

# Xen VGA Passthrough to Windows 8 Consumer Preview 64-bit English HVM domU and Windows XP Home Edition SP3 HVM domU with Xen 4.2-unstable Changesets 25070/25099 and Linux Kernel 3.3.0 in Ubuntu 11.10 oneiric ocelot amd64 Final Release Dom0

## Version 1.8

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### 1 Preparing the USB Flash Drive to Extract VGA Card EEPROM

Reference Documentation URL #1: <http://www.davidgis.fr/blog/index.php?2011/12/07/860-xen-42unstable-patches-for-vga-pass-through>

Reference Documentation URL #2: <http://wiki.xen.org/xenwiki/XenVGAPassthrough>

```
wget http://www.davidgis.fr/download/nvflash\_5.100.1\_usb.iso.tar.bz2  
tar xfvj nvflash_5.100.1_usb.iso.tar.bz2
```

Plug in your USB flash drive.

```
dmesg
```

In my case, the USB flash drive is detected as /dev/sdb.

```
mount | grep sdb
```

```
/dev/sdb1 on /media/C06F-905B type vfat  
(rw,nosuid,nodev,uid=1000,gid=1000,shortname=mixed,dmask=0077,utf8=1,showexec,flush,uhelper=udisks)
```

```
sudo umount /media/C06F-905B/
```

```
sudo dd if=nvflash_5.100.1_usb.iso of=/dev/sdb
```

Reboot your computer with the USB flash drive plugged in.

```
nvflash.exe -list (OPTIONAL)
nvflash.exe -save vgabios.rom
```

Unplug your USB flash drive. Reboot your computer back into Linux Xen Dom0. Plug in your USB flash drive again.

```
cp /media/LEXAR/VGABIOS.ROM /home/teo-en-ming/2nd-palit-nvidia-geforce-8400gs-vgabios.rom
```

## 2 Patching Xen 4.2-unstable Changeset 25099 for Xen VGA Passthrough

```
cd
hg clone -r 25099 http://xenbits.xen.org/xen-unstable.hg xen-unstable.hg-cs25099-vga-passthrough
cd xen-unstable.hg-cs25070-vga-passthrough
./configure
make world
make clean
```

Download Xen VGA Passthrough patches from David Techer's (Frenchman) website.

```
wget http://www.davidgis.fr/download/xen-4.2\_rev24798\_gfx-passthrough-patches.tar.bz2
tar xfvj xen-4.2_rev24798_gfx-passthrough-patches.tar.bz2
```

Patching Xen 4.2-unstable changeset 25070 source tree.

```
patch -p1 < xen-4.2_rev24798_gfx-passthrough-patches/patch_Makefile
patch -p1 < xen-4.2_rev24798_gfx-passthrough-patches/patch_dsdt.asl
patch -p1 < xen-4.2_rev24798_gfx-passthrough-patches/patch_hvmloder.c
patch -p1 < xen-4.2_rev24798_gfx-passthrough-patches/patch_rombios.c
patch -p1 < xen-4.2_rev24798_gfx-passthrough-patches/patch_pci.c
patch -p1 < xen-4.2_rev24798_gfx-passthrough-patches/patch_pass-through.c
```

### 3 Configuring MMIO BARS

```
lspci | grep VGA
```

```
01:00.0 VGA compatible controller: nVidia Corporation GT218 [GeForce 8400 GS] (rev a2)
```

```
dmesg | grep 01:00.0 | grep "pci.*mem"
```

```
[ 0.120488] pci 0000:01:00.0: reg 10: [mem 0xd2000000-0xd2ffffff]
[ 0.120508] pci 0000:01:00.0: reg 14: [mem 0xc0000000-0xcfffffff 64bit pref]
[ 0.120528] pci 0000:01:00.0: reg 1c: [mem 0xd0000000-0xd1ffffff 64bit pref]
[ 0.120556] pci 0000:01:00.0: reg 30: [mem 0xd3000000-0xd307ffff pref]
```

### 4 Calculating Differences for the Four Memory Ranges

#### 4.1 First Memory Range

Maximum =  $0xd2ffffff = 3539992575$

Minimum =  $0xd2000000 = 3523215360$

Difference =  $\text{Max} - \text{Min} + 1 = 3539992575 - 3523215360 + 1 = 16777216 = 0x01000000$

Hence,

Max =  $0xD2FFFFFF$

Min =  $0xD2000000$

Diff =  $0x01000000$

#### 4.2 Second Memory Range

Maximum =  $0xcfffffff = 3489660927$

Minimum =  $0xc0000000 = 3221225472$

Difference =  $\text{Max} - \text{Min} + 1 = 3489660927 - 3221225472 + 1 = 268435456 = 0x10000000$

Hence,

Max =  $0xCFFFFFFF$

Min =  $0xC0000000$

Diff =  $0x10000000$

### 4.3 Third Memory Range

Maximum =  $0xd1ffffff = 3523215359$

Minimum =  $0xd0000000 = 3489660928$

Difference =  $\text{Max} - \text{Min} + 1 = 3523215359 - 3489660928 + 1 = 33554432 = 0x02000000$

Hence,

Max =  $0xD1FFFFFF$

Min =  $0xD0000000$

Diff =  $0x02000000$

### 4.4 Fourth Memory Range

Maximum =  $0xD307FFFF = 3540516863$

Minimum =  $0xD3000000 = 3539992576$

Difference =  $\text{Max} - \text{Min} + 1 = 3540516863 - 3539992576 + 1 = 524288 = 0x00080000$

