Virtualizando con Xen

Taller práctico: Compilación, instalación y configuración de Xen 3.4.3 y herramientas de control y gestión en GNU/Linux Debian
por **@canonigos**

Instalación del Sistema Operativo

- Empezaremos el taller con una instalación limpia (standard base) del sistema operativo GNU/Linux Debian *'Lenny'* 64bits a la que accederemos mediante ssh (OpenSSH(tcp_22))
- Necesitamos una partición con soporte LVM donde alojaremos nuestras máquinas virtuales (vserver)
- Ver presentación: InstalaciónDebianConSoporteLVM.pdf
- **Ojo!**: Si vas a usar una máquina con un sistema operativo existente, te aconsejo que hagas copias de seguridad de todos los datos que creas importantes.
- **Ojo!**: La instalación propuesta en la presentación 'InstalacionDebianConSoporteLVM.pdf' está pensada para una máquina de test. Para sistemas en producción sería conveniente utilizar otro esquema de particiones y tener distintias consideraciones de seguridad que no se tratán aquí.

Objetivo

- Compilaremos e instalaremos una versión actualizada (3.4.3) de Xen sobre GNU/Linux Debian ya que ésta trae como binario en sus repositorios la versión de Xen 3.2.1 además de las herramientas necesarias para la gestión y control.

- Utilizaremos el kernel 2.6.26-1-amd64-xen tanto para dom0 como para los domU's que viene como binario en la distribución.

- Utilizaremos un grupo de volúmenes LVM para almacenar las imágenes de las máquinas virtuales. (Se pueden usar ficheros de imagen, dispositivos de bloques o recursos en red de tipo nfs, iscsi o aoe).

- Configuraremos Xen-Tools e instalaremos una máquina virtual con dicha herramienta.

- Operaremos sobre la máquina virtual mediante la interfaz de consola xm y veremos distintas tareas.

- Si nos da tiempo veremos como virtualizar un sistema operativo mediante HVM.

Comprobar soporte VMX/SVM

Prerequisitos para la Compilación

```
virtual:~# aptitude install bcc bin86 gawk bridge-utils iproute libcurl3 libcurl
4-openssl-dev bzip2 module-init-tools transfig tgif texinfo pciutils-dev mercuri
al build-essential zlib1g-dev python python-dev python-twisted libncurses5-dev l
ibvncserver-dev libsdl-dev libjpeg62-dev ntp debootstrap perl rinse rpm gcc-mult
ilib libconfig-inifiles-perl libtext-template-perl
```

Buscar Kernel

```
virtual:~# apt-cache search linux-image-2.6.26-*|grep xen
linux-headers-2.6.26-1-xen-amd64 - Header files for Linux 2.6.26-1-xen-amd64
linux-headers-2.6.26-2-xen-amd64 - Header files for Linux 2.6.26-2-xen-amd64
linux-image-2.6.26-1-xen-amd64 - Linux 2.6.26 image on AMD64, oldstyle Xen suppo
rt
linux-image-2.6.26-2-xen-amd64 - Linux 2.6.26 image on AMD64, oldstyle Xen suppo
rt
virtual:~#
```

Terminal — ssh — 80×24

Instalar Kernel 2.6.26-1-amd64-xen para dom0 y domU's

```
virtual:~# aptitude install linux-image-2.6.26-1-xen-amd64
Reading package lists... Done
Building dependency tree
Reading state information... Done
Reading extended state information
Initializing package states... Done
Reading task descriptions... Done
The following NEW packages will be installed:
  linux-image-2.6.26-1-xen-amd64 linux-modules-2.6.26-1-xen-amd64{a}
0 packages upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
Need to get 21.1MB of archives. After unpacking 84.4MB will be used.
Do you want to continue? [Y/n/?] 
```

Terminal — ssh — 80×24

Descargar código fuente de Xen, Xen-Tools y Xen-Shell

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Descargar código fuente de Xen, Xen-Tools y Xen-Shell

Descomprimir tarballs

```
virtual:/usr/src# tar zxvf xen-3.4.3.tar.gz  && tar zxvf xen-tools-4.2.tar.gz && tar zx
vf xen-shell-1.9.tar.gz
```

Compilar e Instalar Xen
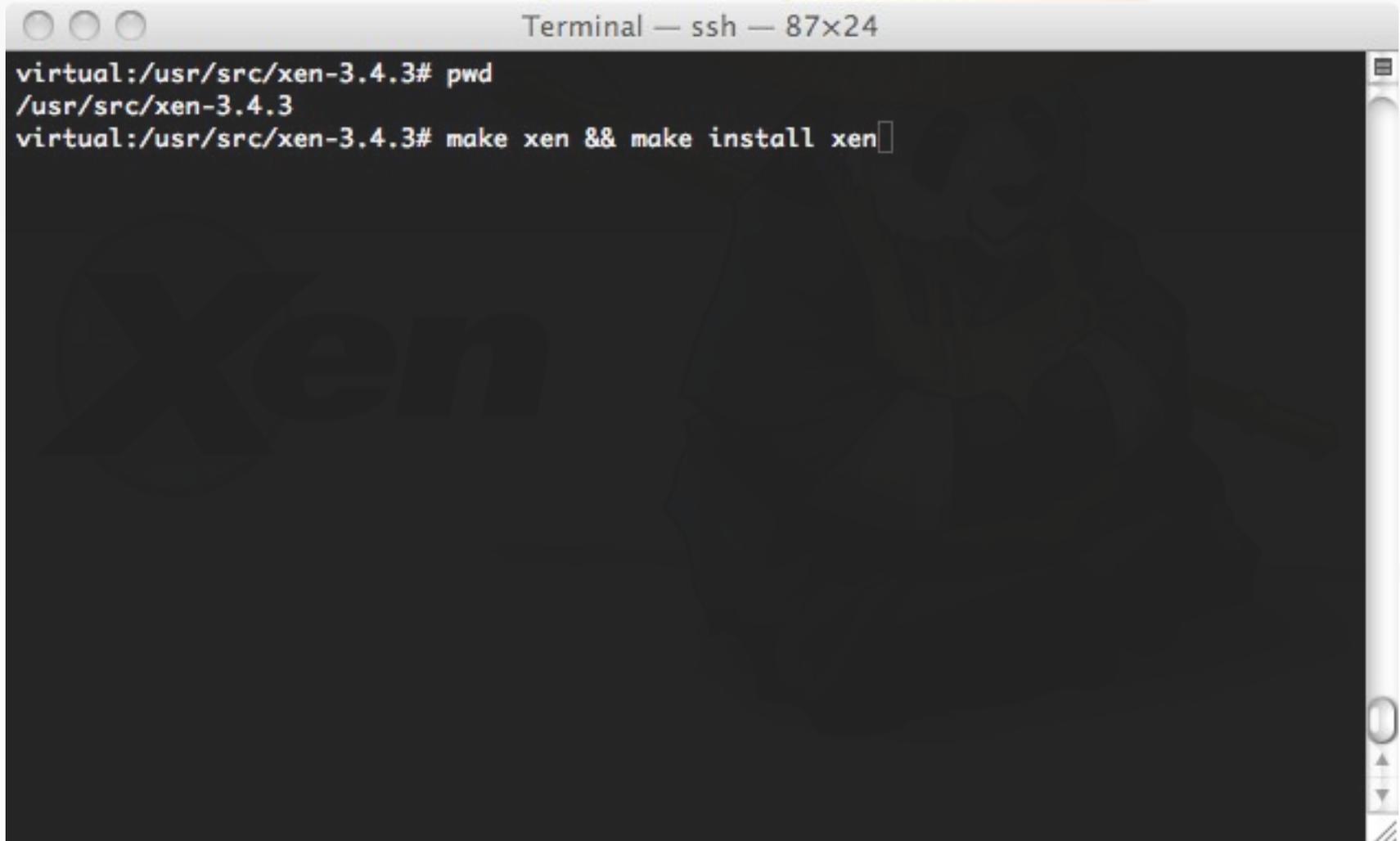
```
virtual:/usr/src/xen-3.4.3# pwd
/usr/src/xen-3.4.3
virtual:/usr/src/xen-3.4.3# make xen && make install xen
```

