

FreeBSD on Azure

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Resources

- VM Depot - community managed portal of Virtual Machine Images
 - <http://vmdepot.msopentech.com>
- Tutorials
 - Deploy and Customize a FreeBSD image for Azure (using the CLI)
 - <http://msopentech.com/blog/2014/05/14/deploy-customize-freebsd-virtual-machine-image-microsoft-azure/>
 - Easy Deploy FreeBSD on Azure (Video)
 - <http://msopentech.com/blog/2014/05/14/deploy-customize-freebsd-virtual-machine-image-microsoft-azure/>
 - Easy Deploy feature of VM Depot
 - <http://msopentech.com/blog/2014/10/22/easy-deploy-vm-depot-microsoft-azure/>
- Scripts for building an image from source
 - See mk-azure in:
 - <http://svnweb.freebsd.org/base/releng/10.1/release/i386>
 - <http://svnweb.freebsd.org/base/releng/10.1/release/amd64>

Virtualizing FreeBSD on Hyper-v

Kylie Liang
Microsoft

Why is FreeBSD important for us?

- Many virtual appliance vendors use FreeBSD
- Single hypervisor for enterprises using FreeBSD-based virtual appliances
- Virtual appliance offerings in Azure

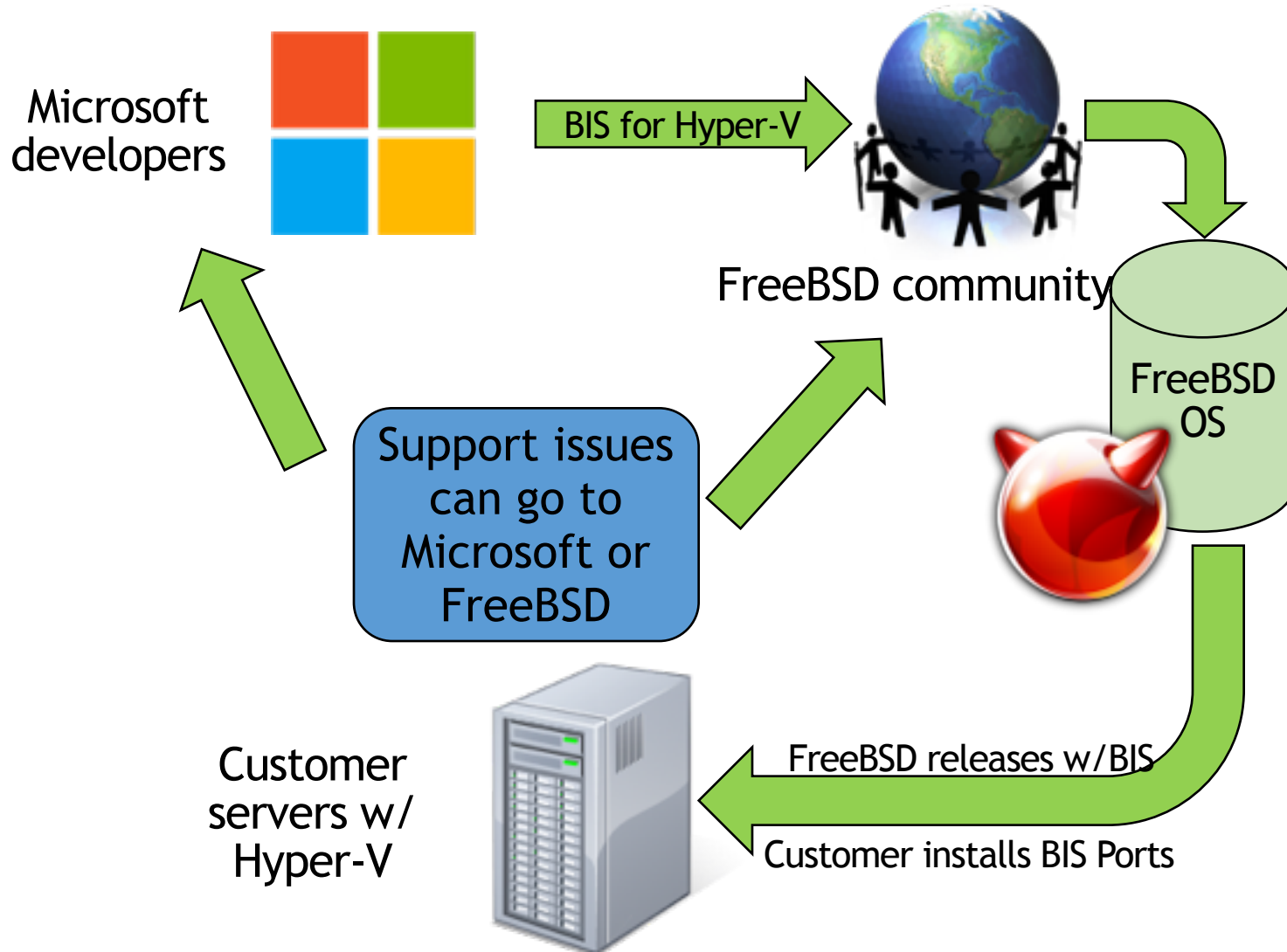
Goals for FreeBSD Support

- Provide the **best experience** for running FreeBSD on Hyper-V and in Microsoft Azure.
- Customers have **great choice and availability** in running FreeBSD distributions.
- Customers can **easily manage and extend** their FreeBSD workloads.

Integration Service for FreeBSD

- Hyper-V presents synthetic devices to the guest OS
 - Synthetic devices seen by the guest OS are the same, regardless of the real hardware under Hyper-V
- Guest OS needs drivers for these synthetic devices
 - Just like an OS needs drivers for devices it sees when running on real hardware