Hence,

Max =  $0xD307FFFF$

Min =  $0xD3000000$

Diff =  $0x00080000$

## 5 Important Mathematical Tool for Hex-Dec and Dec-Hex Conversion (Online)

Link: <http://easycalculation.com/hex-converter.php>

## 6 Modifying tools/firmware/hvmloader/acpi/dsdt.asl

```
vi tools/firmware/hvmloader/acpi/dsdt.asl
```

```
/* reserve MMIO BARs of gfx for 1:1 mapping */
DWordMemory(
    ResourceProducer, PosDecode, MinFixed, MaxFixed,
    Cacheable, ReadWrite,
    0x00000000,
    0xD2000000,
    0xD2FFFFFF,
    0x00000000,
    0x01000000)

DWordMemory(
    ResourceProducer, PosDecode, MinFixed, MaxFixed,
    NonCacheable, ReadWrite,
    0x00000000,
    0xC0000000,
    0xCFFFFFFF,
    0x00000000,
    0x10000000)

DWordMemory(
    ResourceProducer, PosDecode, MinFixed, MaxFixed,
    Cacheable, ReadWrite,
    0x00000000,
    0xD0000000,
    0xD1FFFFFF,
    0x00000000,
    0x02000000)

DWordMemory(
    ResourceProducer, PosDecode, MinFixed, MaxFixed,
    Cacheable, ReadWrite,
    0x00000000,
    0xD3000000,
    0xD307FFFF,
    0x00000000,
    0x00080000,
    ,, _Y01)
```

## 7 Copying the VGA BIOS of Palit NVIDIA Geforce 8400 GS PCI-e x16

```
cp /home/teo-en-ming/2nd-palit-nvidia-geforce-8400gs-vgabios.rom
tools/firmware/vgabios/vgabios-pt.bin
hexdump -C tools/firmware/vgabios/vgabios-pt.bin | less
```

```

00000000 55 aa 78 eb 4b 37 34 30 30 e9 4c 19 77 cc 56 49 |U.x.K7400.L.w.VI|
00000010 44 45 4f 20 0d 00 00 00 88 01 1d 19 00 00 49 42 |DEO .....IB|
00000020 4d 20 56 47 41 20 43 6f 6d 70 61 74 69 62 6c 65 |M VGA Compatible|
00000030 01 00 00 00 80 00 de 4e 30 35 2f 30 36 2f 31 31 |.....N05/06/11|
00000040 00 00 00 00 00 00 00 00 00 10 00 00 51 ee c4 ed |.....Q...|
00000050 e9 61 2a 00 00 00 00 00 c3 e3 ff 7f 08 0c 00 00 |.a*.....|
00000060 ff ff fe 7f 00 00 01 80 71 3b a5 7b e9 50 45 e9 |.....q;.{.PE.|
00000070 57 45 50 4d 49 44 6c 00 6f 00 00 00 00 a0 00 b0 |WEPMIDl.o.....|
00000080 00 b8 00 c0 00 33 47 65 46 6f 72 63 65 20 38 34 |....3GeForce 84|
00000090 30 30 20 47 53 20 56 47 41 20 42 49 4f 53 0d 0a |00 GS VGA BIOS..|
000000a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|

