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Virtual Linux Machines BrandZ

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Virtual Machines - Zones

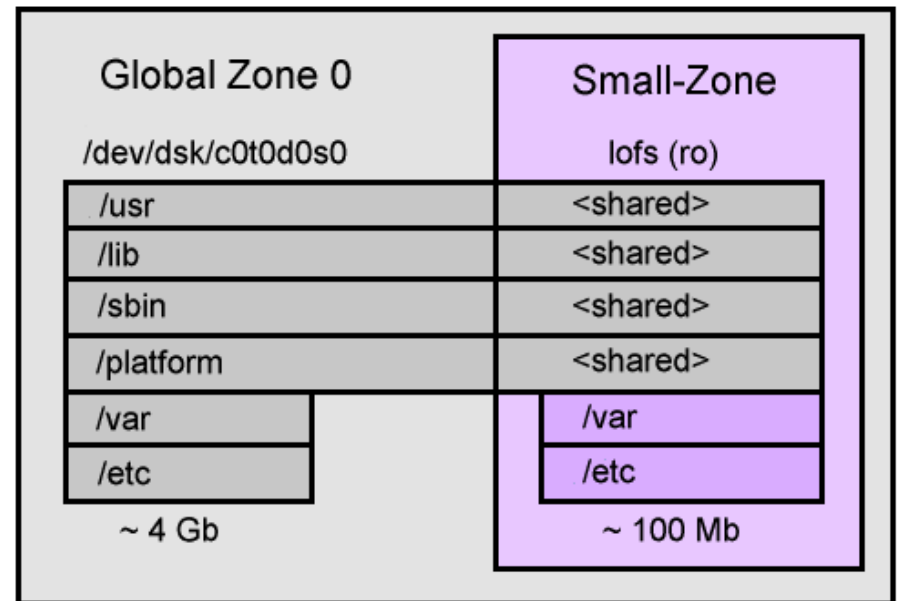
Solaris 10 and Nevada (Solaris 11) has the ability to set up Virtual Machines within the system. Virtual Machines usually have:

- Separate IP addresses
- Shared routing table.
- Private filesystems for / (root) and apps.
- Shared filesystems (/usr /lib) read-only
- Resource management , to prevent a VM to use up to much CPU.

Virtual Machines - Zones

This is the default zone setup

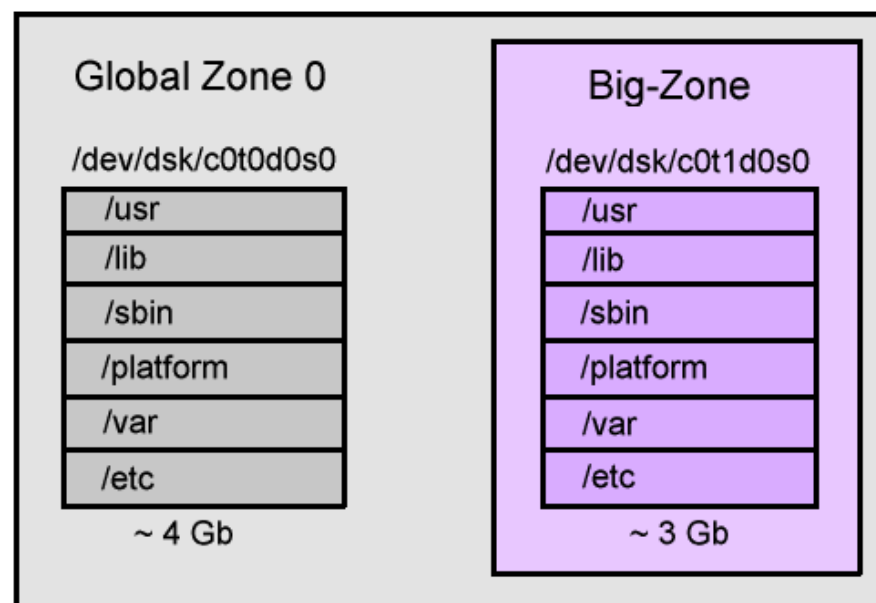
- The virtual machine shares all the binary files with the real server.
- Config and log files are stored on separate nonshared areas.
- Many virtual machines can be built with little disk space.



