



OpenStack troubleshooting: a field survival guide

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What is this talk about?

- **Beginner's** session
- Generic troubleshooting steps for the majority of OpenStack components
- Principles of finding what causes OpenStack components' erroneous behavior
- Where to search and how to ask for help
- Exercises covering a few failure scenarios

DevStack virtual machine

[bit.ly / upstream-institute](https://bit.ly/upstream-institute)

- Pre-installed virtual machine
 - Runs with VirtualBox / VMware / KVM, on Windows / Linux / Mac
 - Requires minimum 5GB **free** RAM (at least 8GB on the host)
 - Has a basic desktop environment and tools to set up devstack
- Interested in contributing?
 - <https://docs.openstack.org/upstream-training>

Why troubleshoot? And how?!

Why to troubleshoot

- Because [google://software+is+broken](https://www.google.com/search?q=software+is+broken)
- Complexity increases room for errors
- OpenStack - the software
 - **Easy concept:** “Just a bunch of python scripts with a nice WebGUI”
 - **Yet complex:** >20M LOC (including docs), ~65K commits in a year across ~60 projects
- OpenStack - the platform
 - Deployed on hundreds / thousands of servers in a DC (*horizontal complexity*)
 - Components layered on top of each other (*vertical complexity*)
 - Services communicate across clusters (*mesh complexity*)
 - Redundancy for high availability (*temporal complexity*)

Basic troubleshooting recipe

- Read the operations guide
 - <https://docs.openstack.org/operations-guide/ops-maintenance.html>
- Apply knowledge
- ...
- Problems fixed!

- Jokes aside:
 - **Know your system to locate failure** (what components, how they work together)
 - **Understand the layers** (minimal understanding from the kernel up to client UI)
 - **Learn the tools that can help in troubleshooting** (searching logs, checking statuses)
 - **Reach out for help** (community is amazing!)