- Integration Services == the drivers for the Hyper-V synthetic devices
 - They run in the guest OS so must follow the device driver model for that guest OS
 - Also include some user-space daemons that interact with the drivers

BIS Development, Distribution & Support



• Support strategy

- Vanilla FreeBSD questions: Contact the FreeBSD.org
- Issues running FreeBSD on Hyper-V: Contact FreeBSD.org or Microsoft
- Issues running Virtual Appliance Vendor's customized FreeBSD on Hyper-v: Contact the Vendor

Microsoft Support for FreeBSD on Hyper-V

- Integration Services 1.0 built into FreeBSD 10 today
 - Lacking core support to enable I/O performance
 - Supported on a “best effort” basis by Microsoft Customer Support
- Integration Services 2.0 in for FreeBSD 10.x
 - Includes feature investments in core areas to enable production workloads
 - VMBus multi-channel & Signal optimization
 - Storage sub-channel & Scatter/Gather List
 - KVP driver and daemon
 - Schedule to upstream into 10.2, however will provide ports for 10.1
 - Will officially be supported by Microsoft Customer Support

Feature Availability

Feature	Hyper-V version	10.x & Head	10	9.1~9.3	8.4
<i>Availability</i>		<i>Built in</i>	<i>Built in</i>	<i>Ports</i>	<i>Ports</i>
<i>Core</i>	2008 R2+	✓ <i>More Coming</i>	✓	✓	✓
Networking					
<i>Jumbo frames</i>	2008 R2+	✓	✓	✓	✓
<i>VLAN tagging and trunking</i>		✓	✓	✓	✓
<i>Live Migration</i>		✓	✓	✓	✓
<i>Static IP Injection</i>	2012+	✓	✓	✓	✓
<i>vRSS</i>	2012R2	<i>Coming Soon!</i>			
<i>TCP Offloading</i>	2008 R2+	<i>Coming Soon!</i>			
<i>Hot Add/Remove NIC</i>	v.Next	<i>Coming Soon!</i>			
<i>SR-IOV</i>	2012+				