```

\*

```

000000d0 00 00 00 00 00 00 00 56 65 72 73 69 6f 6e 20 37 |.....Version 7|
000000e0 30 2e 31 38 2e 36 46 2e 30 30 2e 30 30 20 0d 0a |0.18.6F.00.00 ..|
000000f0 00 43 6f 70 79 72 69 67 68 74 20 28 43 29 20 31 |.Copyright (C) 1|
00000100 39 39 36 2d 32 30 31 30 20 4e 56 49 44 49 41 20 |996-2010 NVIDIA |
00000110 43 6f 72 70 2e 0d 0a 00 00 00 ff ff 00 00 00 00 |Corp.....|
00000120 ff ff 42 49 4f 53 2d 50 2f 4e 40 4e 38 35 34 35 |..BIOS-P/N@N8545|
00000130 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |.....|
00000140 00 00 00 00 00 43 68 69 70 20 52 65 76 20 20 20 |....Chip Rev |
00000150 00 00 00 00 00 00 00 00 00 ba 91 98 96 91 9a 9a |.....|
00000160 8d 96 91 98 df ad 9a 93 9a 9e 8c 9a df d2 df b1 |.....|
00000170 90 8b df b9 90 8d df af 8d 90 9b 8a 9c 8b 96 90 |.....|
00000180 91 df aa 8c 9a f2 f5 ff 50 43 49 52 de 10 c3 10 |.....PCIR....|
00000190 00 00 18 00 00 00 00 03 78 00 01 00 00 80 00 00 |.....x.....|
000001a0 48 59 42 24 ff b8 42 49 54 00 00 01 0c 06 12 45 |HYB$.BIT.....E|
000001b0 32 01 04 00 2c 02 42 02 20 00 38 02 43 01 0e 00 |2...,B. .8.C...|
000001c0 58 02 44 01 04 00 66 02 41 01 03 00 6a 02 49 01 |X.D...f.A..j.I.|
000001d0 12 00 6d 02 4c 01 02 00 7f 02 4d 02 0d 00 81 02 |..m.L.....M....|
000001e0 4e 00 00 00 00 00 50 02 28 00 8e 02 53 02 15 00 |N....P.(...S...|
000001f0 b6 02 54 01 02 00 cb 02 55 01 03 00 cd 02 56 01 |..T....U....V.|
00002000 06 00 d0 02 78 01 08 00 d6 02 64 01 02 00 de 02 |...x....d....|
00002010 70 01 06 00 e0 02 69 02 41 00 e8 02 00 00 29 03 |p....i.A....)|
00002020 d9 49 b8 5d c3 63 0e 80 00 00 00 00 00 00 00 00 |.I.]c.....|
00002030 00 00 00 00 00 00 00 00 00 6f 18 70 00 00 00 00 |.....o.p....|
00002040 00 00 a8 07 00 00 00 00 00 00 00 00 02 0a 5c 5c |.....\|
00002050 1c 02 00 00 30 02 04 00 00 00 00 00 00 00 00 00 |....0.....|
00002060 bd 4a fc 9f 00 00 18 4d 1a 41 00 00 00 b1 4b bd |.J....M.A....K.|
00002070 4b c3 4b db 4b cb 4c 16 4d bd 4b f1 7f 16 4d a4 |K.K.K.L.M.K...M.|
00002080 51 08 a6 4a 4a 4b 56 68 00 00 67 68 00 00 c4 63 |Q..JJKVh..gh...c|
00002090 00 00 b3 64 00 00 b3 66 00 00 f2 67 00 00 0a 68 |...d...f...g...h|
000020a0 00 00 00 00 00 00 42 68 00 00 00 00 00 00 00 00 |.....Bh.....|
000020b0 00 00 e5 67 00 00 86 00 50 d7 00 19 f1 00 28 d9 |...g....P....(|
000020c0 49 14 ed 49 23 22 01 23 45 01 14 cc 4d 10 4a 00 |I.I#".#E...M.J.|
000020d0 8b 4a 47 4a 00 00 00 00 01 01 00 00 00 00 1f 43 |.JGJ.....C|
000020e0 00 00 00 00 00 00 8b c0 00 6f 18 70 00 00 00 ca |.....o.p....|
000020f0 37 61 00 7c c8 00 00 30 36 2f 32 34 2f 31 30 00 |7a|...06/24/10.|
00003000 00 00 00 00 00 00 00 00 00 f5 7f 01 01 00 00 00 |.....|
00003010 00 00 00 00 00 00 00 00 32 30 30 00 30 38 37 32 |.....200.0872|
00003020 30 30 30 30 00 00 00 00 00 00 10 00 77 06 b6 06 |0000.....w...|

```

```
00000330 d3 06 d3 06 45 08 3e 08 81 09 78 09 72 08 72 08 |...E.>...x.r.r.|
00000340 87 07 93 08 73 0f a8 08 a8 5d 20 00 77 06 b6 06 |...s....].w...|
00000350 d3 06 d3 06 45 08 3e 08 81 09 78 09 72 08 72 08 |...E.>...x.r.r.|
00000360 2c 00 9e 06 79 08 a8 5d 31 00 65 05 65 05 b5 0b |...y..]1.e.e...|
```

## 8 Building and Installing Xen 4.2-unstable Changeset 25099

```
make xen
make tools
make stubdom
sudo make install-xen
sudo make install-tools PYTHON_PREFIX_ARG=
sudo make install-stubdom
```

## 9 pciback (Not Using At All)

```
sudo nano /etc/grub.d/40_custom
```

```
menuentry 'Ubuntu 11.10 amd64 Release with Xen 4.2-unstable and Linux Kernel 3.3.0-xen-
teo.en.ming-sgp' --class gnu-linux --class gnu --class os {
    recordfail
    insmod part_msdos
    insmod ext2
    search --no-floppy --fs-uuid --set=root fd1ee157-7822-4a08-8549-56f4ae96f0dc
    set root='(/dev/sda,msdos1)'
    search --no-floppy --fs-uuid --set=root fd1ee157-7822-4a08-8549-56f4ae96f0dc
    multiboot /boot/xen.gz
    module /boot/vmlinuz-3.3.0-xen-teo.en.ming-sgp placeholder root=UUID=fd1ee157-7822-
4a08-8549-56f4ae96f0dc dom0_mem=1024 console=tty quiet splash vt.handoff=7 xen-
pciback.hide=(01:00.0)
    module /boot/initrd.img-3.3.0-xen-teo.en.ming-sgp
}
```

```
sudo update-grub
```