Compilación 2.6.18-xen-hg

```
Terminal — ssh — 87×24

Processor family
  1. AMD-Opteron/Athlon64 (MK8)
  2. Intel EM64T (MPSC)
> 3. Generic-x86-64 (GENERIC_CPU)
choice[1-3]: 3
Enable Xen compatible kernel (X86_64_XEN) [Y/n/?] y
/dev/cpu/microcode - Intel CPU microcode support (MICROCODE) [Y/n/m/?] y
/dev/cpu/*/msr - Model-specific register support (X86_MSR) [M/n/y/?] m
/dev/cpu/*/cpuid - CPU information support (X86_CPUID) [M/n/y/?] m
MTRR (Memory Type Range Register) support (MTRR) [Y/n/?] y
Symmetric multi-processing support (SMP) [Y/n/?] y
Preemption Model
  1. No Forced Preemption (Server) (PREEMPT_NONE)
> 2. Voluntary Kernel Preemption (Desktop) (PREEMPT_VOLUNTARY)
choice[1-2]: 2
Preempt The Big Kernel Lock (PREEMPT_BKL) [Y/n/?] y
Memory model
> 1. Flat Memory (FLATMEM_MANUAL)
choice[1]: 1
Cache clean pages in transcendent memory (PRECACHE) [N/y/?] (NEW)
Swap pages to transcendent memory (PRESWAP) [N/y/?] (NEW)
Maximum number of CPUs (2-256) (NR_CPUS) [32] 32
Support for hot-pluggable CPUs (EXPERIMENTAL) (HOTPLUG_CPU) [Y/n/?] y
Machine check support (X86_MCE) [Y/n/?] (NEW) 
```

Cocinando Xen

http://xkcd.com/303/
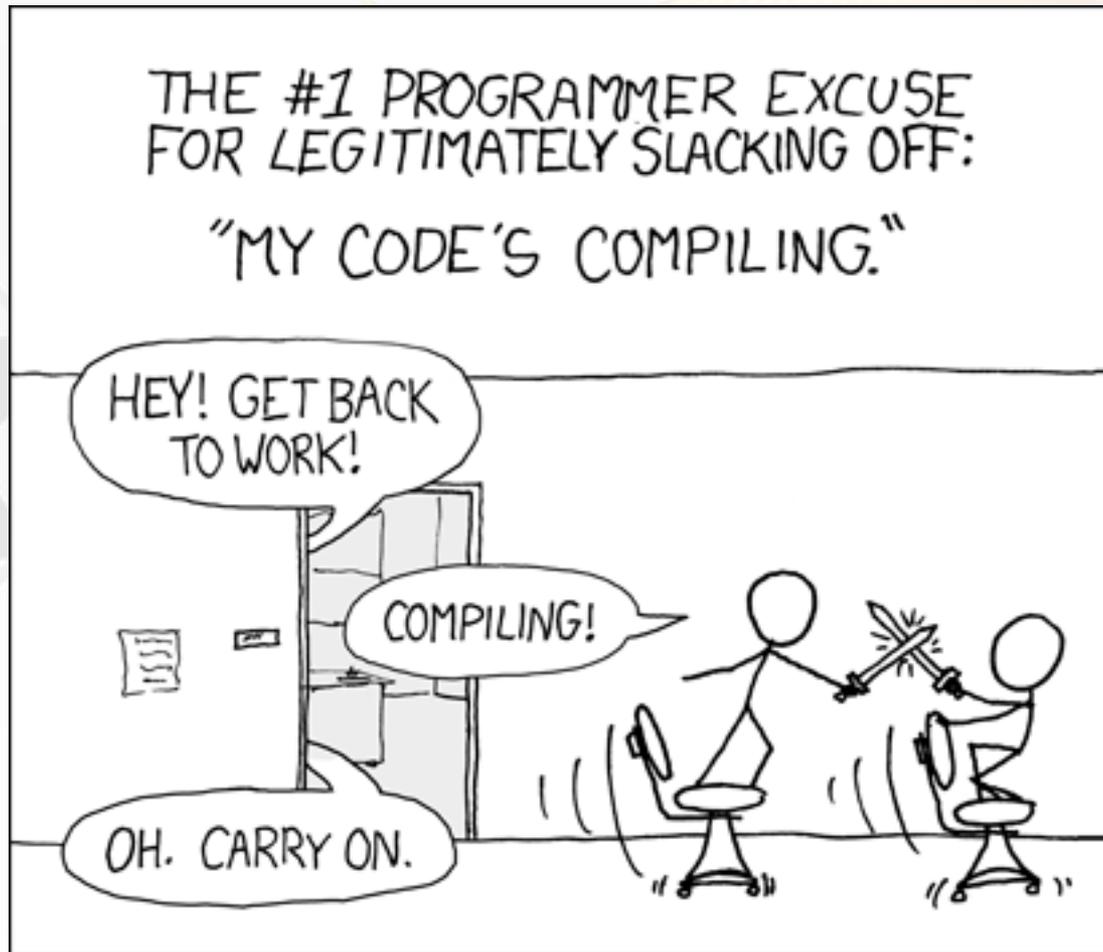
htop del equipo durante compilación

