Solaris VM Migration

Troubleshooting VMware to VirtualBox VM Migration

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Topics

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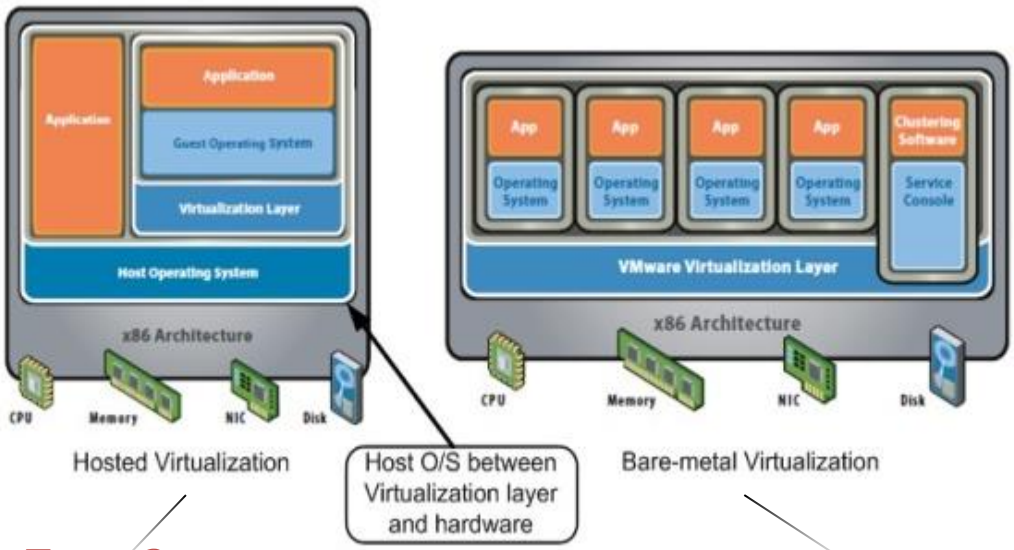
Concepts

- Hypervisor
  - Software that emulates computer hardware allowing multiple operating systems to run on a single physical computer host.
- Type-1 (*bare-metal*) virtualization
  - installs directly onto a server without the need for a traditional operating system to be installed first
- Type-2 (*hosted*) virtualization
  - an operating system must first be installed on a server, and the virtualization layer is installed afterwards, just like an application.

Examples



Type-2

VMware Workstation, Fusion, Player and Server

Microsoft Virtual PC and Server

Oracle VirtualBox

Type-1

VMware ESX

Citrix XenServer

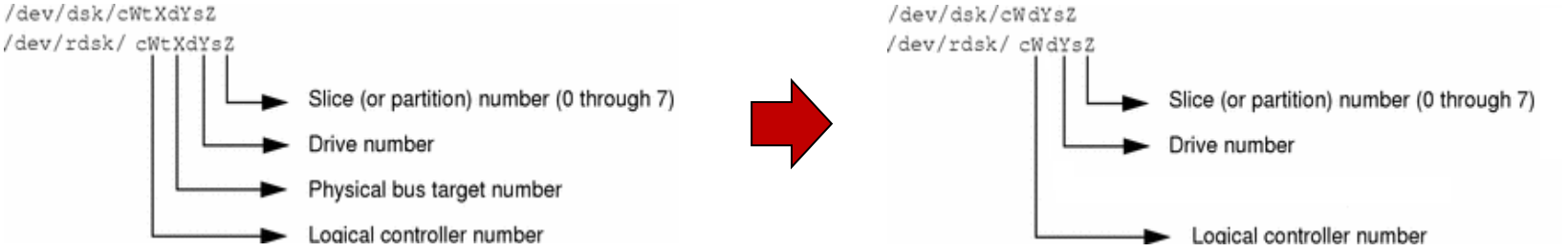
Microsoft Hyper-V Server

Migration Troubleshooting

- Operational System: Oracle Solaris 10
- The location of disk device files is `/dev/dsk`, while raw disks are located in `/dev/rdsk`.

