How to create a guest image for trove (ubuntu 14.04)

This tutorial was created using the IceHouse version of OpenStack with a guest image of Ubuntu Trusty Tahr LTS (14.04) x86_64 (2014-08-06) (Cloud Image).

First step is to create an image, I can follow this steps[1], but for this tutorial I have used the OpenStack it self to configure the image, and then uploaded the compacted image to OpenStack.

Pay attention to the prompt in each command:

> user@silibrina-4:$ **# your local machine with python-troveclient installed and credentials loaded.**
> ubuntu@trove-image-creation:~$ **# the virtual machine we are configuring.**
> suporte@compute1:/tmp$ **# the machine hosting the virtual machine.**

- ## Creating trove image inside openstack

Download ubuntu cloud image from ubuntu repositories, the newest build of trusty version is available here[2].

```
user@silibrina-4:$ mkdir /tmp/trove-img && cd /tmp/trove-img
user@silibrina-4:/tmp/trove-img$  wget http://cloud-images.ubuntu.com/trusty/current/trusty-server-cloudimg-amd64-disk1.img
```

- ## Uploading image to glance

```
user@silibrina-4:/tmp/trove-img$ glance image-create --name=ubuntu-trusty-creating-trove --disk-format=raw
--container-format=bare --min-disk=3 --min-ram=512 --progress --is-public=True --file=trusty-server-cloudimg-amd64-disk1.img
--property architecture=x86_64 --property description="Ubuntu - Trusty Tahr - (14.04) -  06-Aug-2014. This image has
mysql-server-5.6 and trove-guestagent (icehouse) installed (CREATING)"
```

The output must be something like:

```
+----------------------------+-------------------------------------------------------------------------------------+
| Property                   |                    Value                                                            |
+----------------------------+-------------------------------------------------------------------------------------+
| Property 'architecture' | x86_64                                                                                 |
| Property 'description'  | Ubuntu - Trusty Tahr - (14.04) -  06-Aug-2014. This image has                          |
|                         | mysql-server-5.6  and trove-guestagent (icehouse) installed                            |
|                         | (CREATING)                                                                             |
| checksum                | 2fc320aa668172b1b2e5d39b172d3377                                                       |
| container_format        | bare                                                                                   |
| created_at              | 2014-08-07T18:02:04                                                                    |
| deleted                 | False                                                                                  |
| deleted_at              | None                                                                                   |
| disk_format             | raw                                                                                    |
| id                      | 7419385d-6a07-4497-85dd-40c7394485de                                                   |
| is_public               | True                                                                                   |
| min_disk                | 3                                                                                      |
| min_ram                 | 512                                                                                    |
| name                    | ubuntu-trusty-creating-trove                                                           |
| owner                   | c460558413694a8e9055b492fedf8f71                                                       |
| protected               | False                                                                                  |
```

size	255263232
status	active
updated_at	2014-08-07T18:02:55
virtual_size	None

Now, create an instance of this image. Try to use a flavor with the minimum ram and disk specified on the image creation, in this case --min-disk=3 (GB) --min-ram=512 (MB).

In our installation we have the perfect flavor created for this that is m1.database.

But, in case you need to create one, here is the command:

```
user@silibrina-4:/tmp/trove-img$ nova flavor-create --ephemeral=0 --swap=1024 --is-public=True m1.database 100 512 3 1
```

The output must be something like:

ID	Name	Memory_MB	Disk	Ephemeral	Swap	VCPUs	RXTX_Factor	Is_Public
100	m1.database	512	3	0	1024	1	1.0	True

Now, create an instance of the image you created with the m1.database flavor:

```
user@silibrina-4:/tmp/trove-img$ nova boot trove-image-creation --image=ubuntu-trusty-creating-trove --flavor=m1.database
--key-name=silibrina-04 --nic net-id=dbfffebc-8db7-46fb-ab05-4924b9f4aff5 --poll
```