Compilación finalizada con éxito

Compilar e instalar Herramientas
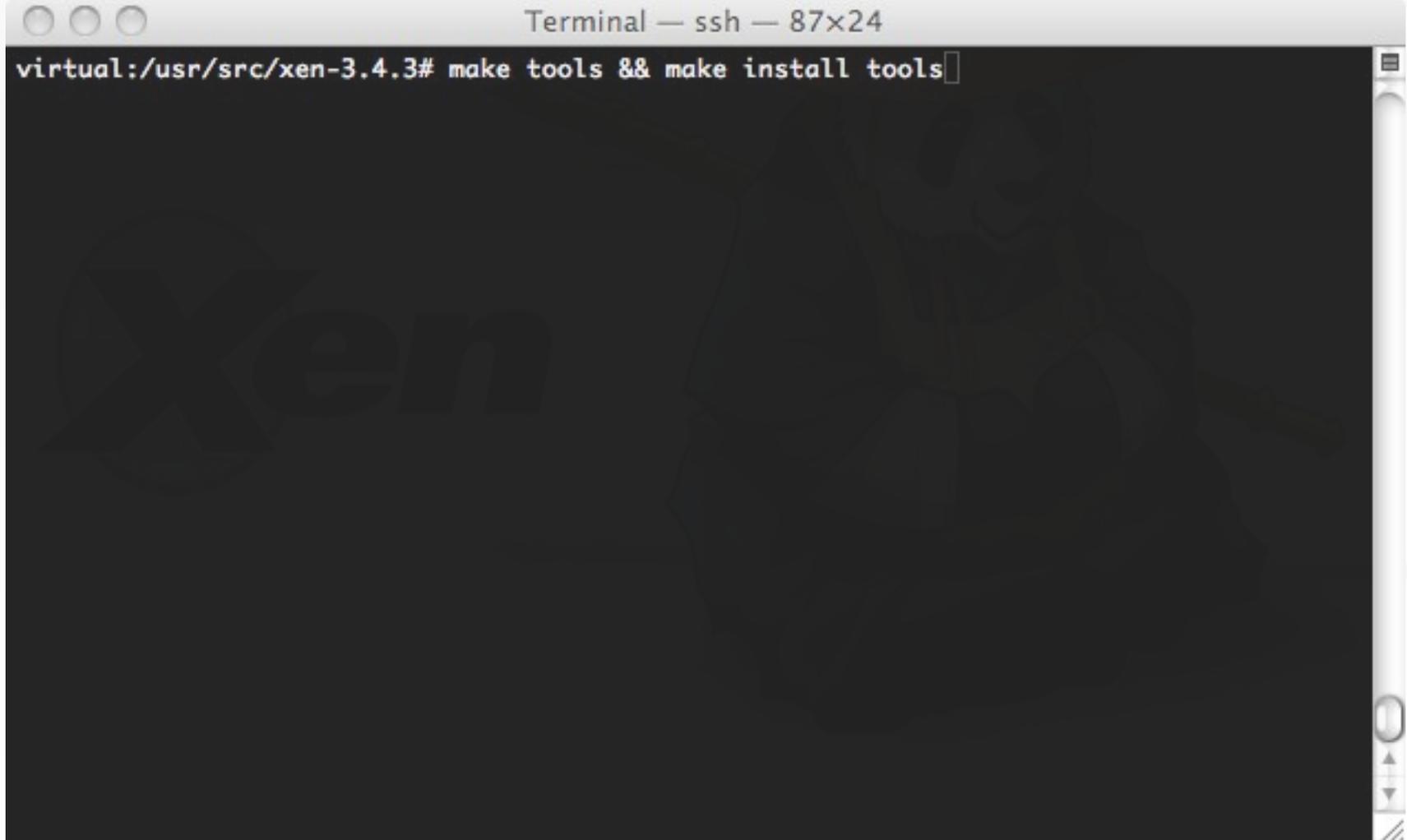
Cocinando Herramientas

http://xkcd.com/149/
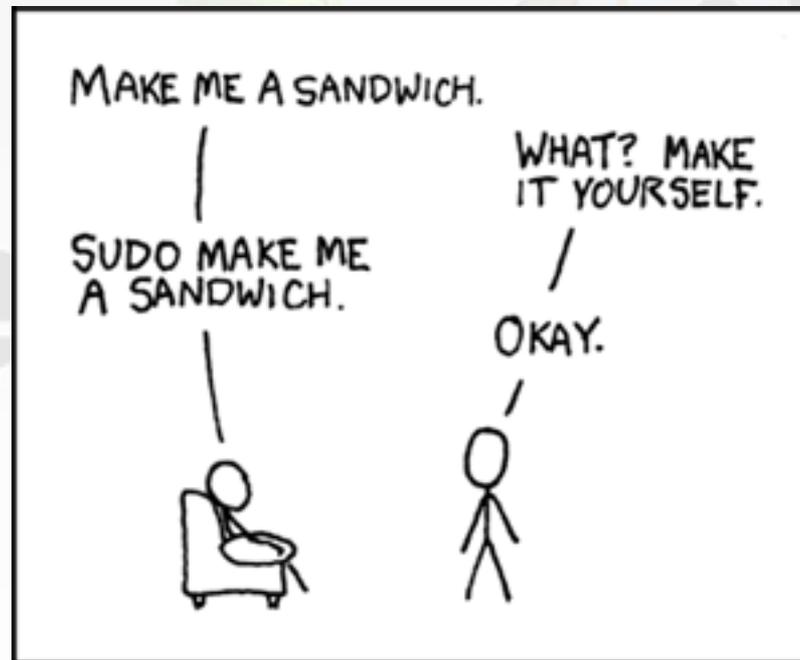
Agregar xend y xendomains al arranque por defecto

```
virtual:/usr/src/xen-3.4.3# update-rc.d xend defaults 20 21
 Adding system startup for /etc/init.d/xend ...
   /etc/rc0.d/K21xend -> ../init.d/xend
   /etc/rc1.d/K21xend -> ../init.d/xend
   /etc/rc6.d/K21xend -> ../init.d/xend
   /etc/rc2.d/S20xend -> ../init.d/xend
   /etc/rc3.d/S20xend -> ../init.d/xend
   /etc/rc4.d/S20xend -> ../init.d/xend
   /etc/rc5.d/S20xend -> ../init.d/xend
virtual:/usr/src/xen-3.4.3# update-rc.d xendomains defaults 21 20
 Adding system startup for /etc/init.d/xendomains ...
   /etc/rc0.d/K20xendomains -> ../init.d/xendomains
   /etc/rc1.d/K20xendomains -> ../init.d/xendomains
   /etc/rc6.d/K20xendomains -> ../init.d/xendomains
   /etc/rc2.d/S21xendomains -> ../init.d/xendomains
   /etc/rc3.d/S21xendomains -> ../init.d/xendomains
   /etc/rc4.d/S21xendomains -> ../init.d/xendomains
   /etc/rc5.d/S21xendomains -> ../init.d/xendomains
virtual:/usr/src/xen-3.4.3# 
```

