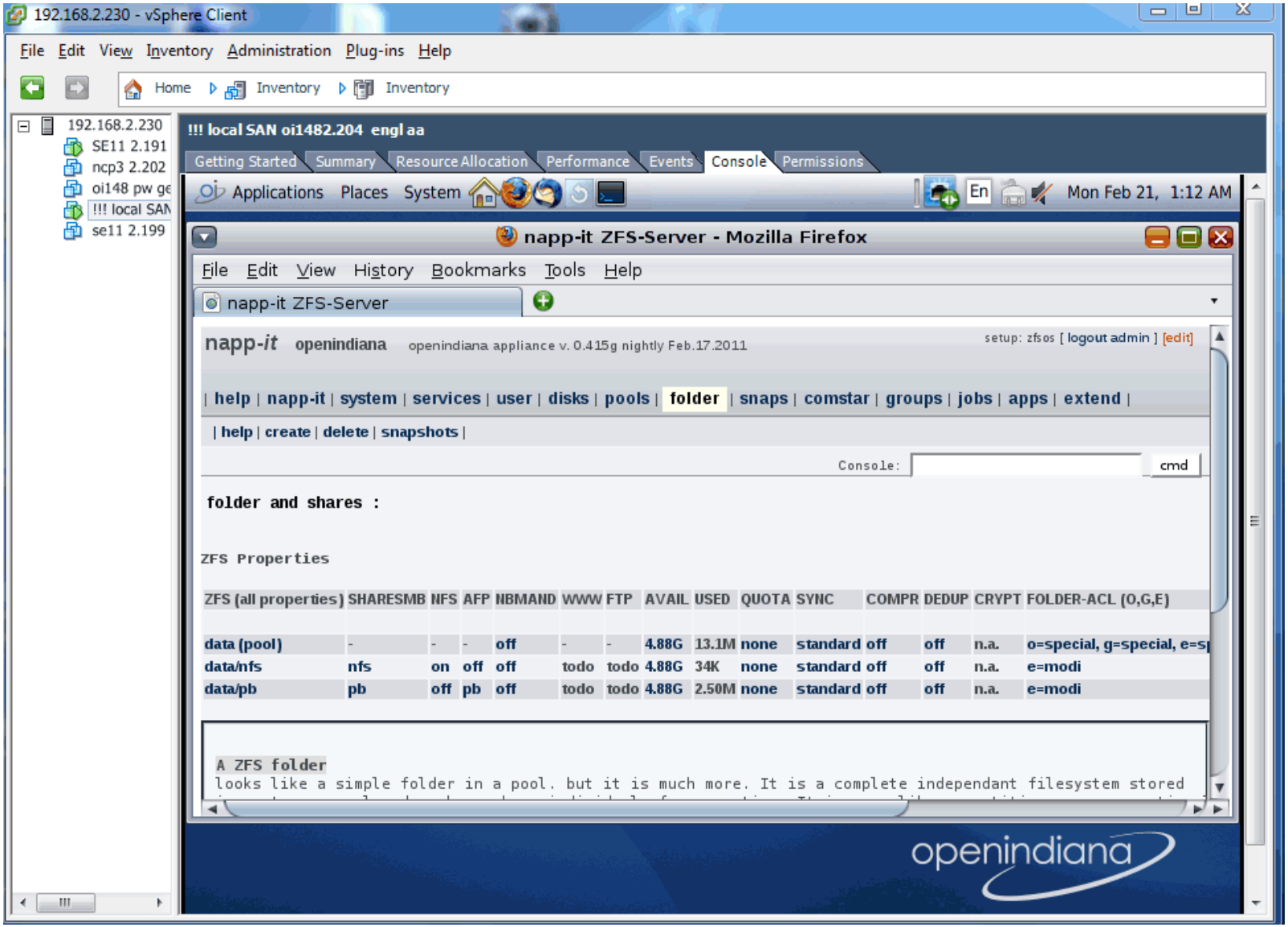
Part 2. All-in-One

ESXi 4.1 server + virtualized ZFS NAS/SAN storage server in a box



Part 1 available at http://www.napp-it.org/doc/downloads/napp-it.pdf

6. napp-it All-In-One (ESXi-Server with virtualized NAS/ SAN Storage Server)

6.1 how many computers do I need and why - an overwiew

6.1.1 use case: single user/ single os/ personal use /powered on when needed

You can use a modern computer for a lot of tasks. You can use it with your office or business apps, you can layout documents and create media files, you can use it to play games, listen music, play movies or browse the internet. For these tasks you have a desktop computer, a laptop, a netbook, a tablet, a media client or an organizer.
Each of these systems has its own operating system.

6.1.2 use case: multi user/ multiple os/ server use/ mostly always on

You can run typical server applications on your personal computer either on its base-os or virtualize some other operating systems on top of your base os with a type-2 hypervisor. But mostly, they need to run 24/7 or they have special demands in terms of data or application security, available cpu or ram resources or they need direct hardware access. So a lot of people need one or more extra „servers„ to do the following.

Storage:

You can use a computer as a storage system or as an archive or backup-system for your business data, your media files or any other sort of data with high demands to data security. Snapshots allows to go back to former versions of your data. The abilty to expand capacity without problems is mandatory. Indeed the storage part is the base and most important aspect of all server tasks. In case of a crash, you can reinstall software without problems but your data is lost if you do not have a most current and working backup.

Applications

For a working IT infrastructure, you need a lot of common server applications like web, mail, dns, dhcp, vpn, firewall, database or special applications like a render server. Very often, you want to isolate these applications from others because of security reasons or they have to run on different operating systems. You either can use a lot of computers. Usually you virtualize all these systems. You need features like best resource usage, isolation, security and availability.

Developer use, Test installations and Education

In these use cases, you need virtualization. It should support all or nearly all available operating systems. A lot of bootable system snapshots to go back to former states are always needed. You need a good memory and resource sharing mechanism to have these systems running at adequate performance especially if you do not have dozens of GB Ram.

Home Use

Beside the above use cases, you may have a dlna media server to distribute your media library to your tv or other audio equipment . You may have a vdr digital sat or cable tuner and videorecorder to share live tv. You may have a torrent client running or a lokal mailserver to collect mails from different accounts. The problem with these use cases. Your prefferred dlna media server is running with Windows, your preferred vdr server is linux. You can use a computer for each task or you can virtualize.

6.2 Virtualization

Some years ago you have needed a separate computer for nearly every server task due to limited hardware resources or different operating systems. But a modern computer is more powerfull than 20 systems some years ago. Systems now have Gigabytes of RAM and Terabytes of disk capacity. With build-in hardware features like Intel's vt-x it is now possible to share basic resources like CPU and RAM between multiple running operating systems with the help of a hypervisor software. Some basic Hardware resources of the host operation system like disk controller, disks, network adapters or videocards are emulated for guest systems.

Current systems, mostly equipped with server-class mainboards add hardware I/O virtualization. Intel has called it vt-d. With vt-d you can not only use a limited set of emulated disk or network controllers, but you can attach real hardware like network and disk-controllers or other pci-e cards to guest systems. Most virtualized servers do not need this. But if you want to virtualize a modern storage-os, direct access to disk controllers and disks is absolutely needed for performance, data security and error management reasons. There are also applications that needs special hardware, not emulated by a hypervisor. In this case, you need vt-d to attach this hardware to a guest system.

