

Hybrid Backup

The snapshot is dead, long live the snapshot!

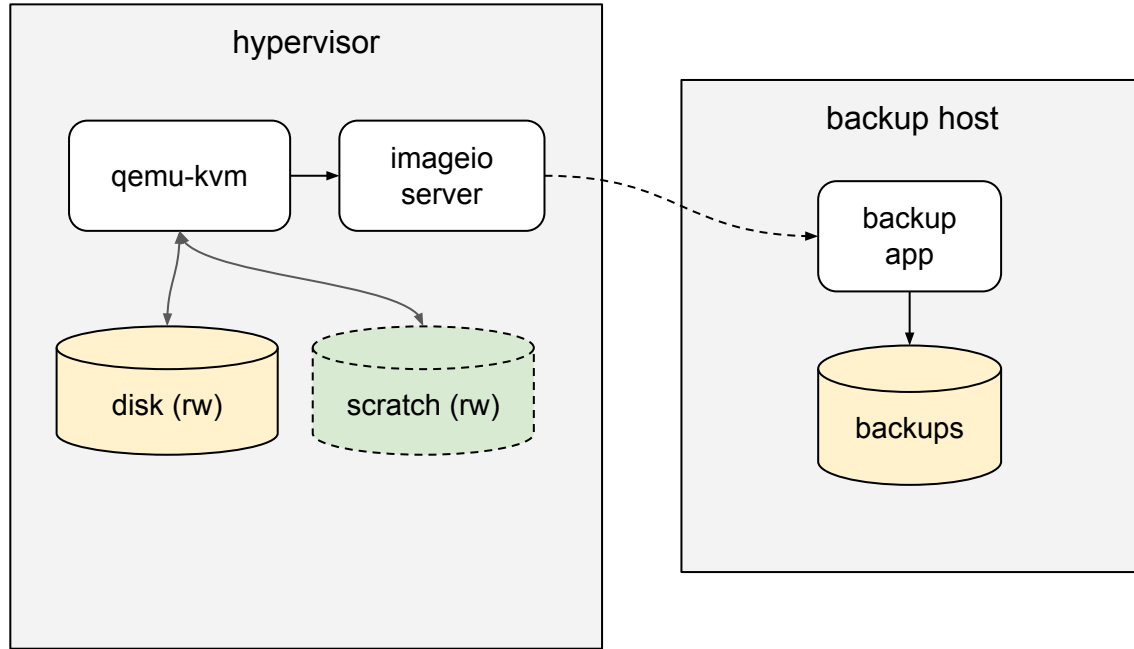
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RHV Demo, March 2022

Why?

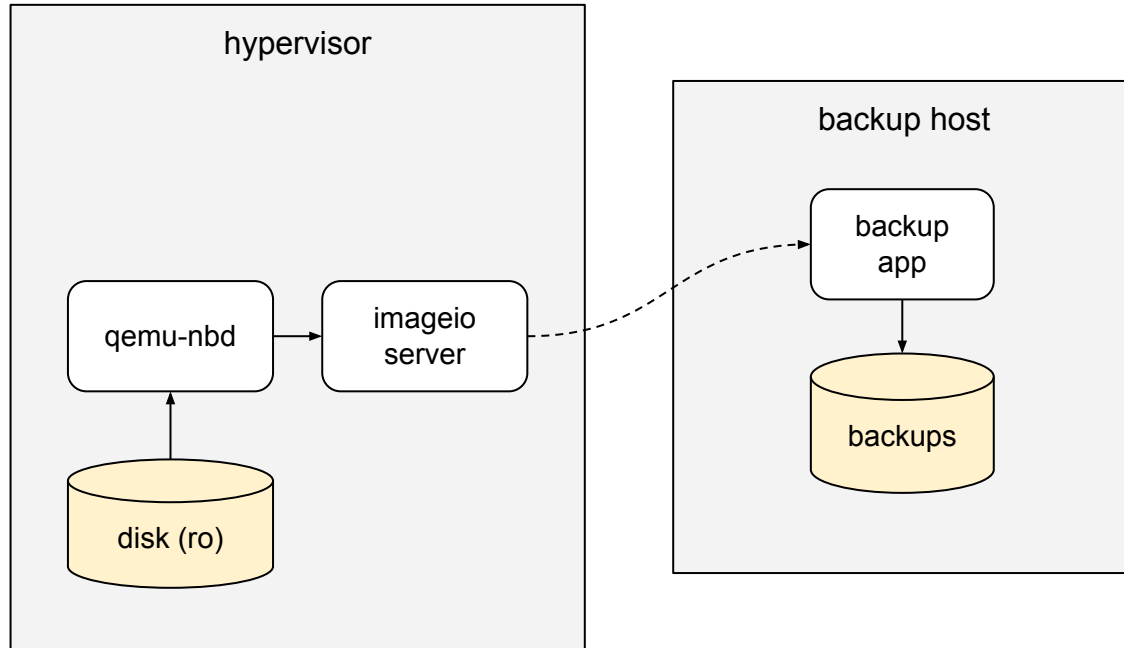
Live backup



Live backup problems

- ✗ Can start only when VM is running
- ✗ Cannot power down the VM during backup
- ✗ Cannot migrate a VM during backup
- ✗ If VM is stopped via API (force), backup is aborted
- ✗ If VM is powered down within the guest, backup is aborted
- ✗ If the scratch disk becomes full, VM pauses
- ✗ Backup I/O degrades guest I/O
- ✗ Guest I/O degrades backup I/O
- ✗ Complex flow on engine