Feature Availability

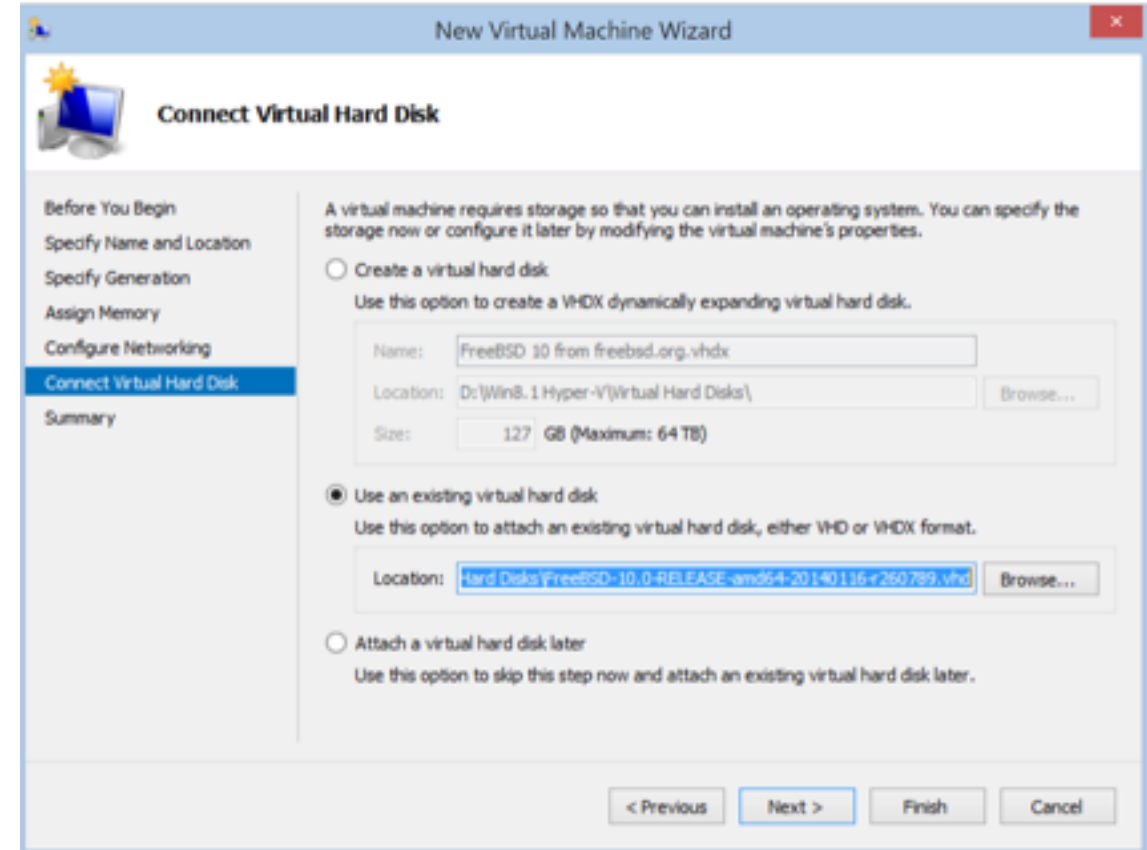
Feature	Hyper-V	10.x & Head	10	9.1~9.3	8.4
<i>Availability</i>		<i>Built in</i>	<i>Built in</i>	<i>Ports</i>	<i>Ports</i>
<i>Storage</i>					
<i>VHDX resize</i>	2012 R2 +	<i>Coming Soon!</i>			
<i>Virtual Fibre Channel</i>		<i>Coming!</i>			
<i>Live virtual machine</i>		<i>Coming!</i>			
<i>TRIM support</i>		<i>Coming Soon!</i>			
<i>Memory</i>					
<i>Configuration of MMIO gap</i>	2012 R2 +	✓	✓	✓	✓
<i>Dynamic Memory - Hot Add</i>	2012 +				
<i>Dynamic Memory - Ballooning</i>					