Terminal — ssh — 87×24

Actualizar gestor de arranque Grub

```
virtual:/usr/src/xen-3.4.3# update-grub
Searching for GRUB installation directory ... found: /boot/grub
Searching for default file ... found: /boot/grub/default
Testing for an existing GRUB menu.lst file ... found: /boot/grub/menu.lst
Searching for splash image ... none found, skipping ...
Found Xen hypervisor 3.4.3,  kernel: /boot/vmlinuz-2.6.26-2-xen-amd64
Found Xen hypervisor 3.4.3,  kernel: /boot/vmlinuz-2.6.18.8-xen
Found kernel: /boot/vmlinuz-2.6.26-2-xen-amd64
Found kernel: /boot/vmlinuz-2.6.26-2-amd64
Found kernel: /boot/vmlinuz-2.6.18.8-xen
Updating /boot/grub/menu.lst ... done

virtual:/usr/src/xen-3.4.3#
```

Terminal — ssh — 87×24

Editar configuración Grub
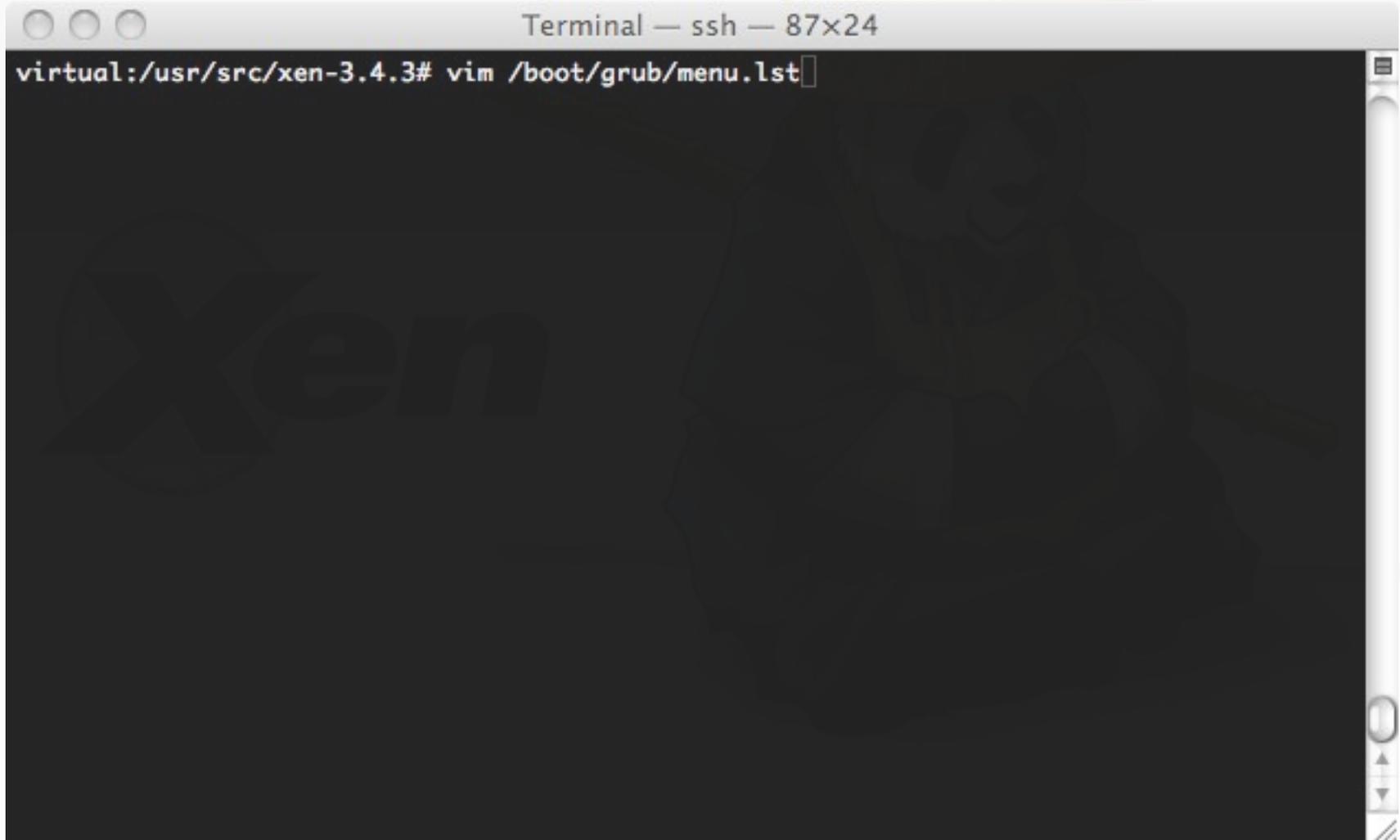
Limitar memoria del dom0


```
Terminal — ssh — 80×24

## can be true or false
# updatedefaultentry=false

## should update-grub add savedefault to the default options
## can be true or false
# savedefault=false

## ## End Default Options ##

title           Xen 3.4.3 / Debian GNU/Linux, kernel 2.6.26-1-xen-amd64
root            (hd0,0)
kernel          /boot/xen-3.4.3.gz dom0_mem=256M
module          /boot/vmlinuz-2.6.26-1-xen-amd64 root=/dev/sda1 ro console=tty0
pci=nomsi
module          /boot/initrd.img-2.6.26-1-xen-amd64

title           Xen 3.4.3 / Debian GNU/Linux, kernel 2.6.18.8-xen
root            (hd0,0)
kernel          /boot/xen-3.4.3.gz
module          /boot/vmlinuz-2.6.18.8-xen root=/dev/sda1 ro console=tty0

title           Debian GNU/Linux, kernel 2.6.26-2-amd64
root            (hd0,0)
                                                        124,28-36        80%
```