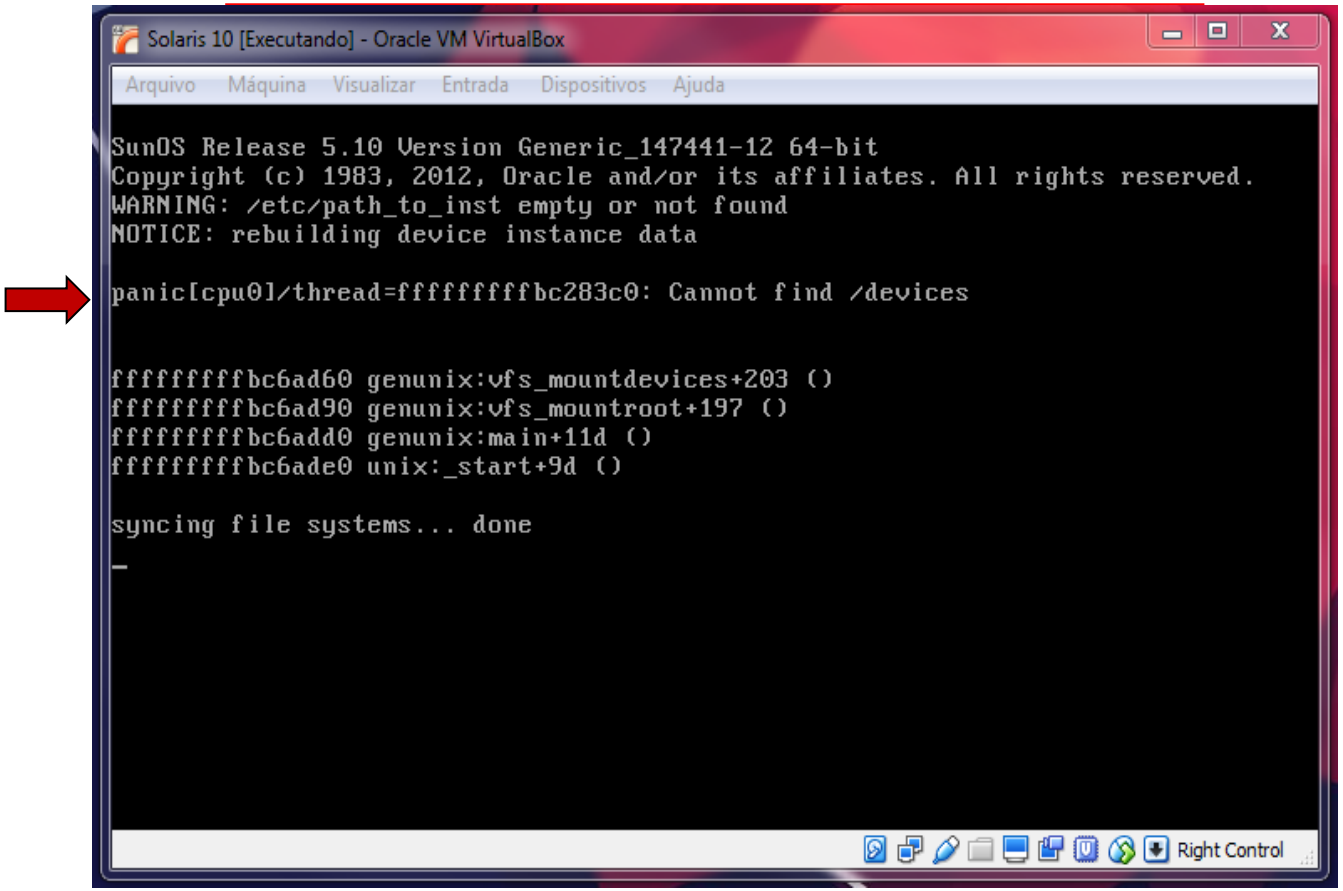
- VMware had the hard disk(s) as SCSI (e.g.: c0t0d0s0)

- VirtualBox enumerated them as IDE (e.g.: c0d0s0).