Cold backup



Cold backup problems

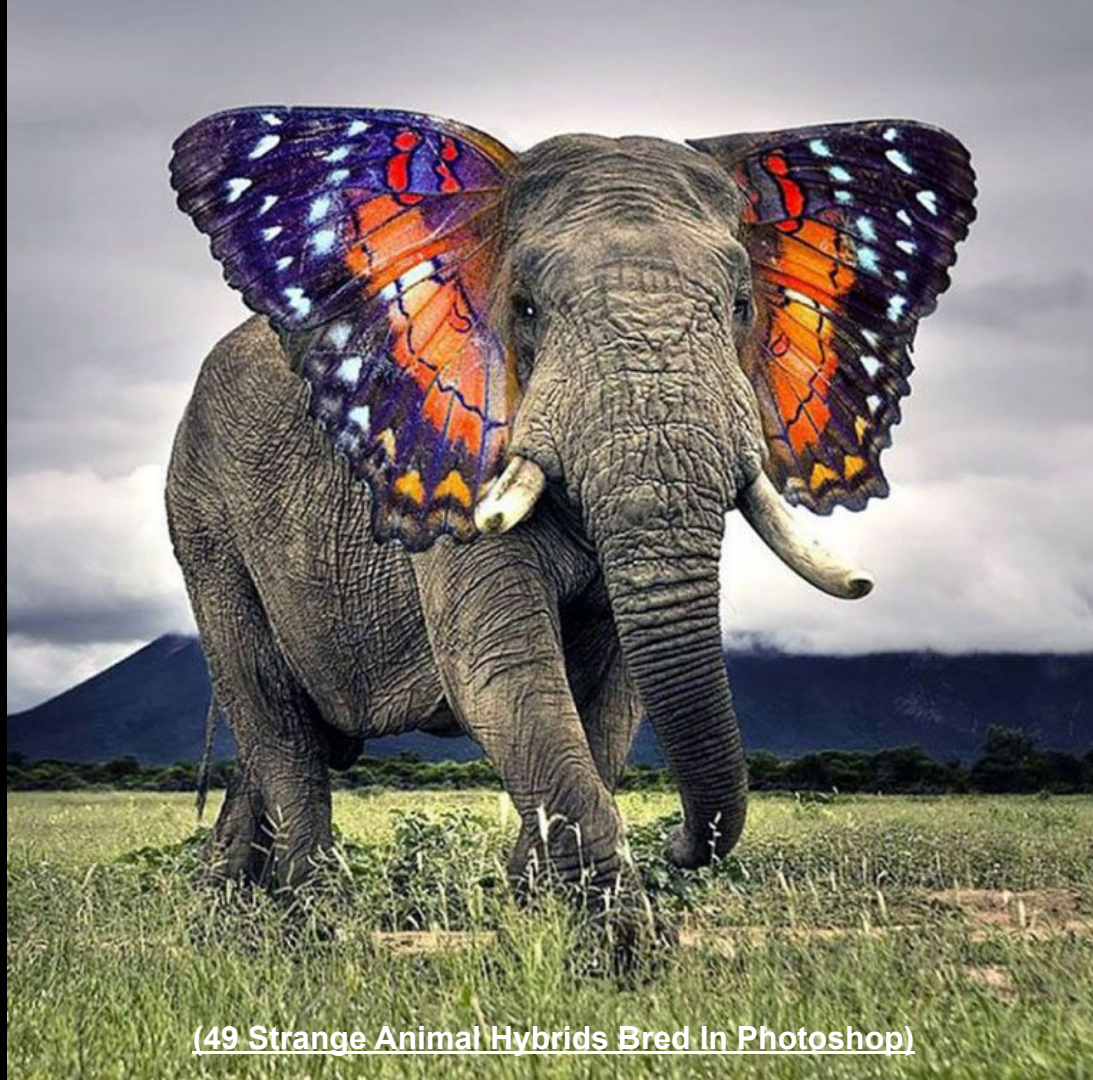
- ✗ Can start only when the VM is down
- ✗ Cannot power up the VM during the backup

What if we could...

- Start and stop a VM during backup
- Start a backup in any VM state
- Migrate a VM during backup
- Take a snapshot during a backup
- Backup on one host, run the VM on another
- Have only one kind of backup

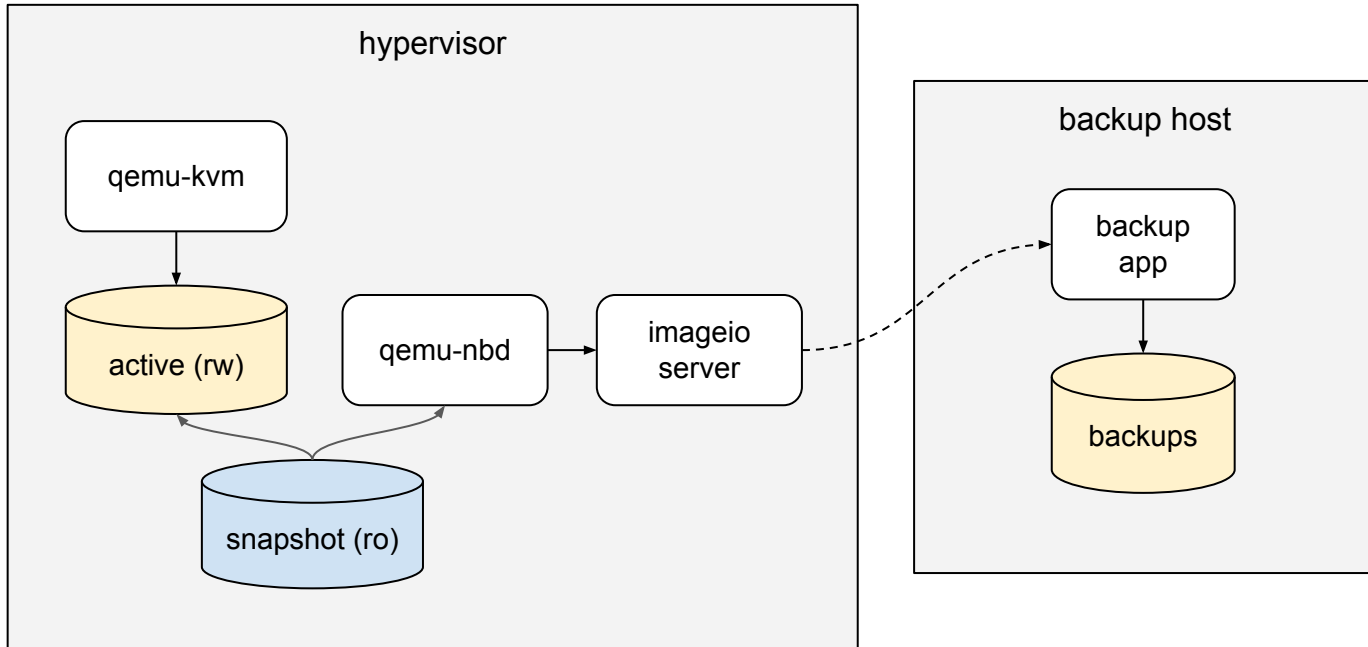
**Can we decouple backup
from VM life cycle?**