## 10 XL Domain Configuration File for Windows 8 Consumer Preview 64-bit English HVM domU

```
# XL domain configuration file for Windows 8 Consumer Preview 64-bit English HVM domU
# Please refer to "man xl.cfg" for further explanations.
# See also docs/misc/xl-network-configuration.markdown and
# docs/misc/xl-disk-configuration.txt

# Written by Teo En Ming (Zhang Enming)
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# Country: Singapore
# Date: 18 Mar 2012 Sun

name="Windows8ConsumerPreview64bitEnglish"
# Product Key: DNJXJ-7XBW8-2378T-X22TX-BKG7J

builder="hvm"

vcpus=2

memory=2048

on_poweroff="destroy"
on_reboot="restart"
on_crash="destroy"

disk=[ 'format=raw, vdev=hda, access=rw, target=/etc/xen/images/windows8consumerpreview64-
bitenglish.img', 'format=raw, vdev=hdc, access=ro, devtype=cdrom, target=/home/teo-en-
ming/Downloads/Windows8-ConsumerPreview-64bit-English.iso' ]

vif=[ 'bridge=virbr0,type=ioemu,model=e1000' ]

#boot=[c|d|n]
#     Selects the emulated virtual device to boot from. Options are hard disk (c), cd-rom (d) or
network/PXE (n).
#     Multiple options can be given and will be attempted in the order they are given. e.g. to boot
from cd-rom
#     but fallback to the hard disk you can give dc. The default is cd.

boot="dc"

acpi=1

#xen_platform_pci=1

#viridian=1

#stdvga=1
```



```
vnc=1
vnclisten="192.168.1.2"
vncdisplay=0
vncunused=1
vncpasswd=""
sdl=0

usb=1
usbdevice="tablet"

# Enable Xen VGA Passthrough
gfx_passthru=1

# VGA Passthrough Palit NVIDIA Geforce 8400 GS PCI Express x16 VGA card.
pci = [ '01:00.0','00:1b.0' ]

# PCI Passthrough Intel HD Audio Controller.
#pci = [ '00:1b.0' ]

# PCI Passthrough all the USB Controllers.
# pci = [ '00:1a.0','00:1a.1','00:1a.2','00:1a.7','00:1d.0','00:1d.1','00:1d.2','00:1d.7' ]
```

## 11 XL Domain Configuration File for Windows XP Home Edition SP3 HVM domU

```
# XL domain configuration file for Windows XP Home Edition SP3 HVM domU
# Please refer to "man xl.cfg" for further explanations.
# See also docs/misc/xl-network-configuration.markdown and
# docs/misc/xl-disk-configuration.txt

# Written by Teo En Ming (Zhang Enming)
# Email: teo.en.ming@gmail.com
# Mobile Phone: +65-8369-2618
# Country: Singapore
# Date: 18 Mar 2012 Sun

name="WindowsXPHomeEditionSP3"

builder="hvm"

vcpus=2

memory=1024

on_poweroff="destroy"
on_reboot="restart"
on_crash="destroy"

disk=[ 'format=raw, vdev=hda, access=rw, target=/var/lib/libvirt/images/Windows-XP-Home-
Edition.img', 'format=raw, vdev=hdc, access=ro, devtype=cdrom, target=/dev/sr1' ]

vif=[ 'bridge=virbr0,type=ioemu,model=rtl8139' ]

#boot=[c|d|n]
#   Selects the emulated virtual device to boot from. Options are hard disk (c), cd-rom (d) or
network/PXE (n).
#   Multiple options can be given and will be attempted in the order they are given. e.g. to boot
from cd-rom
#   but fallback to the hard disk you can give dc. The default is cd.

boot="dc"

acpi=1

#xen_platform_pci=1

#viridian=1

#stdvga=1

vnc=1
```

```
vnclisten="192.168.1.2"
vncdisplay=0
vncunused=1
vncpasswd=""
sdl=0

usb=1
usbdevice="tablet"

# Enable Xen VGA Passthrough
gfx_passthru=1

# VGA Passthrough Palit NVIDIA Geforce 8400 GS PCI Express x16 VGA card.
pci = [ '01:00.0','00:1b.0' ]

# PCI Passthrough Intel HD Audio Controller.
#pci = [ '00:1b.0' ]

# PCI Passthrough all the USB Controllers.
# pci = [ '00:1a.0','00:1a.1','00:1a.2','00:1a.7','00:1d.0','00:1d.1','00:1d.2','00:1d.7' ]
```

## 12 pci-stub

Prevents nouveau and snd\_hda\_intel kernel modules from loading.

```
sudo nano /etc/modprobe.d/blacklist.conf
```

```
# blacklist nouveau kernel module
blacklist nouveau
# blacklist snd_hda_intel kernel module
blacklist snd_hda_intel
```

Uninstall the lightdm display manager. Previous versions of Ubuntu uses gdm.

```
sudo apt-get remove lightdm
```

Reboot your computer.

```
sudo reboot
```

```
ps -ef | grep lightdm
ps -ef | grep X
lsmod | grep nouveau
lsmod | grep snd_hda_intel
```

Starts the Shorewall Firewall.

```
sudo service shorewall restart
```

Load the pci\_stub module.

```
sudo modprobe pci-stub
```

```
lsmod | grep pci_stub
```

Palit NVIDIA Geforce 8400 GS PCI Express x16 VGA card

```
lspci | grep VGA
```

```
lspci -n | grep "01:00.0"
```

```
01:00.0 0300: 10de:10c3 (rev a2)
```

