Case Study: To read the contents of a VHD/LVM block device from a XenServer v6.0.2 /XCP v1.6 (hypervisor)

When we look under the hood of your container we usually will find the following elements:

* VM container
* Virtual Network Interfaces
* Virtual Network
* Physical Network Interface
* Virtual Block devices (Guests HDD)
* Virtual Disk Image
* Storage Repository
* Physical Block Device
* Host

The following picture shows how this comes together:



Copied from : http://www.crucial.com.au/blog/2011/05/19/xenserver-under-the-hood/

Create a virtual machine to test this scenario, with an unencrypted LVM.

In this e.g we use VM-name=i-2-2294

Provided below are the commands to find the relevant VM details for VDI.

***#xe vm-list***

*uuid ( RO) : c76a3665-f7de-3918-e1b3-193f7fd45334*

 *name-label ( RW):* ***i-2-2294-VM***

 *power-state ( RO): running*

***#xe vm-disk-list power-state=running --multiple***

*Disk 0 VBD:*

*uuid ( RO) : 5a6bcb14-fa0b-4243-3035-8c22efc05568*

 *vm-name-label ( RO): i-2-2294-VM*

 *userdevice ( RW): 0*

*Disk 0 VDI:*

*uuid ( RO) :* ***422facae-3deb-4181-98ed-168418ce5e23***

 *name-label ( RW): ROOT-2294*

 *sr-name-label ( RO):* ***ed154d7d-8165-957c-6e18-c9d6f79d3b11***

 *virtual-size ( RO): 21474836480*

Few more XenServer commands to display further VM details:

***#xe vbd-list uuid=5a6bcb14-fa0b-4243-3035-8c22efc05568***

*uuid ( RO) : 5a6bcb14-fa0b-4243-3035-8c22efc05568*

 *vm-uuid ( RO): c76a3665-f7de-3918-e1b3-193f7fd45334*

 *vm-name-label ( RO): i-2-2294-VM*

 *vdi-uuid ( RO): 422facae-3deb-4181-98ed-168418ce5e23*

 *empty ( RO): false*

 *device ( RO): hda*

***# xe vdi-list uuid=422facae-3deb-4181-98ed-168418ce5e23***

*uuid ( RO) : 422facae-3deb-4181-98ed-168418ce5e23*

 *name-label ( RW): ROOT-2294*

 *name-description ( RW):*

 *sr-uuid ( RO): ed154d7d-8165-957c-6e18-c9d6f79d3b11*

 *virtual-size ( RO): 21474836480*

 *sharable ( RO): false*

 *read-only ( RO): false*

***# xe vm-param-list uuid=c76a3665-f7de-3918-e1b3-193f7fd45334***

*uuid ( RO): c76a3665-f7de-3918-e1b3-193f7fd45334*

*name-label ( RW): i-2-2294-VM*

*name-description ( RW): Template which allows VM installation from install media*

 *user-version ( RW): 1*

 *is-a-template ( RW): false*

 *is-a-snapshot ( RO): false*

 *snapshot-of ( RO): <not in database>*

 *snapshots ( RO):*

 *snapshot-time ( RO): 19700101T00:00:00Z*

 *snapshot-info ( RO):*

 *parent ( RO): <not in database>*

 *children ( RO):*

 *is-control-domain ( RO): false*

 *power-state ( RO): running*

 *memory-actual ( RO): 1073688576*

 *memory-target ( RO): 1073741824*

 *memory-overhead ( RO): 11534336*

 *memory-static-max ( RW): 1073741824*

 *memory-dynamic-max ( RW): 1073741824*

 *memory-dynamic-min ( RW): 1073741824*

 *memory-static-min ( RW): 1073741824*

 *suspend-VDI-uuid ( RW): <not in database>*

 *suspend-SR-uuid ( RW): <not in database>*

 *VCPUs-params (MRW): weight: 44; cap: 0*

 *VCPUs-max ( RW): 1*

 *VCPUs-at-startup ( RW): 1*

 *actions-after-shutdown ( RW): Destroy*

 *actions-after-reboot ( RW): Restart*

 *actions-after-crash ( RW): Destroy*

 *console-uuids (SRO): 731f0627-d0b2-1115-dfdf-8e0847c7aa43*

 *platform (MRW): timeoffset: 0; nx: true; acpi: 1; apic: true; pae: true; viridian: true*

 *allowed-operations (SRO): changing\_dynamic\_range; migrate\_send; pool\_migrate; changing\_VCPUs\_live; suspend; hard\_reboot; hard\_shutdown; clean\_reboot; clean\_shutdown; pause; checkpoint; snapshot*

 *current-operations (SRO):*

 *blocked-operations (MRW):*

 *allowed-VBD-devices (SRO): 1; 2; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15*

