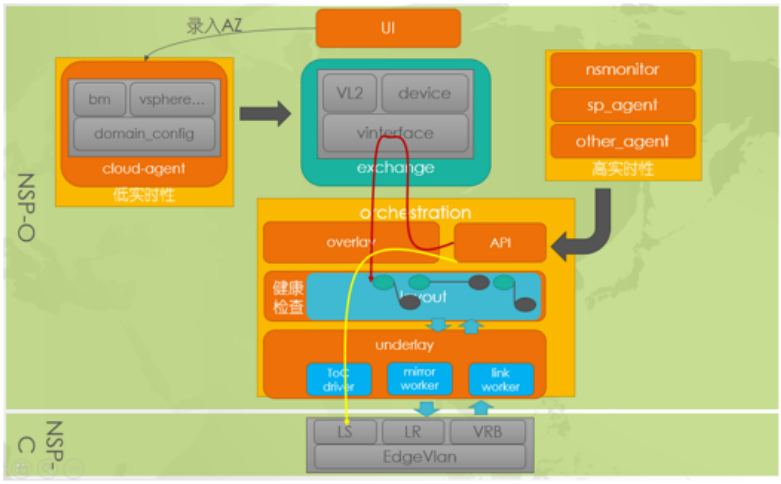
云平台对接：网络虚拟化 & 云网一体化

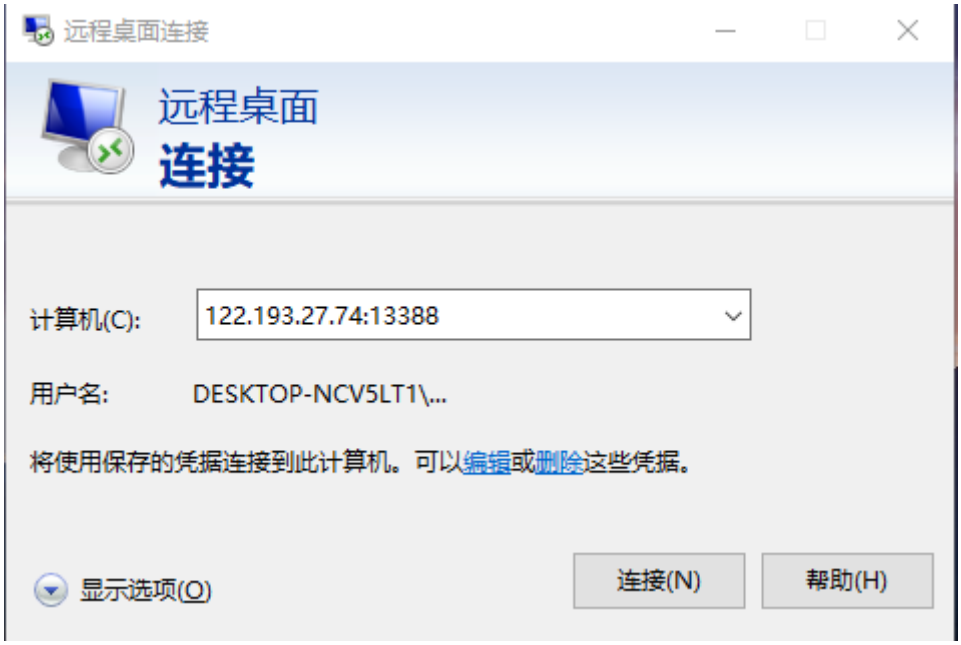
- 网络虚拟化
  - 学习到network/subnet信息
  - 手动加入逻辑网络中，创建LS、LR，并进行组网
- 云网一体化
  - 根据API调用network/subnet组网
  - 自动创建对应的逻辑网络，并创建LS、LR进行组网



