

bhyve

frank

introduction

- BSD Hypervisor
- Native hypervisor/virtual machine manager for FreeBSD
- Mainly developed by NetApp
- Hardware requirement on host
 - VT-x, EPT, POPCNT, UG

introduction

CMOV, PAT, PSE36, CLFLUSH, DTS, ACPI, MMX, FXSR, SSE, SSE2, SS, HTT, TM, PBE>
FMA, CX16, xTPR, PDCM, PCID, SSE4. 1, SSE4. 2, x2APIC, MOVBE, POPCNT, TSCDLT, AESNI, XSA

[2, ERMS, INVPCID, NFPUSG, MPX, RDSEED, ADX, SMAP, CLFLUSHOPT, PROCTRACE>

introduction

```
CPU: Intel(R) Core(TM) i5-6400 CPU @ 2.70GHz (2712.13-MHz K8-class CPU)
Origin="GenuineIntel" Id=0x506e3 Family=0x6 Model=0x5e Stepping=3
Features=0xbfefbfff<FPU, VME, DE, PSE, TSC, MSR, PAE, MCE, CX8, APIC, SEP, MTRR, PGE
Features2=0x7ffafbbf<SSE3, PCLMULQDQ, DTES64, MON, DS_CPL, VMX, EST, TM2, SSSE3,
AMD Features=0x2c100800<SYSCALL, NX, Page1GB, RDTSCP, LM>
AMD Features2=0x121<LAHF, ABM, Prefetch>
Structured Extended Features=0x29c67af<FSGSBASE, TSCADJ, SGX, BMI1, AVX2, SME
XSAVE Features=0xf<XSAVEOPT, XSAVEC, XINUSE, XSAVES>
VT-x: PAT, HLT, MTF, PAUSE EPT, UG, VPID
TSC: P-state invariant, performance statistics
```

features

- Currently supported operating system
 - FreeBSD 8.4-RELEASE amd64/i386 and 8-STABLE amd64
 - FreeBSD 9.*-RELEASE amd64/i386 9-STABLE amd64/i386
 - FreeBSD 10 (All amd64/i386 versions)
 - FreeBSD 11-CURRENT amd64/i386
 - OpenBSD amd64/i386 5.2 and newer
 - GNU/Linux amd64/i386 (Many distributions)
 - NetBSD amd64 6.1 and newer
 - SmartOS 20151001 and newer
 - **Windows x64 Vista, 7, 8, 10**
 - **Windows Server 2008r2, 2012r2, 2016 Technical Preview**

before we create a virtual machine

- Load vmm kernel module
kldload vmm
- Create tap interface for our VM
ifconfig tap0 create
sysctl net.link.tap.up_on_open=1
net.link.tap.up_on_open: 0 -> 1
- Setup bridge(switch) for our VM
- # ifconfig bridge0 create
- # ifconfig bridge0 addm **igb0** addm **tap0**
- # ifconfig bridge0 up

before we create a virtual machine

Make our configuration permanent

- `/boot/loader.conf`
 - `vmm_load="YES"`
- `/etc/sysctl.conf`
 - `hw.vmm.topology.cores_per_package=4`
 - `net.link.tap.up_on_open=1`
- `/etc/rc.conf`
 - `cloned_interfaces="tap0 bridge0"`
 - `ifconfig_bridge0="addm tap0 addm bridge0"`

before we create a virtual machine

- Prepare for UEFI firmware
pkg install -y uefi-edk2-bhyve
- Set core per package (Optional)
sysctl hw.vmm.topology.cores_per_package=4

create a virtual machine

bhyve \

```
-A \  
-c 16 -m 16g \  
-s 0,hostbridge \  
-s 1,ahci-cd,"win10.iso" \  
-s 2,ahci-hd,"/dev/zvol/zroot/vm/win10" \  
-s 3,fbuf,tcp=127.0.0.1:5900,w=1600,h=900 \  
-s 4,xhci,tablet \  
-s 5,virtio-net,tap0 \  
-s 31,lpc \  
-l bootrom,"/usr/local/share/uefi-firmware/BHYVE_UEFI.fd" \  
win10
```

utilities - /usr/share/examples/bhyve/vmrun.sh

Usage: vmrun.sh [-ahi] [-c <CPUs>] [-C <console>] [-d <disk file>]
[-e <name=value>] [-g <gdbport>] [-H <directory>]
[-I <location of installation iso>] [-l <loader>]
[-m <memsize>] [-t <tapdev>] <vmname>

- h: display this help message
- a: force memory mapped local APIC access
- c: number of virtual cpus (default is 2)
- C: console device (default is stdio)
- d: virtio diskdev file (default is ./diskdev)
- e: set FreeBSD loader environment variable
- g: listen for connection from kgdb at <gdbport>
- H: host filesystem to export to the loader
- i: force boot of the Installation CDROM image
- I: Installation CDROM image location (default is ./release.iso)
- l: the OS loader to use (default is /boot/userboot.so)
- m: memory size (default is 512M)
- p: pass-through a host PCI device at bus/slot/func (e.g. 10/0/0)
- t: tap device for virtio-net (default is tap0)

utilities - iohyve

FreeBSD bhyve manager utilizing ZFS and other FreeBSD tools.

utilities - chyves

Another bhyve front-end manager