

HW-3

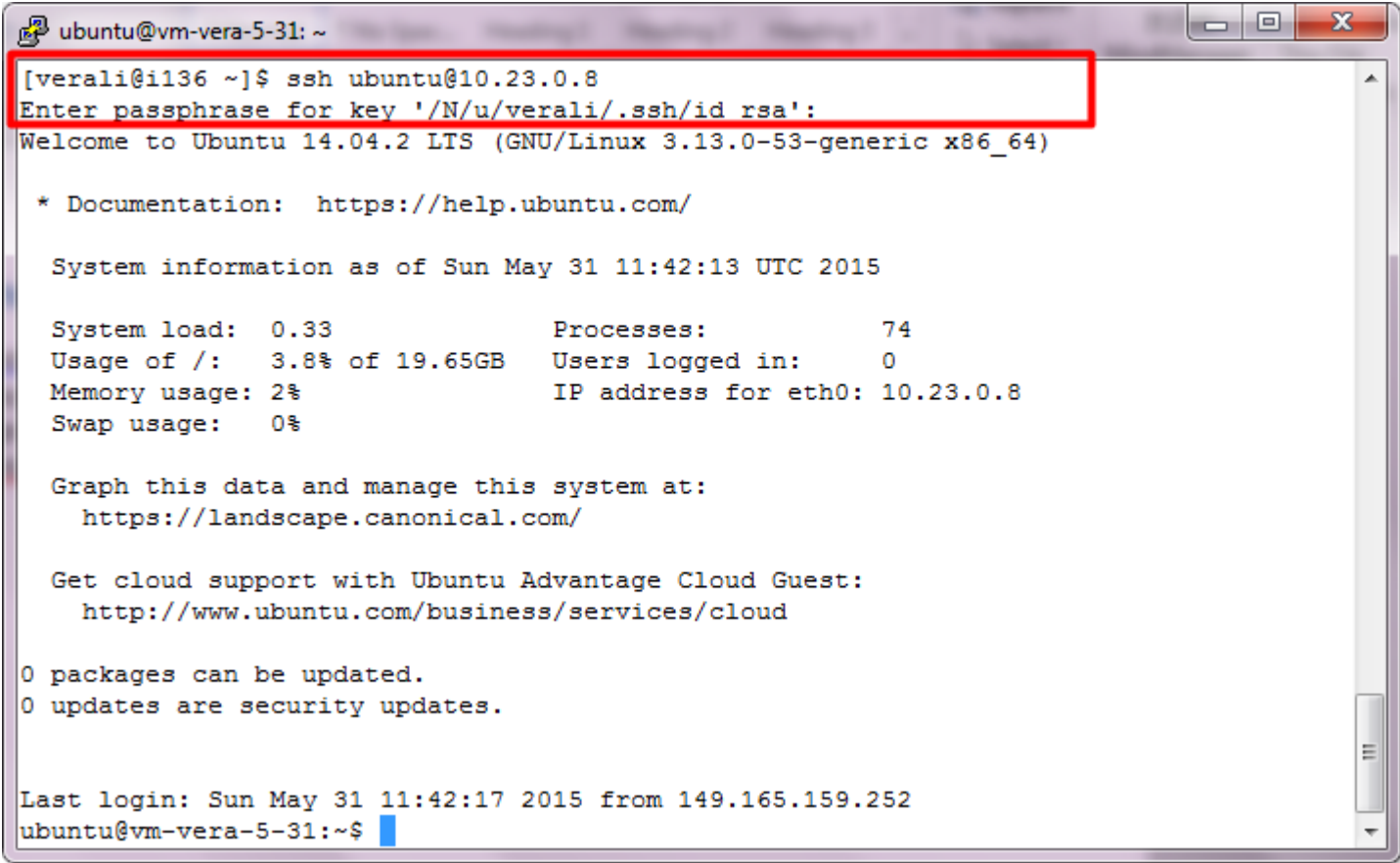
Cloudmesh - Cloud Management Software

Vera Li

Cloudmesh is a cloud resource management software written in Python. It automates launching multiple VM instances across different cloud platforms including Amazon EC2, Microsoft Azure Virtual Machine, HP Cloud, OpenStack, and Eucalyptus. The web interface of Cloudmesh helps users and administrators manage entire cloud resources with the most cutting-edge technologies such as Apache LibCloud, Celery, IPython, Flask, Fabric, Docopt, YAML, MongoDB, and Sphinx. Command Line Tools and Rest APIs are also supported.

Installation on a local machine

1. Logon to Ubuntu vm via putty:



Making sure the key using currently is right and the vm is properly configured:

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State
<input type="checkbox"/>	vm-vera-5-31	futuresystems/ubuntu-14.04	10.23.0.8	m1.small	vera_xuanying_li	Active	nova	None	Running

2. Set up virtual env:
\$ virtualenv ~/ENV
\$ source ~/ENV/bin/activate

```

ubuntu@vm-vera-5-31:~$ export PORTALNAME=verali
ubuntu@vm-vera-5-31:~$ export PROJECTID=fg465
ubuntu@vm-vera-5-31:~$ virtualenv ~/ENV
The program 'virtualenv' is currently not installed. You can install it by typing:
sudo apt-get install python-virtualenv
ubuntu@vm-vera-5-31:~$ ^C
ubuntu@vm-vera-5-31:~$ sudo apt-get install python-virtualenv
sudo: unable to resolve host vm-vera-5-31
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  binutils build-essential cpp cpp-4.8 dpkg-dev fakeroot g++ g++-4.8 gcc
  gcc-4.8 libalgorithm-diff-perl libalgorithm-diff-xs-perl
  libalgorithm-merge-perl libasan0 libatomic1 libc-dev-bin libc6-dev
  libcloog-is14 libdpkg-perl libfakeroot libfile-fcntllock-perl libgcc-4.8-dev
  libgmp10 libgomp1 libisl10 libitm1 libmpc3 libmpfr4 libquadmath0
  libstdc++-4.8-dev libtsan0 linux-libc-dev make manpages-dev python-colorama
  python-distlib python-html5lib python-pip python-setuptools python-wheel
Suggested packages:

```

Installing progress:

```

ubuntu@vm-vera-5-31: ~
Setting up g++-4.8 (4.8.2-19ubuntu1) ...
Setting up g++ (4:4.8.2-1ubuntu6) ...
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Setting up make (3.81-8.2ubuntu3) ...
Setting up libdpkg-perl (1.17.5ubuntu5.4) ...
Setting up dpkg-dev (1.17.5ubuntu5.4) ...
Setting up build-essential (11.6ubuntu6) ...
Setting up libfakeroot:amd64 (1.20-3ubuntu2) ...
Setting up fakeroot (1.20-3ubuntu2) ...
update-alternatives: using /usr/bin/fakeroot-sysv to provide /usr/bin/fakeroot (fakero
oot) in auto mode
Setting up libalgorithm-diff-perl (1.19.02-3) ...
Setting up libalgorithm-diff-xs-perl (0.04-2build4) ...
Setting up libalgorithm-merge-perl (0.08-2) ...
Setting up libfile-fcntllock-perl (0.14-2build1) ...
Setting up manpages-dev (3.54-1ubuntu1) ...
Setting up python-colorama (0.2.5-0.1ubuntu2) ...
Setting up python-distlib (0.1.8-1ubuntu1) ...
Setting up python-html5lib (0.999-3~ubuntu1) ...
Setting up python-setuptools (3.3-1ubuntu1) ...
Setting up python-pip (1.5.4-1ubuntu1) ...
Setting up python-virtualenv (1.11.4-1) ...
Setting up python-wheel (0.24.0-1~ubuntu1) ...
Processing triggers for libc-bin (2.19-0ubuntu6.6) ...
ubuntu@vm-vera-5-31:~$

```

Activate virtualenv:

```
ubuntu@vm-vera-5-31:~$ virtualenv ~/ENV
New python executable in /home/ubuntu/ENV/bin/python
Installing setuptools, pip...done.
ubuntu@vm-vera-5-31:~$ source ~/ENV/bin/activate
(ENV) ubuntu@vm-vera-5-31:~$
```

3. Gitclone cloudmesh git:

```
Setting up git-man (1:1.9.1-1ubuntu0.1) ...
Setting up git (1:1.9.1-1ubuntu0.1) ...
(ENV) ubuntu@vm-vera-5-31:~$ git clone https://github.com/cloudmesh/cloudmesh.git
Cloning into 'cloudmesh'...
remote: Counting objects: 33736, done.
remote: Total 33736 (delta 0), reused 0 (delta 0), pack-reused 33736
Receiving objects: 100% (33736/33736), 19.32 MiB | 12.53 MiB/s, done.
Resolving deltas: 100% (20793/20793), done.
Checking connectivity... done.
(ENV) ubuntu@vm-vera-5-31:~$
```