Reiniciar (la primera y última vez)
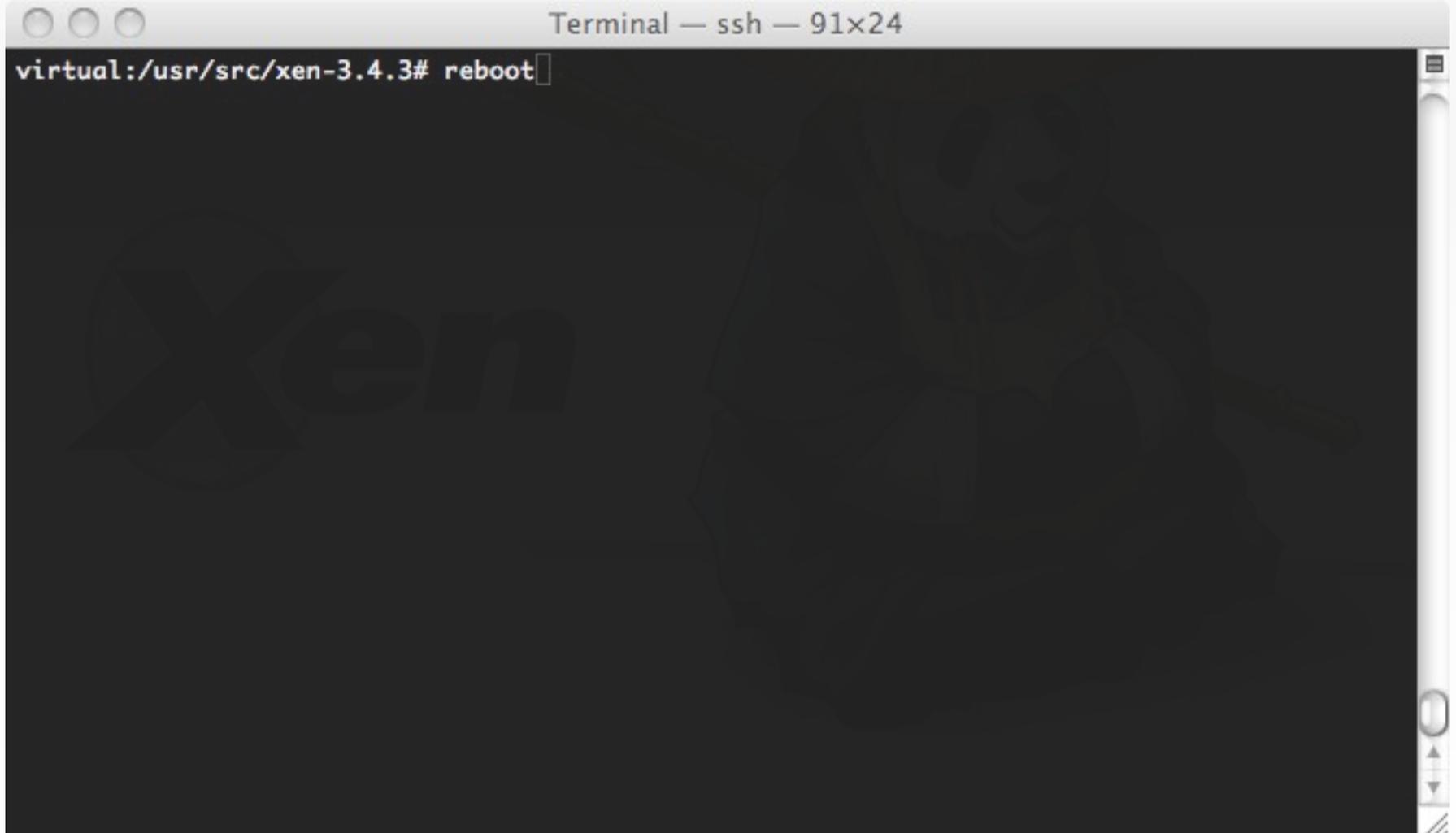

```
Terminal — ssh — 91×24
virtual:/usr/src/xen-3.4.3# reboot
```

Comprobar *caps* del Hypervisor

```
Terminal — ssh — 80×24

Linux virtual.canonigos.es 2.6.26-1-xen-amd64 #1 SMP Fri Mar 13 21:39:38 UTC 200
9 x86_64 GNU/Linux
virtual:~# xm info
host                    : virtual.canonigos.es
release                 : 2.6.26-1-xen-amd64
version                 : #1 SMP Fri Mar 13 21:39:38 UTC 2009
machine                 : x86_64
nr_cpus                 : 2
nr_nodes                : 1
cores_per_socket        : 2
threads_per_core        : 1
cpu_mhz                 : 1995
hw_caps                 : bfebfbff:20100800:00000000:00000140:0000e3bd:00000000:0
0000001:00000000
virt_caps               : hvm
total_memory            : 4022
free_memory             : 3708
node_to_cpu             : node0:0-1
node_to_memory          : node0:3708
xen_major               : 3
xen_minor               : 4
xen_extra               : .3
xen_caps                : xen-3.0-x86_64 xen-3.0-x86_32p hvm-3.0-x86_32 hvm-3.0-x
86_32p hvm-3.0-x86_64
```

