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IS THAT A DATACENTER IN YOUR POCKET?

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IS THAT A CLOUD IN YOUR POCKET?

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WHY?



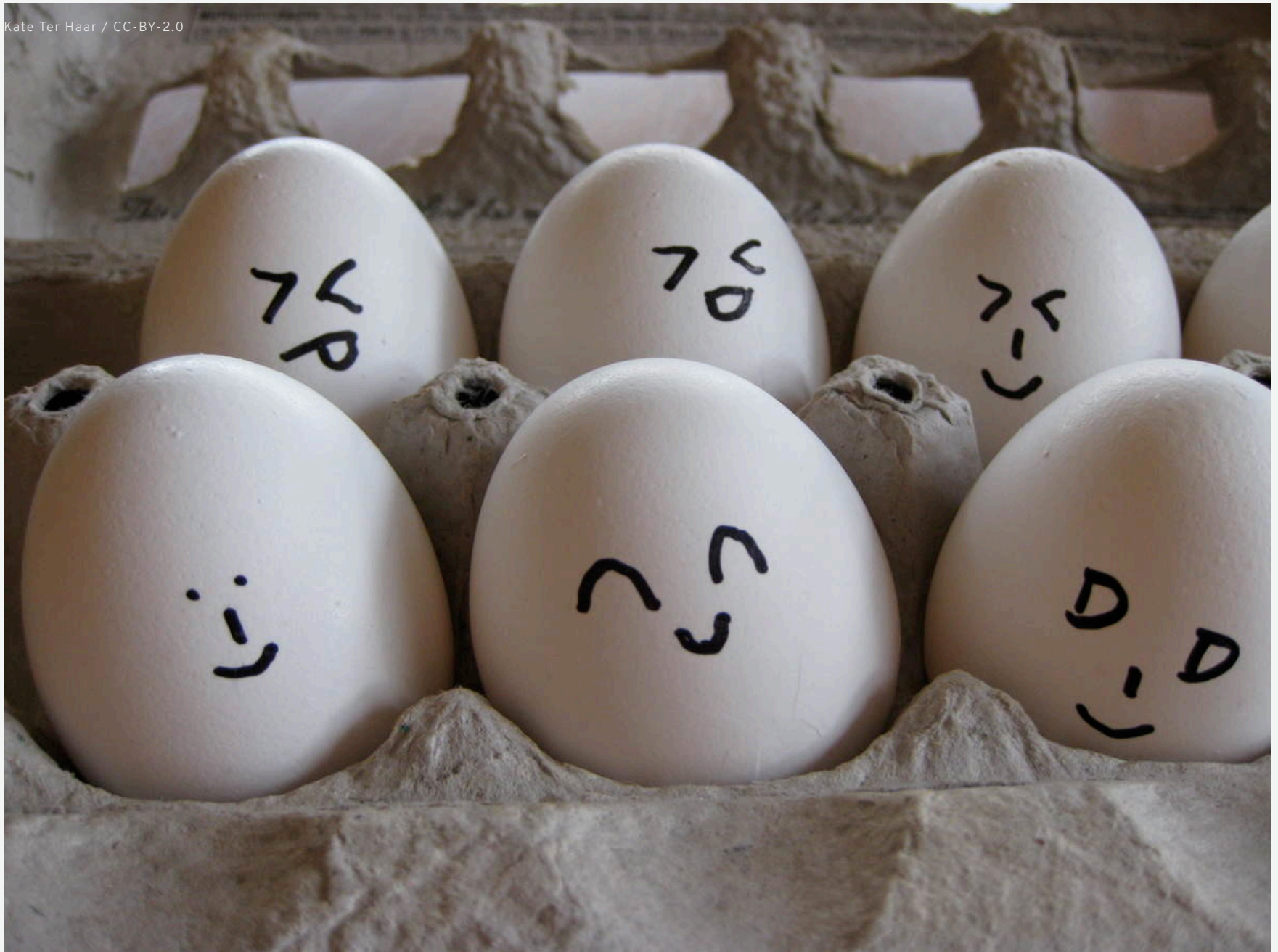
I HAVE AN ITCH



I HAVE AN SCRATCH

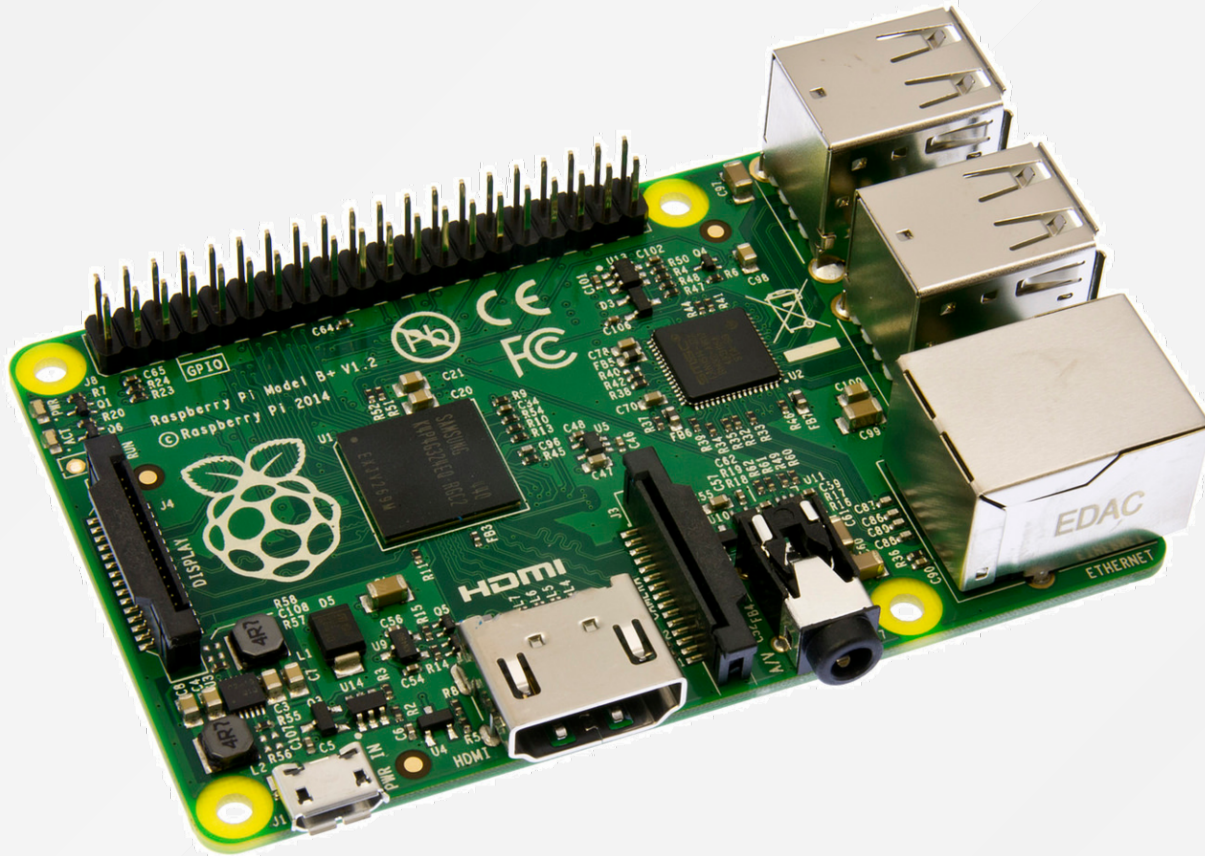


**I HAVE AN SCRATCH
I NEED TO ITCH**















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AGENDA

- Nested Virtualisation
- Thin LVM
- Snapshots
- RHEL-OSP vs RDO vs DevStack
- Atomic + cloud-init

AGENDA

- Along the way
 - Choosing the right Base OS image(s)
 - Gotchas
 - Power Tips

AGENDA

- What Next?
 - UEFI
 - ARM64?