Migration Troubleshooting

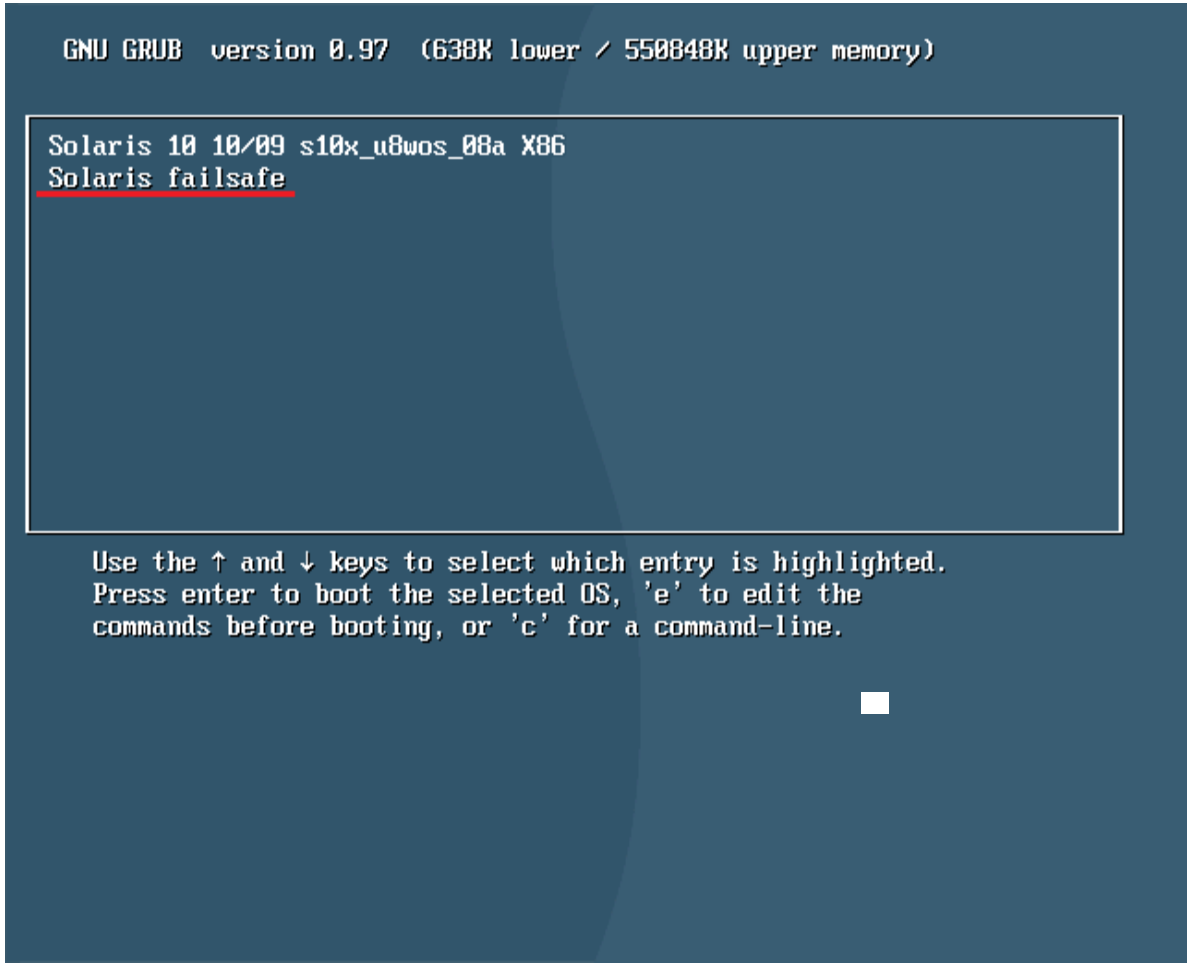
RESULT: KERNEL PANIC + REBOOT LOOP



10-Step Solution

1. Boot Solaris in failsafe mode
2. Mount the root partition in read-write mode
3. (Backup and) remove the devices folders
4. Rebuild the devices folders
5. Fix boot disk path
6. Fix partition tab
7. Rebuild boot archive
8. Force reconfiguration
9. Uninstall VMware Tools
10. Install VirtualBox Guest Additions

1. Boot Solaris in failsafe mode



2. Mount the root partition (read-write)

```
SunOS Release 5.10 Version Generic_139556-08 32-bit
Copyright 1983-2009 Sun Microsystems, Inc.  All rights reserved.
Use is subject to license terms.
Booting to milestone "milestone/single-user:default".
Configuring devices.
Searching for installed OS instances...
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.
fdisk: Cannot stat device /dev/rdsk/c0t600508B4000740BF00023000.

Solaris 10 5/09 s10x_u7wos_08 X86 was found on /dev/dsk/c0t600508B4000740BF0002
000000060000d0s0.
Do you wish to have it mounted read-write on /a? [y,n,?] y [enter]
```

3. Remove the devices folders

- The Oracle Solaris OS includes both `/dev` and `/devices` directories for device drivers. Almost all the drivers in the `/dev` directory are links to the `/devices` directory. The `/dev` directory is UNIX standard. The `/devices` directory is specific to the Oracle Solaris OS.

```
# mv /a/dev /a/dev.bkp
```

```
# mv /a/devices /a/devices.bkp
```

- The `/etc/path_to_inst` database contains record mappings of physical device names to instance numbers.

```
# mv /a/etc/path_to_inst /a/etc/path_to_inst.bkp
```

4. Rebuild the devices folders

- `devfsadm` maintains the `/dev` namespace.
- The default operation is to attempt to load every driver in the system and attach to all possible device instances. Next, `devfsadm` creates logical links to device nodes in `/dev` and `/devices` and loads the device policy.
- In addition to managing `/dev`, `devfsadm` also maintains the `path_to_inst` database.
- `-r root_dir:` presume that the `/dev` directory trees are found under `root_dir`, not directly under root (`/`).

```
# devfsadm -r /a
```

5. Fix boot disk path

- Set `vi` as the default editor.

```
# TERM=vt100
# export TERM
# EDITOR=vi
# export EDITOR
```