6.3 Virtualization with a type-2 hypervisor (on top of your OS at appliocation level)

A type-2 hypervisor like VMware Workstation or Virtualbox is running on top of a full featured host-os like Windows, Linux, OSX, Free-BSD or Solaris. It is usefull for persons who want to try or use another operating system not very often like a Mac-user who wants to use a Windows app from time to time. Only the host-os has full access to all computer resources like CPU, RAM and video-adapter. Guests are always running with substantial reduced performance compared to the host system. Stability of guests depends on stability of host and hypervisor. Due to the complexity of a full feaured host os, you have to patch and update your system very often with a needed reboot afterwards. Hardware access for guests with the help of vt-d is currently not available for type-2 hypervisors.

6.4 Virtualization with a type-1 hypervisor (below of all systems and OS's)

A type-1 hypervisor like VMware ESXi (the alternative is XEN) is also often called a barebone hypervisor. Its a small mini-OS, under 100 MB in size, only used to do the virtualization task. Think of it more as an extended bios than an operating system. You can boot it from a 4 GB disk or usb stick. On top of such a hypervisor you can run your operating systems as virtual machines. Access to real hardware is possible by a set of common used emulated hardware drivers, delivered by the hypervisor or exclusively by a single guest via pass-through on vt-d capable hardware. Virtual Machines are stored in disk-image files either on a local harddisk or on a NAS/Sanserver via NFS or iSCSI to access them from different machines. You can boot these virtual machines without problems on any other ESXi -server, independant from real used hardware (beside vt-d options). Hardware resources like CPU, RAM and Disk capacity can be allocated individually between running guests. One Virtual Machines is running with nearly the same performance than it would be without hypervisor beside the video-adapter. (videoadapter-sharing is on development). If you have more than one Guest, resources are shared optimally. Because of low Graphic-performance, its currently not usefull for deskop use but best for servers. The only settings, you can enter or change locally on a ESXi box are IP adress, used network adapter for set your admin-password.

To manage a ESXi server, you need Windows. After installing ESXi, you can connect from a Windows Browser to download and install the Windows Managment Software vsphere. With vsphere, you can create and manage virtual network switches, virtual machines, allocate resources and mount NFS or iSCSI datastores or remote control this machine. If you start a copied virtual machine, you are asked if it was copied or moved. Thats all - no hardware dependencies- and these basic features are free.

Problem with ESXi: ESXi is Enterprise Grade Software, dedicated to run on certified or supported hardware only. Especially network and disk adapter from desktop machines are often not supported. Also vt-d, needed for storage virtualization is mostly suported or working with newer server class hardware only.
If you want to use ESXi without troubles, you must use certified or known to work hardware, do not buy and try. A cheap entry level mainboard with Intel 202/ 3420 serverchipset, running ESXi with vt-d and without problems is available from 130 Euro/$ up. Believe me, it's worth the premium.

6.5 Virtualization within the OS-Kernel (KVM - Kernel based virtual machines, needs real stable systems best with isolation of functions like with zones)

This is the newest; No extra system below like ESXi or at application level on top but within the Kernel. This is now in OpenIndiana and base of the next ZFS all-in-one

7. How to build a ALL-In-One system (ESXi with embedded NAS/SAN Server + other virtual machines)

7.1 Needed hardware (more options see http://napp-it.org/hardware/index_en.html)

I will not tell you much about options, i will suggest a tested and working config, based on personal experiences: If you have a similar hardware, it may work also.

7.1.1 Mainboard, CPU, RAM, Bootdisk

Use a mainboard with Intel server-chipset 202/204, 5500, 3420 or 5520 and one or two Dual or Quad Xeon processors (only Xeons will always support vt-d)
5500 is quite old, 5520 is high end and 3420 is entry level. If you are looking at the money, choose 3420 or 202.

My preferred mainboards are out the X8/X9-series from Supermicro. The cheapest are X9SCL+ -F and X8-SIL (about 140 Euro/$). With additional 30 Euro/$ you can buy the F-versions like the X8-SIL-F. It has 6 instead of 4 Sata ports and IPMI, a remote management board to power on/off and manage you server remotely from a web-browser. You will never miss this feature anymore. Add a Dualcore or Quad Xeon and 8, 12 or better 16 GB RAM (look at RAM Compatibility List at supermicro homepage). Add a boot-disk (ESXi needs about 4GB, but we will add a storage OS, so it could be a 16-32 GB SLC-USB3 Stick connected to USB2 but best is any 50 GB Sata SSD)

7.1.2 ZFS-Storage OS

A ZFS storage OS needs real hardware access to disk controller and attached disks for performance and failure handlich reasons. We can virtualize the OS itself but we must allow exclusive pass-through access to a disk-controller and disks via vt-d. Because vt-d works only on pc-i device not on disk-level, you must assign a complete disk controller. This could be onboard sata, if you boot from USB or you need an extra disk controller, if you boot from sata. Beside small test-instalations, it is suggested to boot from a Sata-disk and use an extra SAS/SATA Controller based on LSI 1068 or LSI 2008 Chipsets. Let's add an 8 Port Intel SASUC8I SAS/Sata Controller (about 150 Euro/$)

about SAS Controller: Intel SASUC8I Controller could be flashed with Raid IR-Firmware or with a non-raid IT or HBA firmware, which s needed. If your Controller is IR-flashed, reflash it with an IT-firmware.

Add at least two sata disks to build a mirror, connect them to your LSI controller.
Look for a nice case and you are ready to install software.

What I use now:

Mainboard SuperMicro X8-SIL-F (best alternatives: other Supermicro X8..-F with 3420 oder 55xx chipset or X9..-F with 202/204 chipset)
any Xeon CPU
12 GB RAM minimum
50 GB Sata Bootdrive, connected to onboard SATA in ahci-mode
Sata DVD

8 Port Intel SASUCI8I SAS/Sata controller with IT-firmware (due to better support for expanders and disks > 2TB use LSI 9211-8i SAS2 Controller on a new config)
Sata Disks, could be high speed SSD's or high-capacity and low performance 2 TB drives, TLER-Drives like WD Raid-Edition or 4k disks are not suggested

Boot ISO ESXi 4.1 or ESXi 5 (free download from vmware.com), burn it
OpenIndiana Live Boot ISO (free download from openindiana.org), no need to burn

7.2 Set needed Bios settings

Power-On your system and press „del„-Key to run setup

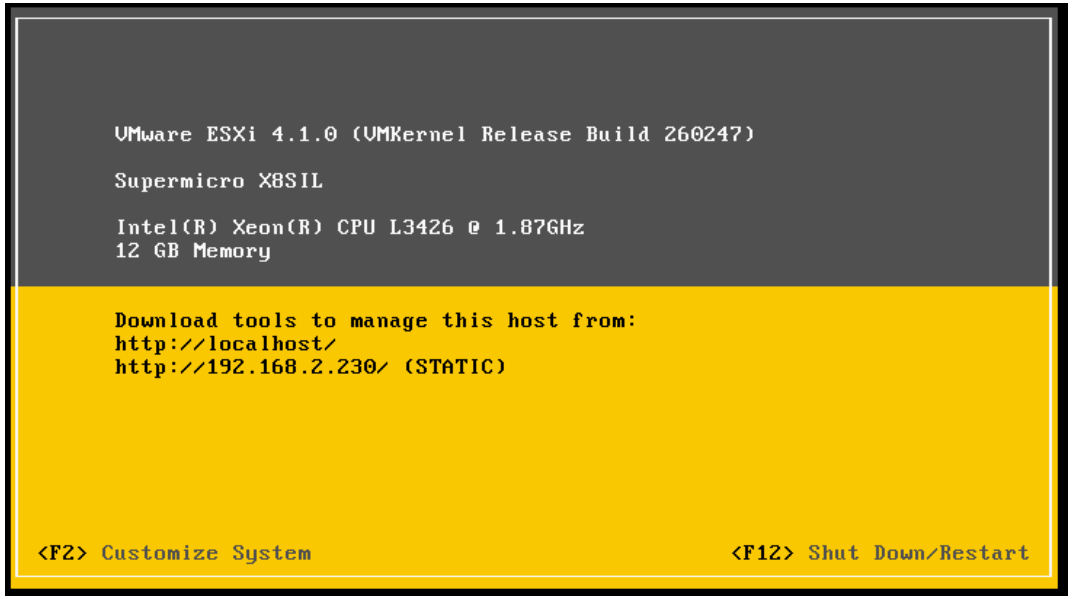
Suggested bios-settings with Bios > 1.0c