Check the cloned directory:

```
(ENV) ubuntu@vm-vera-5-31:~$ ls
cloudmesh ENV
(ENV) ubuntu@vm-vera-5-31:~$ cd cloudmesh
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$ ls
bin                deprecated          Makefile           setup.py
CHANGES.txt       docs               MANIFEST.in        sh_commands.txt
cloudmesh          etc                m.py               simple
cloudmesh_admin    fabfile            prod_todo.txt      test-requirements.txt
cloudmesh_cmd3     heat-templates    README.rst         tests
cloudmesh_common   images             requirements-add.txt tobedeleted
cloudmesh_examples incubator          requirements_osx.txt todo
cloudmesh_install  install           requirements.txt    vagrant
cloudmesh_web      ipython           routes.txt         y.py
cmd                LICENSE.txt       setup.cfg
```

Installation on a virtual machine OpenStack

1. First, you have to start a VM on the cloud and assign it a public IP
Instances

Instances											
		Instance Name	vera	Filter	Launch Instance	Soft Reboot Instances	Terminate Instances				
	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
<input type="checkbox"/>	vm-vera-6-1	futuresystems/ubuntu-14.04	10.23.2.175 149.165.158.168	m1.small	verali-key	Active	nova	None	Running	5 days, 17 hours	Create Snapshot

IP: 10.23.2.175

Public IP: 149.165.158.168

2. Logon to india:

```
verali@i136:~  
[verali@i136 ~]$ export PORTALNAME=verali  
[verali@i136 ~]$ export PROJECTID=fg465  
[verali@i136 ~]$ ssh $PORTALNAME@india.futuresystems.org  
Enter passphrase for key '/N/u/verali/.ssh/id_rsa':  
Last login: Sun Jun  7 03:09:14 2015 from 118.187.21.63  
  
Welcome to india.futuresystems.org  
  
=====
```

ANNOUNCEMENT

- * SSH keys must be registered in the portal. Local authorized_keys are disabled.
- * Planned Outage: June 2, 8:00-23:59.
 - All systems will be offline for monthly maintenance. Please plan accordingly.

SUPPORT

If you have a problem, please submit a ticket.
--> <https://portal.futuresystems.org/help>

torque/2.5.5 version 2.5.5 loaded
moab version 5.4.0 loaded
git version 2.2.1 loaded

```
[verali@i136 ~]$ module load openstack  
Python version 2.7.9 loaded  
OpenStack Clients loaded  
[verali@i136 ~]$ source ~/.cloudmesh/clouds/india/juno/openrc.sh  
[verali@i136 ~]$ ls ~/.cloudmesh/clouds/india/juno/  
cacert.pem  fg465  openrc.sh  openrc.sh.2015-05-05-14:30:41  
[verali@i136 ~]$
```

3. import a pre-existing key

```
verali@i136:~  
docopt.pyc          recombine  
docopt_test.py      script.sh  
docopt_t.py         testGit  
ENV                trusty-server-cloudimg-amd64-disk1.img  
fish.txt            tutorial  
fizzbuzz.py         verali  
glance              VeraLi-origin.txt  
hello               VeraLi.txt  
horizon             VeraLiXuanying  
keystone            writing
```

```
[verali@i136 ~]$ nova keypair-add --pub-key ~/.ssh/id_rsa.pub $USER-india-key  
[verali@i136 ~]$
```

4. open necessary ports on VM – check all ports status

```
verali@i136:~  
[verali@i136 ~]$ nova secgroup-add-rule default tcp 5000 5000 0.0.0.0/0  
ERROR (BadRequest): This rule already exists in group 1831a918-e57c-47bc-blab-14  
23605c8d7e (HTTP 400) (Request-ID: req-df26106d-9f7a-433e-b5bb-c500268baf14)  
[verali@i136 ~]$ nova secgroup-list-rules default  
+-----+-----+-----+-----+-----+  
| IP Protocol | From Port | To Port | IP Range | Source Group |  
+-----+-----+-----+-----+-----+  
| tcp         | 5000      | 5000    | 0.0.0.0/0 |               |  
| icmp        | -1        | -1      | 0.0.0.0/0 |               |  
| tcp         | 8888      | 8888    | 0.0.0.0/0 |               |  
| tcp         | 22        | 22      | 0.0.0.0/0 |               |  
+-----+-----+-----+-----+-----+  
[verali@i136 ~]$
```

5. boot a VM and set public IP

```
verali@i136:~  
[verali@i136 ~]$ nova boot --flavor m1.small --image "futuresystems/ubuntu-14.04"  
" --key name $USER-india-key $USER-001  
+-----+-----+  
| Property | Value |  
+-----+-----+  
| OS-DCF:diskConfig | MANUAL |  
| OS-EXT-AZ:availability_zone | nova |  
| OS-EXT-STS:power_state | 0 |  
| OS-EXT-STS:task_state | scheduling |  
| 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 | 7Z9ta39o8vFx |
```

```
| adminPass | 729ta39o8vFx |
| config_drive | |
| created | 2015-06-07T07:28:11Z |
| flavor | m1.small (2) |
| hostId | |
| id | ad9d35fe-afea-4215-b55d-1ade8cae8a2b |
| image | futuresystems/ubuntu-14.04 (85640c92-c83f-475f-94f6-44dcfa8f4966) |
| key_name | verali-india-key |
| metadata | {} |
```

```
[verali@i136 ~]$ nova floating-ip-create ext-net
```

```
+-----+-----+-----+-----+
| Id | IP | Server Id | Fixed IP |
Pool |
+-----+-----+-----+-----+
| flfde3fd-d9f2-49cd-882f-71902ef3c0bc | 149.165.159.7 | - | - |
ext-net |
+-----+-----+-----+-----+
[verali@i136 ~]$
```

```
verali@i136:~
```

```
+-----+
[verali@i136 ~]$ export MYIP=`nova floating-ip-list | grep "| -" | cut -d '|' -f 3 | head -1`
[verali@i136 ~]$ nova add-floating-ip $USER-001 $MYIP
[verali@i136 ~]$ nova show $USER-001
+-----+-----+
| Property | Value |
+-----+-----+
| OS-DCF:diskConfig | MANUAL |
| OS-EXT-AZ:availability_zone | nova |
| OS-EXT-STS:power_state | 1 |
| OS-EXT-STS:task_state | - |
| OS-EXT-STS:vm_state | active |
| OS-SRV-USG:launched_at | 2015-06-07T07:28:18.000000 |
```



```
| created | 2015-06-07T07:28:11Z
| flavor | m1.small (2)
| hostId | 7981377e2f03530ce2f79011c9adeae44effcc8
be34ec8a05566903c
| id | ad9d35fe-afea-4215-b55d-1ade8cae2b
| image | futuresystems/ubuntu-14.04 (85640c92-c8
3f-475f-94f6-44dcfa8f4966)
| int-net network | 10.23.1.138, 149.165.159.7
| key_name | verali-india-key
| metadata | {}
| name | verali-001
| os-extended-volumes:volumes_attached | []
| progress | 0
| security_groups | default
| status | ACTIVE
| tenant_id | 23491bab37e846ad9322a71c4af41b8f
| updated | 2015-06-07T07:28:18Z
| user_id | f6c775a7a12443e5b91530f791af8177
```

```
+-----+
+-----+
```

```
[verali@i136 ~]$
```

```
verali@i136:~$ t-ID: req-447b5e67-6111-4da2-837a-86f0b2ff46c5)
[verali@i136 ~]$ nova list
+-----+-----+-----+-----+-----+
| ID | Name | Status | Task State | Power State | Networks |
+-----+-----+-----+-----+-----+
| ad9d35fe-afea-4215-b55d-1ade8cae2b | verali-001 | ACTIVE | - | Running | int-net=10.23.1.138, 149.165.159.7 |
+-----+-----+-----+-----+-----+

[verali@i136 ~]$ nova keypair-list
+-----+-----+
| Name | Fingerprint |
+-----+-----+
| localname_indiana_edu | 1c:ac:83:0a:3d:d6:e2:a4:ea:b2:cb:a5:62:b8:80:f1 |
| rsa-key-20150529 | 52:55:82:60:70:8d:2b:ad:52:85:ba:e9:c9:11:14:67 |
| verali-india-key | e2:39:75:12:b5:27:78:13:ed:b3:d7:6e:71:e1:fd:3f |
| verali-key | e2:39:75:12:b5:27:78:13:ed:b3:d7:6e:71:e1:fd:3f |
| verali-ubuntu-vm-key | c4:b0:06:f0:00:53:f4:a9:93:4a:ee:b1:82:71:00:f6 |
| vera_xuanying_li | e2:39:75:12:b5:27:78:13:ed:b3:d7:6e:71:e1:fd:3f |
+-----+-----+
```

Check on openstack that instance is running properly:

fg465 ▾

Instances

Instances vera

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created
<input type="checkbox"/>	verali-001	futuresystems/ubuntu-14.04	10.23.1.138 149.165.159.7	m1.small	verali-india-key	Active	nova	None	Running	6 minutes