 *allowed-VIF-devices (SRO): 1; 2; 3; 4; 5; 6*

 *possible-hosts ( RO): f4af9bc3-24c4-4901-9e70-c725e3616c32; 8ccf3858-2369-4a95-bb69-47af99e2ba1e; 12060590-9c64-4a92-939f-095ac30042e8; 530a3863-be9a-4b0b-97bf-37bd7e6c05a8; f843afad-c35d-4c50-94ef-8bd933226564*

 *HVM-boot-policy ( RW): BIOS order*

 *HVM-boot-params (MRW): order: dc*

 *HVM-shadow-multiplier ( RW): 1.000*

 *PV-kernel ( RW):*

 *PV-ramdisk ( RW):*

 *PV-args ( RW):*

 *PV-legacy-args ( RW):*

 *PV-bootloader ( RW):*

 *PV-bootloader-args ( RW):*

*last-boot-CPU-flags ( RO): vendor: GenuineIntel; features: 17bee3ff-bfebfbff-00000001-2c100800*

 *last-boot-record ( RO): '('struct' ('uuid' 'c76a3665-f7de-3918-e1b3-193f7fd45334') ('allowed\_operations' ('array')) ('current\_operations' ('struct' ('OpaqueRef:8214b5a9-55b9-14e7-0247-b98bd76e022d' 'start\_on'))) ('power\_state' 'Halted') ('name\_label' 'i-2-2294-VM') ('name\_description' 'Template which allows VM installation from install media') ('user\_version' '1') ('is\_a\_template' ('boolean' '0')) ('suspend\_VDI' 'OpaqueRef:NULL') ('resident\_on' 'OpaqueRef:NULL') ('affinity' 'OpaqueRef:2b155ef5-4f8b-cca9-c504-cf0520ceecf2') ('memory\_overhead' '11534336') ('memory\_target' '1073741824') ('memory\_static\_max' '1073741824') ('memory\_dynamic\_max' '1073741824') ('memory\_dynamic\_min' '1073741824') ('memory\_static\_min' '1073741824') ('VCPUs\_params' ('struct' ('weight' '44') ('cap' '0'))) ('VCPUs\_max' '1') ('VCPUs\_at\_startup' '1') ('actions\_after\_shutdown' 'destroy') ('actions\_after\_reboot' 'restart') ('actions\_after\_crash' 'destroy') ('consoles' ('array')) ('VIFs' ('array' 'Opaqu*

*eRef:91acfb6e-cfd1-addb-436f-1d2324c096a6')) ('VBDs' ('array' 'OpaqueRef:4aa80198-3577-7958-89bc-2ecbcb574787' 'OpaqueRef:ef157ec6-2db7-c832-38c2-24efce5afa69')) ('crash\_dumps' ('array')) ('VTPMs' ('array')) ('PV\_bootloader' '') ('PV\_kernel' '') ('PV\_ramdisk' '') ('PV\_args' '') ('PV\_bootloader\_args' '') ('PV\_legacy\_args' '') ('HVM\_boot\_policy' 'BIOS order') ('HVM\_boot\_params' ('struct' ('order' 'dc'))) ('HVM\_shadow\_multiplier' ('double' '1')) ('platform' ('struct' ('nx' 'true') ('acpi' '1') ('apic' 'true') ('pae' 'true') ('viridian' 'true'))) ('PCI\_bus' '') ('other\_config' ('struct' ('base\_template\_name' 'Other install media') ('mac\_seed' '54d837fa-2bd2-90f9-87e7-a623077e6402') ('install-methods' 'cdrom'))) ('domid' '-1') ('domarch' '') ('last\_boot\_CPU\_flags' ('struct')) ('is\_control\_domain' ('boolean' '0')) ('metrics' 'OpaqueRef:dab92c67-5a45-293b-77df-1b2a20edf06a') ('guest\_metrics' 'OpaqueRef:NULL') ('last\_booted\_record' '') ('recommendations' '<restrictions><restriction field=\"me mory-static-max\" max=\"137438953472\" /><restriction field=\"vcpus-max\" max=\"16\" /><restriction property=\"number-of-vbds\" max=\"7\" /><restriction property=\"number-of-vifs\" max=\"7\" /></restrictions>') ('xenstore\_data' ('struct')) ('ha\_always\_run' ('boolean' '0')) ('ha\_restart\_priority' '') ('is\_a\_snapshot' ('boolean' '0')) ('snapshot\_of' 'OpaqueRef:NULL') ('snapshots' ('array')) ('snapshot\_time' ('dateTime.iso8601' '19700101T00:00:00Z')) ('transportable\_snapshot\_id' '') ('blobs' ('struct')) ('tags' ('array')) ('blocked\_operations' ('struct')) ('snapshot\_info' ('struct')) ('snapshot\_metadata' '') ('parent' 'OpaqueRef:NULL') ('children' ('array')) ('bios\_strings' ('struct')) ('protection\_policy' 'OpaqueRef:NULL') ('is\_snapshot\_from\_vmpp' ('boolean' '0')) ('appliance' 'OpaqueRef:NULL') ('start\_delay' '0') ('shutdown\_delay' '0') ('order' '0') ('VGPUs' ('array')) ('attached\_PCIs' ('array')) ('suspend\_SR' 'OpaqueRef:NULL') ('version' '0'))'*

