Dirty Clouds Done Dirt Cheap

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https://github.com/mtreinish/dirty-clouds-done-dirt-cheap/tree/fossasia-2018

OpenStack Mission Statement

The OpenStack Mission: *to produce a ubiquitous Open Source Cloud Computing platform that is easy to use, simple to implement, interoperable between deployments,* ***works well at all scales****, and meets the needs of users and operators of both public and private clouds.*

Scope of the Project

- Pretend to be a sysadmin with no prior OpenStack knowledge
- Try to rely only on install docs and google searches
- $1500 USD Budget
- Build a basic compute cloud
- Install the Ocata release (from April 2017) from tarballs
- No automation or pre-existing install scripts

Buying Hardware

- Maximize core count per USD
- Second priority is amount of RAM per core
- Machines don't need to be fast (that costs money!)


ebay
tm

The Servers

Model	PowerEdge R610
Processor	2x Intel Xeon E5540
Memory Installed	32GB Total Memory; 8 x 4 GB DDR3
Hard Drives	2x 146GB 10K SAS Hard Drive
RAID Controller	Dell PowerEdge R610 Perc 6i
Ethernet	2x Dual Port Embedded Broadcom NetXtreme II 5709c
Return Policy/Warranty	60 days Money Back Or Exchange

$215 Each!!

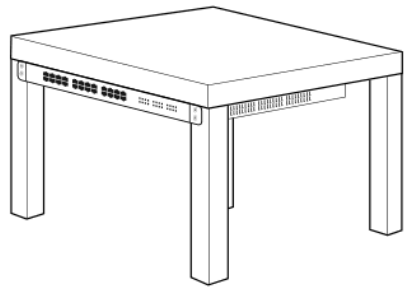

PowerEdge R610
DELL

LackRack

https://wiki.eth0.nl/index.php/LackRack

- Use a LACK side table from Ikea
- 19 inch width between legs
- Can fit 8U
- Lots of color choices
- $9.99 USD

LACKRACK




DELL
PowerEdge R610
FRAGILE


DELL
PowerEdge R610

Quirks with the servers

- Super stripped down:
  - No management interface
  - No redundant power supply
- 4x8GB of RAM not 8x4GB
- Memory installed in wrong slots
- Dead RAID controller battery
- Came with 15k RPM hard drives not 10k RPM
- Came pre-installed with Windows Server 2012 (and default password Apple123)

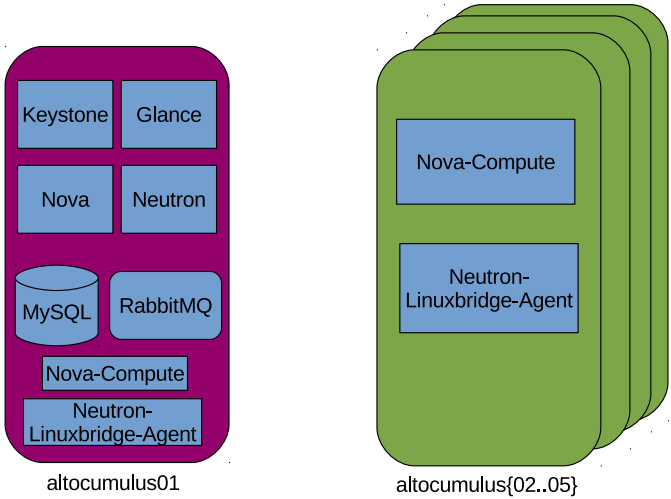
Figuring Out How To Deploy OpenStack

- Over 1800 git repositories hosted on: https://git.openstack.org/
- OpenStack has $>$ 50 projects teams: https://governance.openstack.org/tc/reference/projects/index.html
- Only want the the minimal set of projects to spin up VMs

Compute Starter Kit

- Only need 4 projects to get a functional compute cloud
- Documented at: https://www.openstack.org/software/sample-configs#compute-starter-kit
- The install guide mostly concerned with these projects

Installing OpenStack



Installing OpenStack Services

1. Download service tarball
2. Create service users
3. Install binary requirements
4. Create service dirs in /etc and /var/lib
5. Copy etc/ from tarball into /etc/$Service
6. pip install the tarball
7. Follow install guide on project configuration and setup