Backup a snapshot!

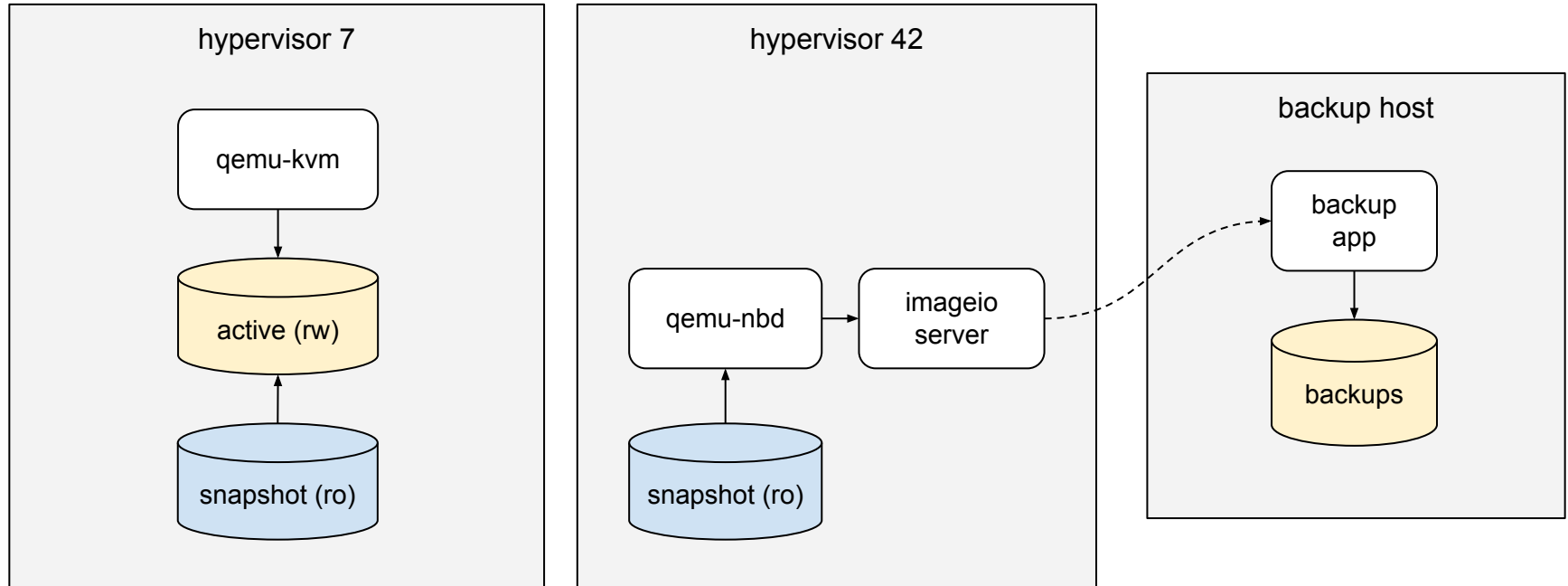


(49 Strange Animal Hybrids Bred In Photoshop)

Hybrid backup (same host)



Hybrid backup (multiple hosts)



Hybrid backup pros and cons

- ✓ Can start, stop, migrate, snapshot a VM during backup
- ✓ Can start backup in any VM state
- ✓ Have only one kind of backup
- ✓ Backup I/O does not affect guest I/O
- ✓ Guest I/O does not affect backup I/O
- ✓ No scratch disks, no pauses
- ✓ Simpler flow on engine side
- ✓ Does not interfere with user snapshots like the old snapshot based backup
- ✗ Need to create and delete a snapshot

Disabling hybrid backup globally

Hybrid backup is enabled by default in oVirt 4.5. To disable it globally:

```
# engine-config -s UseHybridBackup=false  
# systemctl restart ovirt-engine
```