 *resident-on ( RO): f843afad-c35d-4c50-94ef-8bd933226564*

 *affinity ( RW): f843afad-c35d-4c50-94ef-8bd933226564*

 *other-config (MRW): vgpu\_pci: ; base\_template\_name: Other install media; mac\_seed: 54d837fa-2bd2-90f9-87e7-a623077e6402; install-methods: cdrom*

 *dom-id ( RO): 68*

 *recommendations ( RO): <restrictions><restriction field="memory-static-max" max="137438953472" /><restriction field="vcpus-max" max="16" /><restriction property="number-of-vbds" max="7" /><restriction property="number-of-vifs" max="7" /></restrictions>*

 *xenstore-data (MRW): vm-data:*

 *ha-always-run ( RW) [DEPRECATED]: false*

 *ha-restart-priority ( RW):*

 *blobs ( RO):*

 *start-time ( RO): 20140228T15:18:41Z*

 *install-time ( RO): 20140228T15:19:27Z*

 *VCPUs-number ( RO): 1*

 *VCPUs-utilisation (MRO): 0: 0.001*

*os-version (MRO): name: Ubuntu 12.04.3 LTS; uname: 3.8.0-29-generic; distro: ubuntu; major: 12; minor: 04*

 *PV-drivers-version (MRO): major: 6; minor: 1; micro: 0; build: 61809*

 *PV-drivers-up-to-date ( RO): truevm-vif-list*

 *memory (MRO):*

 *disks (MRO):*

 *networks (MRO): 0/ip: 146.169.44.139; 0/ipv6/0: fe80::417:b4ff:fe00:3f*

 *other (MRO): platform-feature-multiprocessor-suspend: 1; feature-balloon: 1*

 *live ( RO): true*

 *guest-metrics-last-updated ( RO): 20140228T15:18:57Z*

 *cooperative ( RO) [DEPRECATED]: true*

 *protection-policy ( RW): <not in database>*

 *is-snapshot-from-vmpp ( RO): false*

 *tags (SRW):*

 *appliance ( RW): <not in database>*

 *start-delay ( RW): 0*

 *shutdown-delay ( RW): 0*

 *order ( RW): 0*

 *version ( RO): 0*

***# xe vm-vif-list uuid=c76a3665-f7de-3918-e1b3-193f7fd45334***

*uuid ( RO) : 172dc8fe-d8d8-f8b7-a7ff-7cd366fdf53c*

 *vm-name-label ( RO): i-2-2294-VM*

 *device ( RO): 0*

 *MAC ( RO): 06:17:b4:00:00:3f*

 *network-uuid ( RO): 832ba4a4-6457-f4c6-7d80-e3d5da6876ad*

 *network-name-label ( RO): Bond 2+3*

To locate the actual disk at the OS level: search with the VDI name format 🡪 **VG\_XenStorage${sr-uuid}VHD${vdi-uuid}**

Search for the actual block device on the hypervisor using the last bit of the VDI uuid:

***#ls -l /dev/mapper/ | grep 168418ce5e23***

*brw-rw---- 1 root disk 252, 23 Feb 28 16:09 VG\_XenStorage--ed154d7d--8165--957c--6e18--c9d6f79d3b11-VHD--422facae--3deb--4181--98ed--168418ce5e23*

***# lvs | grep 422facae-3deb-4181-98ed-168418ce5e23***

*VHD-422facae-3deb-4181-98ed-168418ce5e23 VG\_XenStorage-ed154d7d-8165-957c-6e18-c9d6f79d3b11 -wi-ao 20.05G*

Can read the data using (not in order):

***#strings /dev/mapper/VG\_XenStorage--ed154d7d--8165--957c--6e18--c9d6f79d3b11-VHD--422facae--3deb--4181--98ed--168418ce5e23***

Check/Confirm the different partitions available inside the running VM:

/dev/xvda1 -> /boot -> ext3 filesystem

/dev/xvda5 -> lvm for root and swap vols -> ext4 filesystem

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***guest@demo-test:~$ sudo fdisk -l***