The output must be something like:

Property	Value
OS-DCF:diskConfig	MANUAL
OS-EXT-AZ:availability_zone	nova
OS-EXT-SRV-ATTR:host	-
OS-EXT-SRV-ATTR:hypervisor_hostname	-
OS-EXT-SRV-ATTR:instance_name	instance-000000e8
OS-EXT-STS:power_state	0
OS-EXT-STS:task_state	scheduling
OS-EXT-STS:vm_state	building
OS-SRV-USG:launched_at	-
OS-SRV-USG:terminated_at	-
accessIPv4	
accessIPv6	
adminPass	x25jHLAwUBvp
config_drive	
created	2014-08-07T18:33:40Z
flavor	m1.database (100)
hostId	
id	344e0195-391e-40a9-bd11-c6e535a7fd37
image	ubuntu-trusty-creating-trove (7419385d-6a07-4497-85dd-40c7394485de)
key_name	silibrina-04
metadata	{}
name	trove-image-creation

```
| os-extended-volumes:volumes_attached     | []                                                        |
| progress                                 | 0                                                         |
| security_groups                          | default                                                   |
| status                                   | BUILD                                                     |
| tenant_id                                | c460558413694a8e9055b492fedf8f71                          |
| updated                                  | 2014-08-07T18:33:40Z                                      |
| user_id                                  | 2fafca585b6c4a2eab3429bfab81dfaf                          |
+------------------------------------------+-----------------------------------------------------------+
Server building... 100% complete
Finished
```

Now, access the image to start the installation.

- ## Installing trove-guestagent

Fixing /etc/hosts

During the initialization of trove-guestagent service many commands will be executed with root privileges using the sudo command, the problem is that cloud-init does not set an entry on /etc/hosts for the given hostname (this is not necessarily a bug, since cloud-init only executes during creation but the hostname can be changed anytime), and each sudo call tries to resolve the hostname. Since we do not have an entry in our dns for given hostname, we need to update correctly the /etc/hosts by using this simple script:

First, create this file:

```
ubuntu@trove-image-creation:~$ sudo touch /etc/init.d/update-hostname
```

Then open it:

```
ubuntu@trove-image-creation:~$ sudo vim /etc/init.d/update-hostname
```

And add the following content:

```
#!/bin/bash

NEW_HOSTNAME=`hostname`
TMP_HOSTS_FILE=/tmp/hosts.new
HOSTS_FILE=/etc/hosts

sed -e "/127.0.1.1/c\127.0.1.1	$NEW_HOSTNAME" $HOSTS_FILE > $TMP_HOSTS_FILE

if [ -s $TMP_HOSTS_FILE ]; then
	echo "updating /etc/hosts..."
	/bin/cp $HOSTS_FILE $HOSTS_FILE.bak
	/bin/mv $TMP_HOSTS_FILE $HOSTS_FILE
else
	echo "An error occured while updating /etc/hosts"
fi
```

Save it, and set the right permission:

```
ubuntu@trove-image-creation:~$ sudo chown root.root /etc/init.d/update-hostname
ubuntu@trove-image-creation:~$ sudo chmod 755 /etc/init.d/update-hostname
```

And add this line on /etc/hosts:

```
127.0.1.1 trove-image-creation
```

Right after the ***localhost*** definition.
Now, open rc.local

```
ubuntu@trove-image-creation:~$ sudo vim /etc/rc.local
```

And configure it to run the script on initialization, by adding this entry just before “exit 0”:

```
/bin/bash /etc/init.d/update-hostname
```

Updating machine

```
ubuntu@trove-image-creation:~$ sudo apt-get update
ubuntu@trove-image-creation:~$ sudo  apt-get upgrade
```

And restart the machine:

```
ubuntu@trove-image-creation:~$ sudo  reboot
```

After the reboot, login again in the machine.