Virtual Machines - Zones

But zones with separate filesystems can be created.

- The virtual machine shares nothing with the real server.
- Requires a lot of disk space.





Virtual Machines - Zone utilities

The three most important utilities to manage zones are:

- `zonecfg` - to create a zone
- `zoneadm` - to administrate a zone
- `zlogin` - to log in to the zone.

What you do after the zone is created is all up to you, since you can do basically anything with it.



Virtual Machines - create the zone

```
zonecfg -z vm1
vm1: No such zone configured
Use 'create' to begin configuring a new zone.
zonecfg:vm1> create
zonecfg:vm1> set zonepath=/zones/vm1
zonecfg:vm1> set autoboot=true
zonecfg:vm1> add net
zonecfg:vm1:net> set physical=e1000g2
zonecfg:vm1:net> set address=10.10.10.123/24
zonecfg:vm1:net> end
zonecfg:vm1> add fs
zonecfg:vm1:fs> set special=/export/home
zonecfg:vm1:fs> set dir=/home
zonecfg:vm1:fs> add options [rw,nodevices]
zonecfg:vm1:fs> set type=lofs
zonecfg:vm1:fs> end
zonecfg:vm1> commit
zonecfg:vm1> verify
zonecfg:vm1> exit
```

This transcript shows a session where a zone “vm1” is created with “zonecfg”.

The IP interface and address is configured

A loop back filesystem is added to make users home directories appear in the zone. This is sometimes a good idea if you want the zone to see the users files.



Virtual machines - installing a zone

```
# zoneadm -z vm1 install
Preparing to install zone <vm1>.
Creating list of files to copy from the global zone.
Copying <2525> files to the zone.
Initializing zone product registry.
Determining zone package initialization order.
Preparing to initialize <2091> packages on the
zone.

Done

#
# zoneadm -z vm1 boot
# zlogin -C vm1
[Connected to zone 'vm1' console]

vm1 console login:
```

Zoneadm is used to initialise the zone and copy over private files , mainly the /etc file that will be uniq to the zone.

Then its possible to boot the zone, this is almost instantaneous.

After its booted the root user of the global zone can login with zlogin and start administrate the zone.

The first job is to set up the language terminal and timezone settings. In the same way you do after a normal sys-unconfig.



A Linux zone in Solaris

- A virtual machine in solaris can be marked or Branded and then run a different *NIX operating system
- The first BRANDed Zone to make it out of the Labs is a Linux zone
- It needs to be a Linux kernel 2.4 based distribution. RHEL3 and Centos 3.5 are the recommended distros to use.



