Graduate Operating Systems

Fall 2017

Paper “Xen”

• Goals of Xen; challenges of VMs
• Resource containers
• Accounting issue, QoS crosstalk issue
Paper “Xen”

• Memory management
  – TLB: SW/HW, tagged/flush
  – Push page table responsibility to guest OS
  – Xen avoids TBL flush
    • Give guest OS control over page table management
    • Protect Xen from triggering flushing

Figure 1: The structure of a machine running the Xen hypervisor, hosting a number of different guest operating systems, including Domain0 running control software in a XenoLinux environment.
Paper “Xen”

• CPU management
  – Privilege levels
  – Validate privileged calls by Xen
  – System calls handled without Xen involvement

• I/O management
  – Xen does not emulate devices
  – Uses shared-memory buffer-descriptor rings

Paper “Xen”

• Hypercalls and events
• I/O rings
• BVT scheduling
• Virtual address translation
• Physical memory
• Virtual firewall-router
• Disk
Paper “VirtuOS”

- Virtualization for “decomposition”
- Service domains
- Device driver crashes
- Microkernels
- Exceptionless system call interface
- I/O virtualization: PCI passthrough and IOMMU

Paper “VirtuOS”

- Failure models
- Byzantine failures
- Spinning vs. blocking