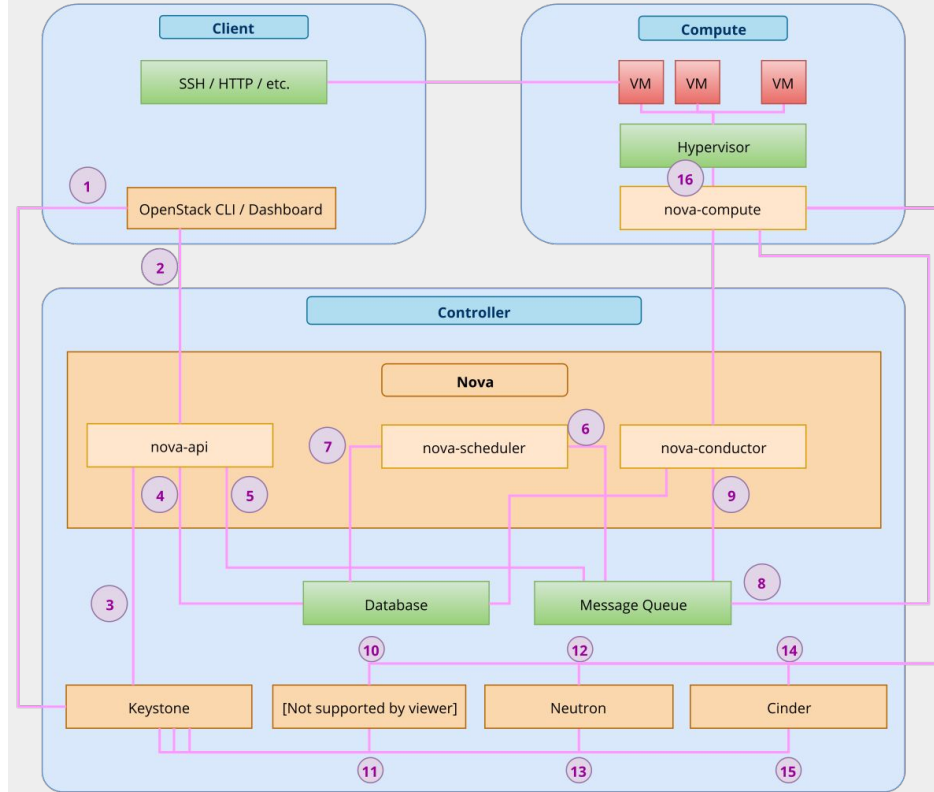
Best approach to troubleshooting

- **Avoid troubles!**
 - Monitoring, logging
 - Alerting
 - Blue-Green deployments
 - Dev / staging environments
 - Infrastructure-as-code
 - Log analytics, etc.

- This talk does **not** address that *perfect world* scenario

What can go wrong during a VM instance creation?

Nova instance creation flow



Source: Pradeep Kumar
<https://www.linuxtechi.com/step-by-step-instance-creation-flow-in-openstack/>

Nova instance creation flow #1

1. The **Horizon** Dashboard or **OpenStack CLI** authenticates against the Identity service (**Keystone**) via it's REST API
 - Keystone authenticates the user and replies with a *token*, which is used for authenticating requests to other components

```
$ openstack server create
Missing value auth-url required for auth plugin password
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test1
Failed to discover available identity versions when contacting http://192.168.10.15/identity. Attempting to parse
version from URL.
Could not find versioned identity endpoints when attempting to authenticate. Please check that your auth_url is
correct. Unable to establish connection to http://192.168.10.15/identity: HTTPConnectionPool(host='192.168.10.15',
port=80): Max retries exceeded with url: /identity (Caused by NewConnectionError('<urllib3.connection.HTTPConnection
object at 0x7fd0293c99d0>: Failed to establish a new connection: [Errno 111] Connection refused',))
```

Nova instance creation flow #1 - debugging

Debugging steps on the user side

```
$ echo $OS_AUTH_URL
# no output
$ nslookup myopenstack.com # dig myopenstack.com
...
** server can't find myopenstack.com: NXDOMAIN
...

$ telnet 192.168.10.15 80
Trying 192.168.10.15... # timeout
```

```
$ echo $OS_AUTH_URL
http://controller.myopenstack.com/identity
$ nslookup myopenstack.com # dig myopenstack.com
...
Non-authoritative answer:
Name:   myopenstack.com
Address: 192.168.10.15
...

$ telnet 192.168.10.15 80
Trying 192.168.10.15...
Connected to 192.168.10.15.
Escape character is '^['.
```

Nova instance creation flow #1 - debugging

Debugging steps on the operators side

```
$ systemctl status apache2.service
• apache2.service - The Apache HTTP Server
...
  Active: inactive (dead) since ...
...

$ a2query -s keystone-wsgi-public
No site matches keystone-wsgi-public (disabled by site administrator)
```

```
$ sudo systemctl restart apache2.service
$ systemctl status apache2.service
• apache2.service - The Apache HTTP Server
...
  Active: active (running) since ...
...

$ sudo a2ensite keystone-wsgi-public
$ a2query -s keystone-wsgi-public
keystone-wsgi-public (enabled by site administrator)
```

Nova instance creation flow #1 - debugging

- On the client side, use `--debug` to retrieve Request ID

```
$ openstack token issue --debug 2>&1 | grep Request-ID
...
The request you have made requires authentication. (HTTP 401) (Request-ID: req-56d543f9-079d-42c0-9eb8-a3dfbc2f90c5)
...
```

- On the server side, check logs
 - <https://docs.openstack.org/keystone/latest/configuration/samples/keystone-conf.html>
 - `[DEFAULT]/log_file` or `systemd`

```
$ journalctl -u devstack@keystone.service | grep req-56d543f9-079d-42c0-9eb8-a3dfbc2f90c5
Apr 27 03:14:32 upstream-training devstack@keystone.service[18195]: WARNING keystone.server.flask.application [None
req-56d543f9-079d-42c0-9eb8-a3dfbc2f90c5 None None] Authorization failed. The request you have made requires
authentication. from 192.168.10.15: Unauthorized: The request you have made requires authentication.
$ journalctl -u devstack@keystone.service | grep -E 'WARNING|ERROR' # -f to watch
$ journalctl -u devstack@keystone.service
```