1.远程连接到跳板机，通过跳板机登录openstackR

- 跳板机信息

  122.193.27.74:13388



账户：administrator

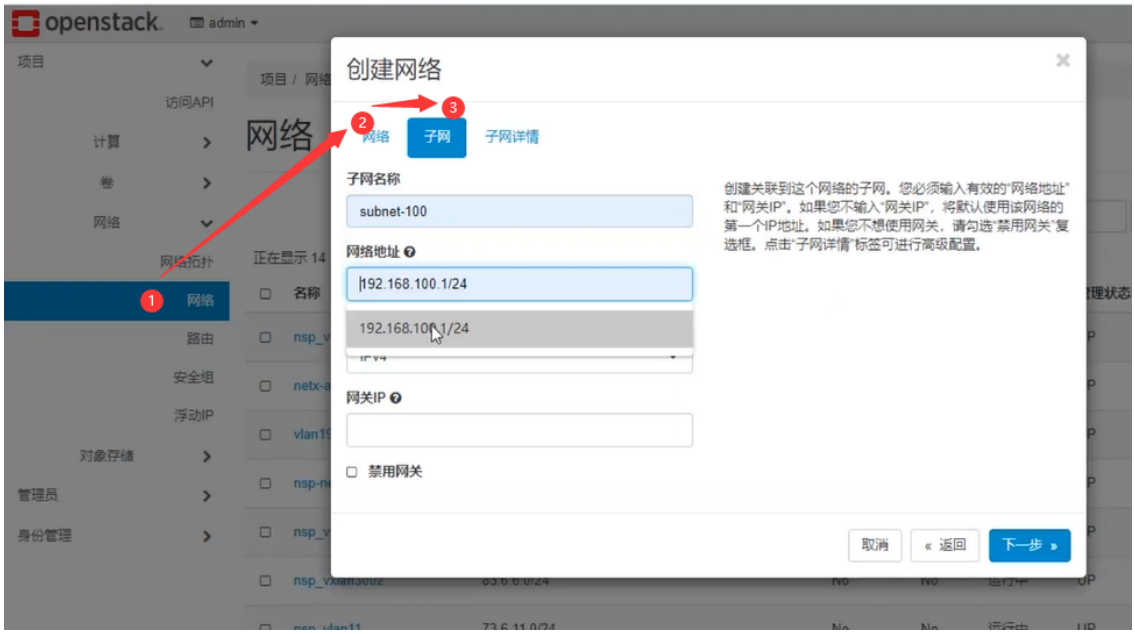
密码：4CtMijmO2L5q%6up

跳板机	122.193.27.74:13388	administrator	4CtMijmO2L5q%6up		win-jump-test