Displaying 1 item

IP address: 10.23.1.138

Public IP: 149.165.159.7

- 6. Cloudmesh installation
- Login to VM vm-vera-5-31


```
ubuntu@vm-vera-5-31: ~  
[verali@i136 ~]$ ssh ubuntu@10.23.0.8  
Enter passphrase for key '/N/u/verali/.ssh/id_rsa':  
Welcome to Ubuntu 14.04.2 LTS (GNU/Linux 3.13.0-53-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com/  
  
System information as of Sun Jun  7 07:38:21 UTC 2015  
  
System load:  0.07               Processes:            98  
Usage of /:   50.2% of 19.65GB    Users logged in:     0  
Memory usage: 43%               IP address for eth0: 10.23.0.8  
Swap usage:   0%  
  
Graph this data and manage this system at:  
https://landscape.canonical.com/  
  
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
22 packages can be updated.  
4 updates are security updates.  
  
Last login: Sun Jun  7 07:38:22 2015 from 149.165.159.252  
ubuntu@vm-vera-5-31:~$
```

<input type="checkbox"/>	vm-vera-5-31	futuresystems/ubuntu-14.04	10.23.0.8 149.165.158.169	m1.small	vera_xuanying_li	Active	nova
--------------------------	--------------	----------------------------	------------------------------	----------	------------------	--------	------

Install Systems Dependencies: `vm$ curl https://raw.githubusercontent.com/cloudmesh/get/master/cloudmesh/ubuntu/14.04.sh | venv=$HOME/ENV bash`

```
Last login: Sun Jun  7 08:07:03 2015 from 149.165.159.252  
ubuntu@vm-vera-5-31:~$ curl https://raw.githubusercontent.com/cloudmesh/get/master/cloudmesh/ubuntu/14.04.sh | venv=$HOME/ENV bash
```

It takes several minutes to finish the installation, snapshot similar to below:


```
ubuntu@vm-vera-5-31: ~  
copy etc/cloudmesh_server.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_server.yaml  
copy etc/cloudmesh_states.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_states.yaml  
copy etc/me-mesh.yaml -> /home/ubuntu/.cloudmesh/me-mesh.yaml  
copy etc/me-none.yaml -> /home/ubuntu/.cloudmesh/me-none.yaml  
copy etc/cloudmesh_launcher.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_launcher.y  
aml  
copy etc/cloudmesh_disciplines.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_discipl  
ines.yaml  
copy etc/me-fg.yaml -> /home/ubuntu/.cloudmesh/me-fg.yaml  
copy etc/cloudmesh_country.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_country.yam  
l  
copy etc/user_info.yaml -> /home/ubuntu/.cloudmesh/user_info.yaml  
copy etc/me-all.yaml -> /home/ubuntu/.cloudmesh/me-all.yaml  
copy etc/cloudmesh_cluster.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_cluster.yam  
l  
copy etc/cloudmesh_flavor.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_flavor.yaml  
copy etc/cloudmesh.yaml -> /home/ubuntu/.cloudmesh/cloudmesh.yaml  
copy etc/cloudmesh_osdb.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_osdb.yaml  
copy etc/cloudmesh_rack.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_rack.yaml  
copy /home/ubuntu/.cloudmesh/me-none.yaml -> /home/ubuntu/.cloudmesh/me.yaml  
# Created: /home/ubuntu/.cloudmesh/me.yaml  
  
# -----  
ubuntu@vm-vera-5-31:~$
```

Activate the virtualenv created: `vm$ source $HOME/ENV/bin/activate`

```
ubuntu@vm-vera-5-31: ~  
copy etc/cloudmesh_disciplines.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_discipl  
ines.yaml  
copy etc/me-fg.yaml -> /home/ubuntu/.cloudmesh/me-fg.yaml  
copy etc/cloudmesh_country.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_country.yam  
l  
copy etc/user_info.yaml -> /home/ubuntu/.cloudmesh/user_info.yaml  
copy etc/me-all.yaml -> /home/ubuntu/.cloudmesh/me-all.yaml  
copy etc/cloudmesh_cluster.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_cluster.yam  
l  
copy etc/cloudmesh_flavor.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_flavor.yaml  
copy etc/cloudmesh.yaml -> /home/ubuntu/.cloudmesh/cloudmesh.yaml  
copy etc/cloudmesh_osdb.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_osdb.yaml  
copy etc/cloudmesh_rack.yaml -> /home/ubuntu/.cloudmesh/cloudmesh_rack.yaml  
copy /home/ubuntu/.cloudmesh/me-none.yaml -> /home/ubuntu/.cloudmesh/me.yaml  
# Created: /home/ubuntu/.cloudmesh/me.yaml  
  
# -----  
ubuntu@vm-vera-5-31:~$ source $HOME/ENV/bin/activate  
(ENV) ubuntu@vm-vera-5-31:~$
```

7. Cloudmesh Setup: create key to upload to futuresystems

```
ubuntu@vm-vera-5-31: ~  
ubuntu@vm-vera-5-31:~$ source $HOME/ENV/bin/activate  
(ENV)ubuntu@vm-vera-5-31:~$ export PORTALNAME=verali  
(ENV)ubuntu@vm-vera-5-31:~$ ssh-keygen -t rsa -C $PORTALNAME-ubuntu-vm-key  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):  
/home/ubuntu/.ssh/id_rsa already exists.  
Overwrite (y/n)? y  
Enter passphrase (empty for no passphrase):  
Enter same passphrase again:  
Your identification has been saved in /home/ubuntu/.ssh/id_rsa.  
Your public key has been saved in /home/ubuntu/.ssh/id_rsa.pub.  
The key fingerprint is:  
e1:6a:ed:44:5d:12:86:b0:f7:bd:c7:6e:5a:5e:a4:ed verali-ubuntu-vm-key  
The key's randomart image is:  
+--[ RSA 2048 ]-----+  
|      .. .o      |  
|      ... .      |  
|      . o . .      |  
|      o + +      |  
|      S o . .      |  
|      +   o +      |  
|      o o   . = o   |  
|      . o   =.o     |  
|      .   .oo E     |  
+-----+  
(ENV) ubuntu@vm-vera-5-31:~$
```

Then lets add the key to the ssh agent:

```
(ENV)ubuntu@vm-vera-5-31:~$ eval `ssh-agent -s`  
Agent pid 24274  
(ENV)ubuntu@vm-vera-5-31:~$ ssh-add  
Enter passphrase for /home/ubuntu/.ssh/id_rsa:  
Identity added: /home/ubuntu/.ssh/id_rsa (/home/ubuntu/.ssh/id_rsa)  
(ENV)ubuntu@vm-vera-5-31:~$ cat ~/.ssh/id_rsa.pub  
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQCDryBFGPyRjghAHYEe/LVpKXEnSTWihv/fm1LNpic  
kkv9Zf6nbnr97OIUkPILxaffbbD5wYtefsgfGKpN+h6GndfAby5w6xiRwCr8eMauNCM+QdGcZZQE84Ibqq  
COzfu0/12WWWzBMkI3k4ydrQ+DCJ8IhPxAShQBAC2YY32PnGwWbkK5hkmNdrYF1zTbi2r1MQ54t36lg+  
kajVar25XhwU+1xC2Hy9eU1WKTzeZQjHfX5FALSrBSj6/ZjaPy5nwd3M1lS5d0JTvUzaTu3hvt8p+Yu0  
T8xdg31SQcEBzNYrs44gYBgn1NbjZS0gXk7BBZDp6lIf1+eaHKK+oPjeQ9x3 verali-ubuntu-vm-ke  
y  
(ENV) ubuntu@vm-vera-5-31:~$
```

Add the ssh key to futuresystem portal. At this point you should be able to connect to india from this VM

Title ▲	Fingerprint
localname@indiana.edu	1c:ac:83:0a:3d:d6:e2:a4:ea:b2:cb:a5:62:b8:80:f1
rsa-key-20150529	52:55:82:60:70:8d:2b:ad:52:85:ba:e9:c9:11:14:67
verali-ubuntu-vm-key	e1:6a:ed:44:5d:12:86:b0:f7:bd:c7:6e:5a:5e:a4:ed
verali-ubuntu-vm-key	c4:b0:06:f0:00:53:f4:a9:93:4a:ee:b1:82:71:00:f6
vera_xuanying.li@ge.com	a7:2b:58:3b:19:c5:e5:9f:b1:19:90:2a:d4:29:7a:1f
vera_xuanying.li@ge.com	e2:39:75:12:b5:27:78:13:ed:b3:d7:6e:71:e1:fd:3f

Create user:

```
ubuntu@vm-vera-5-31: ~  
(ENV) ubuntu@vm-vera-5-31:~$ cm-iu user fetch  
  
# #####  
# download rcfiles (novarc, eucarc, etc) from IaaS platforms  
# #####  
  
Please enter your portal user id [default: ubuntu]: verali  
fetching from india.futuresystems.org{'dest': '/home/ubuntu/.cloudmesh/clouds/i  
ndia',  
'hostname': 'india.futuresystems.org',  
'source': '.cloudmesh/clouds/india/juno/openrc.sh',  
'userid': 'verali'}  
create directory: /home/ubuntu/.cloudmesh/clouds/india  
  <- scp -o StrictHostKeyChecking=no verali@india.futuresystems.org:.cloudmesh  
/clouds/india/juno/openrc.sh /home/ubuntu/.cloudmesh/clouds/india  
openrc.sh                               100% 209    0.2KB/s   00:00  
  
(ENV) ubuntu@vm-vera-5-31:~$ cm-iu user create  
Reading  -> /home/ubuntu/.cloudmesh/clouds/india/openrc.sh  
Updating  -> /home/ubuntu/.cloudmesh/cloudmesh.yaml  
(ENV) ubuntu@vm-vera-5-31:~$
```