Nova instance creation flow #2

2. An authenticated request to **Nova** is issued by connecting to **nova-api**
 - o <https://httpstatuses.com/503> - not quite helpful

```
$ source openrc admin
$ openstack endpoint list --service compute --column URL
+-----+
| URL |
+-----+
| http://192.168.10.15/compute/v2.1 |
+-----+
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test2
Unknown Error (HTTP 503)
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test2 --debug
REQ: curl -g -i -X GET http://192.168.10.15/compute/v2.1/flavors/m1.nano -H "Accept: application/json" -H "User-Agent: python-novaclient" -H "X-Auth-Token: {SHA256}6fa0136025917154a4e984b72b6c5ebb09e5688c7f4a14c67fe62f88d1c1a3bc" -H "X-OpenStack-Nova-API-Version: 2.1"
Resetting dropped connection: 192.168.10.15
```

Nova instance creation flow #2 - debugging

Debugging steps on the user side

```
$ ping 192.168.10.15
PING 192.168.10.15 (192.168.10.15) 56(84) bytes of data.
# timeout
```

```
$ ping 192.168.10.15
PING 192.168.10.15 (192.168.10.15) 56(84) bytes of data.
64 bytes from 192.168.10.15: icmp_seq=1 ttl=64 time=0.1
...
```

Debugging steps on the operators side

```
$ curl http://192.168.10.15/compute/v2.1
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
...
<p>The requested URL /compute was not found on this server.</p>
<address>Apache/2.4.29 Server at 192.168.10.15 Port 80</address>
...
```

```
$ a2ensite nova-api-wsgi.conf
$ curl http://192.168.10.15/compute/v2.1
{"error": {"message": "The request you have made
requires authentication.", "code": 401, "title":
"Unauthorized"}}
```

Nova instance creation flow #3

3. **nova-api** queries **Keystone** for authentication and authorization of the incoming request
 - Keystone validates the token and replies with an updated authentication headers with authorization (roles / permissions) data attached

```
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test3
Unexpected API Error. Please report this at http://bugs.launchpad.net/nova/ and attach the Nova API log if possible.
<class 'keystoneauth1.exceptions.discovery.DiscoveryFailure'> (HTTP 500) (Request-ID:
req-35499014-c704-4eb3-bcf0-866f59651482)
```


Nova instance creation flow #3 - debugging

Debugging steps on the operators site

- Get a request ID from the client side (--debug)

```
$ journalctl -u devstack@n-api | grep 7764b3d2-1f14-453a-8a0c-dd696695f194 | grep ERROR
Apr 28 20:24:27 upstream-training devstack@n-api.service[21131]: ERROR nova.api.openstack.wsgi [None
req-7764b3d2-1f14-453a-8a0c-dd696695f194 demo demo] Unexpected exception in API method: DiscoveryFailure: Could not
find versioned identity endpoints when attempting to authenticate. Please check that your auth_url is correct. Unable
to establish connection to http://192.168.10.16/identity: HTTPConnectionPool(host='192.168.10.16', port=80): Max
retries exceeded with url: /identity (Caused by NewConnectionError('<urllib3.connection.HTTPConnection object at
0x7f46650f39d0>: Failed to establish a new connection: [Errno 113] EHOSTUNREACH',))
```

- “DiscoveryFailure: **Could not find** versioned identity **endpoints**”
- “Please check that your **auth_url** is correct”
- Check configuration file
 - <https://docs.openstack.org/nova/latest/configuration/config.html>

Nova instance creation flow #4

4. **nova-api** checks for conflicts within the **Database** and creates an initial database entry for the new VM instance

```
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test4
# very Long wait time
Unknown Error (HTTP 500)
```