HARDWARE





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CentOS

fedora 



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fedora^f 23



T440s



128 GB SSD



CentOS



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DRAGONS



NESTING



NESTED VIRTUALISATION

Huge performance boost over qemu software emulation



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NESTED VIRTUALISATION

Huge performance boost over qemu software emulation

/etc/modprobe.d/kvm-intel.conf

```
options kvm-intel nested=1
options kvm-intel enable_shadow_vmcs=1
options kvm-intel enable_apicv=1
options kvm-intel ept=1
```

OR

/etc/modprobe.d/kvm-amd.conf

```
options kvm-amd nested=1
```

and reboot

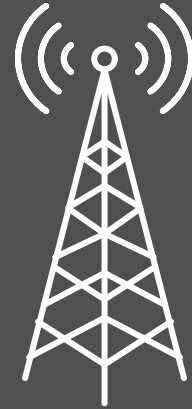


POWER TIP

Always use SSD Storage

Confirm your SSD Storage performance

- `hdparm -f /dev/sdX`



NESTED VIRTUALISATION

Create a dummy VM Centos7_BASE

- eg via virtual-manager

Edit Virtual Machine CPU type

virtsh edit Centos7_BASE

```
<cpu mode='custom' match='exact'>  
<model fallback='allow'>Nehalem</model>  
<vendor>Intel</vendor>  
<feature policy='require' name='vmx'/>  
</cpu>
```

NESTING GOTCHA

Clashing default networks on 192.168.122.x



```
/etc/libvirt/qemu/networks/default.xml
```

```
<network>
  <name>default</name>
  <uuid>cf7022ad-7c12-4349-a15d-2bbcd3eba6ea</uuid>
  <bridge name="virbr0" />
  <mac address='52:54:00:95:F9:9F' />
  <forward />
  <ip address="192.168.122.1" netmask="255.255.255.0">
    <dhcp>
      <range start='192.168.122.128' end='192.168.122.254' />
    </dhcp>
  </ip>
</network>
```

THIN LVM

THIN LVM ON SSD

Creating a thin pool on VG fedora_t440s

```
[root@t440s ~]# lvcreate -T -L 80G fedora_t440s/lv_thin  
Logical volume "lv_thin" created.
```

```
[root@t440s ~]# lvcreate -V40G -T fedora_t440s/thinpool -n Centos7_BASE  
E  
Logical volume "Centos7_BASE" created.
```



LVM GOTCHAS

Thin on LVM

```
/etc/lvm/lvm.conf  
    issue_discards = 1
```



Thin on LVM on luks

- <https://blog.christophersmart.com/2013/06/05/trim-on-lvm-on-luks-on-ssd>

ALL ABOUT THAT BASE

BASE OS IMAGE

Doesn't have to be a minimal install

Have one for RHEL /Centos 6.x and 7.x (and Fedora / Ubuntu?)

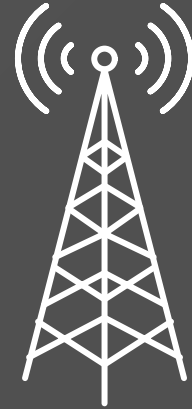
Update your base regularly

How will you build your base image?





POWER TIP



ALWAYS USE A KICKSTART

BASE OS IMAGE

Doesn't have to be a minimal install

- What are your main use cases?
 - mine was OpenStack
- Don't skimp on disk
 - 40GB base HD
- Have some re-usable kickstart functions/snippets

PARTITIONS

```
# Rename VG2 as cinder-volumes in our post
# Kickstart doesn't like cinder-volumes as a VG name
#
# Only two partitions on disk as we're BIOS booting
part /boot --fstype=ext4 --size=300
part pv.253002 --size=30760
part pv.253003 --grow --size=1
volgroup vg_vm1 --pesize=4096 pv.253002
volgroup VG2 --pesize=4096 pv.253003
logvol / --fstype=ext4 --name=lv_root --vgname=vg_vm1 --grow --size=1024 --maxsize=51200
logvol swap --name=lv_swap --vgname=vg_vm1 --grow --size=2016 --maxsize=4032
```



MINIMAL(ISH) PACKAGES

```
%packages
@core
@server-policy
ntp
@Virtualization-Platform
--firstboot
--NetworkManager
--NetworkManager-glib
mysql
```


SSH KEYS

```
# Install SSH keys.
install_ssh_keys()
{
    mkdir -p /root/.ssh
    chmod 700 /root/.ssh
    cat >> /root/.ssh/authorized_keys << KEYS
ssh-rsa owkwdwdwmyreallysimpelepublickey steve@myh
ost
KEYS
    chmod go-r /root/.ssh/authorized_keys
}
```