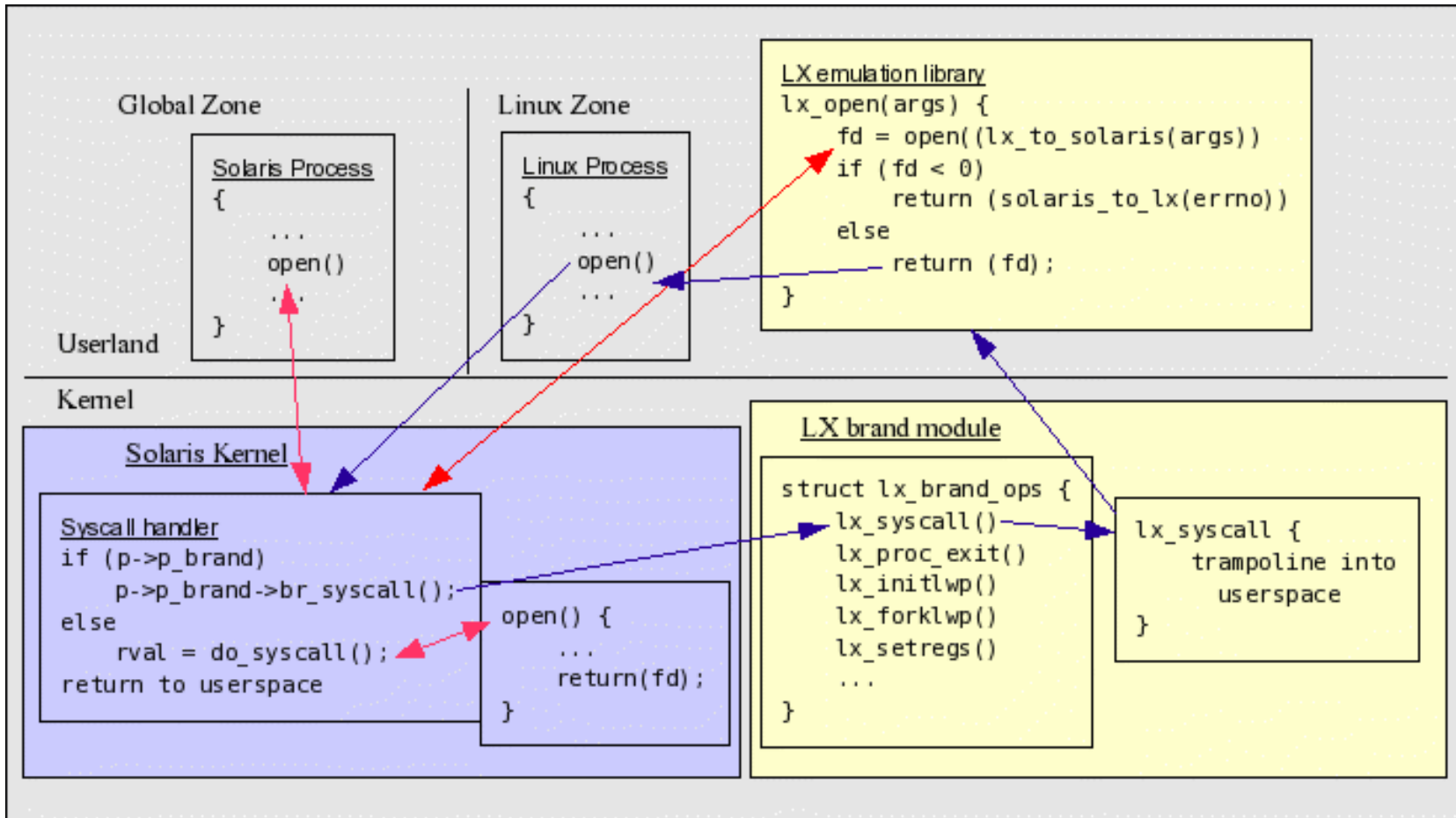
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To set up virtual machines with Linux execution environment we need to do a few more tricks:

- A Linux Distro is needed Red Hat 3.x or equiv. CentOS
- Two packages with linux interception software is needed:
 - SUNWlxr with solaris kernel modules that interfaces with Linux
 - SUNWlxu with the Branded libraries that intercepts linux systemcalls and convert them to solaris.
- This layer of software intercepts linux system calls and subroutine calls and channels them through the solaris subsystems
- These packages is installed on Solaris as normal “pkgadd” packages.