Nova instance creation flow #4 - debugging

Debugging steps on the operators side:

- Sometimes it's worth looking up WARNING / ERROR messages in logs

```
$ journalctl -u devstack@n-api | grep -E "ERROR|WARNING"
Apr 28 21:26:49 upstream-training devstack@n-api.service[25453]: ERROR nova DBConnectionError:
(pymysql.err.OperationalError) (2003, "Can't connect to MySQL server on '127.0.0.1' ([Errno 101] ENETUNREACH)") ...
... OR ...
Apr 28 21:46:48 upstream-training devstack@n-api.service[27737]: ERROR nova OperationalError:
(pymysql.err.OperationalError) (1045, u"Access denied for user 'root'@'localhost' (using password: YES)") ...
```

- "DBConnectionError: **Can't connect to MySQL** server on '127.0.0.1'"
- "OperationalError: **Access denied for user** 'root'@'localhost' (using password: YES)"
- Check configuration file
 - <https://docs.openstack.org/nova/latest/configuration/config.html>
 - [database] / [api_database]

Nova instance creation flow #5

5. **nova-api** sends an RPC request through the **Message Queue** to **nova-scheduler** in order to find a hypervisor to launch the VM on

```
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test5
# very, very, very long wait time
Unknown Error (HTTP 500)
```

Nova instance creation flow #5 - debugging

Debugging steps on the operators site - got the gist, right?

```
$ journalctl -u devstack@n-api | grep -E "ERROR|WARNING"
Apr 28 21:59:43 upstream-training devstack@n-api.service[28186]: WARNING oslo.messaging._drivers.impl_rabbit [-]
Unexpected error during heartbeat thread processing, retrying...: error: [Errno 111] ECONNREFUSED
Apr 28 21:59:53 upstream-training devstack@n-api.service[28186]: ERROR oslo.messaging._drivers.impl_rabbit [None
req-d287384b-1b24-497a-acdc-199801f98a23 demo demo] [07c3a79e-0532-4861-afd7-4b4e3737e7fb] AMQP server on
192.168.10.15:5672 is unreachable: [Errno 111] ECONNREFUSED. Trying again in 32 seconds.: error: [Errno 111]
ECONNREFUSED
$ systemctl status rabbitmq-server # omitted
$ journalctl -u rabbitmq-server # omitted
```

- **“AMQP server on 192.168.10.15:5672 is unreachable”**
- Check MQ health, logs and configuration file
 - <https://docs.openstack.org/operations-guide/ops-maintenance-rabbitmq.html>
 - <https://www.rabbitmq.com/troubleshooting.html>

Nova instance creation flow #6

6. nova-scheduler picks the request from the MQ

```
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test6
+-----+-----+
| Field          | Value                                     |
+-----+-----+
| OS-EXT-STS:task_state | scheduling                               |
| OS-EXT-STS:vm_state  | building                                 |
| ...               |                                          |
| name             | test6                                    |
| status           | BUILD                                   |
+-----+-----+
$ openstack server show test6 -c status -f value
BUILD
# After a while
$ openstack server show test6 -c status -f value
ERROR
```

Nova instance creation flow #6 - debugging

Debugging steps on the operators site

- Looks like nova-api is working
- Check again clients command line to get an error message and query other nova services

```
$ journalctl -u devstack@n-api | grep -E "ERROR"
# no error here...
$ openstack server show test6 -c fault -f value
{'u'message': u'Timed out waiting for a reply to message ID 80a779c36dab4ba68f48600bd961e36e', u'code': 500, u'created': u'2019-04-28T23:18:36Z'}
$ journalctl -u devstack@n-* | grep 80a779c36dab4ba68f48600bd961e36e
Apr 28 23:18:35 upstream-training nova-conductor[26967]: ERROR nova.conductor.manager [None req-c0ddf15e-8072-4289-b7f3-9fe2173051ba demo demo] Failed to schedule instances: MessagingTimeout: Timed out waiting for a reply to message ID 80a779c36dab4ba68f48600bd961e36e
```