Feature Availability

Feature	Hyper-V	10.x & Head	10	9.1~9.3	8.4
<i>Availability</i>		<i>Built in</i>	<i>Built in</i>	<i>Ports</i>	<i>Ports</i>
<i>Video</i>					
<i>Hyper-V-specific video</i>	2008 R2+				
<i>Miscellaneous</i>					
<i>Key-Value Pair</i>	2008 R2+	✓	✓ (ports)	✓	✓
<i>Non-Maskable Interrupt</i>	2012 R2	✓	✓	✓	✓
<i>PAE Kernel Support</i>					
<i>File copy from host to guest</i>	2012 R2				
<i>Generation 2 virtual machines</i>					
<i>Boot using UEFI</i>	2012 R2				
<i>Secure boot</i>	v.Next				

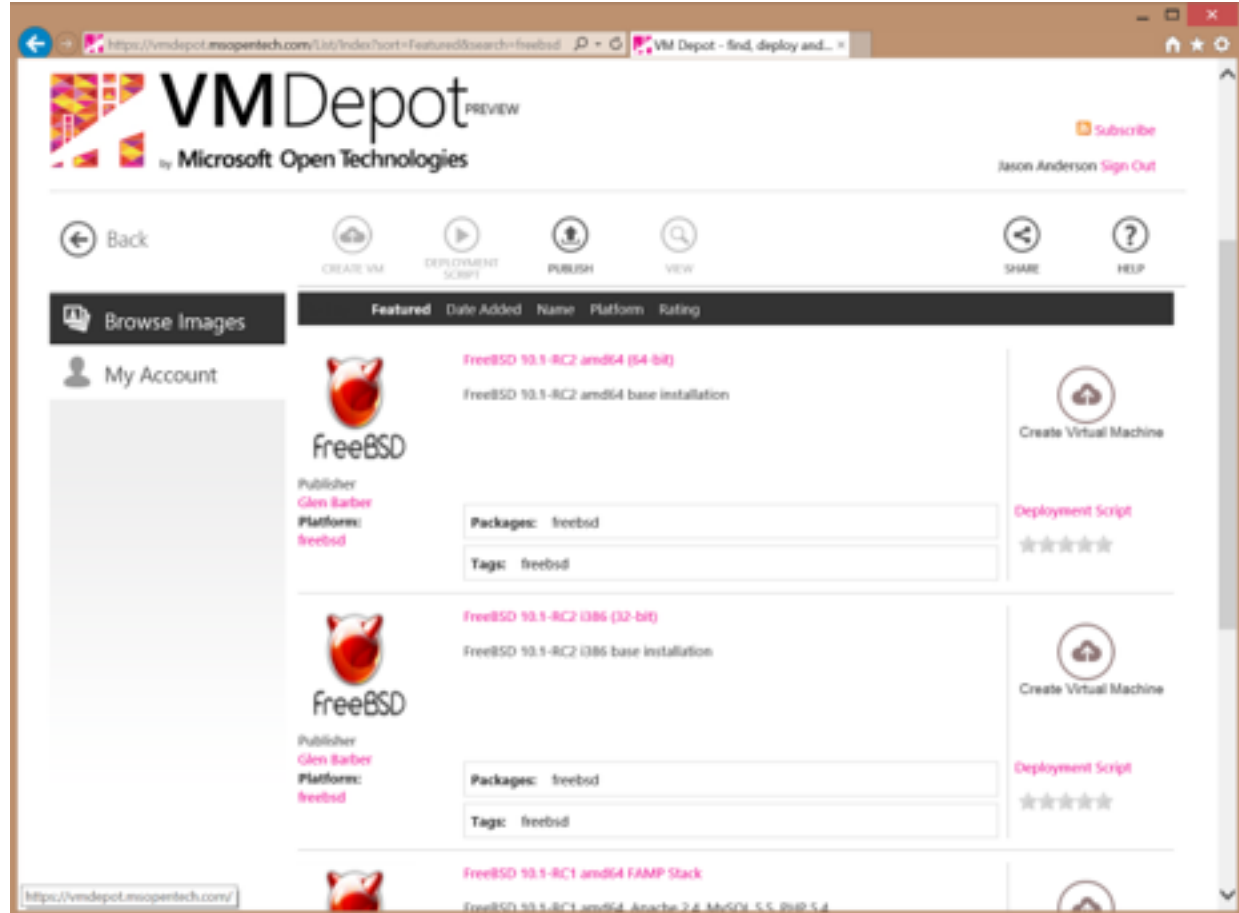
Start to run FreeBSD VM on Hyper-v

- Download Hyper-v Server Free SKU
<http://www.microsoft.com/en-us/evalcenter/evaluate-hyper-v-server-2012-r2>
- Download FreeBSD 10 VHD
<ftp://ftp.freebsd.org/pub/FreeBSD/snapshots/VM-IMAGES/10.0-RELEASE/amd64/Latest/FreeBSD-10.0-RELEASE-amd64-20140116-r260789.vhd.xz>
- Create a VM in Hyper-v manager by using existing virtual disk
20 seconds 😊

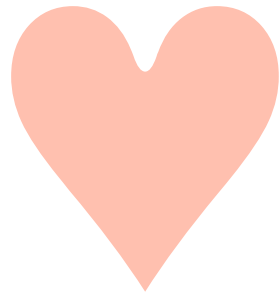


FreeBSD in Microsoft Azure

- VMDepot Community Image
 - Community created images available
 - FreeBSD.org published images as well
- “Bring your own” FreeBSD to Azure
 - Prepare your own FreeBSD image with BIS and the Azure Linux Agent for running in Azure



Microsoft



FreeBSD

Changes to FreeBSD

- Driver source code under `sys/dev/hyperv/`.
 - `include/hyperv.h`
 - `netvsc`
 - `stordisengage`
 - `storvsc`
 - `utilities`
 - `vmbus`
- Minimal change to FreeBSD kernel
 - `sys/amd64/amd64/apic_vector.S`
 - `sys/x86/include/apicvar.h`