Manually edit the file ~/.cloudmesh/cloudmesh.yaml either with vi as shown below:

```
ubuntu@vm-vera-5-31: ~  
meta:  
  yaml_version: 2.1  
  kind: clouds  
cloudmesh:  
  profile:  
    address: Shanghai China  
    email: vera_xuanying.li@ge.com  
    firstname: VeraXuanying  
    gid:  
    uid:  
    lastname: Li  
    phone: +86-18616375623  
    username: verali  
  active:  
    - india  
  hpc:  
    username: TBD  
  shell:  
    color: True  
  clouds:  
#     alamo:  
#         cm_host: alamo.futuregrid.org  
#         cm_label: alamo  
#         cm_type: ec2  
-- INSERT --  
13,25 Top
```

Configure change:


```
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$ emacs ~/.cloudmesh/cloudmesh.yaml
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$ fab india.configure

modify -> /home/ubuntu/.cloudmesh/cloudmesh_server.yaml
modify -> /home/ubuntu/.cloudmesh/cloudmesh.yaml
Configuration changes have been made successfully
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$
```

In order to start the cloudmesh web server that is accessible to outside, we also need to undertake some changes for the india OpenStack cloud configuration with:

```
ubuntu@vm-vera-5-31: ~/cloudmesh
create directory: /home/ubuntu/.cloudmesh/clouds/india
  <- scp -o StrictHostKeyChecking=no verali@india.futuresystems.org:~/.cloudmesh
/clouds/india/juno/openrc.sh /home/ubuntu/.cloudmesh/clouds/india
openrc.sh                               100% 209    0.2KB/s   00:00

(ENV) ubuntu@vm-vera-5-31:~$ cm-iu user create
Reading -> /home/ubuntu/.cloudmesh/clouds/india/openrc.sh
Updating -> /home/ubuntu/.cloudmesh/cloudmesh.yaml
(ENV) ubuntu@vm-vera-5-31:~$ emacs ~/.cloudmesh/cloudmesh.yaml

[1]+  Stopped                  emacs ~/.cloudmesh/cloudmesh.yaml
(ENV) ubuntu@vm-vera-5-31:~$ nano ~/.cloudmesh/cloudmesh.yaml
(ENV) ubuntu@vm-vera-5-31:~$ ls
cloudmesh ENV
(ENV) ubuntu@vm-vera-5-31:~$ cd ~/cloudmesh
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$ fab india.configure

modify -> /home/ubuntu/.cloudmesh/cloudmesh_server.yaml
modify -> /home/ubuntu/.cloudmesh/cloudmesh.yaml
Configuration changes have been made successfully
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$
```

Create and initialize the cloudmesh database using: *(ENV)vm\$ fab mongo.reset*


```
ubuntu@vm-vera-5-31: ~/cloudmesh
Configuration changes have been made successfully
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$ fab mongo.reset

# #####
# initiating mongo
# #####

# #####
# /home/ubuntu/.cloudmesh/mongodb
# #####

# -----
# /home/ubuntu/.cloudmesh/mongodb
# -----
journal    mongodb.log                mongodb.log.2015-06-01T17-07-28
local.0    mongodb.log.2015-05-31T14-17-54  mongod.lock
local.ns   mongodb.log.2015-06-01T17-03-52

-----
deleting the directory (y/N) ☐
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh
local.0    mongodb.log.2015-05-31T14-17-54  mongod.lock
local.ns   mongodb.log.2015-06-01T17-03-52

-----
deleting the directory (y/N) y

# #####
# /home/ubuntu/.cloudmesh/mongodb
# #####
Cloudmesh Services | 1/50
# #####
# Starting mongod
# #####
ACTION: Starting mongod

NOTE: the preparation of mongo may take a few minutes
      please do not interrupt this program.

      Please be patient!
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh

    "_id" : ObjectId("556b102b0409e5fe3730dc43"),
    "user" : "admin",
    "readOnly" : false,
    "pwd" : "d7c4a9acbbbfcf3b48b36ebdada4b5c2"
}
qsub
{
    "_id" : ObjectId("556b102b0409e5fe3730dc44"),
    "user" : "admin",
    "readOnly" : false,
    "pwd" : "d7c4a9acbbbfcf3b48b36ebdada4b5c2"
}
switched to db admin
{
    "_id" : ObjectId("556b102b0409e5fe3730dc45"),
    "user" : "admin",
    "readOnly" : false,
    "pwd" : "d7c4a9acbbbfcf3b48b36ebdada4b5c2"
}
bye
Cloudmesh Services |#                               | 3/50
```

8. start all services for cloudmesh with: *(ENV)vm\$ fab server.start*

```
ubuntu@vm-vera-5-31: ~/cloudmesh

services: 0
servers: 568

Clusters
=====

Cloudmesh Services |#####| 10/50
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ fab server.start

Cloudmesh Services |#                               | 3/50
# #####
# Starting mongod
# #####
ACTION: Starting mongod

NOTE: the preparation of mongo may take a few minutes
      please do not interrupt this program.

      Please be patient!

Cloudmesh Services |#####| 10/50
```

Enter "enter" when see below and finish service loading process:

```
ubuntu@vm-vera-5-31: ~/cloudmesh
DEBUG - Loading module profile
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module git
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module management
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module cloud
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module mesh
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module mesh_hpc
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module users
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module status
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module metric
CM /cloudmesh-2.3.1-py2.7.egg/cloudmesh/provisioner/provisioner.pyc... site:174:
DEBUG - Loading module pie_chart_fg380
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$
```

9. Then the cloudmesh service should be available via public IP: <http://149.165.158.169:5000>

<input type="checkbox"/>	vm-vera-5-31	futuresystems/ubuntu-14.04	10.23.0.8 149.165.158.169
--------------------------	--------------	----------------------------	------------------------------

Cloudmesh

Federated Management of IaaS and PaaS Services

DEVELOPMENT

Launcher

OVERVIEW

Home

Status

Profile

Admin

CLOUDS C

VMs

Images

Flavors

Register

HPC C

Jobs

Queues Info

Login

Rack Diagram

CLOUD COMPUTING

Introduction

CLOUDMESH

Cloud

View details

HPC

View details

Rain

View details

Monitor

View details

Tests

View details

Inventory

View details

News

FAQ

Links

Logged in as TBD TBD (verall)

Logout

▼ C india

80 VMs

+

1

Project: fg465c

Defaults: Image: futuresystems/ubuntu-14.04 Flavor: m1.small last vm name: verali_1

Show 25 entries Search: vera Show / hide columns

		name	status	addresses	flavor	id	image	user_id
	IP	verali-tutorial-6-1	ACTIVE	10.23.2.183, 149.165.159.26	m1.small	60d8f6a-4a3c-4813-a523-ef5991c57524	futuresystems/ubuntu-14.04	f6c775a7a12443e5b91530f791

Showing 1 to 1 of 1 entries (filtered from 80 total entries) First Previous 1 Next Last

Register

▶ aws	not registered
▶ azure	not registered
▶ devstack	not registered
▶ dreamhost	not registered
▶ hp	not registered
▶ hp_east	not registered
▶ ✓ india	registered active
▶ india_havana	not registered

Cloudmesh Shell for VM Management

Command Line Tools (CLI)
[http://cloudmesh.github.io/introduction to cloud computing/cloudmesh/shell/ vm-shell.html](http://cloudmesh.github.io/introduction%20to%20cloud%20computing/cloudmesh/shell/vm-shell.html)

Initialization

check python status

```
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ python
Python 2.7.6 (default, Mar 22 2014, 22:59:56)
[GCC 4.8.2] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

log into virtual-ENV on VM created earlier

```
ubuntu@vm-vera-5-31:~$ source $HOME/ENV/bin/activate
(ENV)ubuntu@vm-vera-5-31:~$ ls
cloudmesh ENV
(ENV)ubuntu@vm-vera-5-31:~$ cd cloudmesh
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ which cm
/home/ubuntu/ENV/bin/cm
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ cm help
verali

Documented commands (type help <topic>):
=====
EOF      dot2      info      loglevel  py        ssh       verbose
admin    edit      init      man        q         stack     version
banner   exec      inventory metric     quit      status    vm
clear    exp       key       notebook  quota     storm     volume
cloud    flavor   label     nova      rain      timer     web
cluster  graphviz launcher  open      register  usage     yaml
color    group    limits    pause     script    use
debug    help     list      plugins   security_group user
default  image    load      project   setup_yaml var

Ipython Commands
=====
notebook

Gui Commands
=====
web

Ssh Commands
=====
ssh

Cloud Commands
=====
admin    default  init      list      quota     stack     user      project
cloud    flavor   inventory loglevel  rain      status    vm
cluster  group    launcher  metric    register   storm     volume
debug    image    usage     nova      security_group usage     keys
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh
-b                surpress the printing of the banner [default: False]

verali
*** Unknown syntax: -h
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh$ cm
verali