- **“Failed to schedule instances: MessagingTimeout”**
- Check the diagram of [Nova instance creation flow](#).
 - Looks like nova-scheduler is the culprit

Nova instance creation flow #7

7. **nova-scheduler** checks the **Database**

- **nova-scheduler** returns the updated instance entry with the appropriate host ID after filtering and weighing
- **nova-scheduler** sends an RPC request to **nova-compute** for launching an instance on the appropriate host

If anything goes wrong, debugging steps on the operators side are similar to previous ones

- Check the nova-scheduler and nova-compute health, logs and configuration
- Check Database and MQ health, logs, and configuration

```
$ systemctl status <service_name> # omitted
$ journalctl -u <service_name> | grep -E "ERROR|WARNING" # omitted
```


Nova instance creation flow #8

8. The responsible **nova-compute** instance picks the request from the **MQ** and queries **nova-conductor** to get VM details
 - Such as image id, flavor (RAM,CPU and Disk), etc.

```
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test8 # omitted
$ openstack server show test8 -c OS-EXT-STS:task_state -f value
BUILD
# After a Long-Long while
$ openstack server show test8 -c OS-EXT-STS:task_state -f value
BUILD
```

... Or... you know, it doesn't.

- VM stuck forever in BUILD state means, the scheduler cannot find a suitable compute node
- Check nova-scheduler, and nova-compute services' health, logs, and configuration

Nova instance creation flow #9

9. **nova-conductor** picks the request from the **MQ** and queries **nova-database**
 - then **nova-compute** picks the instance information from the **MQ**

```
$ source openrc
# Trying to allocate an m1.large instance
$ openstack server create --flavor m1.large --image cirros-0.4.0-x86_64-disk --network private test9 # omitted
$ openstack server show test9 -c OS-EXT-STS:task_state -f value
ERROR
$ openstack server show test9 -c fault -f value
{u'message': u'No valid host was found. ', u'code': 500, u'details': u' File
"/opt/stack/nova/nova/conductor/manager.py", line 1346, in schedule_and_build_instances\n instance_uuids,
...

```

Nova instance creation flow #9 - debugging

Debugging steps on the operators side

```
$ journalctl -u devstack@n-* -u devstack@placement-api | grep -E "DEBUG|WARNING|ERROR"
2019-04-29 05:07:00.046 DEBUG nova.filters [req-b2a4445d-9e5b-4c7e-81d5-b1ee854a3735 admin admin] Filter ComputeFilter returned 1 host(s) from
(pid=17442) get_filtered_objects /opt/stack/nova/nova/filters.py:104
...
2019-04-29 05:07:00.049 DEBUG nova.scheduler.filters.disk_filter [req-b2a4445d-9e5b-4c7e-81d5-b1ee854a3735 admin admin] (centos70, centos70) ram:
799488MB disk: 0MB io_ops: 0 instances: 0 does not have 1024 MB usable disk, it only has 0.0 MB usable disk. from (pid=17442) host_passes
/opt/stack/nova/nova/scheduler/filters/disk_filter.py:70
2019-04-29 05:07:00.050 INFO nova.filters [req-b2a4445d-9e5b-4c7e-81d5-b1ee854a3735 admin admin] Filter DiskFilter returned 0 hosts
2019-04-29 05:07:00.051 INFO nova.filters [req-b2a4445d-9e5b-4c7e-81d5-b1ee854a3735 admin admin] Filtering removed all hosts for the request with
instance ID '05976d37-8e61-488e-aaf4-9ee770bc5ba0'. Filter results: ['RetryFilter: (start: 1, end: 1)', 'AvailabilityZoneFilter: (start: 1, end: 1)',
'ComputeFilter: (start: 1, end: 1)', 'ComputeCapabilitiesFilter: (start: 1, end: 1)', 'ImagePropertiesFilter: (start: 1, end: 1)', 'CoreFilter:
(start: 1, end: 1)', 'RamFilter: (start: 1, end: 1)', 'DiskFilter: (start: 1, end: 0)']
2019-04-29 05:07:00.052 DEBUG nova.scheduler.filter_scheduler [req-b2a4445d-9e5b-4c7e-81d5-b1ee854a3735 admin admin] There are 0 hosts available but
1 instances requested to build. from (pid=17442) select_destinations
```