- disable Watchdog functionality
- disable: „Active State Power Management“. (!!! **needed**, or net-transfer-errors)
- activate vt-d
- set Sata to AHCI
- set boot-order to dvd first, second to your 50 GB SSD, connected to AHCI-SATA

7.3 Install free ESXi 4.1 (or free ESXi 5 with max 32 GB RAM per server)

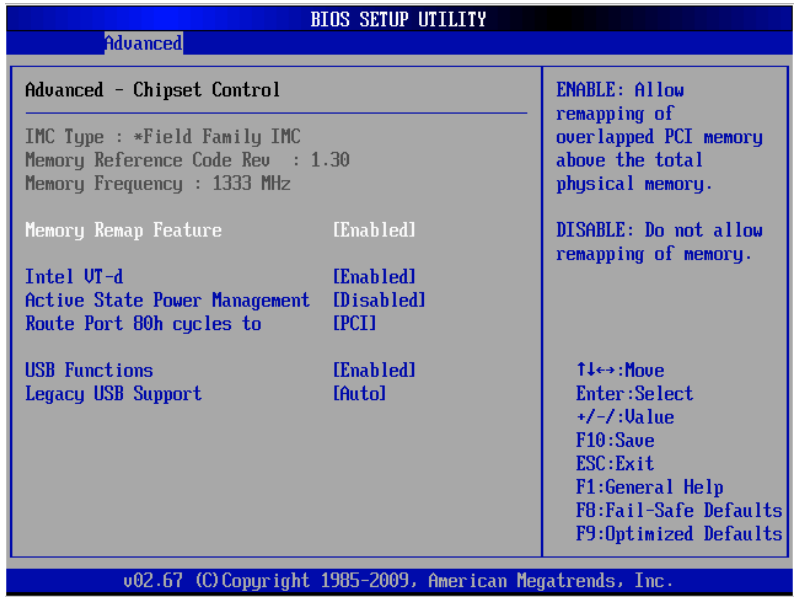
Boot from your ESXi 4.1 boot-cd and Install ESXi onto your 50 GB SSD. This should be quite easy. You do not need any special ESXi knowledge. During Installation you need to enter desired network settings, your language and a root password. There are no other setting-options, you need to know locally at your ESXi-box. If you want to have ESXi and OpenIndiana on a Raid-1, use a 2 x 2,5“ Hardware-Raid (ex Raidsonic SR2760-2S-S2B)

and after a few minutes - here we are !



Your local ESXi Screen. Shutdown, set keyboard, network or a root password.
No more Options are needed locally.

Bios setting: AHCI



Bios setting: vt-d and Active State Power Management

7.4 Install Windows Management Software vsphere

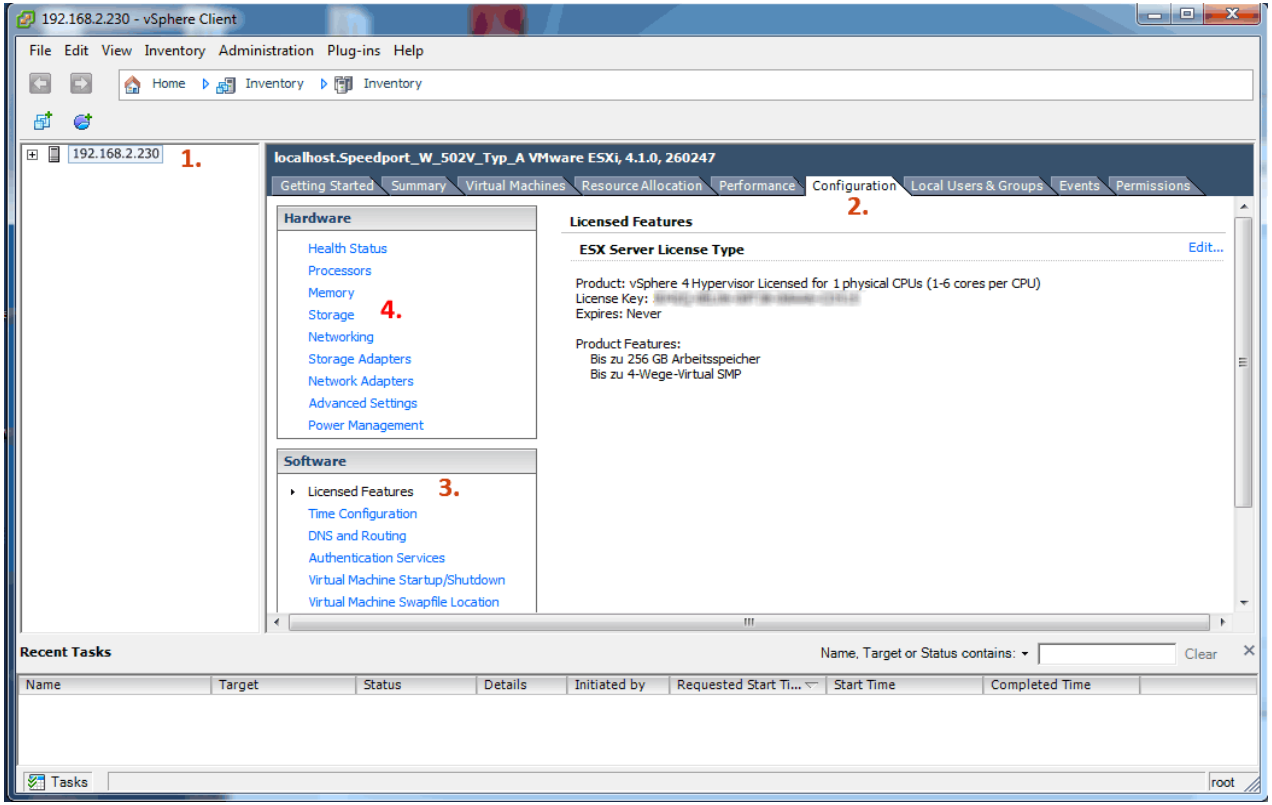
From your Windows PC, start your Browser with adress http://esxi-server-ip

You will get a page about security, due to private certificates.
Klick on Load page, Continue

Now you are on the ESXi welcome-screen
Klick on the red 1. „Download vSphere Client“ to download and setup
ESXi management software.

After setup, start vsphere with your ESXi ip adress, root as user and the root password
you entered during ESXi installation.

That‘s it !
You have a ready tu use ESXi box:



ESXi welcome screen

7.5 Enter free licence Key

Follow the red 1..2..3 (Right Klick ESXi-Konfiguration - Licensed Features) and enter the free license Key, you got from Vmware. (login at VMware and look at the download-page)

If you do not enter a licence key, you can try all the nice and expensive VMware features for two months.