Installing percona repository

The trove-guestagent will need a percona dependency (innobackupex) that is not on ubuntu default repositories, you need to addit:

```
ubuntu@trove-image-creation:~$ sudo  apt-key adv --keyserver keys.gnupg.net --recv-keys 1C4CBDCDCD2EFD2A
```

Now, create the source.list for this repository:

```
ubuntu@trove-image-creation:~$ sudo touch /etc/apt/sources.list.d/percona.list
```

Open it:

```
ubuntu@trove-image-creation:~$ sudo vim /etc/apt/sources.list.d/percona.list
```

And add this lines:

```
deb http://repo.percona.com/apt trusty main
deb-src http://repo.percona.com/apt trusty main
```

And, update the apt-get list:

```
ubuntu@trove-image-creation:~$ sudo apt-get update
```

More information about this here.

Installing trove-guestagent

Install trove-guestagent and his dependencies:

```
ubuntu@trove-image-creation:~$ sudo apt-get install trove-guestagent percona-xtrabackup mysql-server-5.6
```

During this installation you can provide a mysql password of your choice. By default, I am using the suporte user password.
Now, lets add the trove user to root group:

Configuring trove user

```
ubuntu@trove-image-creation:~$ sudo addgroup trove root
```

And also make him able to execute sudo commands without password:

```
ubuntu@trove-image-creation:~$ sudo visudo
```

And add this to the end of the file:

```
trove ALL = NOPASSWD:ALL
```

Configuring mysql

The users root, trove and ubuntu must be able to access the database from localhost without password:

```
ubuntu@trove-image-creation:~$ mysql -u root -p
```

And give the password you provided during the installation.
Now, give root access from localhost without password:

```
mysql> GRANT ALL PRIVILEGES ON *.* TO root@'localhost' IDENTIFIED BY '';
```

To trove user:

```
mysql> GRANT ALL PRIVILEGES ON *.* TO trove@'localhost' IDENTIFIED BY '';
```

And the ubuntu user (I don't know why ubuntu should be able to do it, but it throws and error without it):

```
mysql> GRANT ALL PRIVILEGES ON *.* TO ubuntu@'localhost' IDENTIFIED BY '';
mysql> FLUSH PRIVILEGES;
```

If it do not work, try this:

```
mysql> SET PASSWORD FOR root@localhost=PASSWORD('');
```

To test it , do:

```
ubuntu@trove-image-creation:~$ mysql -u ubuntu
```

And also for root and trove, and see if it is working.

Configuring trove-guestagent

Now, lets create trove-guestagent configuration files, since this version has a bug that does not create these files by default.

create the file /etc/trove/trove-guestagent.conf with 755 permission and owner trove.trove.

```
ubuntu@trove-image-creation:~$ sudo touch /etc/trove/trove-guestagent.conf
ubuntu@trove-image-creation:~$ sudo chown trove.trove /etc/trove/trove-guestagent.conf
ubuntu@trove-image-creation:~$ sudo chmod 755 /etc/trove/trove-guestagent.conf
```

Open it:

```
ubuntu@trove-image-creation:~$ sudo vim /etc/trove/trove-guestagent.conf
```