Disabling hybrid backup for a single backup

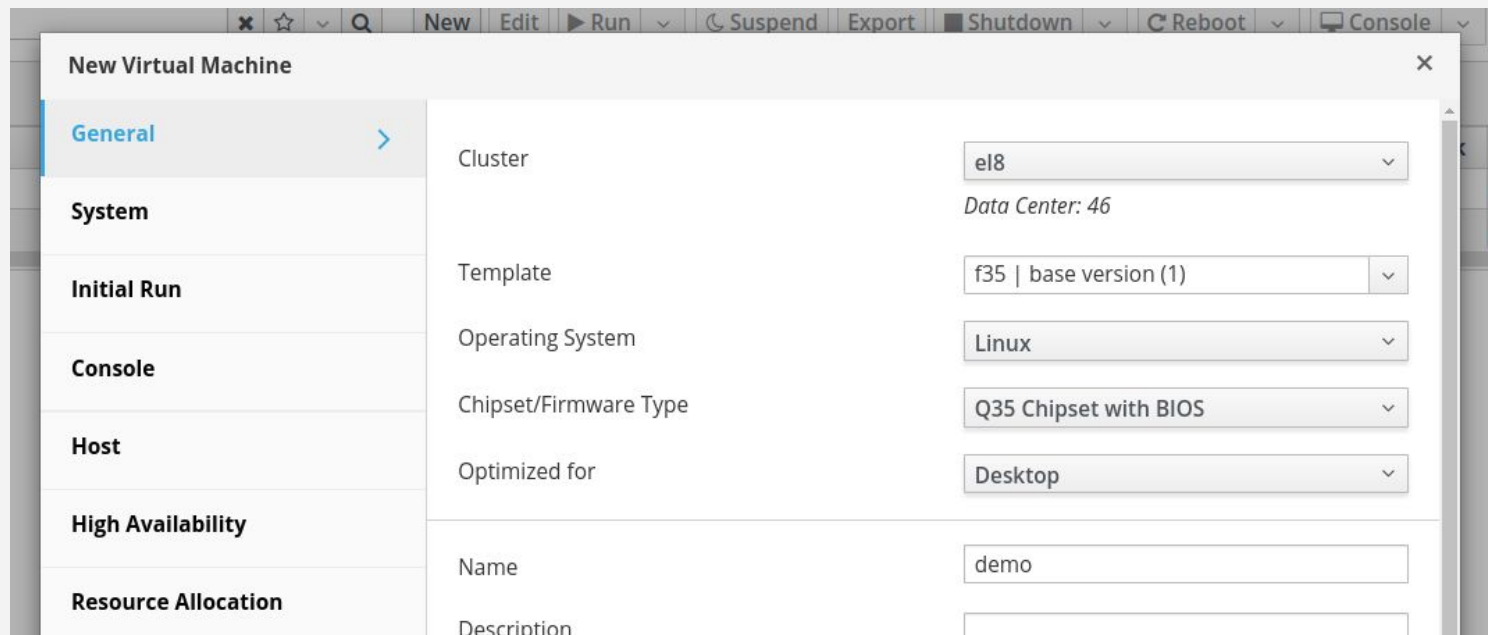
To disable hybrid backup for single backup use the new `use_active` option:

```
backup = backups_service.add(
    types.Backup(
        disks=disks,
        from_checkpoint_id="d377519f-c0e8-48ea-8731-92db4ab83fba",
    ),
    use_active=True,
)
```

Hybrid Demo

1. Create a new VM

Status: Down



The screenshot shows a 'New Virtual Machine' dialog box with a sidebar on the left and a main configuration area on the right. The sidebar contains the following categories: General (selected), System, Initial Run, Console, Host, High Availability, and Resource Allocation. The main area is divided into two sections. The top section contains several dropdown menus: Cluster (e18), Template (f35 | base version (1)), Operating System (Linux), Chipset/Firmware Type (Q35 Chipset with BIOS), and Optimized for (Desktop). Below the 'Data Center: 46' label, there is a 'Name' field containing 'demo' and a 'Description' field which is currently empty. The background shows a toolbar with buttons for New, Edit, Run, Suspend, Export, Shutdown, Reboot, and Console.

Category	Value
Cluster	e18
Template	f35 base version (1)
Operating System	Linux
Chipset/Firmware Type	Q35 Chipset with BIOS
Optimized for	Desktop
Name	demo
Description	

2. Start full backup

```
$ ./backup_vm.py -c engine start e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c
```


```
[ 0.0 ] Starting full backup for VM 'e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c'
```

```
[ 0.5 ] Waiting until backup '46d3be69-1ef3-4da2-974d-90bc5d58c42b' is ready
```


```
[ 11.6 ] Created checkpoint 'a8deec5a-f08c-4cc3-af21-78d2917278c6'
```


```
[ 11.7 ] Backup '46d3be69-1ef3-4da2-974d-90bc5d58c42b' is ready
```