Create a shell script to start Windows HVM domU.

```
cd  
nano start-windows
```

```
#!/bin/sh  
set -x  
#  
# Starts Shorewall Firewall  
sudo service shorewall restart  
#  
# Loads pci-stub kernel module  
sudo modprobe pci-stub  
#  
# Passthrough Palit NVIDIA Geforce 8400 GS PCIe x16 VGA card  
#  
echo "Passthrough Palit NVIDIA Geforce 8400 GS VGA card."  
sudo chmod o+w /sys/bus/pci/drivers/pci-stub/new_id  
sudo chmod o+w /sys/bus/pci/devices/0000:01:00.0/driver/unbind  
sudo chmod o+w /sys/bus/pci/drivers/pci-stub/bind  
echo "10de 10c3" > /sys/bus/pci/drivers/pci-stub/new_id  
echo "0000:01:00.0" > /sys/bus/pci/devices/0000:01:00.0/driver/unbind  
echo "0000:01:00.0" > /sys/bus/pci/drivers/pci-stub/bind  
#  
# Passthrough Intel HD Audio Controller  
#  
echo "Passthrough Intel HD Audio Controller."  
sudo chmod o+w /sys/bus/pci/drivers/pci-stub/new_id  
sudo chmod o+w /sys/bus/pci/devices/0000:00:1b.0/driver/unbind  
sudo chmod o+w /sys/bus/pci/drivers/pci-stub/bind  
echo "8086 3a6e" > /sys/bus/pci/drivers/pci-stub/new_id
```

```
echo "0000:00:1b.0" > /sys/bus/pci/devices/0000:00:1b.0/driver/unbind
echo "0000:00:1b.0" > /sys/bus/pci/drivers/pci-stub/bind
#
# Wait for 10 seconds
#
sleep 10
#
# Start Windows HVM domU with VGA Passthrough
#
#sudo xl create /etc/xen/WindowsXPHomeEditionSP3
sudo xl create /etc/xen/Windows8ConsumerPreview64bitEnglish
```

```
sudo chmod +x start-windows
```

Execute the following start-windows shell script. You may need to execute it twice. Why?

```
./start-windows
```

If you see “Permission denied” errors, press CTRL+C. Then execute the shell script start-windows again.

```
./start-windows
```

### 13 Checking Whether Intel VT-d is Enabled

```
sudo xl dmesg | grep 'I/O virtualisation'
```

```
(XEN) I/O virtualisation enabled
```

## 14 Xen Logs in /var/log/xen

### 14.1 qemu-dm-Windows8ConsumerPreview64bitEnglish.log

```
domid: 1
Strip off blktap sub-type prefix to /etc/xen/images/windows8consumerpreview64-bitenglish.img
(drv 'aio')
Using file /etc/xen/images/windows8consumerpreview64-bitenglish.img in read-write mode
Strip off blktap sub-type prefix to /home/teo-en-ming/Downloads/Windows8-ConsumerPreview-
64bit-English.iso (drv 'aio')
Using file /home/teo-en-ming/Downloads/Windows8-ConsumerPreview-64bit-English.iso in read-
only mode
Watching /local/domain/0/device-model/1/logdirty/cmd
Watching /local/domain/0/device-model/1/command
Watching /local/domain/1/cpu
qemu_map_cache_init nr_buckets = 10000 size 4194304
shared page at pfn feffd
buffered io page at pfn feffb
Guest uuid = eb9aa557-f2d4-473f-a01b-9b235399f235
Register xen platform.
Done register platform.
platform_fixed_ioport: changed ro/rw state of ROM memory area. now is rw state.
xs_read(/local/domain/0/device-model/1/xen_extended_power_mgmt): read error
medium change watch on `hdc' (index: 1): aio:/home/teo-en-ming/Downloads/Windows8-
ConsumerPreview-64bit-English.iso
I/O request not ready: 0, ptr: 0, port: 0, data: 0, count: 0, size: 0
Log-dirty: no command yet.
I/O request not ready: 0, ptr: 0, port: 0, data: 0, count: 0, size: 0
vcpu-set: watch node error.
xs_read(/local/domain/1/log-throttling): read error
qemu: ignoring not-understood drive `/local/domain/1/log-throttling'
medium change watch on `/local/domain/1/log-throttling' - unknown device, ignored
dm-command: hot insert pass-through pci dev
register_real_device: Assigning real physical device 01:00.0 ...
pt_iomul_init: Error: pt_iomul_init can't open file /dev/xen/pci_iomul: No such file or directory:
0x1:0x0.0x0
pt_register_regions: IO region registered (size=0x01000000 base_addr=0xd2000000)
pt_register_regions: IO region registered (size=0x10000000 base_addr=0xc000000c)
pt_register_regions: IO region registered (size=0x02000000 base_addr=0xd000000c)
pt_register_regions: IO region registered (size=0x00000080 base_addr=0x0000d001)
pt_register_regions: Expansion ROM registered (size=0x00080000 base_addr=0xd3000002)
setup_vga_pt: vga bios checksum is adjusted!
pt_msi_setup: msi mapped with pirq 37
pci_intx: intx=1
register_real_device: Real physical device 01:00.0 registered successfully!
IRQ type = MSI-INTx
pt_bar_reg_read: first read BARs of gfx
pt_iomem_map: e_phys=d2000000 maddr=d2000000 type=0 len=16777216 index=0 first_map=1
pt_bar_reg_read: first read BARs of gfx
```