The content of this files must be:

```
[DEFAULT]
# Show more verbose log output (sets INFO log level output)
verbose = False

# Show debugging output in logs (sets DEBUG log level output)
debug = False

# Address to bind the API server
bind_host = 0.0.0.0

# Port the bind the API server to
bind_port = 8778

# The RabbitMQ broker address where a single node is used.
# (string value)
rabbit_host=10.0.0.14

# The RabbitMQ broker port where a single node is used.
# (integer value)
rabbit_port=5672

# RabbitMQ HA cluster host:port pairs. (list value)
#rabbit_hosts=$rabbit_host:$rabbit_port

# Connect over SSL for RabbitMQ. (boolean value)
```

```
#rabbit_use_ssl=false

# The RabbitMQ userid. (string value)
rabbit_userid=guest

# The RabbitMQ password. (string value)
rabbit_password=rabb1tdbpa22

# The RabbitMQ virtual host. (string value)
#rabbit_virtual_host=/

# RabbitMQ topic used for OpenStack notifications. (list value)
#rabbit_notification_topic = ['notifications']

# Path to the extensions
api_extensions_path = trove/extensions/routes

# Configuration options for talking to nova via the novaclient.
# These options are for an admin user in your keystone config.
# It proxies the token received from the user to send to nova via this admin users creds,
# basically acting like the client via that proxy token.
nova_proxy_admin_user = admin
nova_proxy_admin_pass = us3radm1npa22
nova_proxy_admin_tenant_name = service
trove_auth_url = http://10.0.0.14:5000/v2.0
swift_url = http://10.0.0.19:8080/v1/AUTH_

# swift_url can be fetched from Keystone. To fetch from Keystone, comment
# out swift_url and optionally uncomment the lines below.

# Region name of this node. Used when searching catalog. Default value is None.
#os_region_name = RegionOne
# Service type to use when searching catalog.
#swift_service_type = object-store

# Datastore management implementations. Format datastore:manager.impl
# datastore_registry_ext = mysql:trove.guestagent.datastore.mysql.manager.Manager,
percona:trove.guestagent.datastore.mysql.manager.Manager

# Root configuration
root_grant = ALL
root_grant_option = True

#root_grant = ALTER ROUTINE, CREATE, ALTER, CREATE ROUTINE, CREATE TEMPORARY TABLES, CREATE VIEW, CREATE USER,
DELETE, DROP, EVENT, EXECUTE, INDEX, INSERT, LOCK TABLES, PROCESS, REFERENCES, SELECT, SHOW DATABASES, SHOW
VIEW, TRIGGER, UPDATE, USAGE
#root_grant_option = False

# used by passlib to generate root password
#default_password_length = 36
```

```
# For communicating with trove-conductor
control_exchange = trove

# ============ Logging information ============================
log_dir = /var/log/trove/
log_file = trove-guestagent.log

# Users to ignore for user create/list/delete operations
ignore_users = os_admin
ignore_dbs = lost+found, mysql, information_schema

# Strategy information for backups
# Additional commandline options to be passed to the backup runner (by strategy). For example:
# backup_runner_options = InnoBackupEx:--no-lock,  MySQLDump:--events --routines --triggers
storage_strategy = SwiftStorage
storage_namespace = trove.guestagent.strategies.storage.swift
backup_swift_container = database_backups
backup_use_gzip_compression = True
backup_use_openssl_encryption = True
backup_aes_cbc_key = "default_aes_cbc_key"
backup_use_snet = False
backup_chunk_size = 65536
backup_segment_max_size = 2147483648
```

There is another bug that makes impossible to start the service, to fix it you need to open the /etc/init/trove-guestagent.conf

And change the command:

```
exec start-stop-daemon --start --chuid trove:trove \
        --chdir /var/lib/trove --name trove-guestagent \
        --exec /usr/bin/trove-guestagent -- --config-file=/etc/trove/trove-guestagent.conf --log-dir=/var/log/trove
--logfile=guestagent.log
```

to

```
exec start-stop-daemon --start --chuid trove:trove \
        --chdir /var/lib/trove --name trove-guestagent \
        --exec /usr/bin/trove-guestagent -- --config-file=/etc/guest_info --config-file=/etc/trove/trove-guestagent.conf
--log-dir=/var/log/trove --logfile=guestagent.log
```

Now, set the right permission on trove log directory:

```
ubuntu@trove-image-creation:~$ sudo chmod 755 /var/log/trove/
```

And the right owner:

```
ubuntu@trove-image-creation:~$ sudo chown trove.trove -R /var/log/trove/
```

Now, let try to start and see what happens:

ubuntu@trove-image-creation:~$ sudo service trove-guestagent start

Lets take a look the the logs:

ubuntu@trove-image-creation:~$ sudo tail /var/log/trove/guestagent.log

If you have done everything correctly up to here you will see something like this and the process probably did not start, please don't panic:

2014-08-07 19:24:25.886 4341 CRITICAL root [-] Manager class not registered for datastore manager None

This is happening because /etc/guest_info does not exists yet, it is created by cloud-init during the creation of a database instance, and this process will execute with success only when trove is creating this instance.