If you enter the licence key, all free functions are availible without time-limit. Most important commercial functions are high availability, move of running VM‘s and use of the storage API for backups. You could also manage multiple ESXi server from one application.

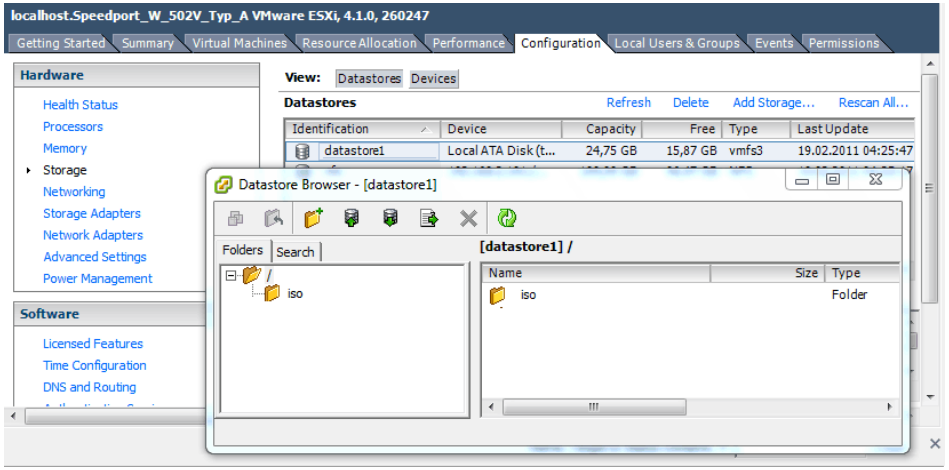
With the free version, you must open a vsphere session for each server, you cannot use most backup-tools and you can only up/ download files with the (ultra slow) ESXi filebrowser. But that does not matter. We will add a sophisticated SAN-Storage Server with more advanced features.

7.6 Upload OpenIndiana 151a live Boot Iso to local datastore

Follow the red 1. 2. 4.(Right Klick ESXi-Konfiguration-Storage) from the Screenshot on last page. Right-Klick on „local Datastore„ (your 50 GB SSD) and select „browse Datastore„ to launch the embedded file-browser to up- or download files and folders.

Use the filebrowser to create a folder named iso and upload the OpenIndiana ISO (or other boot ISO-files) to the newly creted iso-folder. We need them to install new operating systems as guests.

It would be now possible to create a new virtual server, installed from this iso.
But we want to use pass-through, so we need a few more steps.



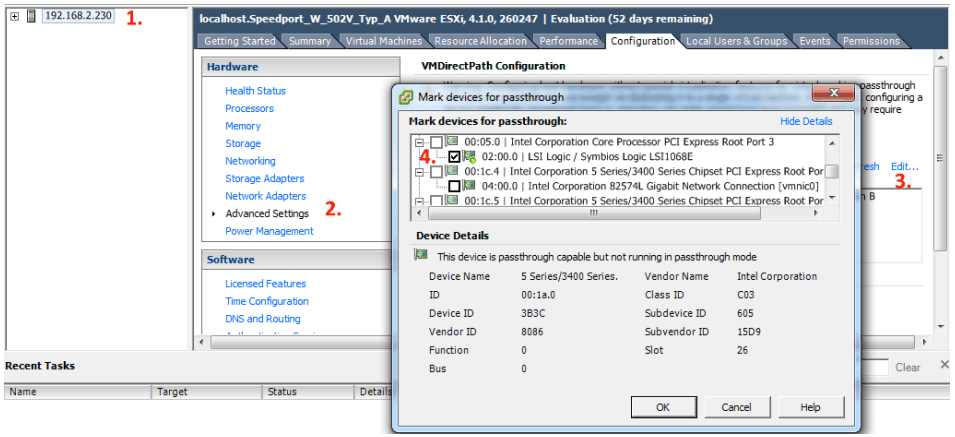
ESXi File-Browser

7.6 Enable pass-through for your LSI 1068 or 2008 SAS controller

Follow the red 1..2..3..4 (Right Klick ESXi-Advanced Settings-Edit and check LSI 1068/2008 Controller). Klick on OK to save the settings.

From now on, ESXi will not touch this Controller in any way.
You can pass-through it as a pci-Adapter directly to a guest OS.
The guest OS will see it and can use it with its own driver.

Currently ESXi use this controller already, so we need a reboot now.
Right Klick on ESXi (the red 1.) and select reboot.

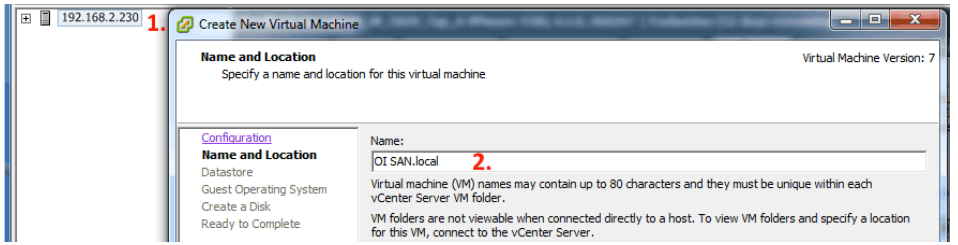


enable Pass-through

7.7 create an OpenIndiana virtual Machine, store it on local disk/datastore

Now its time to create our first and most important virtual virtual machine, our storage-server. Right Klick on the ESXi Server (red 1.) and select „New virtual machine„. with typical settings. Name it like OI SAN.local (If i have more han one disk, i always add the disk where the machine was stored, in this case i use local datastor. Select OS-type Solaris 64 bit and increase bootdisk size to at least 12 GB.

Klick on finish and you have created your first virtual machine with default settings. Next we will modify these defaults to fit our needs.



create a new virtual Machine

7.8 VMware Settings / Storage server

We will now modify some defaults of this Virtual Machine.
Right Klick on this Machine (the red 1.) and select „Edit settings„

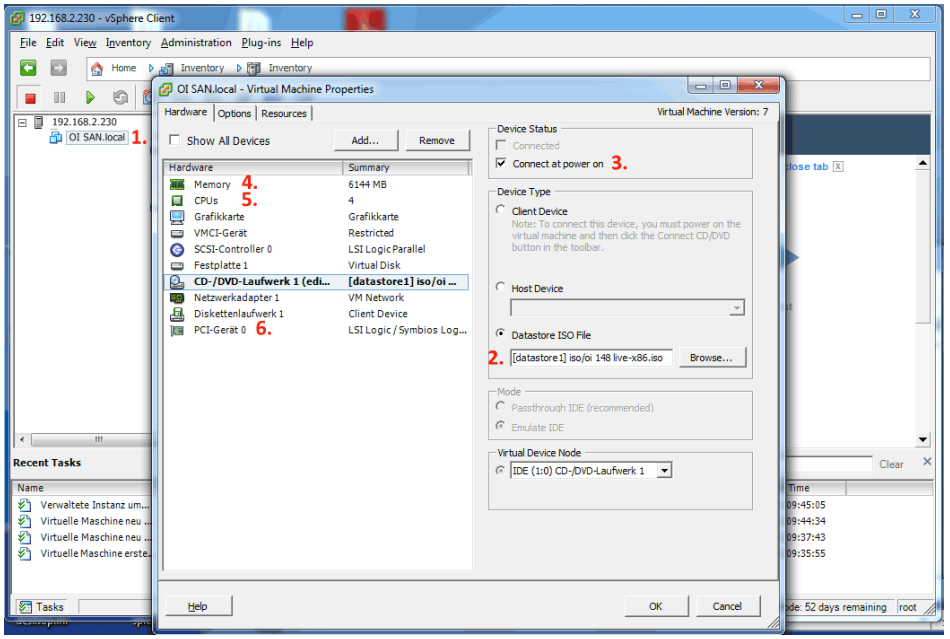
With 2. you can mount a ISO file as a botable CD. Browse to uploaded Openindiana-Iso (/local datatastore/iso) and select the OpenIndiana Iso.
Enable CD on boot time with 3. (boot from it)