pt\_iomem\_map: e\_phys=c0000000 maddr=c0000000 type=8 len=268435456 index=1 first\_map=1  
pt\_bar\_reg\_read: first read BARs of gfx  
pt\_bar\_reg\_read: first read BARs of gfx  
pt\_iomem\_map: e\_phys=d0000000 maddr=d0000000 type=8 len=33554432 index=3 first\_map=1  
pt\_bar\_reg\_read: first read BARs of gfx  
pt\_bar\_reg\_read: first read BARs of gfx  
pt\_ioport\_map: e\_phys=d000 pio\_base=d000 len=128 index=5 first\_map=1  
platform\_fixed\_ioport: changed ro/rw state of ROM memory area. now is rw state.  
platform\_fixed\_ioport: changed ro/rw state of ROM memory area. now is ro state.  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_pci\_read\_config: [00:05:0] Error: Failed to read register with invalid access size alignment.  
[Offset:0eh][Length:4]  
pt\_iomem\_map: e\_phys=ffffff maddr=d2000000 type=0 len=16777216 index=0 first\_map=0  
pt\_iomem\_map: e\_phys=ffffff maddr=c0000000 type=8 len=268435456 index=1 first\_map=0  
pt\_iomem\_map: e\_phys=ffffff maddr=d0000000 type=8 len=33554432 index=3 first\_map=0  
pt\_ioport\_map: e\_phys=ffff pio\_base=d000 len=128 index=5 first\_map=0  
pt\_iomem\_map: e\_phys=d2000000 maddr=d2000000 type=0 len=16777216 index=0 first\_map=0  
pt\_iomem\_map: e\_phys=c0000000 maddr=c0000000 type=8 len=268435456 index=1 first\_map=0  
pt\_iomem\_map: e\_phys=d0000000 maddr=d0000000 type=8 len=33554432 index=3 first\_map=0  
pt\_ioport\_map: e\_phys=d000 pio\_base=d000 len=128 index=5 first\_map=0  
pt\_iomem\_map: e\_phys=ffffff maddr=d2000000 type=0 len=16777216 index=0 first\_map=0  
pt\_iomem\_map: e\_phys=ffffff maddr=c0000000 type=8 len=268435456 index=1 first\_map=0  
pt\_iomem\_map: e\_phys=ffffff maddr=d0000000 type=8 len=33554432 index=3 first\_map=0  
pt\_ioport\_map: e\_phys=ffff pio\_base=d000 len=128 index=5 first\_map=0  
pt\_iomem\_map: e\_phys=d2000000 maddr=d2000000 type=0 len=16777216 index=0 first\_map=0  
pt\_iomem\_map: e\_phys=c0000000 maddr=c0000000 type=8 len=268435456 index=1 first\_map=0  
pt\_iomem\_map: e\_phys=d0000000 maddr=d0000000 type=8 len=33554432 index=3 first\_map=0  
pt\_ioport\_map: e\_phys=d000 pio\_base=d000 len=128 index=5 first\_map=0

## 14.2 qemu-dm-WindowsXPHomeEditionSP3.log

```
domid: 1
Strip off blktap sub-type prefix to /var/lib/libvirt/images/Windows-XP-Home-Edition.img (drv
'aio')
Using file /var/lib/libvirt/images/Windows-XP-Home-Edition.img in read-write mode
Using file /dev/sr1 in read-only mode
Watching /local/domain/0/device-model/1/logdirty/cmd
Watching /local/domain/0/device-model/1/command
Watching /local/domain/1/cpu
qemu_map_cache_init nr_buckets = 10000 size 4194304
shared page at pfn feffd
buffered io page at pfn feffb
Guest uuid = 8cad4267-b556-4a49-8966-9dcf3d032f5a
Register xen platform.
Done register platform.
platform_fixed_ioport: changed ro/rw state of ROM memory area. now is rw state.
xs_read(/local/domain/0/device-model/1/xen_extended_power_mgmt): read error
medium change watch on `hdc' (index: 1): /dev/sr1
I/O request not ready: 0, ptr: 0, port: 0, data: 0, count: 0, size: 0
Log-dirty: no command yet.
I/O request not ready: 0, ptr: 0, port: 0, data: 0, count: 0, size: 0
vcpu-set: watch node error.
xs_read(/local/domain/1/log-throttling): read error
qemu: ignoring not-understood drive `/local/domain/1/log-throttling'
medium change watch on `/local/domain/1/log-throttling' - unknown device, ignored
dm-command: hot insert pass-through pci dev
register_real_device: Assigning real physical device 01:00.0 ...
pt_iomul_init: Error: pt_iomul_init can't open file /dev/xen/pci_iomul: No such file or directory:
0x1:0x0.0x0
pt_register_regions: IO region registered (size=0x01000000 base_addr=0xd2000000)