- ## Preparing image

First, we need to get the instance we just created on openstack and upload it to glance. In order to do that we need to discover in which compute node the instance is, you can do it by executing the following command on your machine:

user@silibrina-4:/tmp/trove-img$ nova show trove-image-creation

The output must be something like:

```
+-------------------------------------+--------------------------------------------------------------------------------------+
| Property                            | Value                                                                                |
+-------------------------------------+--------------------------------------------------------------------------------------+
| OS-DCF:diskConfig                   | MANUAL                                                                               |
| OS-EXT-AZ:availability_zone         | nova                                                                                 |
| OS-EXT-SRV-ATTR:host                | compute1                                                                             |
| OS-EXT-SRV-ATTR:hypervisor_hostname | compute1                                                                             |
| OS-EXT-SRV-ATTR:instance_name       | instance-000000e8                                                                    |
| OS-EXT-STS:power_state              | 1                                                                                    |
| OS-EXT-STS:task_state               | -                                                                                    |
| OS-EXT-STS:vm_state                 | active                                                                               |
| OS-SRV-USG:launched_at              | 2014-08-07T18:34:15.000000                                                           |
| OS-SRV-USG:terminated_at            | -                                                                                    |
| accessIPv4                          |                                                                                      |
| accessIPv6                          |                                                                                      |
| config_drive                        |                                                                                      |
| created                             | 2014-08-07T18:33:40Z                                                                 |
| flavor                              | m1.database (100)                                                                    |
| hostId                              | 99ba3536e8f046fbb29867efe722329e05e87379ce0f28879f89fd99                             |
| id                                  | 344e0195-391e-40a9-bd11-c6e535a7fd37                                                 |
| image                               | ubuntu-trusty-creating-trove (7419385d-6a07-4497-85dd-40c7394485de)                  |
| key_name                            | silibrina-04                                                                         |
| metadata                            | {}                                                                                   |
| name                                | trove-image-creation                                                                 |
| os-extended-volumes:volumes_attached | []                                                                                   |
```

```
| progress                          | 0                                         |
| security_groups                   | default                                   |
| silibrina-net network             | 10.11.0.134                               |
| status                            | ACTIVE                                    |
| tenant_id                         | c460558413694a8e9055b492fedf8f71          |
| updated                           | 2014-08-07T18:34:15Z                      |
| user_id                           | 2fafca585b6c4a2eab3429bfab81dfaf          |
+-----------------------------------+-------------------------------------------+
```

Take a look at the attributes OS-EXT-SRV-ATTR:host and id, it says the hostname of the compute node.

Host:

```
| OS-EXT-SRV-ATTR:host              | compute1                                  |
```

Id:

```
| id                                | 344e0195-391e-40a9-bd11-c6e535a7fd37      |
```

Instance name:

```
| OS-EXT-SRV-ATTR:instance_name     | instance-000000e8                         |
```

For this example, the host is **compute1** and the instance id is **344e0195-391e-40a9-bd11-c6e535a7fd37**.
Now, lets shutdown the VM so we can copy the machine:

```
ubuntu@trove-image-creation:~$ sudo shutdown -h now
```

Also stop it at the hypervisor level:

```
user@silibrina-4:/tmp/trove-img$ nova stop trove-image-creation
```

Now, access the host (hypervisor), and copy the machine:
Now you should prepare the image by cleaning some data that is generate on first start that changes instance to instance:

```
suporte@compute1:~$ sudo virt-sysprep -d instance-000000e8
```