With red 4. we will attach 6 GB RAM to our storage server*
With red 5. attach max 2 CPU cores* on ESXi 4,1
With add.. pci device, we can add our pass-through storage adapter LSI 1068 (6.)
With add.. Networkadapter add a vmxnet3 adapter (Solaris Express and OpenIndiana)

Thats it.
Our virtual machin is ready to install.
Right Klick on the virtual machine (red 1) and select Power - Power ON

Klick on the virtual machine (red 1.) and select property Console.
You will get a boot screen and you can Install OpenIndana as usual.

(RAM depends on use case, do not use more than 2 vCPU or you may have boot problems
This problems seems to be solved with ESXi 5)



VM settings

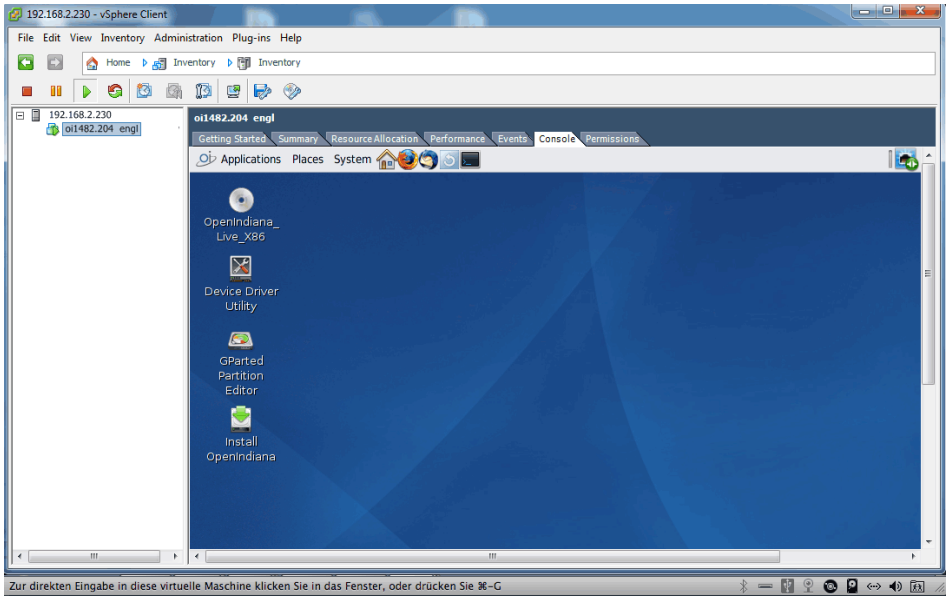
7.9 Start installation on OpenIndiana

Right Klick on 1.. (OI SAN.local) and select Power - Power ON
Your virtual machine is booting the OpenIndiana Installer, start it with default options, select your keyboard and language.

OpenIndiana Live (booted from DVD-ISO) is up and running.
Klick on install to install OpenIndiana to the 12 GB virtual HD on local datastore from 7.7

Select your Time-Zone and Language, enter a default user ex
user: admin
full name: admin
with a pw and your desired hostname

wait a few minutes until installation is finished, reboot now
!! If OpenIndiana is not rebooting correctly, reset the virtual machine
(Right - Klick on OI SAN.local and select Power - reset)



OpenIndiana Live, booted from DVD

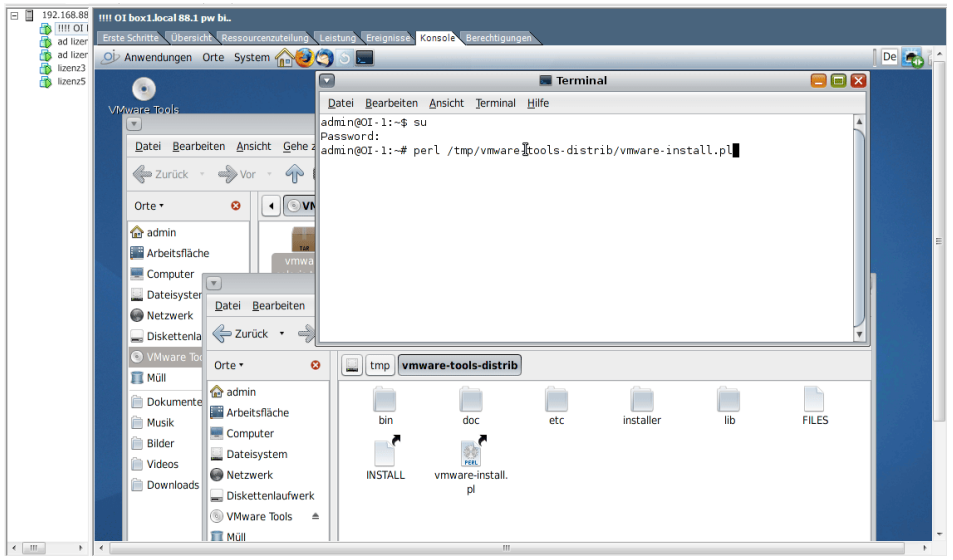
7.10 Install vmware tools

You should install vmware-tools on every guest-os to allow ESXi to shutdown the machine or to have better net, video or mouse support.

Howto Install vmware-tools on OpenIndiana

Disconnect OpenIndiana Boot-CD (VM-CD-Settings, uncheck connected)
Right-klick on the Virtual machine Icon and select Guest-Install/upgrade vmware tools
The tools cd is now mounted as /cdrom/vmwaretools
open a terminal, enter su to get root permissions and start nautilus (filebrowser)
open compressed tools cd and copy included folder (vmware-tools-distrib) to /tmp
open a new terminal and su to get root permissions and enter
perl /tmp/vmware-tools-distrib/vmware-install.pl (With OI 151 dev, installation is only working with english language setting in OI), accept defaults.
That's all, you can now add a VMXnet3 highspeed network driver to OpenIndiana

(On Nexenta tools are installed via apt-get install vmware-tools. vmxnet3 driver is currently missing on Nexenta. On some configs vmxnet3 is reported to be unstable. Use e1000 in this case. With internal ESXi connects it also delivers more than 1 Gb/s)