Linux in a Virtual machine

- The mechanism behind the Linux Zone





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The complete installation process is described here:

<http://opensolaris.org/os/community/brandz>

<http://opensolaris.org/os/community/brandz/install>

OpenSolaris Build 49 and later has the SUNWlx packages installed with the system, the only extra S/W needed is the Linux distro and some apps. A copy of CentOS can be found here:

http://dlc.sun.com/osol/brandz/downloads/centos_fs_image.tar.bz2

After you have installed OpenSolaris there is only 2 things you need to do:



Setting up the LINUX VM:

```
zonecfg -z linuxvm1
linuxvm1: No such zone configured
Use 'create' to begin configuring a new zone.
zonecfg:linuxvm1> create -t SUNWlx
zonecfg:linuxvm1> set zonpath=/zones/linuxvm1
zonecfg:linuxvm1> set autoboot=true
zonecfg:linuxvm1> add net
zonecfg:linuxvm1:net> set physical=e1000g2
zonecfg:linuxvm1:net> set address=10.10.10.18/24
zonecfg:linuxvm1:net> end
zonecfg:linuxvm1> add attr
zonecfg:linuxvm1:fs> set name="audio"
zonecfg:linuxvm1:fs> set type=boolean
zonecfg:linuxvm1:fs> set value=true
zonecfg:linuxvm1:fs> end
zonecfg:linuxvm1:fs> set special=/export/home
zonecfg:linuxvm1:fs> set dir=/home
zonecfg:linuxvm1:fs> add options [rw,nodevices]
zonecfg:linuxvm1:fs> set type=lofs
zonecfg:linuxvm1:fs> end
zonecfg:linuxvm1> commit
zonecfg:linuxvm1> verify
zonecfg:linuxvm1> exit
```

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Brand this zone as linux using
the SUNWlx template

create -t SUNWlx

Set up audio environment for
desktop use - think
multimedia and Games.

Make the home dirs
loopbacked



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The result of running “zonecfg” is an XML file that is saved in the /etc/zones directory . This file is used to direct the installation and management of the zone.

/etc/zones/linuxvm1.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE zone PUBLIC "-//Sun Microsystems Inc//DTD Zones//EN"
"file:///usr/share/lib/xml/dtd/zonecfg.dtd.1">
<!--
  DO NOT EDIT THIS FILE.  Use zonecfg(1M) instead.
-->
<zone name="linuxvm1" zonename="/zones/linuxvm1" autoboot="true" brand="lx">
  <network address="192.168.245.228" physical="bge0"/>
  <attr name="audio" type="boolean" value="true"/>
  <filesystem special="/export/home" directory="/home" type="lofs">
    <fsoption name="rw"/>
    <fsoption name="nodevices"/>
  </filesystem>
</zone>
```

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Now we need to install the zone from the centos linux tarball.

(its also possible to use other ISO images or tarballs of RHEL3)

```
# zoneadm -z linuxvm1 install -d /path_to_distro/centos_fs_image.tar
```

This takes a good while since its a 1.3 GB file.

Then its time to boot the zone and login .

```
# zoneadm -z linuxvm1 boot
```

```
# zoneadm list -iv          ( to check the status )
```

```
# zlogin -C linuxvm1
```

```
[ Connected to zone 'linuxvm1' console ]
```

```
CentOS release 3.5 (final)
```

```
Kernel 2.4.21 on an i686
```

```
linuxvm1 login:
```



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What to do with it - now that its up ?

- First job is to set up linux networking
 - Edit `/etc/sysconfig/network` , `/etc/hosts`,
`/etc/resolv.conf`, `/etc/nsswitch.conf` in the Linux VM
 - Setup Ipaddress, Gateway , DNS a.s.o
- Setup solaris to network to the Linux VM
 - `/etc/hosts` or DNS needs to know the Linux vm address
- Create identical users in the linux VM as you have in solaris (remember that the HOME dirs are loopbacked)



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Set up SSH and use the X forwarding

- Run `ssh-keygen -t rsa` for a user in solaris, no passphrase.
- Copy `$HOME/.ssh/id_rsa.pub` to `$HOME/.ssh/authorized_keys`, this will enable “loopback” ssh from and to the same user between solaris & linux.
- Make sure that X forwarding is enabled in Linux
- From solaris you can now run
`ssh -X linuxvm1 program-name`
- Simplest program to try first is Adobe Acrobat.



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DEMO

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Thank you!

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“open” artwork and icons by chandan:
<http://blogs.sun.com/chandan>

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