- openstackR：http://172.16.253.50/dashboard

2.创建网络与虚拟机实例

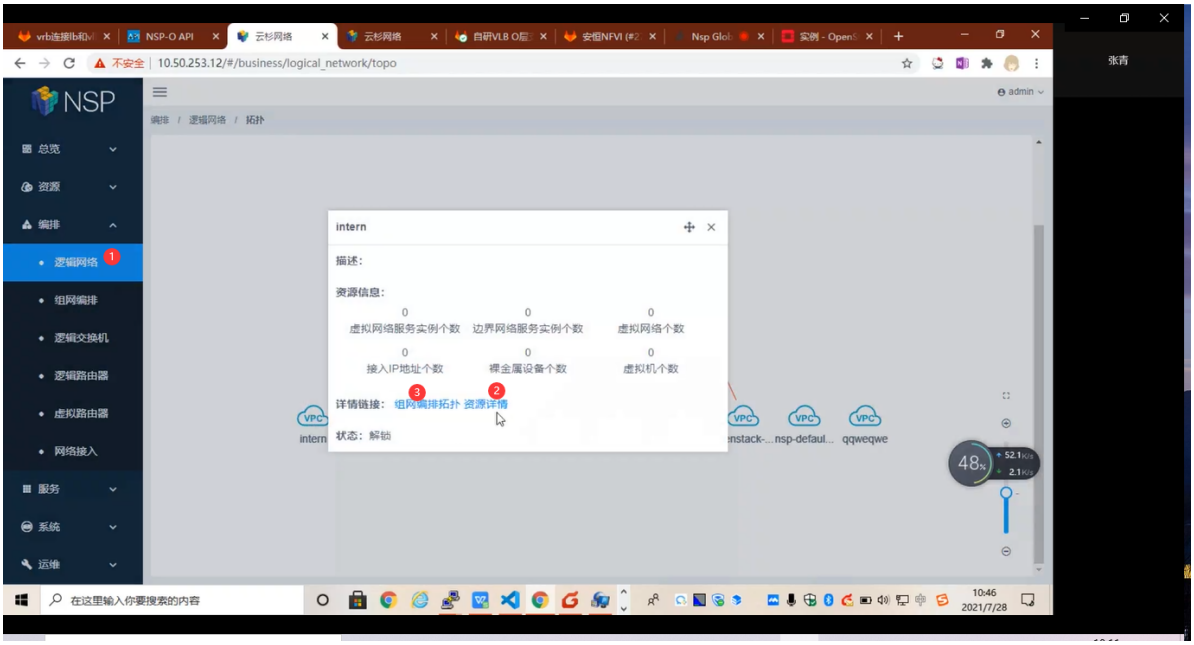
- 创建网络及其子网



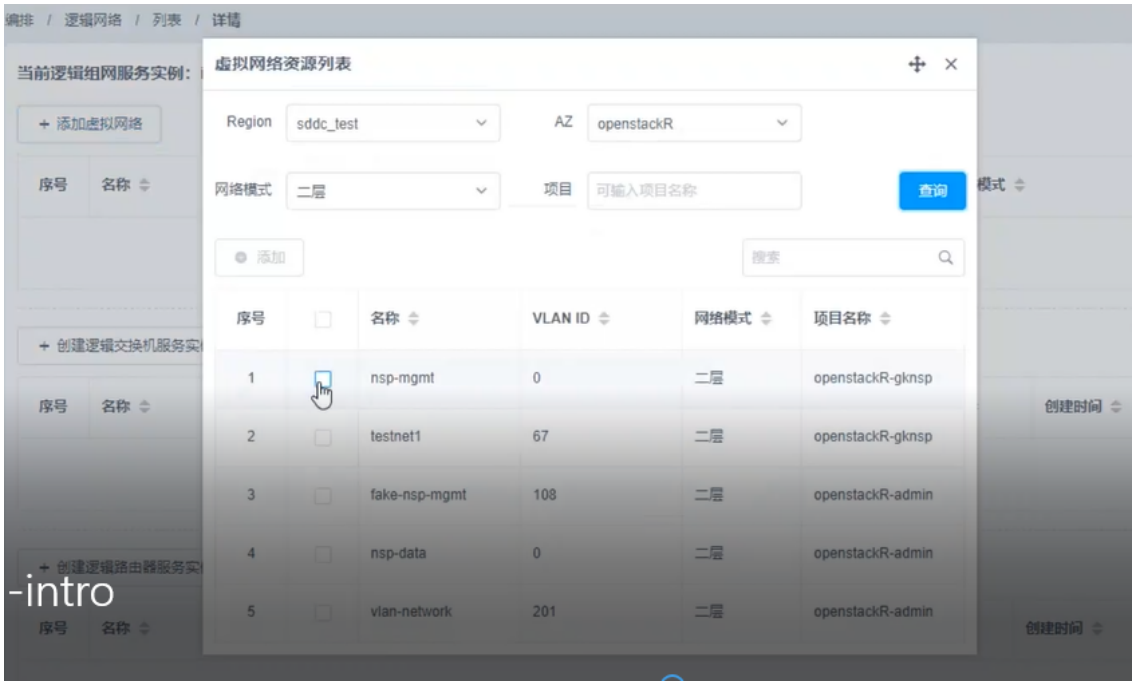
- 创建虚拟机实例