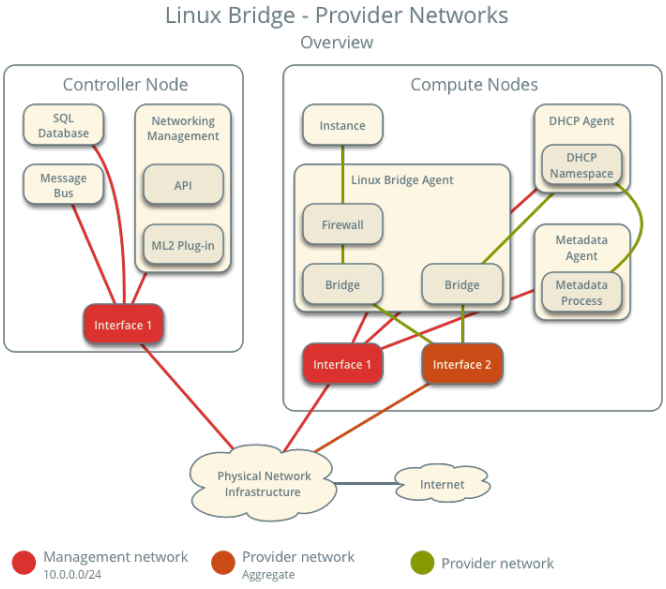
Python Requirements aren't fun

```
ERROR keystone Traceback (most recent call last):
ERROR keystone   File "/usr/local/bin/keystone-wsgi-admin", line 51, in <module>
ERROR keystone     application = initialize_admin_application()
ERROR keystone   File "/usr/local/lib/python2.7/dist-packages/keystone/server/wsgi.py", line 132, in
    initialize_admin_application
ERROR keystone     config_files=_get_config_files())

...

ERROR keystone   File "/usr/local/lib/python2.7/dist-packages/paste/deploy/loadwsgi.py", line 640, in
    find_egg_entry_point
ERROR keystone     pkg_resources.require(self.spec)
ERROR keystone   File "/usr/lib/python2.7/dist-packages/pkg_resources/__init__.py", line 943, in require
ERROR keystone     needed = self.resolve(parse_requirements(requirements))
ERROR keystone   File "/usr/lib/python2.7/dist-packages/pkg_resources/__init__.py", line 834, in resolve
ERROR keystone     raise VersionConflict(dist, req).with_context(dependent_req)
ERROR keystone ContextualVersionConflict: (requests 2.13.0 (/usr/local/lib/python2.7/dist-packages),
    Requirement.parse('requests!=2.12.2,!=2.13.0,>=2.10.0'), set(['oslo.policy']))
```

Networking Configuration



Issues with Neutron

- Too many configuration files
- Blindly copying pasting from install guide
- First time I had to look at packages and/or devstack

NEUTRON

an OpenStack Community Project

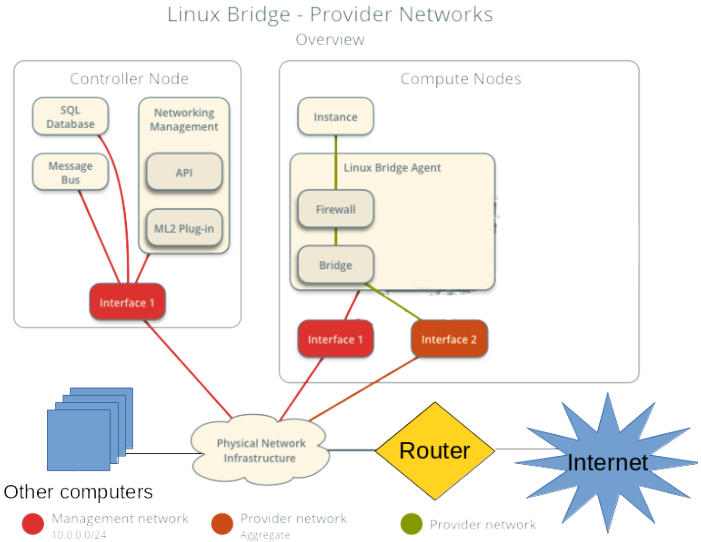
Any guesses what this means

```
ERROR neutron.plugins.ml2.drivers.agent._common_agent [req-8c98874d-5436-4912-9db5-f675bfe4df5e - - - -
    -] Error in agent loop. Devices info: {'current': set(['tap0ab3c3ba-09']), 'timestamps': {'
    tap0ab3c3ba-09': 9}, 'removed': set([]), 'added': set(['tap0ab3c3ba-09']), 'updated': set([])}
ERROR neutron.plugins.ml2.drivers.agent._common_agent Traceback (most recent call last):
ERROR neutron.plugins.ml2.drivers.agent._common_agent   File "/usr/local/lib/python2.7/dist-packages/
    neutron/plugins/ml2/drivers/agent/_common_agent.py", line 453, in daemon_loop
ERROR neutron.plugins.ml2.drivers.agent._common_agent     sync = self.process_network_devices(
    device_info)
ERROR neutron.plugins.ml2.drivers.agent._common_agent   File "/usr/local/lib/python2.7/dist-packages/
    osprofiler/profiler.py", line 153, in wrapper
ERROR neutron.plugins.ml2.drivers.agent._common_agent     return f(*args, **kwargs)
ERROR neutron.plugins.ml2.drivers.agent._common_agent   File "/usr/local/lib/python2.7/dist-packages/
    neutron/plugins/ml2/drivers/agent/_common_agent.py", line 203, in process_network_devices

...

ERROR neutron.plugins.ml2.drivers.agent._common_agent     execute_rootwrap_daemon(cmd, process_input,
    addl_env))
ERROR neutron.plugins.ml2.drivers.agent._common_agent   File "<string>", line 2, in run_one_command
ERROR neutron.plugins.ml2.drivers.agent._common_agent   File "/usr/lib/python2.7/multiprocessing/
    managers.py", line 774, in _callmethod
ERROR neutron.plugins.ml2.drivers.agent._common_agent     raise convert_to_error(kind, result)
ERROR neutron.plugins.ml2.drivers.agent._common_agent RemoteError:
ERROR neutron.plugins.ml2.drivers.agent._common_agent
    ---------------------------------------------------------------------------
ERROR neutron.plugins.ml2.drivers.agent._common_agent Unserializable message: ('#ERROR', ValueError('I/O
     operation on closed file',))
ERROR neutron.plugins.ml2.drivers.agent._common_agent
    ---------------------------------------------------------------------------
```