- “filter **DiskFilter** returned **0** hosts”
- “there are **0** hosts available but 1 instances requested to build.”
 - Filter scheduler docs: <https://docs.openstack.org/nova/latest/user/filter-scheduler.html>
 - Placement api (from Stein) docs: <https://docs.openstack.org/placement/latest/>

Nova instance creation flow #10 - #15

For the sake completeness:

10. **nova-compute** connects to **Glance** Image service to retrieve the boot image URI
 11. **Glance** validates auth[nz] with **Keystone** and returns image metadata to **nova-compute**
 12. **nova-compute** connects to **Neutron** network service to allocate and configure (sub)networks, IP addresses, etc.
 13. **Neutron** validates auth[nz] with **Keystone**, configures networking and returns information to **nova-compute**
 14. **nova-compute** connects to **Cinder** Volume service to configure and attach volumes to the VM
 15. **Cinder** validates auth[nz] with **Keystone**, configures block storage and returns information to **nova-compute**
- Troubleshooting steps are similar to that of Nova
 - Diagnostics are done on the nova-compute nodes

Nova instance creation flow #16

16. **nova-compute** configures the hypervisor to create the VM

- At this point, Horizon is able to show remote VNC console, and SSH should work

```
$ source openrc
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test16 # omitted
$ openstack server show test16 -c addresses -f value
private=fd4f:38ff:47e7:0:f816:3eff:fe22:3d7d, 10.0.0.32
$ ip address list | grep -E '10\.0\.'
# No IP address in the 10.0.* space. How to SSH?
```

- Cannot connect to your VM? Check these:
 - Is VM successfully built?
 - Did it get an IP address?
 - Security groups let ICMP / SSH through?

Nova instance creation flow #16 - debugging

Debugging steps on the user side

```
$ ip netns ls | grep qrouter
qrouter-c7b74975-3bd4-40fe-98ee-bd03fb0d7b7a (id: 1)
$ sudo ip netns exec qrouter-c7b74975-3bd4-40fe-98ee-bd03fb0d7b7a ip address list | grep '10\.0'
    inet 10.0.0.1/26 brd 10.0.0.63 scope global qr-2f57a265-b7
$ sudo ip netns exec qrouter-c7b74975-3bd4-40fe-98ee-bd03fb0d7b7a ssh 10.0.0.32 -l cirros
# Long wait, timeout
$ openstack security group rule list default
+-----+-----+-----+-----+-----+
| ID                | IP Protocol | IP Range | Port Range | Remote Security Group |
+-----+-----+-----+-----+-----+
| 242e5b36-4541-49ba-bde0-14bccf9c5df2 | None        | None     |           | 478cead4-7770-4703-b1db-e30a3542601b |
| 58ca602e-38de-43de-bc29-3415d9db0ebb | None        | None     |           | None                                     |
| a70c278e-ab6e-43a0-ba46-53bfb79b5163 | None        | None     |           | 478cead4-7770-4703-b1db-e30a3542601b |
| ab2f3c50-9f99-4360-8bd5-10efae17a546 | None        | None     |           | None                                     |
+-----+-----+-----+-----+-----+
$ openstack security group rule create --protocol tcp --dst-port 22:22 --ingress default # omitted
$ sudo ip netns exec qrouter-c7b74975-3bd4-40fe-98ee-bd03fb0d7b7a ssh 10.0.0.32 -l cirros
cirros@10.0.0.32's password: # yaaay happiness and frustration of not remembering the password. It's `gocubsgo`
```