FIX VG AND YUM CACHE

```
keep_yumcache()  
{  
    sed -i 's/keepcache=0/keepcache=1/g' /etc/yum.  
conf  
}
```

```
fix_vg_name()  
{  
    vgrename VG2 cinder-volumes  
}
```

```
install_ssh_keys  
fix_vg_name  
keep_yumcache
```

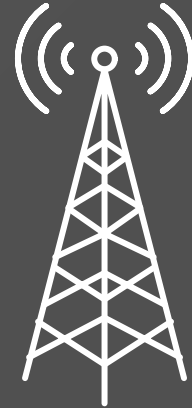


PATCH THAT BASE

POWER TIP

Keep a Content Cache

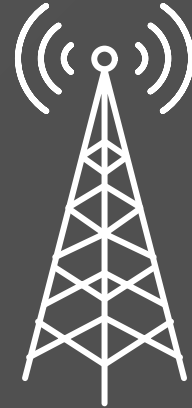
- rsync
 - nice and simple



POWER TIP

Keep a Content Cache

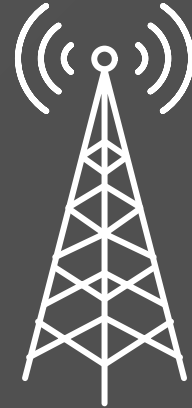
- rsync
 - nice and simple
- mrepo
 - More elegant



POWER TIP

Keep a Content Cache

- rsync
 - nice and simple
- mrepo
 - More elegant
- RH Satellite 6.x / Katello + The Foreman
 - Double brownie points
 - Needs more storage



PATCH THE VM

```
# from my host environment
```

```
rsync -av 7/ centos7:/var/cache/yum/x86_64/7/
```

```
# From my VM
```

```
yum -y upgrade
```

```
# Pull changes back to my cache
```

```
rsync -av centos7:/var/cache/yum/x86_64/7/ 7/
```



ALL ABOUT THAT THIN BASE



MIGRATING TO THIN LVM

Power off your VM and get to know fstrim and kpartx

```
[root@t440s ~]# kpartx -a /dev/fedora_t440s/Centos7
```

```
[root@t440s ~]# cd /mnt; mkdir volume
```

```
[root@t440s mnt]# mount /dev/mapper/fedora_t440s-Centos7_BASE1 /mnt/volume/
```

```
[root@t440s mnt]# fstrim -v volume
```

```
boot: 356.5 MiB (373850112 bytes) trimmed
```

```
[root@t440s mnt]# umount volume/
```

```
[root@t440s mnt]# mount /dev/centos7/root /mnt/volume/
```

```
[root@t440s mnt]# fstrim -v ./volume
```

```
./boot: 9.8 GiB (10481520640 bytes) trimmed
```

```
[root@t440s mnt]# umount volume
```

```
[root@t440s mnt]# vgchange -a n centos7
```

```
0 logical volume(s) in volume group "centos7" now active
```

```
[root@t440s mnt]# kpartx -d /dev/mapper/fedora_t440s-Centos7_BASE
```



LVTHIN GOTCHAS

virt-manager and thin



- Can't manage existing thin volumes
- You can manually add the path



LVTHIN GOTCHAS

virt-manager and thin



- Can't manage existing thin volumes
- **Don't** manually add the path
- virsh edit <VM Image>
 - manually enter the pathname

LVM THIN SNAPSHOTS

SNAPSHOTS OF SNAPSHOTS

- Great on Thin on SSD
 - minimal performance overheard
- I can easily create latest RDO or RHEL-OSP off my base
- Make snapshots as your layer things up
- Sensible names
 - Liberty_v1 vs Liberty_neutron_test
- Keep copious notes

THIN SNAPSHOT GOTCHA

Thin no longer auto activates



THIN SNAPSHOT GOTCHA



```
# Thin no longer auto activates
```

```
# This is good
```

```
[root@t440s ~]# lvcreate -s --name Centos7_Liberty \  
fedora_t440s/Centos7_BASE
```

```
Logical volume "Centos7_Liberty" created.
```

```
# Enable the thin volume
```

```
[root@t440s ~]# lvchange -ay -K fedora_t440s/Centos7_Liberty
```