pt_register_regions: IO region registered (size=0x10000000 base_addr=0xc000000c)
pt_register_regions: IO region registered (size=0x02000000 base_addr=0xd000000c)
pt_register_regions: IO region registered (size=0x00000080 base_addr=0x0000d001)
pt_register_regions: Expansion ROM registered (size=0x00080000 base_addr=0xd3000002)
setup_vga_pt: vga bios checksum is adjusted!
pt_msi_setup: msi mapped with pirq 37
pci_intx: intx=1
register_real_device: Real physical device 01:00.0 registered successfully!
IRQ type = MSI-INTx
dm-command: hot insert pass-through pci dev
register_real_device: Assigning real physical device 00:1b.0 ...
pt_iomul_init: Error: pt_iomul_init can't open file /dev/xen/pci_iomul: No such file or directory:
0x0:0x1b.0x0
pt_register_regions: IO region registered (size=0x00004000 base_addr=0xd3220004)
pt_msi_setup: msi mapped with pirq 36
pci_intx: intx=1
register_real_device: Real physical device 00:1b.0 registered successfully!
IRQ type = MSI-INTx
pt_bar_reg_read: first read BARs of gfx
```



```
pt_iomem_map: e_phys=d2000000 maddr=d2000000 type=0 len=16777216 index=0 first_map=1
pt_bar_reg_read: first read BARs of gfx
pt_iomem_map: e_phys=c0000000 maddr=c0000000 type=8 len=268435456 index=1 first_map=1
pt_bar_reg_read: first read BARs of gfx
pt_bar_reg_read: first read BARs of gfx
pt_iomem_map: e_phys=d0000000 maddr=d0000000 type=8 len=33554432 index=3 first_map=1
pt_bar_reg_read: first read BARs of gfx
pt_bar_reg_read: first read BARs of gfx
pt_ioport_map: e_phys=d000 pio_base=d000 len=128 index=5 first_map=1
pt_iomem_map: e_phys=f1000000 maddr=d3220000 type=0 len=16384 index=0 first_map=1
platform_fixed_ioport: changed ro/rw state of ROM memory area. now is rw state.
platform_fixed_ioport: changed ro/rw state of ROM memory area. now is ro state.
pt_iomem_map: e_phys=ffffffff maddr=d2000000 type=0 len=16777216 index=0 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=c0000000 type=8 len=268435456 index=1 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=d0000000 type=8 len=33554432 index=3 first_map=0
pt_ioport_map: e_phys=ffff pio_base=d000 len=128 index=5 first_map=0
pt_iomem_map: e_phys=d2000000 maddr=d2000000 type=0 len=16777216 index=0 first_map=0
pt_iomem_map: e_phys=c0000000 maddr=c0000000 type=8 len=268435456 index=1 first_map=0
pt_iomem_map: e_phys=d0000000 maddr=d0000000 type=8 len=33554432 index=3 first_map=0
pt_ioport_map: e_phys=d000 pio_base=d000 len=128 index=5 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=d3220000 type=0 len=16384 index=0 first_map=0
pt_pci_write_config: [00:06:0] Warning: Guest attempt to set address to unused Base Address
Register. [Offset:30h][Length:4]
pt_iomem_map: e_phys=f1000000 maddr=d3220000 type=0 len=16384 index=0 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=d3220000 type=0 len=16384 index=0 first_map=0
pt_iomem_map: e_phys=f1000000 maddr=d3220000 type=0 len=16384 index=0 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=d2000000 type=0 len=16777216 index=0 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=c0000000 type=8 len=268435456 index=1 first_map=0
pt_iomem_map: e_phys=ffffffff maddr=d0000000 type=8 len=33554432 index=3 first_map=0
pt_ioport_map: e_phys=ffff pio_base=d000 len=128 index=5 first_map=0
pt_iomem_map: e_phys=d2000000 maddr=d2000000 type=0 len=16777216 index=0 first_map=0
pt_iomem_map: e_phys=c0000000 maddr=c0000000 type=8 len=268435456 index=1 first_map=0
pt_iomem_map: e_phys=d0000000 maddr=d0000000 type=8 len=33554432 index=3 first_map=0
pt_ioport_map: e_phys=d000 pio_base=d000 len=128 index=5 first_map=0
reset requested in cpu_handle_ioreq.
Issued domain 1 reboot
```