Instalar Xen-Tools
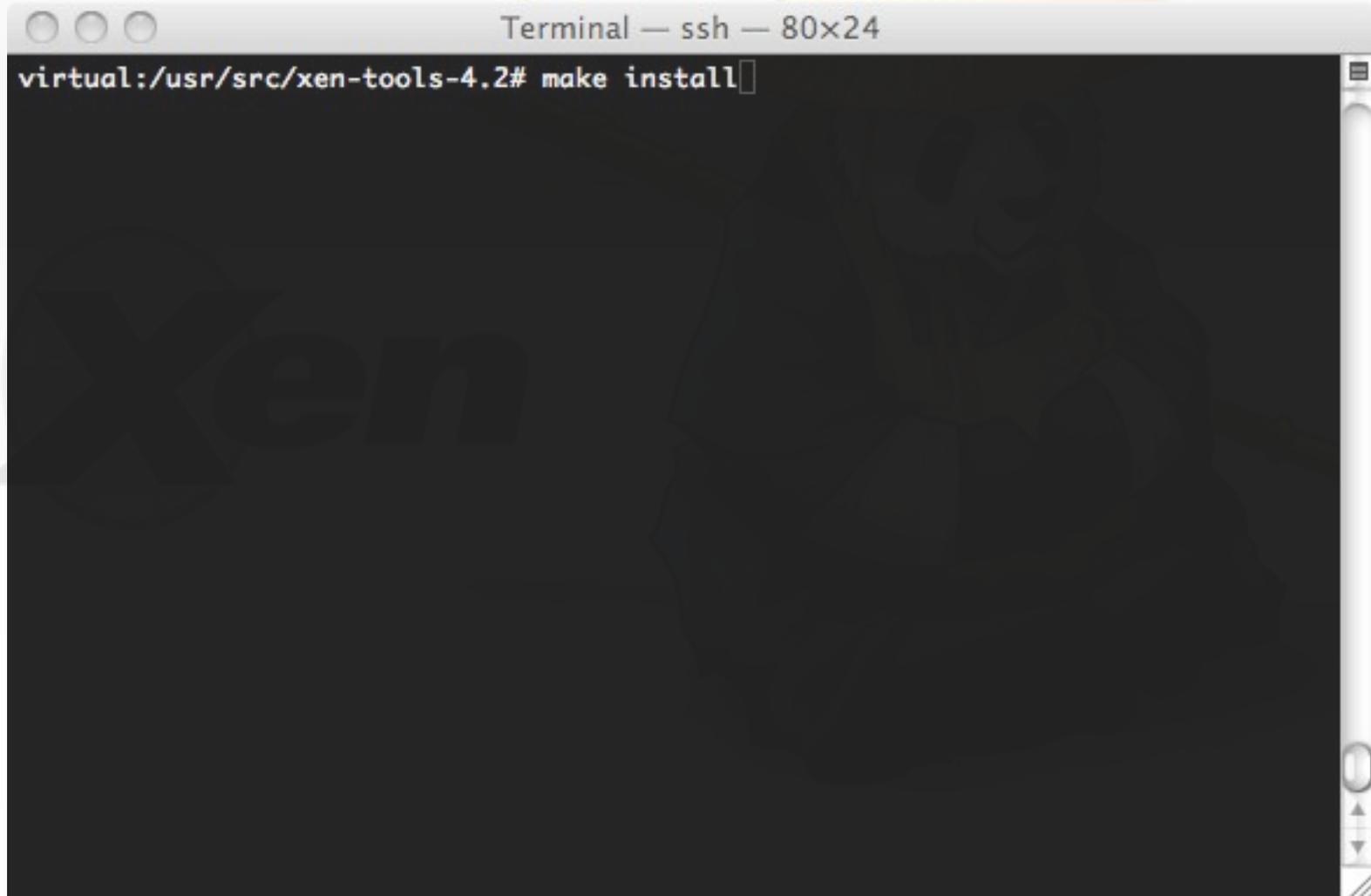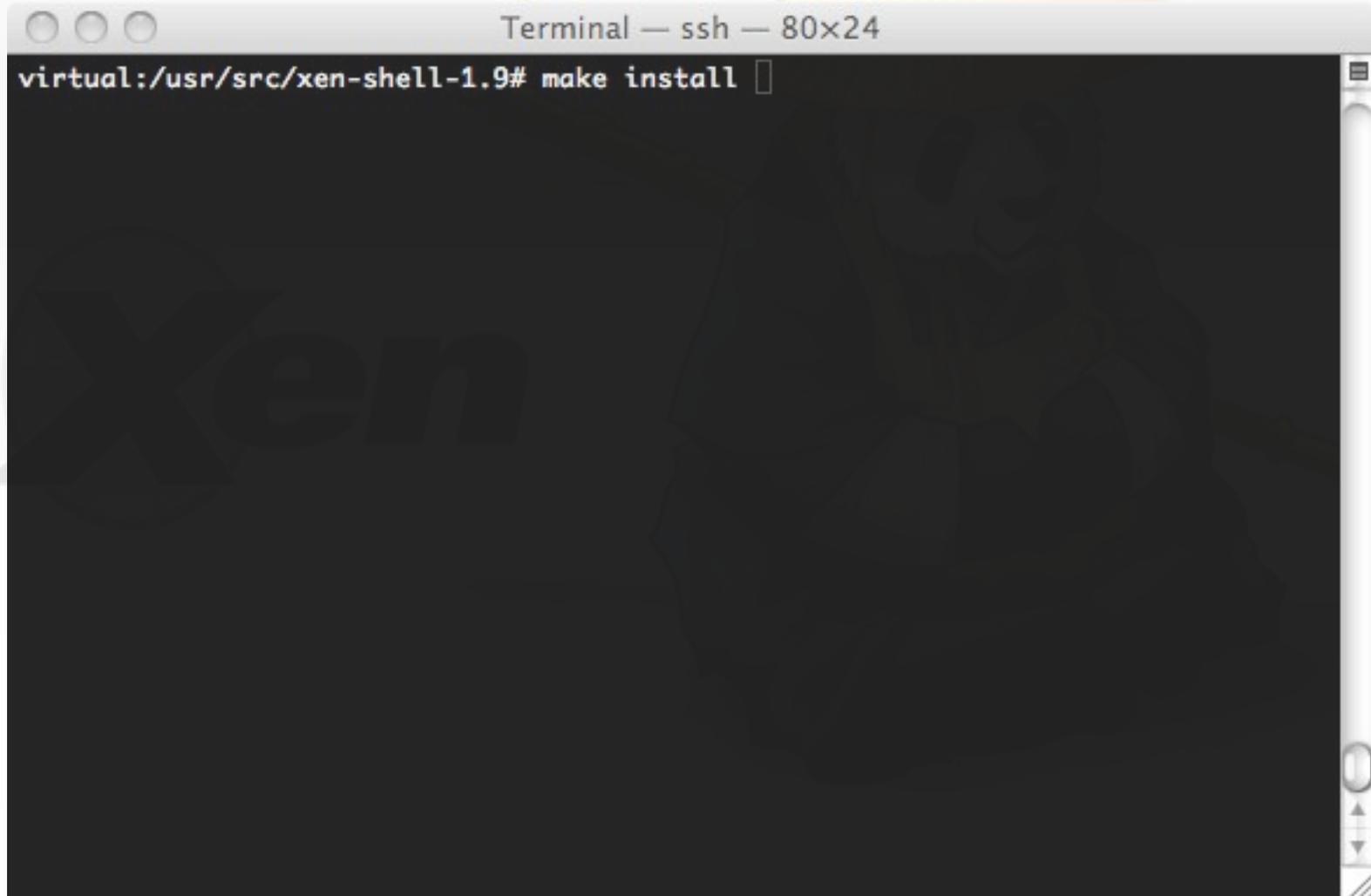
Instalar Xen-Shell

Editar configuración Xen-Tools (I)

```
Terminal — ssh — 80×24

##
#   Output directory for storing loopback images.
#
#   If you choose to use loopback images, which are simple to manage but
# slower than LVM partitions, then specify a directory here and uncomment
# the line.
#
#   New instances will be stored in subdirectories named after their
# hostnames.
#
##
# dir = /home/xen
#


#
##
#
# If you don't wish to use loopback images then you may specify an
# LVM volume group here instead
#
##
# lvm = vg0
lvm=vserver
-- INSERT --                                                56,12        10%
```

Editar configuración Xen-Tools (II)

Editar configuración Xen-Tools (III)


```
##
# Networking setup values.
##


#
# Uncomment and adjust these network settings if you wish to give your
# new instances static IP addresses.
#
gateway     = 192.168.13.1
netmask     = 255.255.255.0
broadcast   = 192.168.13.255
#
# Uncomment this if you wish the images to use DHCP
#
# dhcp = 1


#
# Uncomment and adjust this setting if you wish to give your new
# instances a specific nameserver.
#
-- INSERT --                                          152,26          44%
```

Terminal — ssh — 80×24

Editar configuración Xen-Tools (IV)

```
Terminal — ssh — 80×24

#
# You can yet change the hashing method to encrypt the generated
# password by changing the line below.
# Valid values : md5, sha256 and sha512.
#
# hash_method = sha256
#


#
# Uncomment the following line if you wish to interactively setup a
# new root password for images.
#
passwd = 1
#


#
# If you'd like all accounts on your host system which are not present
# on the guest system to be copied over then uncomment the following line.
#
# accounts = 1
#


#
-- INSERT --                                          222,1          65%
```

Editar configuración Xen-Tools (V)

Editar configuración Xen-Tools (VI)


```
#
#  If you're using the lenny or later version of the Xen guest kernel you will
# need to make sure that you use 'hvc0' for the guest serial device,
# and 'xvdX' instead of 'sdX' for serial devices.
#
#  You may specify the things to use here:
#
 serial_device = hvc0 #default
# serial_device = tty1
#
 disk_device = xvda #default
# disk_device = sda
#


#
#  Here we specify the output directory which the Xen configuration
# files will be written to, and the suffix to give them.
#
#  Historically xen-tools have created configuration files in /etc/xen,
# and given each file the name $hostname.cfg.  If you want to change
# that behaviour you may do so here.
                                                        304,1          93%
```