LETS BUILD A CLOUD



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INITIAL CENTOS 7 BASE

use virsh edit to re-point our VM at the new snapshot

start VM

```
systemctl stop NetworkManager
```

```
yum remove NetworkManager\*
```

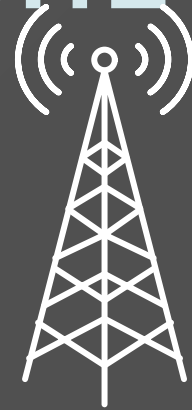
```
systemctl enable network
```



USE OUR CONTENT CACHE

```
# from my host environment
```

```
rsync -av 7/ \  
centos:/var/cache/yum/x86_64/7/
```



RDO



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RDO + PACKSTACK

Simple packstack - <https://www.rdoproject.org/Quickstart>

```
yum -y upgrade
yum install -y \
https://www.rdoproject.org/repos/rdo-release.rpm
yum install -y openstack-packstack
packstack --allinone --cinder-volumes-create=n
```

Uses our existing cinder-volumes as LVM backing for cinder

Rsync post packstack repo back to our host

```
rsync -av centos:/var/cache/yum/x86_64/7/ 7/
```

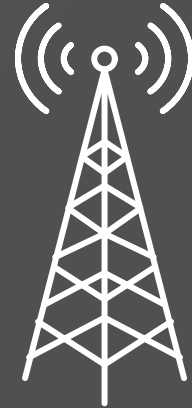
Reboot and have a play



POWER TIP

Keep **digital** notes

- Pen + Paper = a start
- vi / gedit / gnote
- Google Docs / Google Keep
- Trac / Redmine / Wiki
- Document in Mojo





logged in as [steve](#) | [Logout](#) | [Preferences](#) | [Help/Guide](#) | [About Trac](#)

	Wiki	Timeline	Roadmap	Browse Source	View Tickets	New Ticket	Search	Admin
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[← Previous Ticket](#) | [Next Ticket →](#)

Ticket #193 (accepted task)

[Modify](#) ↓

Create Centos 7 base image for demos

Opened [5 weeks](#) ago

Last modified [0 seconds](#) ago

Reported by:	steve	Owned by:	steve
Priority:	minor	Milestone:	FY16Q4
Component:	Centos	Version:	
Keywords:		Cc:	

Description (last modified by [steve](#)) ([diff](#))

Needed for my LCA 2015 session to repeat some RDO and Atomic demos

[Reply](#)

Refs

- [#167](#) Create local lv_thin pool on T440s for Demos
- [#191](#) RHEL7 based [OpenStack](#) demo of RHELOSP8 Liberty
- [#185](#) RHEL7 based [OpenStack](#) demo of RDO Kilo
- [#159](#) RHEL7 based [OpenStack](#) demo of RHOS5
- RHEL7 based [OpenStack](#) demo of RHELOSP7 Kilo

Need to apply the following profile to the VM for nesting

```
<cpu mode='custom' match='exact'>
  <model fallback='allow'>Nehalem</model>
  <vendor>Intel</vendor>
  <feature policy='require' name='vmx' />
```

FIREWALL GOTCHA

Learn firewallld

```
firewall-cmd --permanent --add-service=http
```

```
firewall-cmd --permanent --add-service=https
```

```
firewall-cmd --permanent --add-port=5000/tcp
```



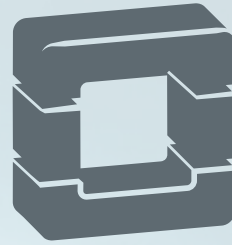
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VS

RDO



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openstack™



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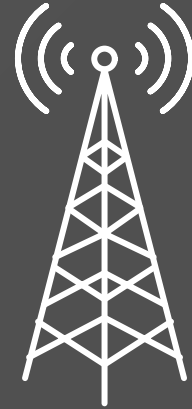
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UBER POWER TIPS

Documentation and Repeatability

- I can blow away my snaps

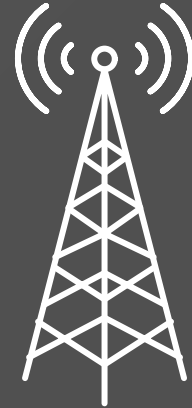


UBER POWER TIPS

Documentation and Repeatability

- I can blow away my snaps

Regularly patch base environment (s)