=====
Cloudmesh Shell
=====

cm>
```

Import cloudmesh and `print cloudmesh.shell("help")`

```
>>> import cloudmesh
>>> print cloudmesh.shell("help")
verali

Documented commands (type help <topic>):
=====
EOF      dot2      info      loglevel  py        ssh       verbose
admin    edit      init      man        q         stack     version
banner   exec      inventory metric     quit      status    vm
clear    exp       key       notebook  quota     storm     volume
cloud    flavor   label     nova      rain      timer     web
cluster  graphviz launcher  open      register  usage     yaml
color    group    limits    pause     script    use
debug    help     list      plugins   security_group user
default  image    load      project   setup_yaml var

Ipython Commands
=====
notebook

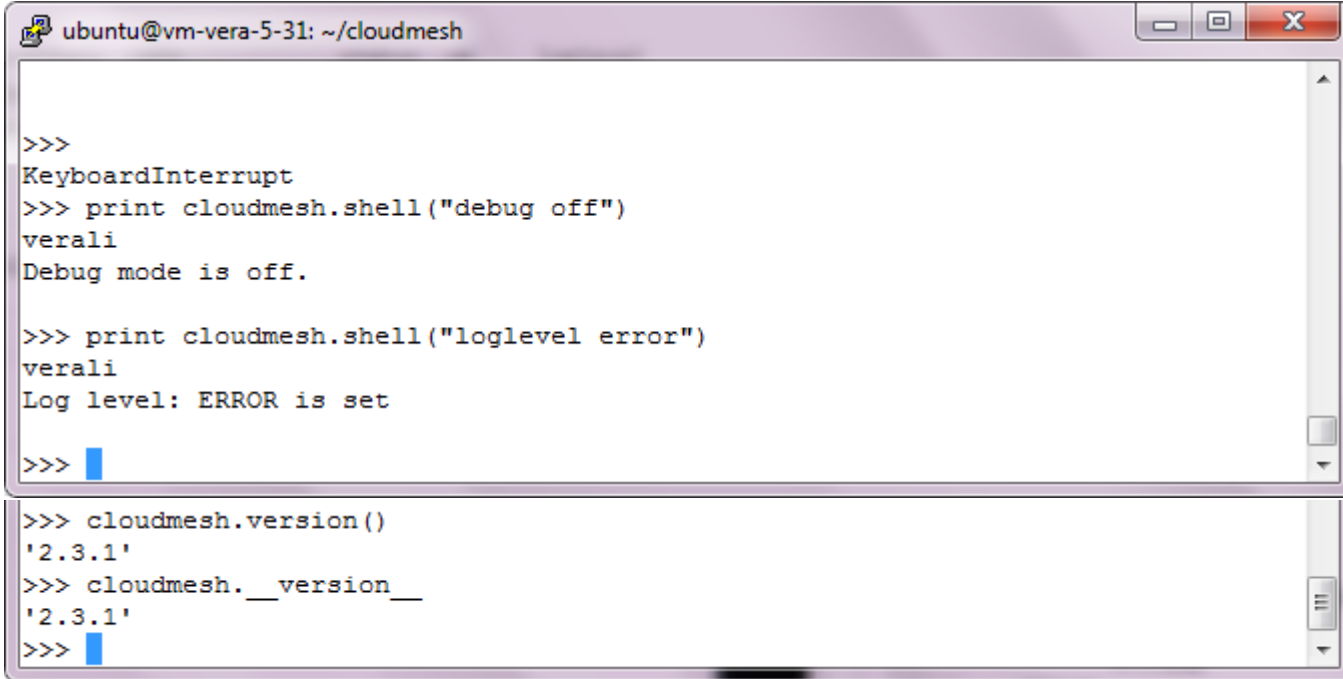
Gui Commands
=====
web

Ssh Commands
=====
ssh

Cloud Commands
=====
admin    default  init      list      quota     stack     user     project
cloud    flavor   inventory loglevel  rain      status    vm
cluster  group    launcher  metric    register  storm     volume
debug    image    usage     nova      security_group usage     keys
```



```
print cloudmesh.shell("debug off")
print cloudmesh.shell("loglevel error")
```



A terminal window titled 'ubuntu@vm-vera-5-31: ~/cloudmesh' showing the execution of several commands. The first command 'print cloudmesh.shell("debug off")' returns 'verali' and 'Debug mode is off.'. The second command 'print cloudmesh.shell("loglevel error")' returns 'verali' and 'Log level: ERROR is set'. The third command 'cloudmesh.version()' returns '2.3.1'. The fourth command 'cloudmesh.__version__' also returns '2.3.1'.

```
ubuntu@vm-vera-5-31: ~/cloudmesh

>>>
KeyboardInterrupt
>>> print cloudmesh.shell("debug off")
verali
Debug mode is off.

>>> print cloudmesh.shell("loglevel error")
verali
Log level: ERROR is set

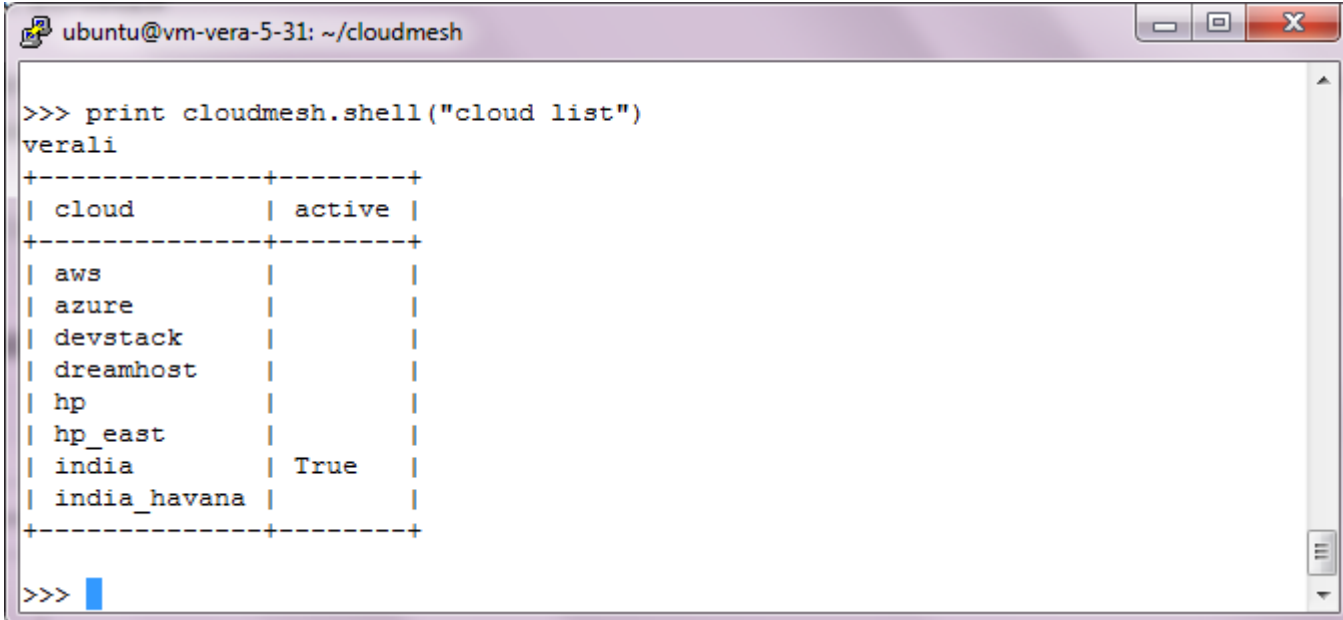
>>>

>>> cloudmesh.version()
'2.3.1'
>>> cloudmesh.__version__
'2.3.1'
>>>
```

Activating Clouds

Let us inspect what is already available by invoking the list command

```
print cloudmesh.shell("cloud list")
```



A terminal window titled 'ubuntu@vm-vera-5-31: ~/cloudmesh' showing the output of the 'print cloudmesh.shell("cloud list")' command. The output is a table listing various cloud providers and their active status.