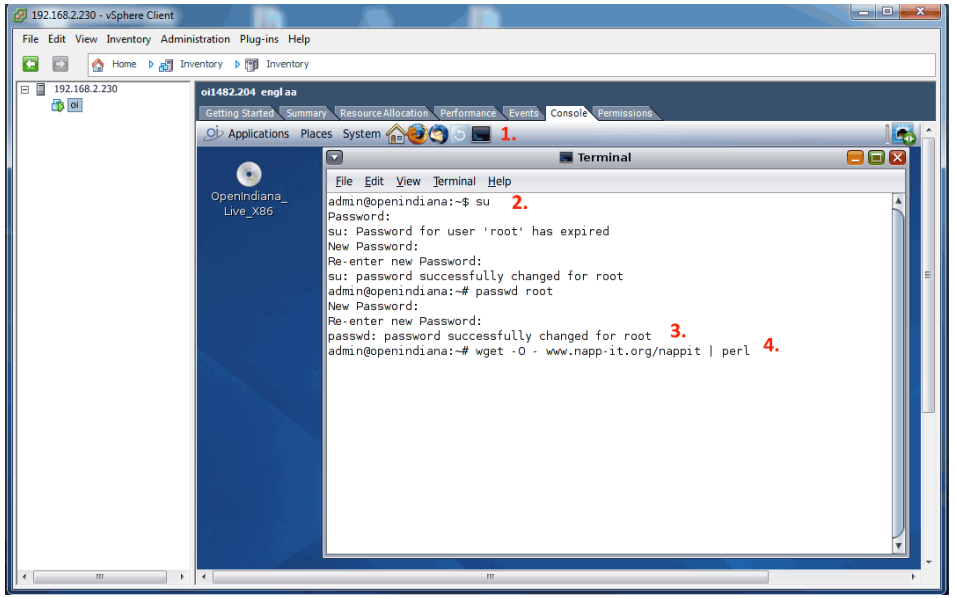


8. Configure your OpenIndiana NAS/ SAN

8.1 After booting, enter your name ex. admin and password

Open a Terminal (red 1.)
Enter su to get root permissions (red 2.)
you have to enter your users pw (ex admin pw)
and set a new and from admin different root pw

You may change the root-pw to any pw at any time (red 3.)



8.2 set ESXi-IP and Storage IP to a manual IP-Adress (OI-menu System)

usually you have to manuall enter a dns-server
open a terminal and su
start nautilus
edit /etc/resolv.conf
add a nameserver, enter (8.8.8.8 is a free Google DNS):
nameserver 8.8.8.8

see last page FAQ

8.3 vlan settings

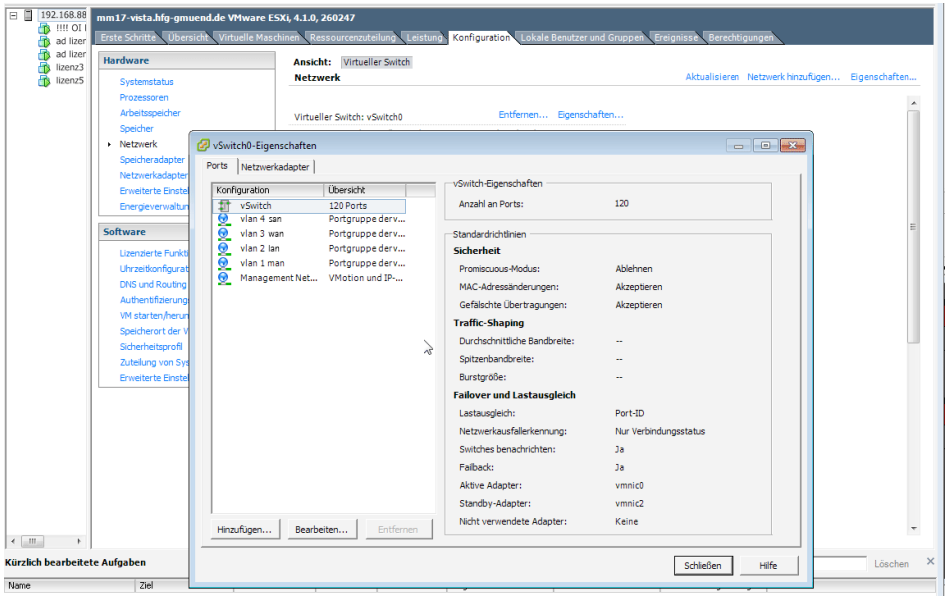
If you only have one physical NIC and a private and secure network, you do not need any special network settings or modify the default ESXi virtual switch in ESXi-Network-properties

Usually, you have more than one network (example: SAN, LAN, WAN/Internet)

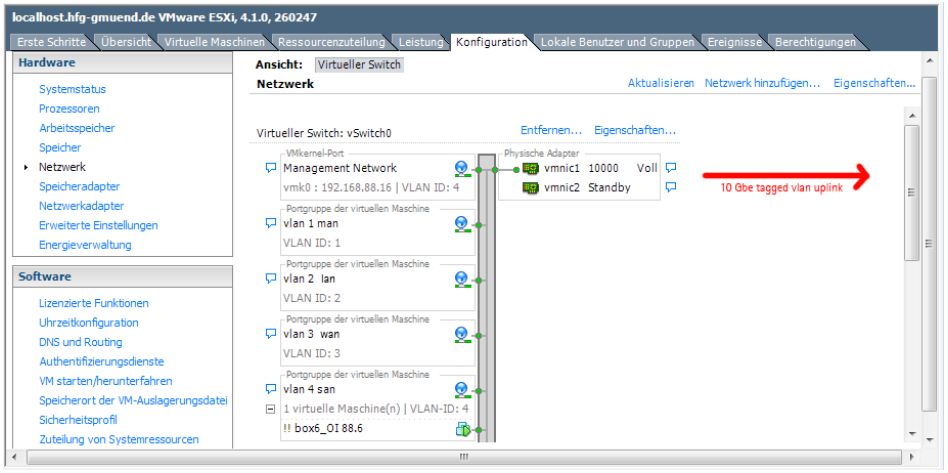
Best to use is:

Use a physical switch, where you have configured ports for these vlans. Connect your switch with one 1GB or 10 GB tagged link for example 10 Gb CX4 Links on a HP-Procurve 2910 with your your All-In-One(s).

Use your ESXi virtual switch ESXi-Network-properties to create a virtual switch to distribute your vlans to your guests.



A virtual switch works just similar to a pyisical switch.
on the right-side, you can connect it to your physical nic(s), either untagged or tagged if you use vlans. On the left side you have a management-network-port where you can set ESXi ip. This ip is also used for your NFS datastore.
You can then add virtual machine-connections. Name them like SAN, LAN or WAN and set them to a vlan id like SAS=1, LAN=2, WAN=3. You can then connect virtual NICs of your guests to these connections.



8.4 Configure OpenIndiana and install napp-it

Enter (care about spaces, Internet required): (red 4.)

wget -O - www.napp-it.org/nappit | perl

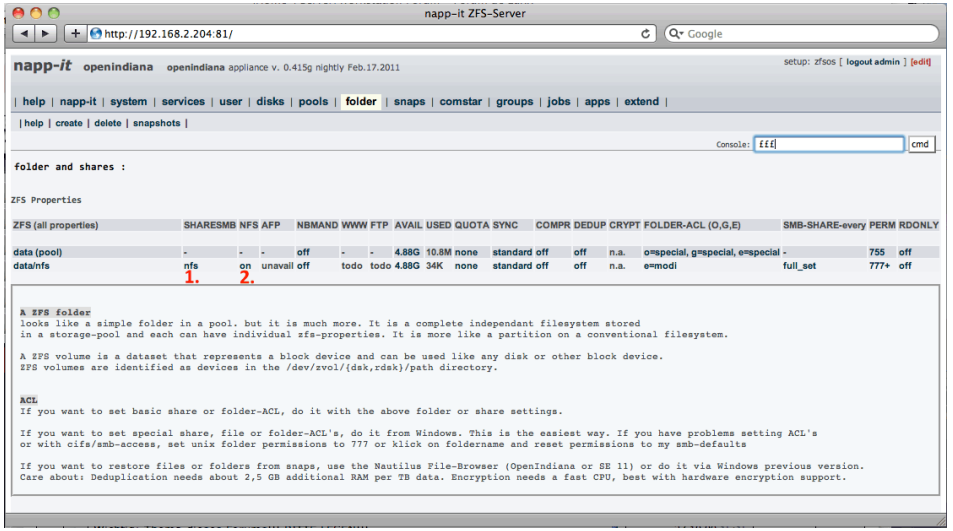
When Installation is finshed, write down IP of your server,
opt. run the AFP (Apple File Services) or AMP (Apache, mySQL, PHP-installer)

wget -O - www.napp-it.org/afp | perl
wget -O - www.napp-it.org/amp | perl

After First-time install, you must reenter root-pw to create a smb-password too
Enter: passwd root, then reboot

name the folder nfs, keep defaults like share smb (see 1.)
in menu folder share it also via nfs (see 2.)