- ## Converting, compressing and copying

With the VM stopped, you can copy the disk while converting to qcow2 and compressing it, in order to decrease the spawning time.

```
suporte@compute1:/tmp$ sudo qemu-img convert -p -c -O qcow2
/var/lib/nova/instances/344e0195-391e-40a9-bd11-c6e535a7fd37/disk /tmp/ubuntu-server-14.04-mysql-trove.qcow2
```

And copy it to your machine:

```
user@silibrina-4:/tmp/trove-img$ scp suporte@compute1:/tmp/ubuntu-server-14.04-mysql-trove.qcow2 .
```

- **Upload it to glance**

user@silibrina-4:/tmp/trove-img$ glance image-create --name=ubuntu-server-14.04-mysql-trove --disk-format=qcow2 --container-format=bare --min-disk=3 --min-ram=512 --progress --is-public=True --file=ubuntu-server-14.04-mysql-trove.qcow2 --property architecture=x86_64 --property description="Ubuntu - Trusty Tahr - (14.04) - 06-Aug-2014. This image has mysql-server-5.6 and trove-guestagent (icehouse) installed."

The output must be something like this:

```
+---------------------------+--------------------------------------------------------------------------------------------------+
| Property                  | Value                                                                                            |
+---------------------------+--------------------------------------------------------------------------------------------------+
| Property 'architecture'   | x86_64                                                                                           |
| Property 'description'    | Ubuntu - Trusty Tahr - (14.04) - 06-Aug-2014. This image has mysql-server-5.6                    |
|                           | and trove-guestagent (icehouse) installed.                                                       |
| checksum                  | e3e865b27ced19ae0cf6fd3a4d7668c1                                                                 |
| container_format          | bare                                                                                             |
| created_at                | 2014-08-07T19:57:12                                                                              |
| deleted                   | False                                                                                            |
| deleted_at                | None                                                                                             |
| disk_format               | qcow2                                                                                            |
| id                        | 3372a276-b287-4635-80c6-939f7656d2a5                                                             |
| is_public                 | True                                                                                             |
| min_disk                  | 3                                                                                                |
| min_ram                   | 512                                                                                              |
| name                      | ubuntu-server-14.04-mysql-trove-2                                                                |
| owner                     | c460558413694a8e9055b492fedf8f71                                                                 |
| protected                 | False                                                                                            |
| size                      | 1331167232                                                                                       |
| status                    | active                                                                                           |
| updated_at                | 2014-08-07T20:01:40                                                                              |
| virtual_size              | None                                                                                             |
+---------------------------+--------------------------------------------------------------------------------------------------+
```

- Adding image to trove

Access your trove node, and execute trove-manage adding this new image, remember that you will probably need to update the default trove choice, to do it take a look at the installation manual here[3].

suporte@controller:~$ sudo trove-manage --config-file=/etc/trove/trove.conf datastore_version_update mysql mysql-5.6 mysql 3372a276-b287-4635-80c6-939f7656d2a5 mysql-server-5.6 1

Now, lets test it and create a trove instance:

user@silibrina-4:~/Downloads$ trove create teste-trove-20 100 --size=2 --databases=teste --users teste:teste --datastore_version mysql-5.6 --datastore mysql --nic net-id=dbfffebc-8db7-46fb-ab05-4924b9f4aff5

It will create an instance and a database with name teste-trove-20.

1 - http://docs.openstack.org/image-guide/content/ubuntucompressing ubuntu images for openstack-image.html
2 - http://cloud-images.ubuntu.com/trusty/current/trusty-server-cloudimg-amd64-disk1.img
3 - http://docs.openstack.org/icehouse/install-guide/install/apt/content/trove-install.html
4 - https://pve.proxmox.com/wiki/Shrink_Qcow2_Disk_Files
5 - http://mindref.blogspot.com.br/2011/07/shrink-qcow2.html