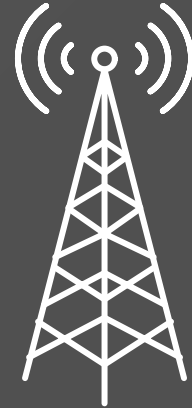
UBER POWER TIPS

Documentation and Repeatability

- I can blow away my snaps

Regularly patch base environment (s)

Re-image my base very quickly



EXPERIMENT

Lets do some neutron hacking.

```
[root@t440s ~]# lvcreate -s --name Centos7_Liberty_Net \  
fedora_t440s/Centos7_Liberty
```

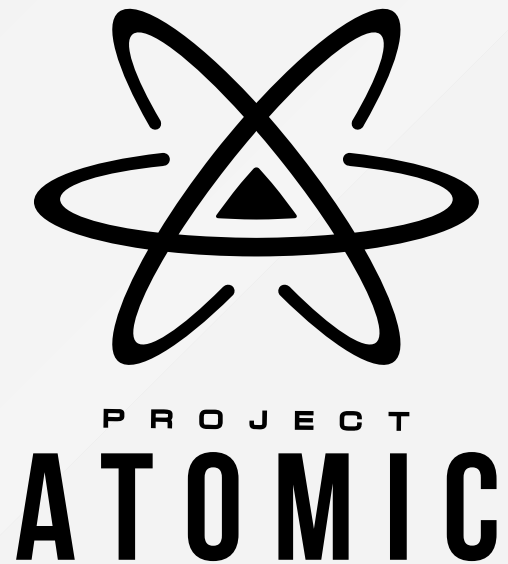
Logical volume "Centos7_Liberty_Net" created.

```
[root@t440s ~]# lvchange -a y -K  
fedora_t440s/Centos7_Liberty_Net
```

Edit VM via virsh edit and restart



LVM VS QCOW



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LEARN CLOUD-INIT

<https://access.redhat.com/articles/rhel-atomic-cloud-init-faq>

Create two data files we can inject via cloud-init

- meta-data
- user-data

EXAMPLE FILES

```
# cat >meta-data<<EOF
```

```
instance-id: Atomic0  
local-hostname: atomic-00  
EOF
```

EXAMPLE FILES

```
# cat >meta-data<<EOF
```

```
instance-id: Atomic0  
local-hostname: atomic-00  
EOF
```

```
# cat >user-data<<EOF
```

```
#cloud-config  
password: atomic  
chpasswd: {expire: False}  
ssh_pwauth: True  
ssh_authorized_keys:  
  - ssh-rsa <my rsa pubkey> steve@host  
EOF
```

CREATE ISO IMAGE

```
genisoimage -output atomic0-cidata.iso \  
-volid cidata -joliet -rock user-data meta-data
```

l: -input-charset not specified, using utf-8 (detected in locale settings)

Total translation table size: 0

Total rockridge attributes bytes: 331

Total directory bytes: 0

Path table size(bytes): 10

Max brk space used 0

183 extents written (0 MB)



QEMU + QCOW2

```
[root@t440s images]# qemu-img create -f qcow2 \  
-o backing_file=../ISO/rhel-atomic-cloud-7.1-1.x86_64.qcow2 \  
atomic-instance-0.qcow2
```

```
Formatting 'atomic-instance-0.qcow2', fmt=qcow2  
size=10737418240 backing_file='../ISO/rhel-atomic-cloud-7.1-  
1.x86_64.qcow2' encryption=off cluster_size=65536  
lazy_refcounts=off
```

QEMU + QCOW2 + LIBVIRT

Use virt-install to create our first atomic host

Note the cloud-init ISO file

```
virt-install --import --name Atomic0 --ram 2048 --vcpus 2 \  
--disk path=/opt/Virtual/images/atomic-instance-  
0.qcow2,format=qcow2,bus=virtio \  
--disk path=/opt/Virtual/images/atomic0-cidata.iso,device=cdrom \  
--network bridge=virbr0 --graphics vnc
```

Lets start a console

```
virsh console Atomic0
```



POWER TIP

You can re-init the disk without re-running virt-install

- cloud-init cdrom will still be attached
- You can also snap your snap.