3. Auto-generated snapshot created

Compute > Virtual Machines > demo 

General Network Interfaces Disks Snapshots Appli

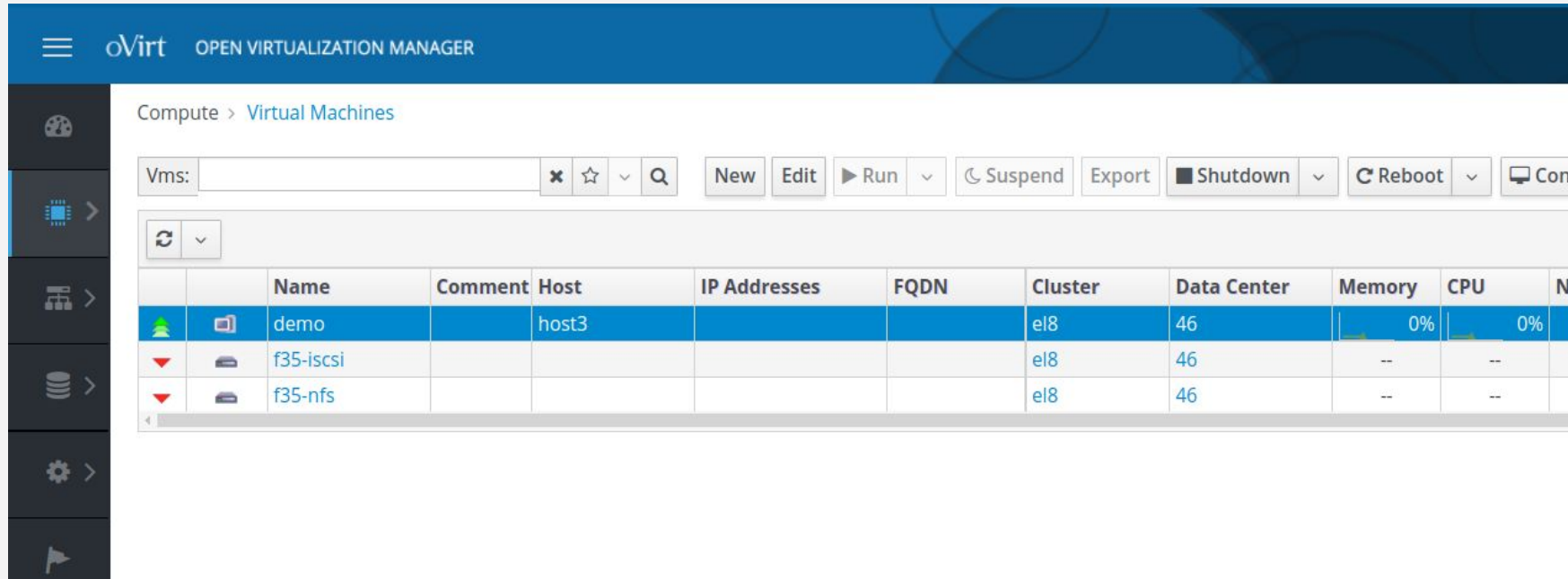
 Active VM

 Auto-generated for Backup VM




Date	Mar 2, 2022, 11:02:14 AM
Status	LOCKED
Memory	false
Description	Auto-generated for Backup VM
Defined Memory	1024 MB
Physical Memory Guaran...	1024 MB
Number of CPU Cores	1 (1:1:1)

4. Start the VM

Status: Powering Up



The screenshot displays the oVirt Open Virtualization Manager interface. The top navigation bar includes the oVirt logo and the text "OPEN VIRTUALIZATION MANAGER". Below this, the breadcrumb "Compute > Virtual Machines" is visible. A search bar labeled "Vms:" is followed by several action buttons: "New", "Edit", "Run" (with a play icon), "Suspend" (with a moon icon), "Export", "Shutdown" (with a square icon), "Reboot" (with a circular arrow icon), and "Connect" (with a monitor icon). A refresh button is also present. The main content area features a table with the following columns: Name, Comment, Host, IP Addresses, FQDN, Cluster, Data Center, Memory, and CPU. The table lists three virtual machines: "demo" (status: Powering Up), "f35-iscsi" (status: Stopped), and "f35-nfs" (status: Stopped). The "demo" VM is highlighted in blue.

	Name	Comment	Host	IP Addresses	FQDN	Cluster	Data Center	Memory	CPU	N
	demo		host3			el8	46	0%	0%	
	f35-iscsi					el8	46	--	--	
	f35-nfs					el8	46	--	--	

5. Start downloading full backup...

```
$ ./backup_vm.py -c engine download e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c \  
  --backup-dir /data/scratch/backups \  
  --backup-uuid 46d3be69-1ef3-4da2-974d-90bc5d58c42b  
  
[ 0.0 ] Downloading VM 'e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c' disks  
  
[ 0.1 ] Downloading full backup for disk  
'56a62431-624d-4309-af8b-b9b2407dbce5'  
  
[ 2.0 ] Image transfer '0eae849f-7451-451a-9727-d8b2d0ac7834' is ready  
  
...
```

6. Migrate VM during backup

Status: Migrating From

Migrate VM(s) ✕

Select a host to migrate 1 virtual machine(s) to:

Destination host ⓘ

Migrate all VMs in positive enforcing affinity with selected VMs. ⓘ

Virtual machines demo

7. Download backup finished

...

```
[ 100.00% ] 6.00 GiB, 3.38 seconds, 1.77 GiB/s
```

```
[ 5.3 ] Finalizing image transfer
```

```
[ 8.4 ] Download completed successfully
```

```
[ 8.4 ] Finished downloading disks
```