You are now able to login via smb as root and via NFS (try from Windows)



NAS management via napp-it

8.5 Setup your NAS with napp-it

Launch napp-it via webbrowser at http://serverip:81

!! problem currently napp-it uses mini-httpd, one of the smallers webservers.
Sometimes, mini-http crashes under load. You have to restart it then as root:
/etc/init.d/napp-it start

8.6 Create a pool

Menu pool - create

We wanto to use this pool to store VM,s, so create a mirrored-vdev
(opt. add more mirrors, add a hotspare)

8.7 Create a folder

Menu folder create.
Share it via NFS and SMB.
needed permissions 777 and acl modify for everyone with inherit =on
or share NFS with the root option for ESXi like root=@192.168.1.0/24 pool/zfs

9. Setup ESXi to use SAN-Storage

The storage-features of free-ESXi are absolutely minimalistic and slow. Thats the reason we want to store all other VM's beside the storage-os itself on a NFS-SAN

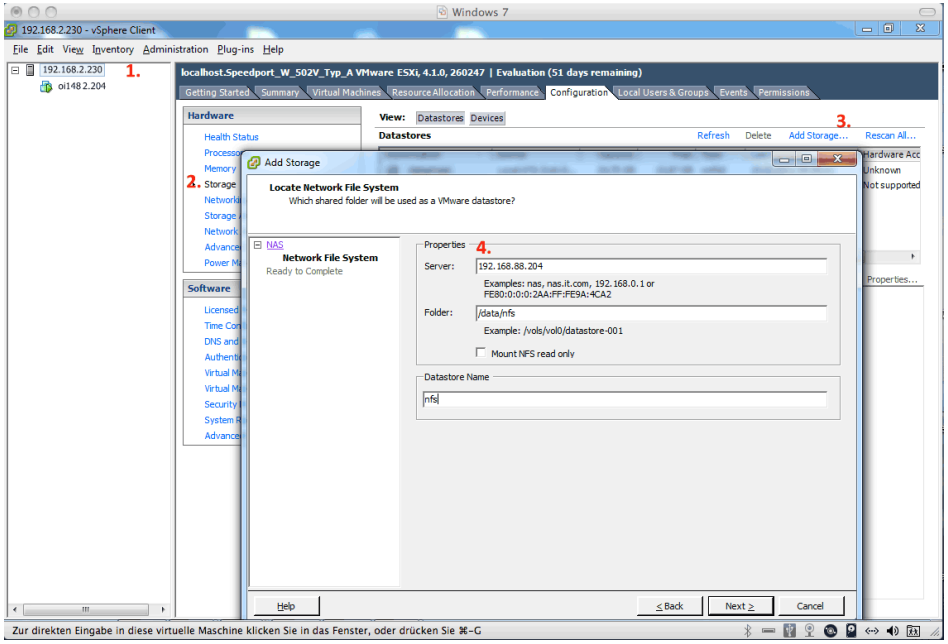
In 8.2.2 we have shared a ZFS folder via NFS. We can now mount it as a NFS datastore.

9.1 mount NFS SAN datastore

Klick on the ESXi icon (red 1.), then select Storage (red 2) and Add Storage (red 3.)
Select Network Files System (NFS) and enter
host: your host ip
folder: ex /data/nfs
name : ex nfs

Thats it, you can now create new virtual machines on this datastore with name nfs

Attention: NFS-share permissions must be set to 777 (via napp-it, menu folder)
If you get a mount-error, restart NFS service

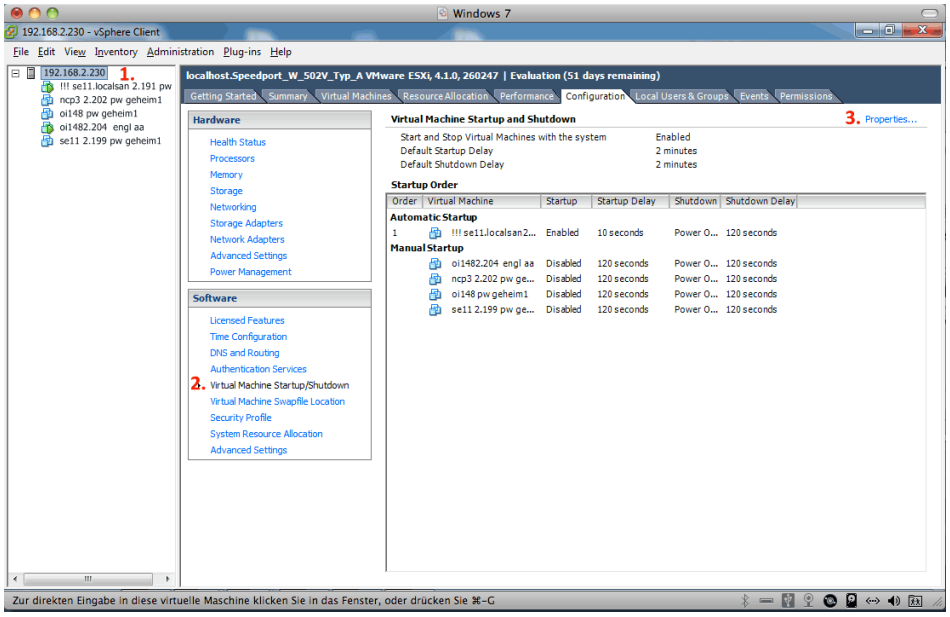


9.2 Set autostart (Storage must always start at first order)

Follow the 1..2..3 and set your Storage OS to autostart before others with a delay.
Set an additional shutdown-delay for you storage OS

9.3 Shutdown

SAN-Server must be the last VM to shutdown.
Do it manually or set a long enough shutdown delay.



Startup-Order

10 Backup, Updates and Failover after a crash, How to handle problems

You must always be prepared to handle updates and crash scenarios. While you can hot-move VM's if you pay for the needed ESXi license (not included in the free version) this is not as easy with a SAN-Server. There are some HA solutions available, but they are complicated, have often performance problems and they are mostly expensive.

First I need to say, you always need an external backup (in another physical place) in case of a desaster like a fire.
For regular updates or a ‚usual' system-crash of ESXi, your SAN-Server or any VM, you can handle it like this:

If you can tolerate a 20 min timeframe for a complete restart of your system with say 10 VM's in case of any crash or a planned update, you can do in in a very simple way with the free ESXi. All what you need is a second All-In-One with enough free disk-slots to hot-plugin your ZFS pool and enough RAM and CPU resources to handle the extra load. (Or you may have your disks in an external enclosure with an expander. In this case, you just need to plug your SAS-Cable to the next machine).