*Disk /dev/xvda: 21.5 GB, 21474836480 bytes*

*255 heads, 63 sectors/track, 2610 cylinders, total 41943040 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x00098c7c*

 *Device Boot Start End Blocks Id System*

*/dev/xvda1 2048 499711 248832 83 Linux*

*/dev/xvda2 501758 41940991 20719617 5 Extended*

*/dev/xvda5 501760 41940991 20719616 8e Linux LVM*

*Disk /dev/mapper/systemvg-root: 14.8 GB, 14759755776 bytes*

*255 heads, 63 sectors/track, 1794 cylinders, total 28827648 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x00000000*

*Disk /dev/mapper/systemvg-root doesn't contain a valid partition table*

*Disk /dev/mapper/systemvg-swap\_1: 6434 MB, 6434062336 bytes*

*255 heads, 63 sectors/track, 782 cylinders, total 12566528 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x00000000*

*Disk /dev/mapper/systemvg-swap\_1 doesn't contain a valid partition table*

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Using kpartx, we create device mappings:

***# fdisk -l $(ls /dev/sm/backend/ed154d7d-8165-957c-6e18-c9d6f79d3b11/422facae-3deb-4181-98ed-168418ce5e23)***

***# kpartx -a $(ls /dev/sm/backend/ed154d7d-8165-957c-6e18-c9d6f79d3b11/422facae-3deb-4181-98ed-168418ce5e23)***

Newly created volumes:

**# ls /dev/mapper/**

*422facae-3deb-4181-98ed-168418ce5e23p1*

*422facae-3deb-4181-98ed-168418ce5e23p5*

All three volumes are visible:

***# ls /dev/mapper/ | grep 168418ce5e23***

*422facae-3deb-4181-98ed-168418ce5e23p1*

*422facae-3deb-4181-98ed-168418ce5e23p5*

*VG\_XenStorage--ed154d7d--8165--957c--6e18--c9d6f79d3b11-VHD--422facae--3deb--4181--98ed--168418ce5e23*

Mount for /boot (ext3) partition works:

***# mount /dev/mapper/422facae-3deb-4181-98ed-168418ce5e23p1 /mnt***

***# cd /mnt/***

***# ls***

*abi-3.8.0-29-generic config-3.8.0-29-generic grub initrd.img-3.8.0-29-generic lost+found memtest86+.bin memtest86+\_multiboot.bin System.map-3.8.0-29-generic vmlinuz-3.8.0-29-generic*

Found that the hypervisor verison we are currently using doesn’t support ext4 as there no modules available.

***# mount -t ext4 /dev/mapper/422facae-3deb-4181-98ed-168418ce5e23p5 /mnt***

*mount: wrong fs type, bad option, bad superblock on /dev/mapper/422facae-3deb-4181-98ed-168418ce5e23p5,*

 *missing codepage or other error*

 *In some cases useful info is found in syslog - try*

 *dmesg | tail or so*

VM cannot be stopped unless the newly created device/partition mappings are deleted.

I found that even after running “**kpartx –d**”, the mappings still existed, used “**dmsetup remove**” instead.

***# kpartx -d /dev/mapper/422facae-3deb-4181-98ed-168418ce5e23p5***

***# kpartx -d /dev/mapper/422facae-3deb-4181-98ed-168418ce5e23p1***

Partitions still exist after running “**kpartx –d**”

***# ls -l /dev/mapper/ | grep 168418ce5e23***

*brw------- 1 root root 252, 24 Feb 28 17:16 422facae-3deb-4181-98ed-168418ce5e23p1*

*brw------- 1 root root 252, 25 Feb 28 17:16 422facae-3deb-4181-98ed-168418ce5e23p5*

*brw-rw---- 1 root disk 252, 23 Feb 28 17:31 VG\_XenStorage--ed154d7d--8165--957c--6e18--c9d6f79d3b11-VHD--422facae--3deb--4181--98ed--168418ce5e23*

After running “**dmsetup remove**”, I was able to stop the VM.

***# dmsetup remove 422facae-3deb-4181-98ed-168418ce5e23p1***

***# ls -l /dev/mapper/ | grep 168418ce5e23***

*brw------- 1 root root 252, 25 Feb 28 17:16 422facae-3deb-4181-98ed-168418ce5e23p5*

*brw-rw---- 1 root disk 252, 23 Feb 28 17:31 VG\_XenStorage--ed154d7d--8165--957c--6e18--c9d6f79d3b11-VHD--422facae--3deb--4181--98ed--168418ce5e23*

***# dmsetup remove 422facae-3deb-4181-98ed-168418ce5e23p5***

After stopping the VM no device mappings were found with the matching VDI.

***# ls -l /dev/mapper/ | grep 168418ce5e23***