tips:镜像源选cirros，实例类型选tiny或little较小的来测试

3.登录NSP（http://10.50.253.12）进行组网

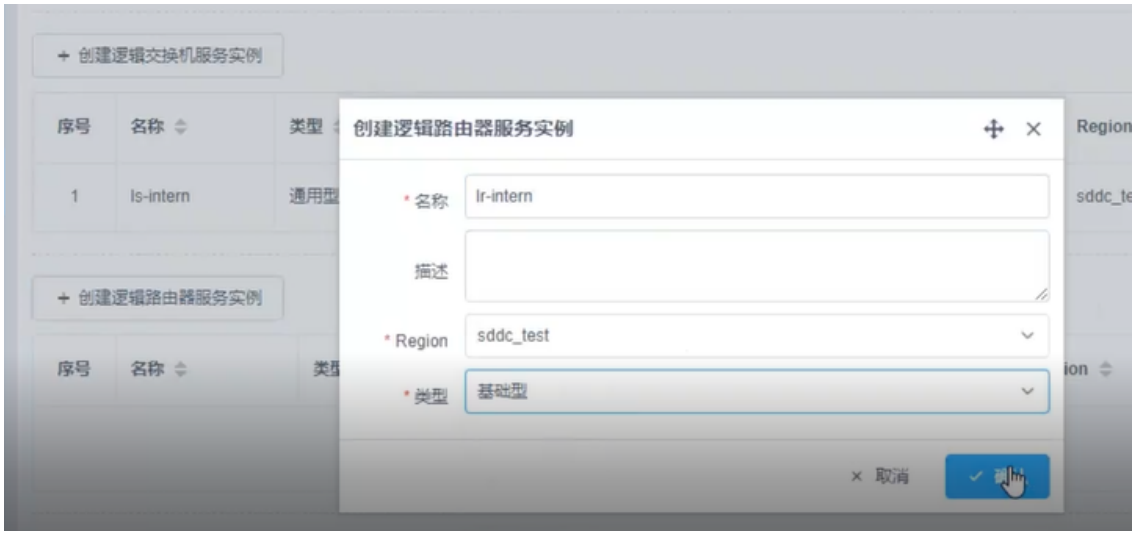


- **在资源详情中添加一些网络资源实例**
    - 虚拟网络



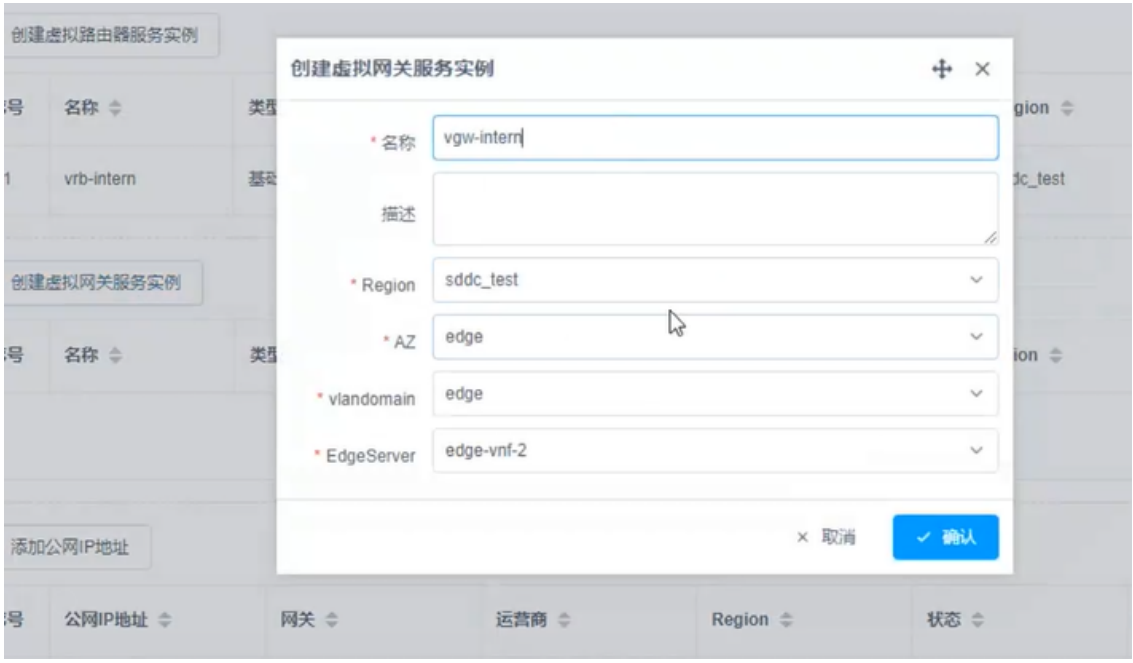