```
ubuntu@vm-vera-5-31: ~/cloudmesh

>>> print cloudmesh.shell("cloud list")
verali
+-----+-----+
| cloud      | active |
+-----+-----+
| aws        |        |
| azure      |        |
| devstack   |        |
| dreamhost  |        |
| hp         |        |
| hp_east    |        |
| india      | True   |
| india_havana |       |
+-----+-----+

>>>
```

```
print cloudmesh.shell("cloud on india") - activate india cloud:
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh
KeyboardInterrupt
>>> print cloudmesh.shell("cloud on aws")
verali
Traceback (most recent call last):
  File "/home/ubuntu/ENV/local/lib/python2.7/site-packages/cloudmesh-2.3.1-py2.7.egg/cloudmesh/cm_mongo.py", line 297, in get_cloud
    cloud = provider(cloud_name, credentials)
  File "/home/ubuntu/ENV/local/lib/python2.7/site-packages/cloudmesh-2.3.1-py2.7.egg/cloudmesh/iaas/aws/cm_compute.py", line 29, in __init__
    self.load_default(label)
  File "/home/ubuntu/ENV/local/lib/python2.7/site-packages/cloudmesh-2.3.1-py2.7.egg/cloudmesh/iaas/aws/cm_compute.py", line 71, in load_default
    location = self.compute_config.default(label)['location']
KeyError: 'location'

WARNING: failed to activate cloud 'aws'

>>> print cloudmesh.shell("cloud on india")
verali
cloud 'india' activated.
>>>
```

lpython git:

```
ubuntu@vm-vera-5-31: ~/cloudmesh
.
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ git version
git version 1.9.1
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ git clone git@github.com:cloudmesh/introduction_to_cloud_computing.git
Cloning into 'introduction_to_cloud_computing'...
The authenticity of host 'github.com (192.30.252.131)' can't be established.
RSA key fingerprint is 16:27:ac:a5:76:28:2d:36:63:1b:56:4d:eb:df:a6:48.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'github.com,192.30.252.131' (RSA) to the list of known hosts.
Enter passphrase for key '/home/ubuntu/.ssh/id_rsa':
remote: Counting objects: 35065, done.
remote: Compressing objects: 100% (20/20), done.
remote: Total 35065 (delta 6), reused 0 (delta 0), pack-reused 35045
Receiving objects: 100% (35065/35065), 64.83 MiB | 18.88 MiB/s, done.
Resolving deltas: 100% (26642/26642), done.
Checking connectivity... done.
```

Start a VM

how to start a VM on cloud india: `print cloudmesh.shell("vm start --cloud=india --image=futuresystems/ubuntu-14.04 --flavor=m1.small")`

```
ubuntu@vm-vera-5-31: ~/cloudmesh
>>> import cloudmesh
>>> print cloudmesh.shell("vm start --cloud=india --image=futuresystems/ubuntu-14.04 --flavor=m1.small")
verali

# #####
# Starting vm->verali_1 on cloud->india using image->futuresystems/ubuntu-14.04,
# flavor->m1.small, key->verali_ubuntu-key
# #####
{'cloud': 'india',
 'cm_user_id': 'verali',
 'flavor_id': 'u'2'',
 'image_id': 'u'85640c92-c83f-475f-94f6-44dcfa8f4966',
 'key': 'u'verali_ubuntu-key',
 'name': 'u'verali_1',
 u'server': {u'OS-DCF:diskConfig': u'MANUAL',
              u'adminPass': '*****',
              u'id': 'u'dcfc29f7-cca1-4dc1-b97d-f4f378a099fe',
              u'links': [{u'href': u'http://i5r.idp.iu.futuregrid.org/v2/2f841c236fc04e14a24d2655d9726eb5/servers/dcfc29f7-cca1-4dc1-b97d-f4f378a099fe',
                           u'rel': u'self'},
                          {u'href': u'http://i5r.idp.iu.futuregrid.org/2f841c236fc04e14a24d2655d9726eb5/servers/dcfc29f7-cca1-4dc1-b97d-f4f378a099fe',
                           u'rel': u'bookmark'}]},
              u'security_groups': [{u'name': u'default'}]}}

>>>
```

Set a default flavor or a default image

Each cloud must have a default image and a default flavor to launch vm instances in a simple step. The cloud set command provides a way to set default values for an image or a flavor. `print cloudmesh.shell("cloud set flavor india --id=2")` & `print cloudmesh.shell("cloud set image india --name=futuresystems/ubuntu-14.04")`

```
>>> print cloudmesh.shell("cloud set flavor india --id=2")
verali
'm1.small' is selected

>>> print cloudmesh.shell("cloud set image india --name=futuresystems/ubuntu-14.04")
verali
'futuresystems/ubuntu-14.04' is selected

>>>
```

Get all available Flavors or Images

```
ubuntu@vm-vera-5-31: ~/cloudmesh
>>> print cloudmesh.shell("list flavor india --refresh")
verali
+-----+-----+-----+-----+-----+-----+
| id | name          | vcpus | ram  | disk | refresh time |
+-----+-----+-----+-----+-----+-----+
| 1 | m1.tiny       | 1     | 512  | 0    | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 3 | m1.medium    | 2     | 4096 | 40   | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 2 | m1.small     | 1     | 2048 | 20   | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 5 | m1.xlarge    | 8     | 16384 | 160  | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 4 | m1.large     | 4     | 8192 | 80   | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 7 | m1.medium_e60 | 2     | 4096 | 40   | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 6 | m1.small_e30 | 1     | 2048 | 20   | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 9 | m1.xlarge_e200 | 8     | 16384 | 160  | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
| 8 | m1.large_e100 | 4     | 8192 | 80   | 2015-06-07T11-11-25Z |
+-----+-----+-----+-----+-----+-----+
>>>
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh
>>> print cloudmesh.shell("list image india --refresh")
verali
```

name	type_id	iname	location	status	id	updated
memory_mb	fid	vcpus				
/verali/myimages/ubuntu-14.04				ACTIVE	ba3c874b-fc7c-4fe2-a9d3-52905d694d5d	2015-06-01T14:35:51Z
fg464/hadoop-b649	1	m1.medium	snapshot	ACTIVE	186592ce-eed5-4631-bc0c-7022eccd8508	2015-03-28T14:27:59Z
4096	3	2				
futuresystems/ubuntu-12.04				ACTIVE	4bb3194f-8255-4bbb-bdc7-9d261378b4dc	2015-05-30T21:12:29Z
jdelforg/cloudmesh	5	m1.small	snapshot	ACTIVE	90fac3d3-c56a-4d1b-9ad8-0a606497c142	2015-06-04T20:46:05Z
2048	2	1				
VM with Cloudmesh Configured Completely	1	m1.medium	snapshot	ACTIVE	f63a996c-ea69-4a56-830e-c190bca2f828	2015-05-27T02:11:48Z
4096	3	2				
jdelforg/cloudmesh-configured				ACTIVE	a7e9a263-031d-40b5-88db-4	

Refreshing VM status

```
ubuntu@vm-vera-5-31: ~/cloudmesh
>>> print cloudmesh.shell("list vm india --refresh")
verali
+-----+-----+-----+-----+
| name                                     | status | addresses |
| flavor | image |
+=====+=====+=====+
| he-ordpress-ex2-naomi-wordpress_instance-cgi2op67jwni | ACTIVE | 10.23.2.208, 149.165.159.4 |
| m1.small | futuresystems/fedora-21 |
+-----+-----+-----+-----+
| jesaldan-cbp                               | ACTIVE | 10.23.0.218 |
| m1.large | unavailable |
+-----+-----+-----+-----+
| tomglazed-0b1afee8-952f-40c3-937a-cc0feca9c356       | ACTIVE | 10.23.3.23 |
| m1.small | unavailable |
+-----+-----+-----+-----+
| ansible5-Branko-4508827d-d5a7-4e49-b61f-fa6688cbea2a | ACTIVE | 10.23.2.55 |
| m1.medium | unavailable |
+-----+-----+-----+-----+
| ansible6-Branko                               | ACTIVE | 10.23.2.70, 149.165.159.44 |
| m1.medium | unavailable |
+-----+-----+-----+-----+
| verali_1                                       | ACTIVE | 10.23.1.155 |
| m1.small | futuresystems/ubuntu-14.04 |
+-----+-----+-----+-----+
| sjagdale_1                                   | ACTIVE | 10.23.2.9 |
| m1.small | unavailable |
+-----+-----+-----+-----+
| he-erver_group-ij5o5ju2ulz1-kyptdbod7xew-e5t4o13yocb6 | ACTIVE | 10.23.2.207 |
| m1.small | unavailable |
+-----+-----+-----+-----+
| verali_2                                       | ACTIVE | 10.23.1.157 |
| m1.medium | futuresystems/ubuntu-12.04 |
+-----+-----+-----+-----+
```

Starting 3 VMs quickly


```
>>> import uuid;
>>> temp_group_name="ipython-tutorial-" + str(uuid.uuid4().get_hex().upper()[0:6])
>>> print cloudmesh.shell("vm start --cloud=india --count=3 --group={0}".format(temp_group_name))
```

Result:

```
ubuntu@vm-vera-5-31: ~/cloudmesh
flavor->m1.small, key->verali_ubuntu-key
# #####
{'cloud': 'india',
 'cm_user_id': 'verali',
 'flavor_id': 'u'2',
 'image_id': 'u'85640c92-c83f-475f-94f6-44dcfa8f4966',
 'key': 'u'verali_ubuntu-key',
 'name': 'u'verali_3',
 u'server': {u'OS-DCF:diskConfig': u'MANUAL',
             u'adminPass': '*****',
             u'id': 'u'1e23f3f0-d561-4ad5-98c6-36329bc80086',
             u'links': [{u'href': 'u'http://i5r.idp.iu.futuregrid.org/v2/2f841c236fc04e14a24d2655d9726eb5/servers/1e23f3f0-d561-4ad5-98c6-36329bc80086',
                          u'rel': u'self'},
                        {u'href': 'u'http://i5r.idp.iu.futuregrid.org/2f841c236fc04e14a24d2655d9726eb5/servers/1e23f3f0-d561-4ad5-98c6-36329bc80086',
                          u'rel': u'bookmark'}]},
             u'security_groups': [{u'name': u'default'}]}}