Recovering keystone admin access

- What to do if forgot credentials / lost the openrc file?
- With admin access to the control host, enable token-based auth
 - <https://docs.openstack.org/keystone/latest/configuration/samples/keystone-conf.html>
- Set the environment variables:
 - OS_TOKEN as in [DEFAULT] / admin_token in keystone.conf
 - OS_URL as in [DEFAULT] / admin_endpoint in keystone.conf

```
$ export OS_TOKEN=<admin_token>
$ export OS_URL=<admin_endpoint>
$ openstack user set --password <newpassword> admin
```

- Admin token-based authentication is **insecure**, and **should be disabled** as soon as other means of authentication are recovered!

General troubleshooting tips & tricks

Troubleshooting checklist

- Identify & reproduce the problem
 - What was the user / admin interaction what triggered it
- Collect information
 - Client tools being used, versions, debug output
 - Services being involved, configuration, logs, debug output
 - Check environment: networking, OS, dependent services, storage disk space, etc.
- Fix trivial issues
 - Fix it on the spot, experiment with dev/test environment, home lab
- Ask for help
 - Use web search, reach out to docs, support, developers
- Mitigate carefully
 - Plan and test the steps of the mitigation procedure (aka “do not break prod”)
- Document everything for future reference

Collecting information

- Networking

- Neutron troubleshooting is hard
- Connectivity checks using standard linux tools and openvswitch cli

```
$ ping <address>
$ telnet <address> <port>
$ ip address list
$ ip netns list
$ ip netns exec
```

```
$ sudo ovs-vsctl show
$ sudo ovs-tcpdump -i br-int
$ sudo tcpdump -i <tap-dev>
```

- Operating system environment and metrics

- Usually from nova-compute or cinder-volume hosts

```
$ lsb_release -a
$ uname -a
$ df -h
$ free -m
```

```
$ top      # or htop
$ iostat  # or iotop
$ dmesg
```

- More tools: http://www.brendangregg.com/Perf/linux_perf_tools_full.png

Watch out for non-OpenStack related issues

- Resource exhaustion on controller / compute / storage nodes
 - Disk usage
 - Memory usage
 - Swap usage / Swappiness
 - OOM-killer
 - CPU usage / Load
 - File descriptor limits
 - Physical node failure
- Connectivity
 - IP address collision
 - Network switch misconfiguration / failure
 - Cable / SFP failure
- Other
 - Time synchronization
 - External network misconfiguration (DNS / Firewall)

Working with openstack cli tools

- Common options to all subcommands
 - To gather more information about a problem, check **--version**, read **--help**, use **--debug**
 - OpenStack client releases: <https://releases.openstack.org/teams/openstackclient.html>

```
$ openstack --version
openstack 3.18.0
$ openstack --help # omitted
$ openstack server create --help # omitted
$ openstack server list --debug # omitted
```

- The old way: use the dedicated tools
 - Today all functionality should be implemented in the openstack command
 - The individual tools are installable with pip: `python-(nova|cinder|neutron|etc)client`
 - Example: nova releases found on <https://releases.openstack.org/teams/nova.html>

```
$ nova --version # --help, --debug also works
```