- Backup and edit `/a/boot/solaris/bootenv.rc` using `vi`.

```
# vi /a/boot/solaris/bootenv.rc
```

  - Lines to look for: `setprop bootpath '/pci@0,0…`
  - Set the bootpath to the pci path, without `../../devices`
  - This information can be found by typing the following command:

```
# df -k // here you will find the /a partition's device path
```

If you are unable to use the cursor while editing in `vi`, you should use regex replace:

```
:%s/old_string/new_string/gc [enter] y [enter] :wq [enter]
```

6. Fix partition tab

- Edit `/a/etc/vfstab` to match the new devices' naming convention.
- In other words, replace any `cWtXdY` device to `cWtXdYsZ` format.
- Tip: use `vi` and regex replace.

```
# vi /a/etc/vfstab
```

```
:%s/old_string/new_string/gc [enter] y [enter] :wq [enter]
```

```
#device         device          mount           FS      fsck    mount   mount
#to mount       to fsck         point           type    pass    at boot options
#
#/dev/dsk/c1d0s2 /dev/rdsk/c1d0s2 /usr          ufs     1       yes     -
fd      -       /dev/fd fd      -       no      -
/proc   -       /proc   proc    -       no      -
/dev/dsk/c2t2d0s1       -       -       swap    -       no      -
/dev/dsk/c2t2d0s0       /dev/rdsk/c2t2d0s0      /       ufs     1       no
-
/dev/dsk/c2t2d0s5       /dev/rdsk/c2t2d0s5      /var    ufs     1       no
-
/dev/dsk/c2t2d0s6       /dev/rdsk/c2t2d0s6      /opt    ufs     2       yes
-
swap    -       /tmp    tmpfs   -       yes     -
```

7. Rebuild boot archive

- The `bootadm` command manages the boot archive and, with x86 boot environments, the GRUB (GRand Unified Bootloader) menu.
- The `update-archive` option provides a way for user to update the boot archive as a preventative measure or as part of a recovery procedure.
- `update-archive [-vn] [-R altroot [-p platform]]`
  - Updates current boot archive if required. Applies to both SPARC and x86 platforms.

```
# bootadm update-archive -v -R /a
```

8. Force reconfiguration

- Autoconfiguration offers many advantages over the manual configuration method used in earlier versions of SunOS, in which device drivers were manually added to the kernel, the kernel was recompiled, and the system had to be restarted.
- Now, with autoconfiguration, the administrator simply connects the new device to the system and performs a reconfiguration startup.
- To perform a reconfiguration startup, follow these steps:

- Create the `/a/reconfigure` file with the following command:

```
# touch /a/reconfigure
```

- The `/reconfigure` file causes the Oracle Solaris software to check for the presence of any newly installed devices the next time you start up your system.
- Unmount `/a` and gracefully reboot the system with the following command:

```
# cd /; umount /a; sync; sync; init 6
```

9. Uninstall VMware Tools

- At this point, you should be able to boot Solaris.
- Unfortunately, if VMware Tools were previously installed, it will not be possible to show Solaris' GUI because misconfigured Xorg.conf file.
- To uninstall VMware Tools, enter the following command as root:

```
# vmware-uninstall-tools.pl
```

Restart the system. After the reboot, you should be able to see Solaris' GUI.

10. Install VirtualBox Guest Additions

- In order to have a better user experience with the virtual machine, it is recommended to download and install the VirtualBox Guest Additions.

- To achieve that, follow the procedure below:
- Navigate to http://download.virtualbox.org/virtualbox/ and find your VirtualBox version folder
- The software version can be found at Help > About.
- Copy the link of the corresponding version's ISO file.
- Download the file (~60MB) by typing:

```
# wget http://download.virtualbox.org/virtualbox/5.0.10/VBoxGuestAdditions_5.0.10.iso
```

- Mount the ISO file in a loopback device by typing:

```
# mount -F hsfs -o ro `lofiadm -a /path/to/image.iso` /mnt
```

- Run the VirtualBox Guest Additions installation by typing:

```
# ./mnt/VBoxLinuxAdditions.run
```

Results

- At this point, you should be able to boot and interact nicely with Solaris.

References

- What is virtualization?
- https://yoyoclouds.wordpress.com/category/cloud-computing/private-cloud/vmware/page/2/

- Device Naming Conventions
- https://docs.oracle.com/cd/E19455-01/805-6331/6j5vgg680/index.html

- Linux man pages
- http://linux.die.net/man/

References

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- http://www.sgvulcan.com/2011/06/16/moving-a-solaris-guest-from-vmware-to-virtualbox/

- Rebuilding the Solaris Device Tree
- http://spiralbound.net/blog/2005/12/21/rebuilding-the-solaris-device-tree/