DHCP Fun


Linux Bridge - Provider Networks
Overview
Controller Node
SQL Database
Networking Management
Message Bus
API
ML2 Plug-in
Interface 1
Compute Nodes
Instance
Linux Bridge Agent
Firewall
Bridge
Interface 1
Interface 2
Physical Network Infrastructure
Router
Internet
Other computers
Management network
10.0.0.0/24
Provider network
Aggregate
Provider network

Blank Images

```
DEBUG glance_store._drivers.filesystem [req-3163a1a7-4ca9-47e8
    -9444-cd8b865055fb 20f283024ffd4bf4841a8d33bdb4f385 6
    c3fc6392e0c487e85d57afe5a5ab2b7 - default default] Wrote 0
    bytes to /var/lib/glance/images/e6735636-43d9-4fb0-a302-
    f3710386b689 with checksum d41d8cd98f00b204e9800998ecf8427e add
     /usr/local/lib/python2.7/dist-packages/glance_store/_drivers/
    filesystem.py:706
```

Where's my metadata?

- Without DHCP neutron can't set routes to metadata service at *169.254.169.254*
- Need to get IP address into the guest to start networking
- Using Nova's ConfigDrive works except most versions of cloud-init don't set static IP from config drives (Fixed with newer cloud-init, >=0.7.9)
- Set *force_config_drive* option to true
- Need to create custom images with Glean instead of cloud-init

Installation Pain Points

- Python Packaging:
  - Binary Dependencies
  - etc files (and any data files)
  - No dependency solver, always use upper constraints
- Debugging OpenStack requires a high level of competence

Making OpenStack Better for Small Deployments

- Honestly, it's not that bad
- >=90% of the issues were because of using tarballs
- Networking and neutron is too confusing
- Work on improving logging and error reporting

What to do with your budget cloud?

OpenStack Development

- Lots of capacity for running devstack or virtual clouds
- A really good platform to develop and test OpenStack applications
- For example I found 4 tempest bugs testing it on the cloud

Cloud Native Compute Workloads

- Good for running embarrasingly parallel workloads
- Each invidiual machine is slow, but a fair amount of parallel capacity.
- My example use case: https://github.com/mtreinish/handbrakecloud

Why you don't want to do this

- 5x 1U Servers in your bedroom closet is not pleasant
- The power bill (at peak draw it's about 1.35kW for the rack)
- Don't get to spend $1,328.37 on a weekend vacation

Where to get more information

- openstack-dev ML openstack-dev@lists.openstack.org
- Ocata install guides https://docs.openstack.org/project-install-guide/ocata/
- Ocata network guides https://docs.openstack.org/ocata/networking-guide/
- Blog post about the project: https://blog.kortar.org/?p=380
- These slides: https://github.com/mtreinish/dirty-clouds-done-dirt-cheap/tree/fossasia-2018