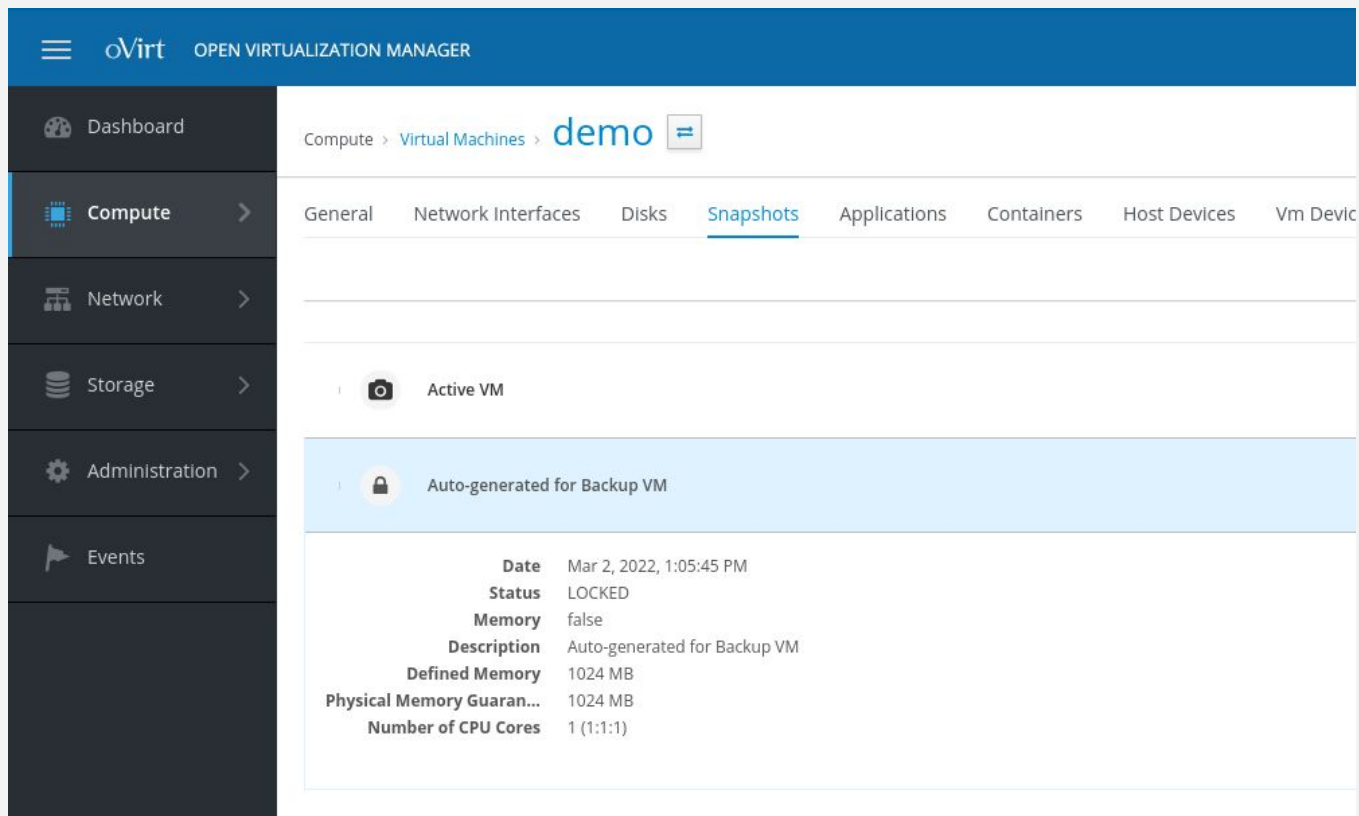
8. Stop the backup

```
$ ./backup_vm.py -c engine stop e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c \  
46d3be69-1ef3-4da2-974d-90bc5d58c42b
```

```
[ 0.0 ] Finalizing backup '46d3be69-1ef3-4da2-974d-90bc5d58c42b'
```

```
[ 7.3 ] Backup '46d3be69-1ef3-4da2-974d-90bc5d58c42b' completed successfully
```

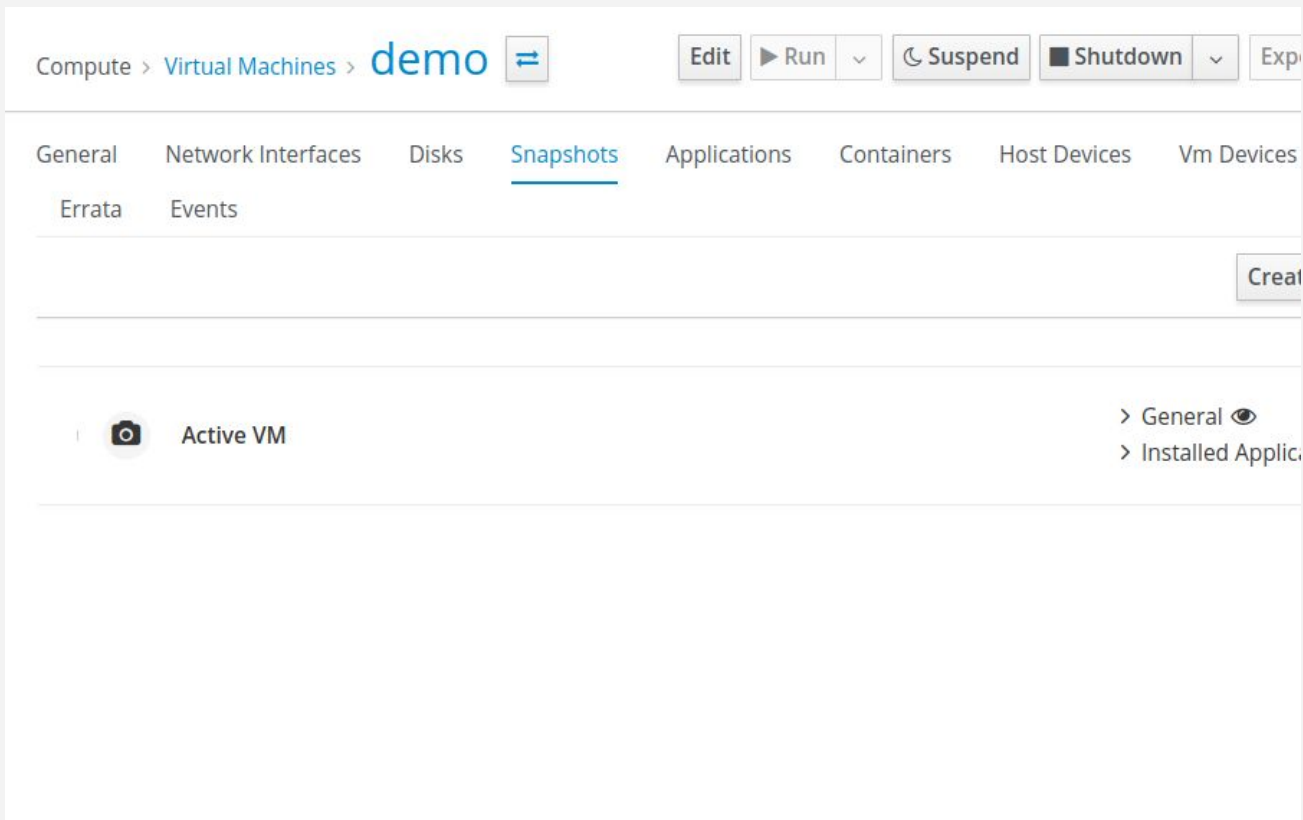

9. Auto-generated snapshot deletion started...



The screenshot displays the oVirt Open Virtualization Manager interface. The top navigation bar includes the oVirt logo and the text "OPEN VIRTUALIZATION MANAGER". A left sidebar contains navigation options: Dashboard, Compute (selected), Network, Storage, Administration, and Events. The main content area shows the breadcrumb "Compute > Virtual Machines > demo" and a tabbed interface with "Snapshots" selected. Under the "Snapshots" tab, there are two entries: "Active VM" and "Auto-generated for Backup VM". The "Auto-generated for Backup VM" entry is highlighted in light blue and has a lock icon. Below this entry, a table lists the snapshot's properties:

Date	Mar 2, 2022, 1:05:45 PM
Status	LOCKED
Memory	false
Description	Auto-generated for Backup VM
Defined Memory	1024 MB
Physical Memory Guarant...	1024 MB
Number of CPU Cores	1 (1:1:1)

10. Auto-generated snapshot deleted



The screenshot displays the VMware vSphere interface for a virtual machine named "demo". The breadcrumb navigation shows "Compute > Virtual Machines > demo". The top toolbar includes buttons for "Edit", "Run", "Suspend", "Shutdown", and "Export". The "Snapshots" tab is selected and underlined in the navigation menu, which also includes "General", "Network Interfaces", "Disks", "Applications", "Containers", "Host Devices", "Vm Devices", "Errata", and "Events". A "Create" button is visible on the right side of the main content area. Below the navigation, there is a section for the VM's state, showing a camera icon and the text "Active VM". On the right side of this section, there are expandable menus for "General" and "Installed Applic".

11. Start incremental backup

```
$ ./backup_vm.py -c engine start e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c \  
  --from-checkpoint-uuid a8deec5a-f08c-4cc3-af21-78d2917278c6  
  
[ 0.0 ] Starting incremental backup since checkpoint  
        'a8deec5a-f08c-4cc3-af21-78d2917278c6' for VM  
        'e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c'  
  
[ 0.4 ] Waiting until backup '2f27c101-d118-46f9-a82a-735f5a587441' is ready  
  
[ 9.5 ] Created checkpoint 'c73f3985-19ff-45bb-a288-4e9bf265c815'  
  
[ 9.6 ] Backup '2f27c101-d118-46f9-a82a-735f5a587441' is ready
```

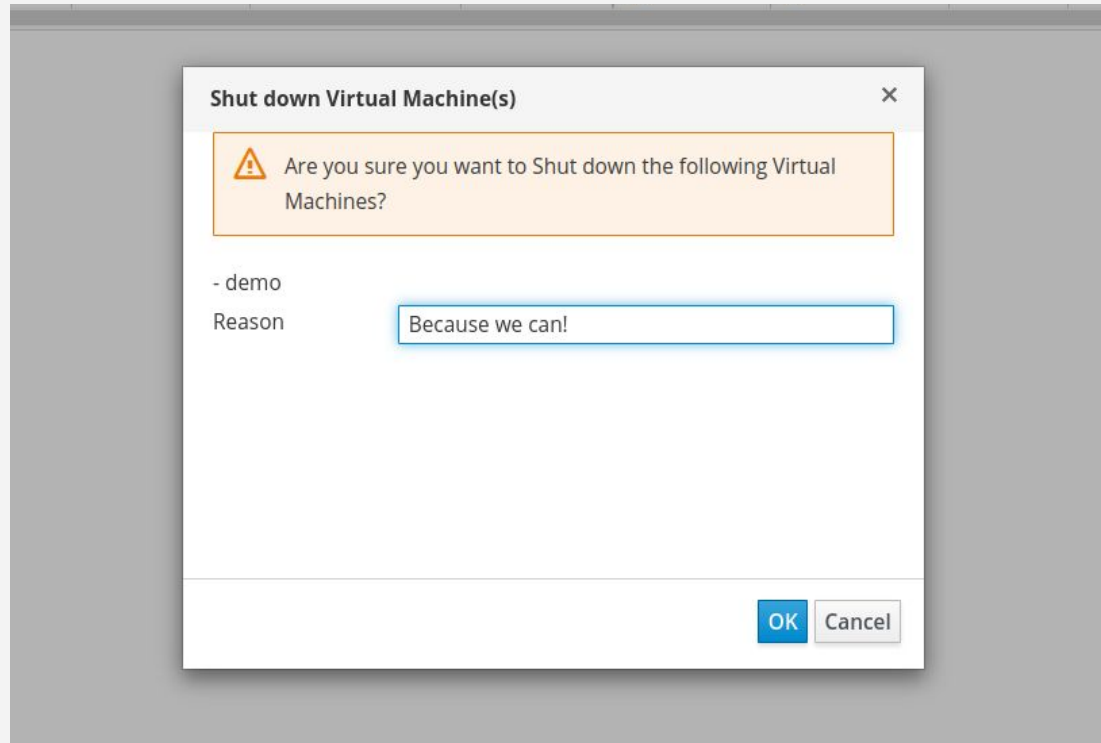
12. Auto-generated snapshot created

The screenshot displays the oVirt Open Virtualization Manager interface. The top navigation bar includes the oVirt logo and the text "OPEN VIRTUALIZATION MANAGER". A left sidebar contains navigation options: Dashboard, Compute (selected), Network, Storage, Administration, and Events. The main content area shows the breadcrumb "Compute > Virtual Machines > demo" and a tabbed interface with "Snapshots" selected. Under the "Snapshots" tab, two snapshots are listed: "Active VM" (with a camera icon) and "Auto-generated for Backup VM" (with a lock icon). The "Auto-generated for Backup VM" snapshot is highlighted in light blue and has the following details:

Date	Mar 2, 2022, 1:05:45 PM
Status	LOCKED
Memory	false
Description	Auto-generated for Backup VM
Defined Memory	1024 MB
Physical Memory Guarant...	1024 MB
Number of CPU Cores	1 (1:1:1)

