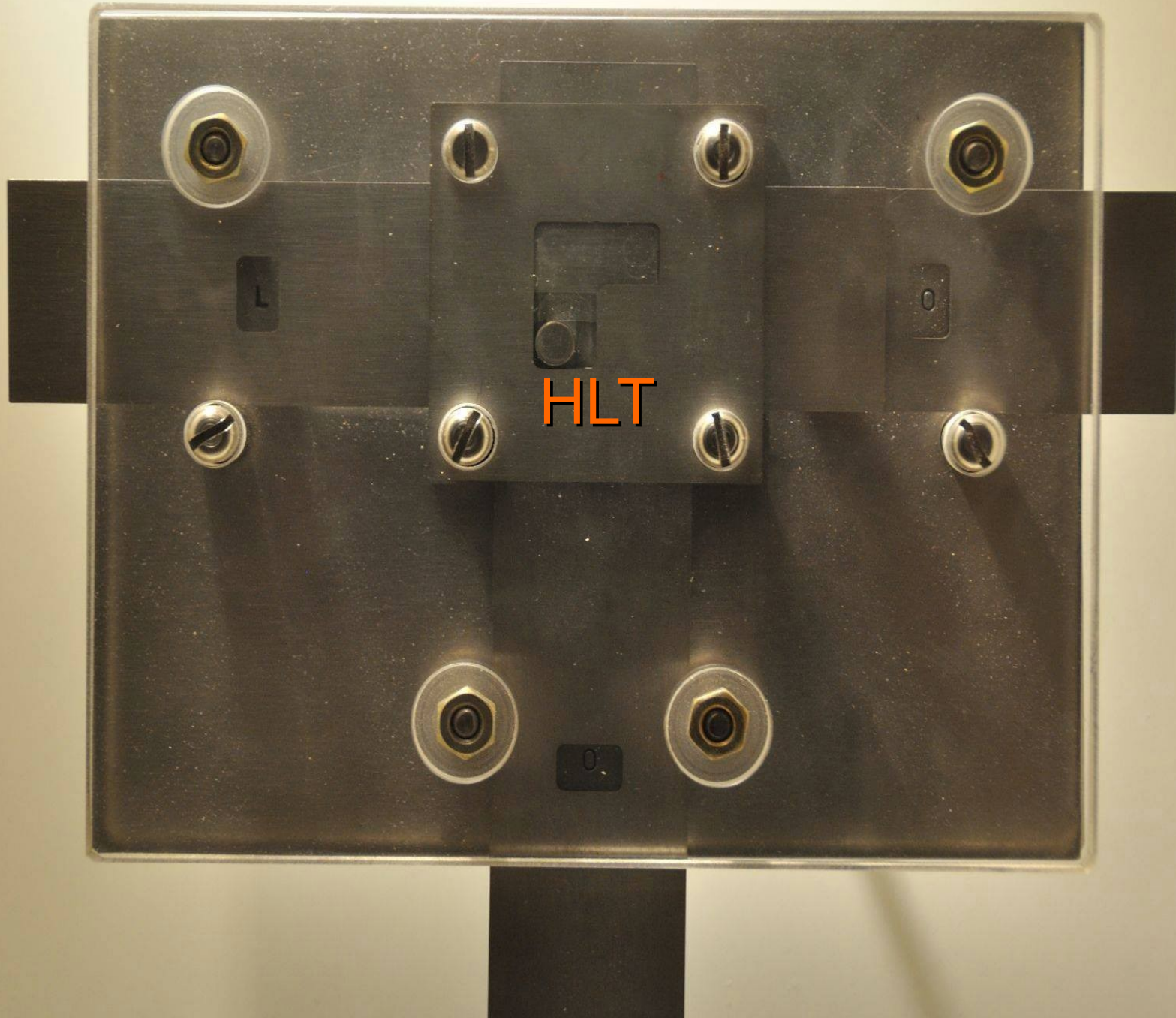
- **Optimize VM for one application:**
- Strip unused parts of OS and libraries
- Link directly with application
- Advantages:
 - **No context switching:** No User-to-Kernel and vv.
 - Less memory usage
 - Apply **application-specific** OS optimizations
 - More secure?

Unikernels



Video

- *“The Next Generation Cloud: Unleashing the Power of the **Unikernel**”*
- **Russell Pavlicek**, Xen Project Evangelist
- Large Installation System Administration Conference (LISA) 2015
- <https://www.usenix.org/conference/lisa15/conference-program/presentation/pavlicek>
-
-
- *(Thanks to Niels)*



Projects!