Example of collecting debug logs - client side

```
$ openstack server create --flavor m1.nano --image cirros-0.4.0-x86_64-disk --network private test --debug
...
auth_config_hook(): {'auth_type': 'password', 'beta_command': False, u'image_status_code_retries': '5
defaults: {u'auth_type': 'password', u'status': u'active', u'image_status_code_retries': 5, 'api_time
cloud cfg: {'auth_type': 'password', 'beta_command': False, u'image_status_code_retries': '5', u'int
...
command: server create -> openstackclient.compute.v2.server.CreateServer (auth=True)
...
Using parameters {'username': 'demo', 'project_name': 'demo', 'user_domain_id': 'default', 'auth_url'
Get auth_ref
REQ: curl -g -i -X GET http://192.168.10.15/identity -H "Accept: application/json" -H "User-Agent: op
Starting new HTTP connection (1): 192.168.10.15:80
http://192.168.10.15:80 "GET /identity HTTP/1.1" 300 272
RESP: [300] Connection: close Content-Length: 272 Content-Type: application/json Date: Mon, 29 Apr 20
RESP BODY: {"versions": {"values": [{"status": "stable", "updated": "2019-01-22T00:00:00Z", "media-ty
...
http://192.168.10.15:80 "POST /identity/v3/auth/tokens HTTP/1.1" 201 3253
{"token": {"is_domain": false, "methods": ["password"], "roles": [{"id": "9ae9e8b27dcb419598a8952f4d8
Instantiating image api: <class 'openstackclient.api.image_v2.APIv2'>
curl -g -i -X GET -H 'Accept-Encoding: gzip, deflate' -H 'Accept: */*' -H 'User-Agent: python-glancec
...
REQ: curl -g -i -X GET http://192.168.10.15/compute/v2.1/flavors/m1.nano -H "Accept: application/json
Resetting dropped connection: 192.168.10.15
http://192.168.10.15:80 "GET /compute/v2.1/flavors/m1.nano HTTP/1.1" 404 80
RESP: [404] Connection: close Content-Length: 80 Content-Type: application/json; charset=UTF-8 Date:
RESP BODY: {"itemNotFound": {"message": "Flavor m1.nano could not be found.", "code": 404}}
```

Set environment

Parse arguments

Request *auth(n|z)*

Request *image*

Request *flavor*

Example of collecting debug logs - server side

Configure debug logging

```
$ grep -i ^debug /etc/nova/*  
/etc/nova/nova-cpu.conf:debug = True  
/etc/nova/nova-dhcpbridge.conf:debug = True  
/etc/nova/nova.conf:debug = True  
/etc/nova/nova_cell1.conf:debug = True
```

Query logs from systemd

```
$ journalctl --unit devstack@n-cpu.service  
$ journalctl -u devstack@n-cpu.service -u devstack@n-cond.service  
$ journalctl -u devstack@n-*  
$ journalctl -u devstack@n-* | grep <id>  
$ journalctl -o short-precise      # nanoseconds  
$ journalctl -a                   # colors  
$ journalctl --since -1hour       # limit history  
  
# Learn your tools!  
$ man systemctl  
$ man systemd.time
```

Query logs from /var/log

```
$ less /var/log/nova/nova-compute.log  
$ less /var/log/nova/nova-{compute,conductor}.log  
$ less /var/log/nova/*  
$ grep <id> /var/log/nova/*
```

Where to search for help

- Knowledge base
 - Documentation
<https://docs.openstack.org/>
 - Wiki
<https://wiki.openstack.org/>
 - Project specifications
<http://specs.openstack.org/>
- Support
 - Community Q&A
<https://ask.openstack.org/>
 - IRC
freenode.net / #openstack
 - Mailing lists
<http://lists.openstack.org> / openstack-discuss
- Collaboration
 - OpenDev
<https://opendev.org/openstack/>
 - Bugs, blueprints (old)
<https://launchpad.net/openstack>
 - Bugs, features (new)
<https://storyboard.openstack.org/>

Administrator & troubleshooting guides

- Troubleshooting guides
 - Maintenance guide: <https://docs.openstack.org/operations-guide/ops-maintenance.html>
 - Compute: <https://docs.openstack.org/nova/latest/admin/support-compute.html>
 - Volume: <https://docs.openstack.org/cinder/latest/admin/blockstorage-troubleshoot.html>
- Project specific administrator guides
 - Image: <https://docs.openstack.org/glance/latest/admin/>
 - Networking: <https://docs.openstack.org/neutron/latest/admin/>
 - Identity: <https://docs.openstack.org/keystone/latest/admin/>
 - Orchestration: <https://docs.openstack.org/heat/latest/admin/>
 - Dashboard: <https://docs.openstack.org/horizon/latest/admin/>

Thank you!

Questions?