Suggested use case:

- Use All-In-One configs always in pairs to have a second failover machine, use identical vlan/ virtual switch settings on your ESXi machines
- Keep enough free disk slots in the second machine to have the option to move the pool or use external disc enclosures connected with external SAS2
- Keep the second All-In-One nearly in sync with the first machine via ZFS replication (not a really backup but a mechanism for best availability), do snaps.
- Do additional backups to a third backup machine (other location) or external/ removable disks.

10.1 What to do in case of problems or planned system updates with increasing severity

10.1.1 You have deleted a file or folder or want to go back to a former state

- stop the VM
- connect the NFS share via SMB
- right-klick to a affected folder and select previous version: restore the needed file or folder (or use Nautilus file browser with time-slider)
- If you need to go back to a hot-running state of a VM, you must have done additional ESXi snaps. You can then revert within ESXi to this state

-> you must have done snaps (ZFS only or ESXi snaps with a ZFS snap afterwards)

10.1.2 you have a disk failure, but pool remains intakt

- replace a failed disk as soon as possible, use hot-spare disks on mirrors aor raid-z3, use higher raid-z levels
- do a regular scrub (online filecheck function to find and repair hidden data failures, run it weekly with desktop disks, monthly with enterprise disks)

If you have a hot-plug capable controller (ex: Sata ahci or SAS controller), you can remove a failed disk and replace it on a running machine. If you have set autoreplace to on, the new disk will be used for resilvering immediatly. Otherwise you have to go to menu disk-replace and replace by selecting only the source disk.

If your new disk is in a new slot, goto menu disk replace, select the two and replace them. If your system is not hot-pluggable, you must shut-down and replace the disk. In this case it is sometimes needed to insert the new disk in another slot (not the port with the formerly damaged disk)

-> use always redundant vdev-layouts where one or more disks can fail

10.1.3 Your first machine is offline from whatever reason (sudden hardware failure or planned system-updates, ZFS datapool remains intact)

- Move your ZFS datapool with original VM's to your second All-In-One
- Import the datapool
- share it via NFS
- Import the share in ESXi, open the datastore via ESXi filebrowser (ESXi menu storage, right click to datastore, select search)
- Open folder with a VM and right click on the .vmx, select add to inventory
- Start you VM's. You are asked if you have copied or moved the machine; select move
  If you have the same virtual switch/ network setting (vlans), you do not need to do anything more.

Alle of your VM's are rerunning on the second machine with original data after about 30 min, if you use external disk-enclosures within 15 min.

10.1.4 Your first All-In-One is lost (fire, stolen etc), your paired All-In-One is available

- stop replication funktion for your backup ZFS folder
- set read-only to off
- share the folder via NFS and import it in ESXi
.. same like 10.1.3 with the difference, that you do not use real time data but have a time delay depending on your replication settings (example 15min or daily)

Alle of your VM's are rerunning on the second machine with replicated data and a small timelag after about 15 min

10.1.5 Your first All-In-One is lost (fire, stolen etc), your paired All-In-One is also lost or replicated data is damaged/ too old and there is no working snap

- you must restore your pools from a backup
- copy your VM folders back to a All-In-One share
- check if permissions are set to full or modify for everyone
- NFS-share the folder
.. same like 10.1.3 with the difference, that you do not use real time data but have a time delay depending on your restore time

Alle of your VM's are rerunning on a new machine with backup data and a timelag from at least several hours if your backups are on tapes

11. FAQ

How do i access my snapshots for clone/copy/move or backup?

Your VM's are just files, stored on a NFS SAN-share.
Share this folder also via SMB and you have easy access to all files and snaps via Windows previous version

How do i create hot-snaps (include RAM-state)

Create a snap within ESXi

keep attention. ESXi snaps are slow. With each snap, it becomes slower
best is: do a ZFSsnap afterwards and delete ESXi snap
In case of problems, stop VM, restore ZFS, restart VM end restore ESXi hot-snap
If you do not have databases, its often ok to do ZFS cold-snaps (unlimited, without delay)
From OS-vew its similar to a sudden shut-down.

Is it save, to have a lot of VM's on a NFS share and a lot of users on the same pool with SMB

Solaris is very stable, so it could work
You can also setup a second NAS with its own SAS Controller and pool to have them completely independant.

I use VLANS and a 10 GBe IP-SAN-Network, how can i include such a All-In-One

Most of the traditional SAN-things are obsolet with all in One (Most SAN is Computer intern)
Cteate a tagged 10 GBe Vlan Port at your Switch. Connect your All-in-One with 10 GBe to this switch.
Manage vlans with ESXi integrated virtual switch features. If you need more than one vlan on a guest without vlan supports, add more nics to this guest and connect each untagged to the needed vlan.

Remote Control of OpenIndiana via vsphere is slow, Are there any other options

Use TIGHTVNC (Windows, install client only), Activate Desktop-sharing in OpenIndiana in System-Preferences-Desktop Sharing. (english keyboard mapping is used always)

How can i access snapshots/ data from any user within OpenIndiana

Use Nautilus Filebrowser with TimeSlider. Open a terminal, enter su to get root permissions and enter nautilus
With Nautilus TimeSlider, you can select a folder and go back in time until a desired folder/ file appears from a snapshot

How can I move VM's + pools in case of a crash or needed ESXi or OpenIndiana updates

If you need a good availability, you should have a second All-In-One with the same network settings and enough free Disk-slots to plug-in the complete pool from your first All-In-One. A move of all VM's is then done in a few minutes. Plug-In the pool, import it, share it as NFS, import this share in ESXi, add the VM's to inventory and you can boot the moved VM's without problems or special other settings and you have always the newest data (no backup-delay, but do backups anyway !!)

12 reported problems and workarounds

Boot problems with Solaris Express and OpenIndiana with more than 2 vCPU's in ESXi (Nexenta seems not affected, seems solved with ESXi 5)

use 2 vCPU only
use at least 1.5 GB assigned RAM

When i try to import the NFS share, I got the following error:
Call "HostDatastoreSystem.CreateNasDatastore" for object "ha-datastoresystem" on ESX "{ESX server}" failed:

possible reason see
http://blog.jeffcosta.com/2011/01/10/hostdatastoresystem-createnasdatastore-for-object-ha-datastoresystem-error-when-setting-up-vmware-nfs-data-store/

but most errors when you try to import a NFS share are permission problems, check:
you are using NFS3, so you must look at the unix permissions, set it to 777
(with all-in one, you may check folder via SMB and set modify permission for everybody recursivly to the share)

I installed VMware tools on Nexenta via apt-get install vmware-tools but the high-speed network-driver VMXnet3 is missing

Not part of the current tools with Nexenta (included in vmware-tools on OpenIndiana and Solaris Express)

Im low on RAM, can i heavily overcommit RAM on ESXi with a virtualized storage machine?

A ZFS SAN server will use its assigned RAM on heavy loads. If you also have other machines with heavy RAM-usages, you should not overcommit RAM extensively. But thats a general suggestion and not a specific problem a virtiualized SAN-Server.

OpenIndiana 151 dev release and vmware-tools

only working with english language settings, solved with OpenIndiana 151a

error messages about uninitialized variables in perl files (not in napp-it)

napp-it use strict option of perl to get these warnings, you can ignore them

Solaris 11: problem - could not install vmware tools
currently no fix