- KVP daemon is upstreamed to <http://svnweb.freebsd.org/base/head/contrib/hyperv/tools/>
- Ports for FreeBSD 9.x/8.4/10.0(KVP) are upstreamed to <http://svnweb.freebsd.org/ports/head/emulators/hyperv-is/>

```
root@FreeBSD10:~ # ls /boot/kernel | grep hv_  
hv_ata_pci_disengage.ko  
hv_ata_pci_disengage.ko.symbols  
hv_netvsc.ko  
hv_netvsc.ko.symbols  
hv_storvsc.ko  
hv_storvsc.ko.symbols  
hv_utils.ko  
hv_utils.ko.symbols  
hv_vmbus.ko  
hv_vmbus.ko.symbols
```

One example – KVP (Key Value Pair)

The screenshot displays the Hyper-V Manager interface. A virtual machine named 'FreeBSD10.1RC3x32_i386_build_test' is running. The terminal window shows the following command and output:

```
root@FreeBSD10:~# pr awk | grep kwp
root 327 0.0 0.2 10036 1940 - Ss 4:50PM 0:00.93 /usr/sbin/kr_kwp_daem
```

The network configuration table at the bottom of the window is as follows:

Adapter	Connection	IP Addresses	Status
Network Adapter (Dynamic MAC: 00:15:5D:0E:83:AE)	External	10.172.7.16, fe80:215:5d16:06:83ae	Degraded (Integration services upgrade r...

Link of Interest

- Channel 9 Talk on Linux/FreeBSD Integration Services on Hyper-V

<http://channel9.msdn.com/Shows/Edge/Edge-Show-87-Linux-Integraton-Services-for-Hyper-V>

- Linux/FreeBSD Virtual Machines on Hyper-V

<http://technet.microsoft.com/en-us/library/dn531030.aspx>

- Linux/FreeBSD Integration Services for Microsoft Hyper-V Forum

<https://social.technet.microsoft.com/Forums/en-US/home?forum=linuxintegrationservices&filter=alltypes&sort=lastpostdesc>



**Thank
you !**

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