In-Guest Device Emulation

A Research Project
About Me

- Alexander Graf
- KVM developer at Amazon Web Services
  - Server class PowerPC KVM port
  - Nested SVM
- Opinions my own
Device Emulation
SMM
SMM

Kernel
SMM

Kernel

PS/2

Keyboard
QEMU

Device Emulation
QEMU

KVM

read()
QEMU

ioctl()
QEMU

ioctl()
VFIO

Device Emulation
VFIO
PIO
MMIO

- KVM
- SMI

Diagram showing KVM and SMI with a circuit board icon.
MMIO

- KVM
- SMI
- 84 4d d4
- x86 emulator
IRQs
IRQs

KVM

MSI-X
IRQs

KVM

Target SMI

MSI-X
Benefits
Benefits
Benefits

- KVM
Benefits
Benefits
Benefits
Benefits
Benefits
Benefits
Benefits

KVM

SA

Contract

Document
Downsides
Downsides

- AMD SEV
- Nested Virtualization
- Blue Pill
IDE on NVMe
localhost login: root
Last login: Tue Sep  3 10:03:58 on ttyS0

Have a lot of fun...

```bash
ip-10-0-2-15:~ # lscsi
[0:0:0:0] disk ATA model ion /dev/sda
```

```
/dev/sda:

Model=model, FwRev=version, SerialNo=serial
Config=[ ]
RamCHS=0/255/255, TrkSize=65524, SectSize=512, ECCbytes=4
Blksize=512, Sectors=1665536, SecsPerCluster=1
Based Block Address=1
PIO modes: pio0 pio1 pio2 pio3 pio4
DMA modes: sdma0 sdma1 sdma2 adma0 adma1 adma2
UDMA modes: udma0 udma1 udma2 udma3 udma4 udma5
```

```
AdvancedPM=no WriteCache=enabled
Drive conforms to: ATA/ATAPI-5 published, ANSI INCITS 340-2000: ATA/ATAPI-4,5,6,7

* signifies the current active mode
```

```bash
ip-10-0-2-15:~ # hdparm -t /dev/sda
```

```
/dev/sda:
Timing buffered disk reads: 342 MB in 3.01 seconds = 113.55 MB/sec
```

```bash
ip-10-0-2-15:~ #
```
Thank You
OSA Icons

Icons received from http://www.opensecurityarchitecture.org/cms/library/icon-library
Other Icons

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https://commons.wikimedia.org/wiki/File:Crystal_Project_Hardware.png

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