# #####
# Starting vm->verali_4 on cloud->india using image->futuresystems/ubuntu-14.04,
flavor->m1.small, key->verali_ubuntu-key
# #####
{'cloud': 'india',
 'cm_user_id': 'verali',
 'flavor_id': 'u'2',
 'image_id': 'u'85640c92-c83f-475f-94f6-44dcfa8f4966',
 'key': 'u'verali_ubuntu-key',
 'name': 'u'verali_4',
 u'server': {u'OS-DCF:diskConfig': u'MANUAL',
             u'adminPass': '*****',
             u'id': 'u'e899566f-fc75-4e65-aac1-312c0ef92d4d',
             u'links': [{u'href': 'u'http://i5r.idp.iu.futuregrid.org/v2/2f841c236fc04e14a24d2655d9726eb5/servers/e899566f-fc75-4e65-aac1-312c0ef92d4d',
                          u'rel': u'self'},
                        {u'href': 'u'http://i5r.idp.iu.futuregrid.org/2f841c236fc04e14a24d2655d9726eb5/servers/e899566f-fc75-4e65-aac1-312c0ef92d4d',
                          u'rel': u'bookmark'}]},
             u'security_groups': [{u'name': u'default'}]}}

# #####
# Starting vm->verali_5 on cloud->india using image->futuresystems/ubuntu-14.04,
flavor->m1.small, key->verali_ubuntu-key
```

Deleting VMs

```
>>> cloudmesh.shell("vm delete --group={0} --cloud=india --force".format(temp_group_name))
```

```
>>> cloudmesh.shell("vm delete --group={0} --cloud=india --force".format(temp_group_name))
verali
# #####
# Deleting vm->verali 5 on cloud->india
# #####
# {'msg': 'success'}
# #####
# Deleting vm->verali_4 on cloud->india
# #####
# {'msg': 'success'}
# #####
# Deleting vm->verali 3 on cloud->india
# #####
# {'msg': 'success'}
time consumed: 6.64 s
>>>
```

Virtual Machine Name

```
>>> cloudmesh.shell("label")
verali
next vm name:
verali_7
>>>
```

Python APIs

http://cloudmesh.github.io/introduction_to_cloud_computing/cloudmesh/api/index.html

remember to import cloudmesh each time before using python API on VM

```
ubuntu@vm-vera-5-31: ~/cloudmesh
File "<stdin>", line 1, in <module>
NameError: name 'cloudmesh' is not defined
>>> import cloudmesh
>>> cloudmesh.version()
'2.3.1'
>>> print cloudmesh.version()
2.3.1
>>>
```

UUIDs

```
ubuntu@vm-vera-5-31: ~/cloudmesh
>>> print cloudmesh.version()
2.3.1
>>> import uuid
>>> uuid.uuid1()
UUID('1caa50e6-0d09-11e5-951f-fa163e191e02')
>>> uuid.uuid4()
UUID('4f278229-effe-4ce8-b618-4e04dec126a0')
>>>
KeyboardInterrupt
>>> uuid.UUID(bytes=uuid.uuid4().bytes)
UUID('1262d161-721c-4353-97ca-ac7cee8ce142')
>>> uuid.uuid4().int
132531241045550325165778668903795607195L
>>>
```

Cloudmesh get_unique_name

```
>>> print get_unique_name()
6d8378940d0911e5951ffa163e191e02
>>> get_unique_name("verali")
'verali860f8ede0d0911e5951ffa163e191e02'
>>>
```

Generating VM names

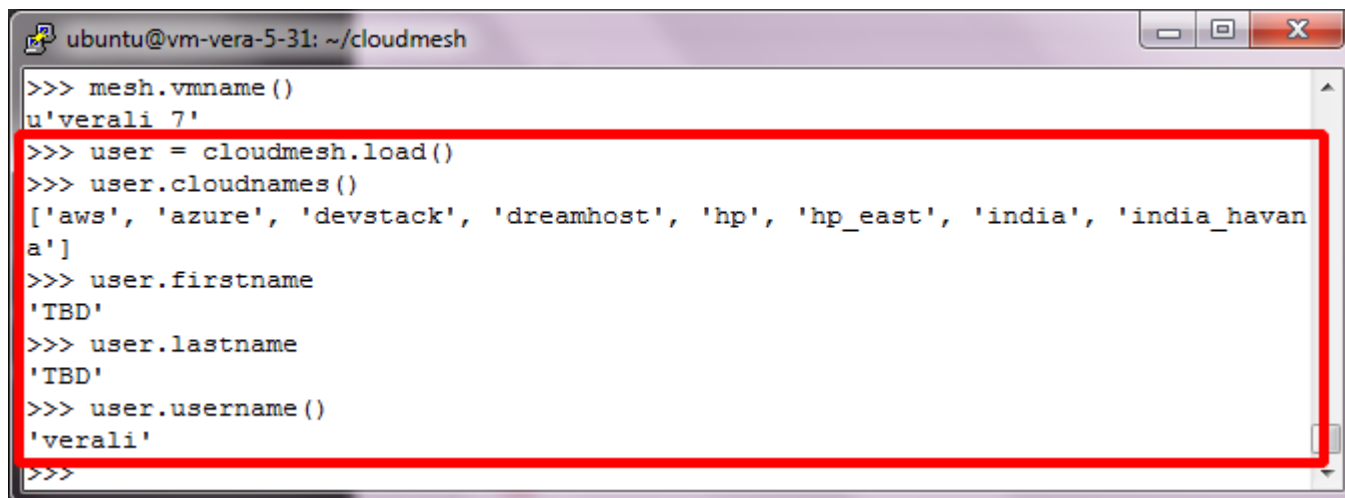
```

>>> get_unique_name("verali")
'verali860f8ede0d0911e5951ffa163e191e02'
>>> print cloudmesh.vm_name("verali_xuanying6-7-2015", 1)
verali_xuanying6-7-2015-00001
>>> mesh = cloudmesh.mesh("mongo")
CM                               cloudmesh/cm_mongo.pyc:119:  DEBUG - [__init__()]
    called with [{'collection': 'cloudmesh'}]
>>> username = cloudmesh.load().username()
>>> mesh.activate(username)
CM                               cloudmesh/cm_mongo.pyc:404:  INFO - Activating -
> india
CM                               cloudmesh/cm_mongo.pyc:236:  DEBUG - [get_cloud()]
    called with [{'cm_user_id': 'verali', 'cloud_name': u'india', 'force': False}]
CM                               cloudmesh/cm_mongo.pyc:192:  DEBUG - [get cloud i

group rule allowing ssh exists for cloud: india, type: openstack, tenant: fg465
c
CM                               cloudmesh/cm_mongo.pyc:331:  DEBUG - Ec2 security
group rule allowing ssh exists for cloud: india, type: openstack, tenant: fg465
c
CM                               cloudmesh/cm_mongo.pyc:411:  INFO - Activation o
f cloud india and user verali Succeeded!
>>> mesh.vmname()
u'verali_7'
>>>

```

API for cloudmesh.yaml



```

ubuntu@vm-vera-5-31: ~/cloudmesh
>>> mesh.vmname()
u'verali_7'
>>> user = cloudmesh.load()
>>> user.cloudnames()
['aws', 'azure', 'devstack', 'dreamhost', 'hp', 'hp_east', 'india', 'india_havan
a']
>>> user.firstname
'TBD'
>>> user.lastname
'TBD'
>>> user.username()
'verali'
>>>

```

API for cloudmesh_server.yaml

```
>>> config = cloudmesh.load("server")
>>> print config.keys()
['kind', 'meta', 'cloudmesh']
>>> config.get('meta').keys()
['yaml_version', 'kind', 'filename', 'location', 'prefix']
>>> config.get('meta.filename')
'/home/ubuntu/.cloudmesh/cloudmesh_server.yaml'
>>> print config.get('cloudmesh').keys()
['server']
>>>
```

3 mandatory exercises all included in earlier snapshot history.

Sample - Exercise-1:

```
ubuntu@vm-vera-5-31: ~/cloudmesh
cloudmesh_examples      requirements.txt
cloudmesh_install       routes.txt
cloudmesh_web           setup.cfg
cmd                     setup.py
deprecated              sh_commands.txt
dist                    simple
docs                    test-requirements.txt
etc                     tests
fabfile                 tobedeleted
heat-templates          todo
images                  requirements
incubator                verali cloudmesh ex1.py
install                 verali_cloudmesh_ex1.py.save
introduction_to_cloud_computing y.py
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$ python verali cloudmesh ex1.py
2.3.1
(ENV)ubuntu@vm-vera-5-31:~/cloudmesh$
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh
GNU nano 2.2.6      File: verali cloudmesh ex1.py

import cloudmesh
print cloudmesh.version()
cloudmesh.__version__

[ Read 3 lines ]
^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^U UnCut Text ^T To Spell
```

Adding new Commands via a Python Package

[http://cloudmesh.github.io/introduction to cloud computing/cloudmesh/cm/cmd3.html#exercise-1](http://cloudmesh.github.io/introduction%20to%20cloud%20computing/cloudmesh/cm/cmd3.html#exercise-1)

install CMD3 in virtual env:

```
ubuntu@vm-vera-5-31: ~  
ubuntu@vm-vera-5-31:~$ . ~/ENV/bin/activate  
(ENV)ubuntu@vm-vera-5-31:~$ pip install cmd3  
/home/ubuntu/ENV/local/lib/python2.7/site-packages/pip/_vendor/requests/packages  
/urllib3/util/ssl_.py:90: InsecurePlatformWarning: A true SSLContext object is n  
ot available. This prevents urllib3 from configuring SSL appropriately and may c  
ause certain SSL connections to fail. For more information, see https://urllib3.  
readthedocs.org/en/latest/security.html#insecureplatformwarning.  
InsecurePlatformWarning  
Requirement already satisfied (use --upgrade to upgrade): cmd3 in ./ENV/lib/pyth  
on2.7/site-packages  
Requirement already satisfied (use --upgrade to upgrade): future in ./ENV/lib/py  
thon2.7/site-packages (from cmd3)  
Requirement already satisfied (use --upgrade to upgrade): wheel in ./ENV/lib/pyt  
hon2.7/site-packages (from cmd3)  
Requirement already satisfied (use --upgrade to upgrade): prettytable in ./ENV/l  
ib/python2.7/site-packages (from cmd3)
```

```
ubuntu@vm-vera-5-31: ~  
Requirement already satisfied (use --upgrade to upgrade): cloudmesh-base in ./EN  
V/lib/python2.7/site-packages (from cmd3)  
Requirement already satisfied (use --upgrade to upgrade): docopt in ./ENV/lib/py  
thon2.7/site-packages (from cmd3)  
Requirement already satisfied (use --upgrade to upgrade): python-hostlist in ./E  
NV/lib/python2.7/site-packages (from cmd3)  
Requirement already satisfied (use --upgrade to upgrade): pytz>=2015.2 in ./ENV/  
lib/python2.7/site-packages (from cloudmesh-timestring->cmd3)  
Requirement already satisfied (use --upgrade to upgrade): PyYAML in ./ENV/lib/py  
thon2.7/site-packages (from pyaml->cmd3)  
Requirement already satisfied (use --upgrade to upgrade): pytimeparse in ./ENV/l  
ib/python2.7/site-packages (from cloudmesh-base->cmd3)  
Requirement already satisfied (use --upgrade to upgrade): pymongo==2.8 in ./ENV/  
lib/python2.7/site-packages (from cloudmesh-base->cmd3)  
Requirement already satisfied (use --upgrade to upgrade): mongoengine in ./ENV/l  
ib/python2.7/site-packages (from cloudmesh-base->cmd3)  
(ENV)ubuntu@vm-vera-5-31:~$ ls  
cloudmesh  CMD3  ENV  
(ENV)ubuntu@vm-vera-5-31:~$
```



```
(ENV) ubuntu@vm-vera-5-31:~$ which cm
/home/ubuntu/ENV/bin/cm
(ENV) ubuntu@vm-vera-5-31:~$ cm help
verali
```

```
Documented commands (type help <topic>):
```

```
=====
EOF      dot2      info      loglevel  py        ssh       verbose
admin    edit      init      man       q         stack     version
banner   exec      inventory metric    quit      status    vm
clear    exp       key       notebook quota     storm     volume
cloud    flavor   label     nova      rain      timer     web
cluster  graphviz launcher open      register  usage     yaml
color    group    limits    pause     script    use
debug    help     list      plugins   security_group user
default  image    load      project   setup_yaml var
```

```
ubuntu@vm-vera-5-31: ~
(ENV) ubuntu@vm-vera-5-31:~$ less ~/.cloudmesh/cmd3.yaml
(ENV) ubuntu@vm-vera-5-31:~$
(ENV) ubuntu@vm-vera-5-31:~$ cm-generate-command
Usage:
    cm-generate-command COMMAND [PACKAGE] [--path=PATH] [--topic=TOPIC]
(ENV) ubuntu@vm-vera-5-31:~$ cm-generate-command uebercool --path=~

# #####
# Generating Cloudmesh Command
# #####
Command: uebercool
Package: cloudmesh_uebercool
```

```
# #####
# Setup Directory with Package and Command
# #####
rm -rf /home/ubuntu/cloudmesh_uebercool
cp -rf /home/ubuntu/.cloudmesh/etc/cmd3_template /home/ubuntu/cloudmesh_uebercool
mv /home/ubuntu/cloudmesh_uebercool/cmd3_template /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool
mv /home/ubuntu/cloudmesh_uebercool/setup.py.in /home/ubuntu/cloudmesh_uebercool/setup.py
mv /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool/command_command.py.in /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool/command_uebercool.py
mv /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool/plugins/cm_shell_command.py.in /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool/plugins/cm_shell_uebercool.py
```

```
ubuntu@vm-vera-5-31: ~  
ercool.py  
  
# #####  
# replacing comand and package name in template files  
# #####  
Converting: /home/ubuntu/cloudmesh_uebercool/setup.py  
Converting: /home/ubuntu/cloudmesh_uebercool/Makefile  
Converting: /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool/plugins/cm_shell_uebercool.py  
Converting: /home/ubuntu/cloudmesh_uebercool/cloudmesh_uebercool/command_uebercool.py  
  
# #####  
# Comand code created.  
# #####  
(ENV) ubuntu@vm-vera-5-31:~$ ls  
cloudmesh cloudmesh_uebercool cmd3 CMD3 ENV  
(ENV) ubuntu@vm-vera-5-31:~$
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh_uebercool  
  
*** System restart required ***  
Last login: Sun Jun 7 12:43:26 2015 from 149.165.159.252  
ubuntu@vm-vera-5-31:~$ ls  
cloudmesh cloudmesh_uebercool cmd3 CMD3 ENV  
ubuntu@vm-vera-5-31:~$ . ~/ENV/bin/activate  
(ENV) ubuntu@vm-vera-5-31:~$ ls  
cloudmesh cloudmesh_uebercool cmd3 CMD3 ENV  
(ENV) ubuntu@vm-vera-5-31:~$ cd cloudmesh_uebercool  
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh_uebercool$ ls  
cloudmesh_uebercool LICENSE requirements.txt setup.py  
__init__.py Makefile setup.cfg  
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh_uebercool$
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh_uebercool  
  
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh_uebercool$ ls  
cloudmesh_uebercool LICENSE requirements.txt setup.py  
__init__.py Makefile setup.cfg  
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh_uebercool$ python setup.py install  
  
# #####  
# Installing Cloudmesh cloudmesh_uebercool  
# #####  
  
# #####  
# Creating requirements.txt file  
# #####  
running install
```

```
ubuntu@vm-vera-5-31: ~  
(ENV) ubuntu@vm-vera-5-31:~$ less ~/.cloudmesh/cmd3.yaml  
  
meta:  
  yaml_version: 2.1  
  kind: cmd3  
  filename: ${HOME}/.cloudmesh/cmd3.yaml  
  location: ${HOME}/.cloudmesh/cmd3.yaml  
  prefix: null  
cmd3:  
  modules:  
    - cloudmesh_cmd3.plugins  
    - cloudmesh_docker.plugins  
    - cloudmesh_slurm.plugins  
    - cloudmesh_deploy.plugins
```

```
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh_uebercool$ pwd  
/home/ubuntu/cloudmesh_uebercool  
(ENV) ubuntu@vm-vera-5-31:~/cloudmesh_uebercool$ nano ~/.cloudmesh/cmd3.yaml
```

```
ubuntu@vm-vera-5-31: ~/cloudmesh_uebercool  
GNU nano 2.2.6      File: /home/ubuntu/.cloudmesh/cmd3.yaml  
  
meta:  
  yaml_version: 2.1  
  kind: cmd3  
  filename: ${HOME}/.cloudmesh/cmd3.yaml  
  location: ${HOME}/.cloudmesh/cmd3.yaml  
  prefix: null  
cmd3:  
  modules:  
    - cloudmesh_cmd3.plugins  
    - cloudmesh_docker.plugins  
    - cloudmesh_slurm.plugins  
    - cloudmesh_deploy.plugins  
    - cloudmesh_uebercool.plugins  
  
^G Get Help  ^O WriteOut  ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos  
^X Exit      ^J Justify   ^W Where Is   ^V Next Page  ^U UnCut Text ^T To Spell
```

```
ubuntu@vm-vera-5-31: ~  
color      group      limits      pause      script      usage      web  
debug      help      list      plugins      security_group  use      yaml  
default    image      load      project      setup_yaml    user  
  
Ipython Commands  
=====  
notebook  
  
Mycommands Commands  
=====  
uebercool  veracommand  
  
Gui Commands  
=====  
web  
  
Ssh Commands  
=====  
ssh  
  
Cloud Commands  
=====  
admin      default  init      list      quota      stack      user      project  
cloud      flavor   inventory loglevel  rain      status     vm  
cluster    group    launcher  metric    register   storm      volume  
debug      image    usage     nova      security_group  usage     keys  
  
cm> 
```