13. Stop the VM

Status: Powering Down

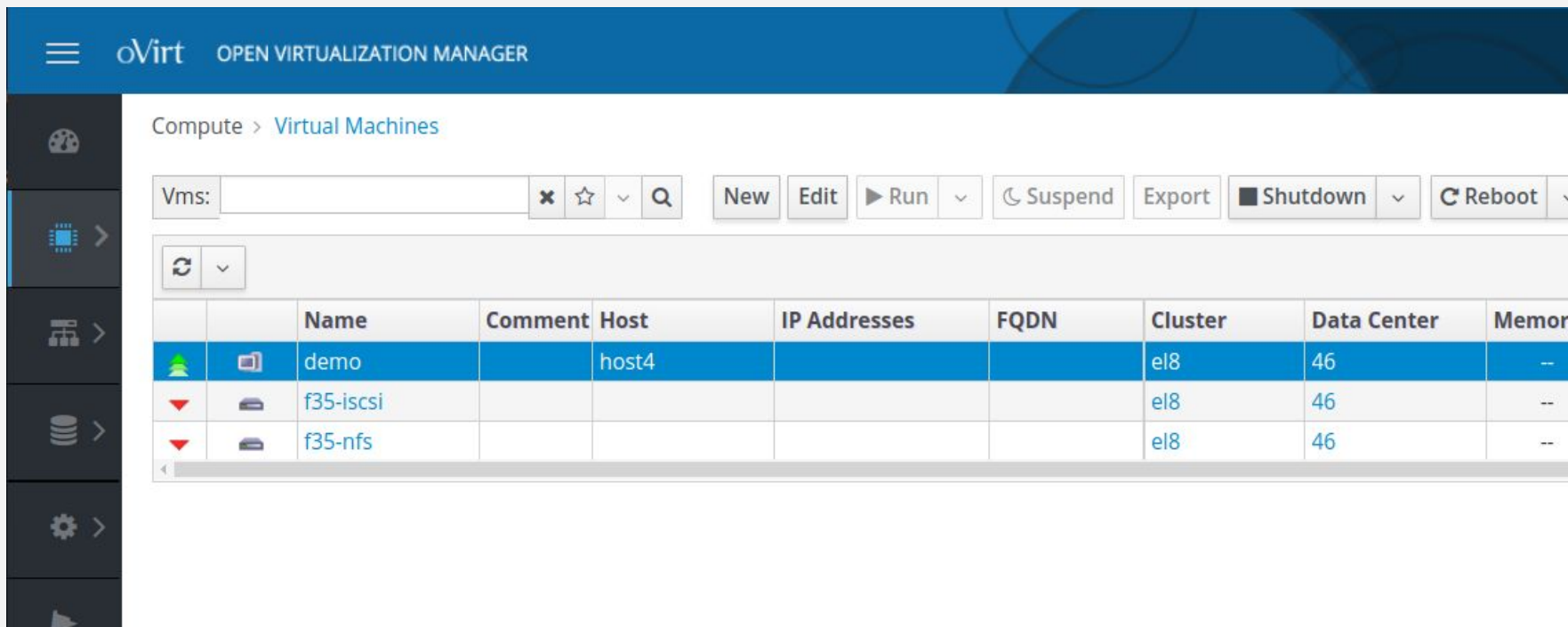


14. Download incremental backup




```
$ ./backup_vm.py -c engine download e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c \  
  --backup-dir /data/scratch/backups \  
  --backup-uuid 2f27c101-d118-46f9-a82a-735f5a587441 \  
  --incremental  
  
[ 0.0 ] Downloading VM 'e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c' disks  
[ 0.1 ] Downloading incremental backup for disk '56a62431-624d-4309-af8b-b9b2407dbce5'  
[ 1.9 ] Image transfer 'b10b448b-0bc2-43be-b683-9c2b91318b31' is ready  
[ 100.00% ] 6.00 GiB, 0.62 seconds, 9.69 GiB/s  
[ 2.5 ] Finalizing image transfer  
[ 4.5 ] Download completed successfully  
[ 4.6 ] Finished downloading disks
```

15. Start the VM

Status: Powering Up



The screenshot shows the oVirt Open Virtualization Manager interface. The top navigation bar includes the oVirt logo and the text "OPEN VIRTUALIZATION MANAGER". Below the navigation bar, the breadcrumb "Compute > Virtual Machines" is visible. A search bar labeled "Vms:" is followed by several action buttons: "New", "Edit", "Run" (with a play icon), "Suspend" (with a refresh icon), "Export", "Shutdown" (with a square icon), and "Reboot" (with a circular arrow icon). Below the buttons is a table of virtual machines. The table has columns for Name, Comment, Host, IP Addresses, FQDN, Cluster, Data Center, and Memory. The first row is highlighted in blue and shows a VM named "demo" on host "host4". The other two rows are "f35-iscsi" and "f35-nfs", both on host "el8".

	Name	Comment	Host	IP Addresses	FQDN	Cluster	Data Center	Memor
	demo		host4			el8	46	--
	f35-iscsi					el8	46	--
	f35-nfs					el8	46	--

16. Stop the backup

```
$ ./backup_vm.py -c engine stop e0bf8ae0-3360-4e0b-9fd8-12cf5fe9839c \  
2f27c101-d118-46f9-a82a-735f5a587441
```

```
[ 0.0 ] Finalizing backup '2f27c101-d118-46f9-a82a-735f5a587441'
```

```
[ 5.2 ] Backup '2f27c101-d118-46f9-a82a-735f5a587441' completed successfully
```


No virtual machines were harmed

More info

- [RFE] Allow changing vm powerstate during backup operation without interrupting the backup
<https://bugzilla.redhat.com/2053669>
- [CBT] [RFE] Extend backup scratch disk as needed
<https://bugzilla.redhat.com/1913387>
- [CBT] Provide a way to control backup mode per request
<https://bugzilla.redhat.com/2071744>