Crear máquina virtual
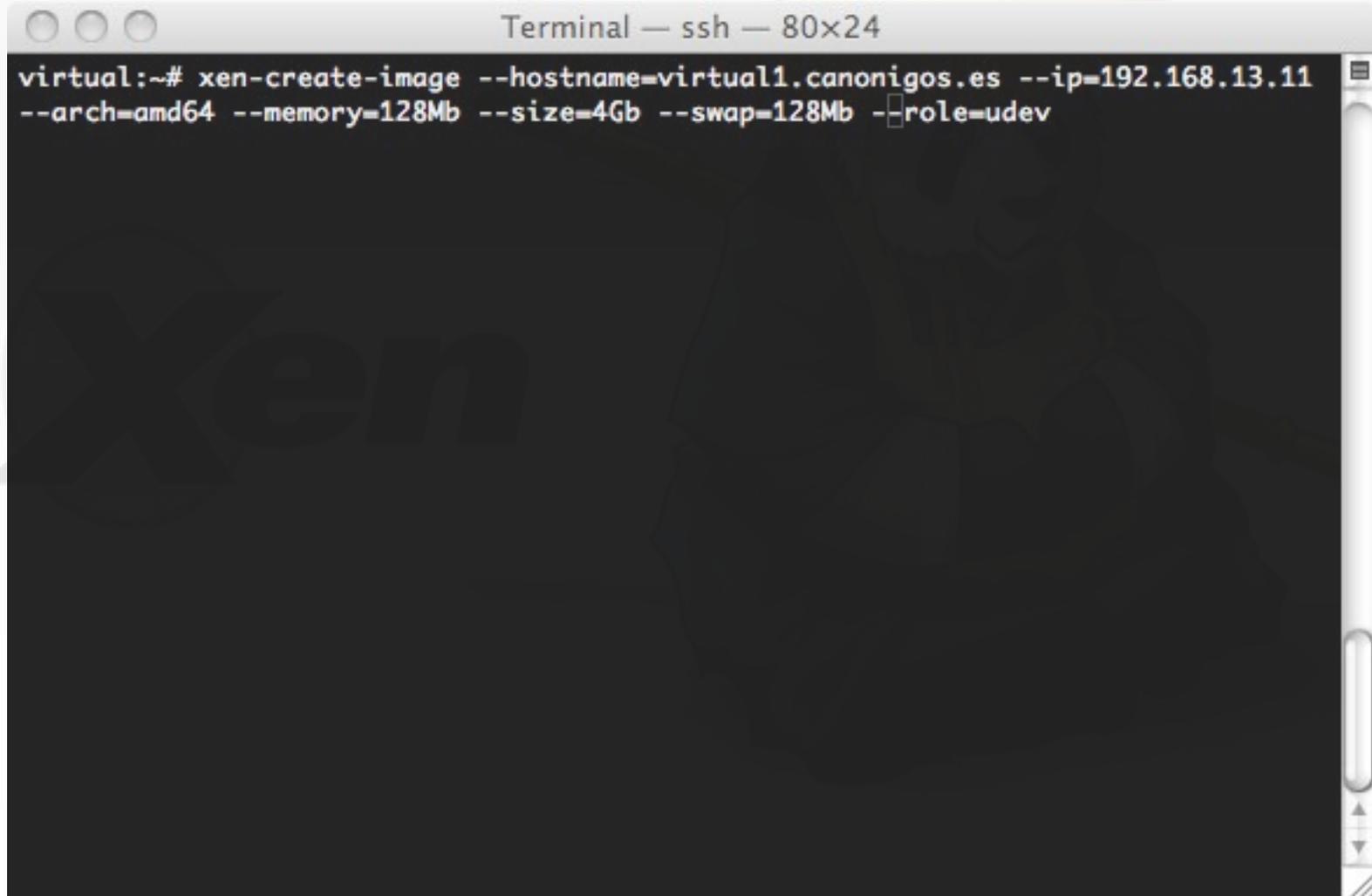
Resumen de Xen-Tools y creación de discos sobre LVM

```
--------------------
Hostname        :  virtual1.canonigos.es
Distribution    :  lenny
Mirror          :
Partitions      :  swap            128Mb  (swap)
                   /               4G     (ext3)

Image type      :  full
Memory size     :  128Mb
Kernel path     :  /boot/vmlinuz-2.6.26-1-xen-amd64
Initrd path     :  /boot/initrd.img-2.6.26-1-xen-amd64

Networking Information
----------------------
IP Address 1    :  192.168.13.11 [MAC: 00:16:3E:9A:27:A3]
Netmask         :  255.255.255.0
Broadcast       :  192.168.13.255
Gateway         :  192.168.13.1


Creating swap on /dev/vserver/virtual1.canonigos.es-swap
Done


Creating ext3 filesystem on /dev/vserver/virtual1.canonigos.es-disk
```

htop del equipo durante creación

Terminando de crear máquina virtual, ejecutando *hooks*

```
                    /                 4G      (ext3)
Image type      :  full
Memory size     :  128Mb
Kernel path     :  /boot/vmlinuz-2.6.26-1-xen-amd64
Initrd path     :  /boot/initrd.img-2.6.26-1-xen-amd64

Networking Information
----------------------
IP Address 1    : 192.168.13.11 [MAC: 00:16:3E:9A:27:A3]
Netmask         : 255.255.255.0
Broadcast       : 192.168.13.255
Gateway         : 192.168.13.1


Creating swap on /dev/vserver/virtual1.canonigos.es-swap
Done

Creating ext3 filesystem on /dev/vserver/virtual1.canonigos.es-disk
Done
Installation method: debootstrap
Done

Running hooks
```