QCOW2 GOTCHAS

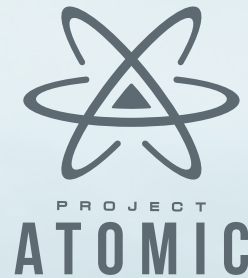
Don't snapshot a running instance



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ATOMIC HOST

fedora^f

 CentOS



DOCKER EXAMPLES

Playing with Docker and Kubernetes on Atomic

- mydbforweb
 - <https://access.redhat.com/articles/1330533>
- webwithdb
 - <https://access.redhat.com/articles/1328953>
- Getting started with Kubernetes
 - <https://access.redhat.com/articles/1198103>





SCRATCH I NEED TO ITCH



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UEFI + KVM

Currently can boot a VM

Need to re-base

- VMs
- Kickstarts
- Then full Secure boot



UEFI READY USB KEY

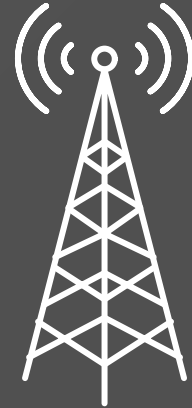
Download RHEL 7.x 64bit ISO or Fedora

```
livecd-iso-to-disk \
```

```
--format --reset-mbr \  
--efi rhel-server-7.1-x86_64-dvd.iso \  
/dev/sdx
```

Boot USB in UEFI mode

- **force** UEFI only in BIOS



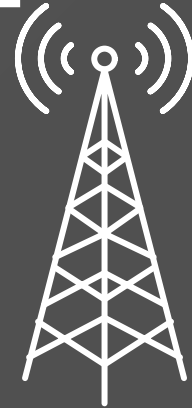
STEVE'S WORLD OF CRAZY

UEFI + BIOS LIVE IMAGE

Live RHEL 7.x image

Can boot on BIOS and UEFI systems

Runs off my SD-CARD and USB3 card reader



RHEL 7.X INSTALL

In UEFI Mode

Leave a little space on the USB Key

- 8MB is sufficient

Boot / test / patch

Note your EFI layout

```
[root@rhel7sd 7Server]# parted /dev/sdd unit s print
```

```
Model: TS-RDF5 SD Transcend (scsi)
```

```
Disk /dev/sdb: 30539776s
```

```
Sector size (logical/physical): 512B/512B
```

```
Partition Table: gpt
```

```
Disk Flags:
```

Number	Start	End	Size	File system	Name	Flags
1	2048s	411647s	409600s	fat16	EFI System Partition	boot
2	411648s	1435647s	1024000s	xfs		
3	1435648s	28706815s	27271168s			



BIOS ENABLE

Legacy BIOS needs a couple of tweaks

- Additional bios_grub partition

```
# parted -a optimal /dev/sdd
```

```
(parted) unit s
```

```
(parted) mkpart non-fs 28706816s 28710911s
```

```
(parted) print
```

```
Model: TS-RDF5 SD Transcend (scsi)
```

```
Disk /dev/sdd: 30539776s
```

```
Sector size (logical/physical): 512B/512B
```

```
Partition Table: gpt
```

```
Disk Flags:
```

Number	Start	End	Size	File system	Name	Flags
1	2048s	411647s	409600s	fat16	EFI System Partition	boot, esp
2	411648s	1435647s	1024000s	xf		msftdata
3	1435648s	28706815s	27271168s			lvm
4	28706816s	28710911s	4096s		non-fs	

```
(parted) set 4 bios_grub on
```



INSTALL GRUB2

We'll only have grub2-efi installed

```
yum install grub2
```

Power off and force BIOS to boot **Legacy** only

Then boot from your Installer in rescue mode from USB Key or DVD-ROM



BIOS GRUB2

You **must** have booted in legacy mode to enable traditional grub2

```
chroot /mnt/sysimage
```

```
grub-install --target=i386-pc /dev/sdx
```

```
grub2-mkconfig -o /boot/grub/grub.conf
```

Reboot and test - should survive kernel upgrades

Retest in UEFI mode



NEXT?

TO DO

Re-Work all demos as UEFI ready kickstarts

kickstart the creation of my BIOS/UFI live image

- Add encryption support?

Fully script Kubernetes on Atomic via cloud-init + Ansible

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Development Preview



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QUESTIONS?

THANK YOU

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