## 15 Passthrough USB Keyboard and USB Mouse to Windows HVM domU

List your USB devices.

```
lsusb
```

```
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 003 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 004 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 005 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 006 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 007 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 008 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 001 Device 002: ID 2040:2400 Hauppauge WinTV PVR USB2 (Model 24019)
Bus 001 Device 003: ID 0409:005a NEC Corp. HighSpeed Hub
Bus 006 Device 002: ID 0603:00f2 Novatek Microelectronics Corp.
Bus 008 Device 002: ID 15d9:0a41 Trust International B.V. MI-2540D [Optical mouse]
```

On the QEMU console, execute the following commands.

Passthrough USB Keyboard.

```
usb_add host:0603:00f2
```

Passthrough USB Mouse.

```
usb_add host:15d9:0a41
```

## 16 Reverting Back to lightdm Display Manager

```
sudo reboot
sudo apt-get install lightdm
sudo service lightdm start
```

## 17 PCI Passthrough the USB Controllers to Windows HVM domU

```
lspci
```

```
00:00.0 Host bridge: Intel Corporation 4 Series Chipset DRAM Controller (rev 03)
00:01.0 PCI bridge: Intel Corporation 4 Series Chipset PCI Express Root Port (rev 03)
00:03.0 Communication controller: Intel Corporation 4 Series Chipset HECI Controller (rev 03)
00:19.0 Ethernet controller: Intel Corporation 82567LM-3 Gigabit Network Connection (rev 02)
00:1a.0 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB UHCI Controller #4 (rev 02)
00:1a.1 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB UHCI Controller #5 (rev 02)
00:1a.2 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB UHCI Controller #6 (rev 02)
00:1a.7 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB2 EHCI Controller #2 (rev 02)
00:1b.0 Audio device: Intel Corporation 82801JD/DO (ICH10 Family) HD Audio Controller (rev 02)
00:1d.0 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB UHCI Controller #1 (rev 02)
00:1d.1 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB UHCI Controller #2 (rev 02)
00:1d.2 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB UHCI Controller #3 (rev 02)
00:1d.7 USB Controller: Intel Corporation 82801JD/DO (ICH10 Family) USB2 EHCI Controller #1 (rev 02)
00:1e.0 PCI bridge: Intel Corporation 82801 PCI Bridge (rev a2)
00:1f.0 ISA bridge: Intel Corporation 82801JDO (ICH10DO) LPC Interface Controller (rev 02)
00:1f.2 IDE interface: Intel Corporation 82801JD/DO (ICH10 Family) 4-port SATA IDE Controller (rev 02)
00:1f.3 SMBus: Intel Corporation 82801JD/DO (ICH10 Family) SMBus Controller (rev 02)
00:1f.5 IDE interface: Intel Corporation 82801JD/DO (ICH10 Family) 2-port SATA IDE Controller (rev 02)
01:00.0 VGA compatible controller: nVidia Corporation GT218 [GeForce 8400 GS] (rev a2)
01:00.1 Audio device: nVidia Corporation High Definition Audio Controller (rev a1)
02:01.0 FireWire (IEEE 1394): Agere Systems FW322/323 (rev 70)
```

```
sudo nano /etc/grub.d/40_custom
```

```
menuentry 'Ubuntu 11.10 amd64 Release with Xen 4.2-unstable and Linux Kernel 3.3.0-xen-
teo.en.ming-sgp' --class gnu-linux --class gnu --class os {
    recordfail
    insmod part_msdos
    insmod ext2
    search --no-floppy --fs-uuid --set=root fd1ee157-7822-4a08-8549-56f4ae96f0dc
    set root='(/dev/sda,msdos1)'
    search --no-floppy --fs-uuid --set=root fd1ee157-7822-4a08-8549-56f4ae96f0dc
    multiboot /boot/xen.gz
    module /boot/vmlinuz-3.3.0-xen-teo.en.ming-sgp placeholder root=UUID=fd1ee157-7822-
4a08-8549-56f4ae96f0dc dom0_mem=1024 console=tty quiet splash vt.handoff=7 xen-
pciback.hide=(00:1a.0)(00:1a.1)(00:1a.2)(00:1a.7)(00:1d.0)(00:1d.1)(00:1d.2)(00:1d.7)
    module /boot/initrd.img-3.3.0-xen-teo.en.ming-sgp
}
```

```
sudo update-grub
```

```
sudo reboot
```

**Please note that your USB keyboard and USB mouse will not work after rebooting. Hence it is not advisable to use this method to passthrough your USB controllers to Windows HVM domU because ALL the USB controllers have been hidden from domain 0 as shown above. Of course, you can choose not to hide all the USB controllers from dom0.**

## 18 Opening Firewall Port for VNC Server in dom0 for Xen VGA Passthrough

/etc/shorewall/rules

```
# Allows VNC viewer connection to VNC Server in dom0 for Xen VGA Passthrough (QEMU monitor only)
ACCEPT          net:192.168.1.0/24  $FW  tcp  5900
```

## 19 Tested Xen 4.2-unstable Changesets

Xen 4.2-unstable Changeset	Xen VGA Passthrough to Windows 8 Consumer Preview HVM Virtual Machine Successful?
25070	YES, BUT PARTIAL, LESS THAN 100%
25099	YES, BUT PARTIAL, LESS THAN 100%

## 20 PCI Passthrough Intel HD Audio Controller on Intel DQ45CB Desktop Board

Please refer to the start-windows linux bash shell script in Section 12 of this document.

## 21 Testing ---Outdated--- NVIDIA Display Drivers for Windows XP Home Edition SP3 32-bit HVM domU with Xen 4.2-unstable VGA Passthrough

NVIDIA Display Driver Version	Windows XP Home Edition SP3 32-bit HVM domU	Windows 8 Consumer Preview 64-bit English HVM domU	Ubuntu 11.10 amd64 Release Domain 0	NVIDIA Display Driver Download Location
275.33 WHQL	CRASHED	NOT TESTED, USING LATEST NVIDIA DRIVER VERSION INSTEAD	CRASHED	<a href="http://www.softpedia.com">www.softpedia.com</a>
275.50 BETA	CRASHED	NOT TESTED, USING LATEST NVIDIA DRIVER VERSION INSTEAD	CRASHED	<a href="http://www.softpedia.com">www.softpedia.com</a>

Please note that using the **very latest** NVIDIA Display Drivers, as of 29 March 2012, for Windows 8 Consumer Preview 64-bit English HVM domU and Windows XP Home Edition SP3 HVM domU **will not** cause the respective HVM virtual machines and dom0 to crash with Xen 4.2-unstable VGA Passthrough. However, the following errors **still exist** in Device Manager for NVIDIA Geforce 8400 GS:

1. Yellow exclamation mark besides NVIDIA Geforce 8400 GS in Device Manager
2. General tab: Windows has stopped this device because it has reported problems. (Code 43)
3. Resources tab: This device isn't using any resources because it has a problem.

With the above-mentioned errors, you can still play and watch Youtube videos and do internet browsing. But you will not be able to run 3D graphics benchmarks and play 3D games. I have tried to run Unigine Heaven DX11 and 3dmark11 3D graphics benchmarks without success. This is why I say that Xen 4.2-unstable VGA Passthrough to Windows 8 Consumer Preview and Windows XP Home Edition SP3 HVM virtual machines is only partially successful, i.e., less than 100% success.

## 22 Tested VGA Adapters

<b>Display Adapter</b>	<b>Xen VGA Passthrough</b>
NVIDIA Quadro 6000	100% Success
NVIDIA Geforce 8400 GS	Partial Success***

\*\*\* Yellow exclamation mark with NVIDIA Geforce 8400 GS in Device Manager.