Máquina virtual creada con éxito

Ejecución de máquina virtual
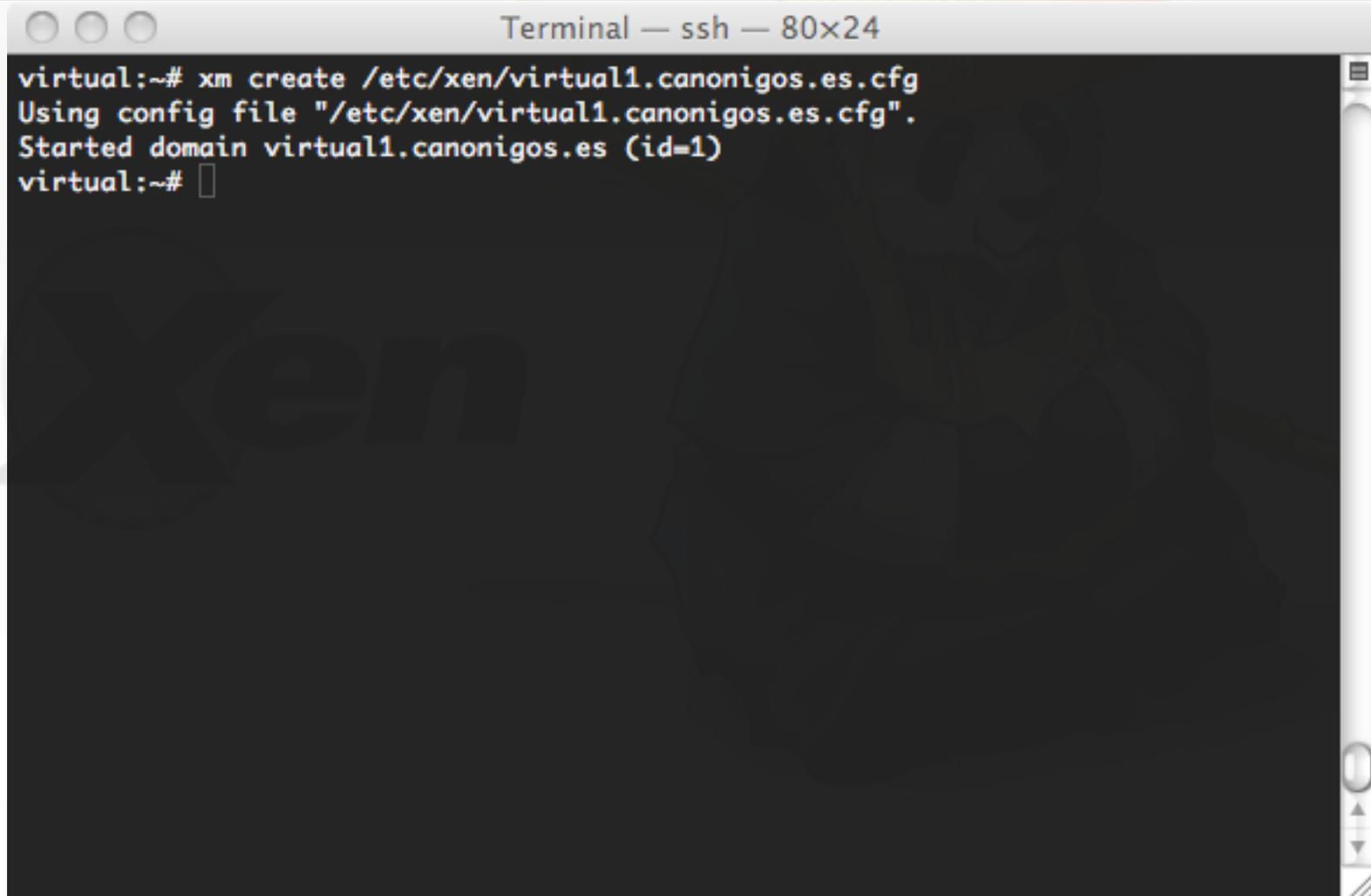
```
virtual:~# xm create /etc/xen/virtual1.canonigos.es.cfg
Using config file "/etc/xen/virtual1.canonigos.es.cfg".
Started domain virtual1.canonigos.es (id=1)
virtual:~#
```

Accediendo a la nueva máquina virtual

Terminal — ssh — 80×24

```
Last login: Wed Nov 10 02:22:14 on ttys000
trillian:~ esencia$ ssh root@192.168.13.11
The authenticity of host '192.168.13.11 (192.168.13.11)' can't be established.
RSA key fingerprint is 7c:ee:3c:74:de:8c:e5:5d:79:a2:d3:4d:d1:9b:5c:cc.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.13.11' (RSA) to the list of known hosts.
root@192.168.13.11's password:
Linux virtual1.canonigos.es 2.6.26-1-xen-amd64 #1 SMP Fri Mar 13 21:39:38 UTC 20
09 x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
virtual1:~# uname -a
Linux virtual1.canonigos.es 2.6.26-1-xen-amd64 #1 SMP Fri Mar 13 21:39:38 UTC 20
09 x86_64 GNU/Linux
virtual1:~# cat /proc/cpuinfo
processor       : 0
vendor_id       : GenuineIntel
cpu family      : 6
model           : 15
```

xm list

```
virtual:~# xm create /etc/xen/virtual1.canonigos.es.cfg
Using config file "/etc/xen/virtual1.canonigos.es.cfg".
Started domain virtual1.canonigos.es (id=1)
virtual:~# xm list
Name                                    ID   Mem VCPUs      State   Time(s)
Domain-0                                 0   256     2     r-----    259.1
virtual1.canonigos.es                    1   128     1     -b----      3.0
virtual:~#
```

xm top

```
xentop - 02:42:36    Xen 3.4.3
2 domains: 1 running, 1 blocked, 0 paused, 0 crashed, 0 dying, 0 shutdown
Mem: 4118836k total, 452684k used, 3666152k free    CPUs: 2 @ 1995MHz
      NAME    STATE    CPU(sec) CPU(%)      MEM(k) MEM(%)  MAXMEM(k) MAXMEM(%) VCPUS
 NETS NETTX(k) NETRX(k) VBDS   VBD_OO    VBD_RD   VBD_WR SSID
  Domain-0 -----r         259    1.7      262144    6.4   no limit       n/a     2
     0        0        0    0         0        0        0    0
virtual1.c --b---           2    0.0      131072    3.2     131072       3.2     1
     1       11       20    2         0      853       61    0




Delay  Networks  vBds  VCPUs  Repeat header  Sort order  Quit  ▯
```

Virtualizando HVM

```
1  import os, re
2  arch = os.uname()[4]
3
4  kernel = "/usr/lib/xen/boot/hvmloader"
5
6  builder='hvm'
7  vcpus = '2'
8  memory = 512
9  shadow_memory = 8
10 name = "xp1.canonigos.es"
11 vif = [ 'type=ioemu, bridge=eth0' ]
12 disk = [
13  'phy:/dev/mapper/vserver-lvol0,ioemu:hda,w',
14  'file:/root/xpsp3.iso,ioemu:hdb:cdrom,r'
15 ]
16
17
18 device_model = '/usr/lib/xen/bin/qemu-dm'
19 # boot on floppy (a), hard disk (c) or CD-ROM (d)
20 # default: hard disk, cd-rom, floppy
21 boot="c"
22
23 sdl=0
24 vnc=1
25 vnclisten="0.0.0.0"
26 vncconsole=1
27 vncpasswd='canonigos'
28 stdvga=0
29 serial='pty'
30 usbdevice='tablet'
31
32 on_poweroff = 'destroy'
33 on_reboot   = 'restart'
34 on_crash    = 'restart'
```

xp1.canonigos.es.cfg (~/Dropbox/TallerXen) – VIM1

xp1.canonigos.es.cfg   1,1   All

Ejecución de máquina virtual

Preguntas

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