- 逻辑交换机

- 逻辑路由器

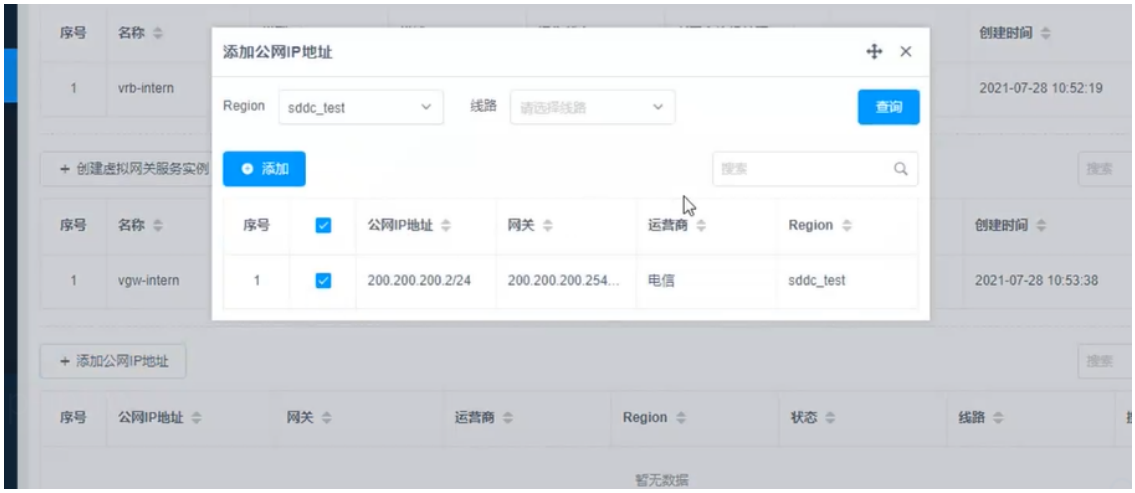


- 虚拟路由器

- 创建虚拟网关

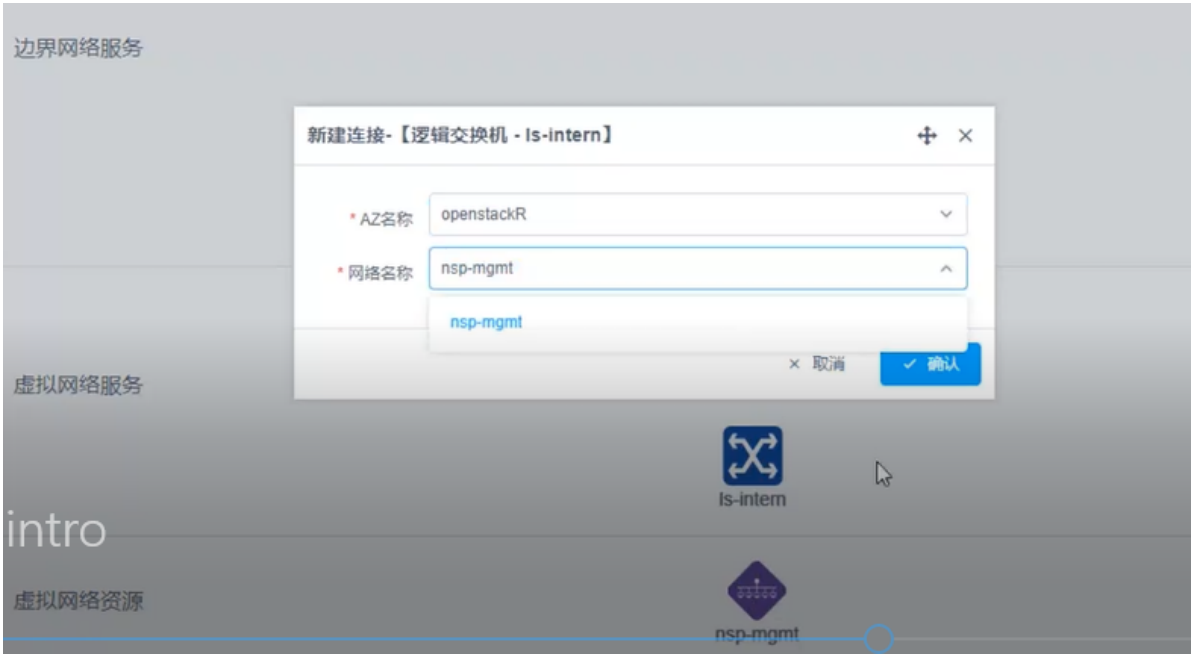


- 公网IP



- **在组网编排拓扑中进行连线**

(1) ls-intern新建连接到nsp-mgmt



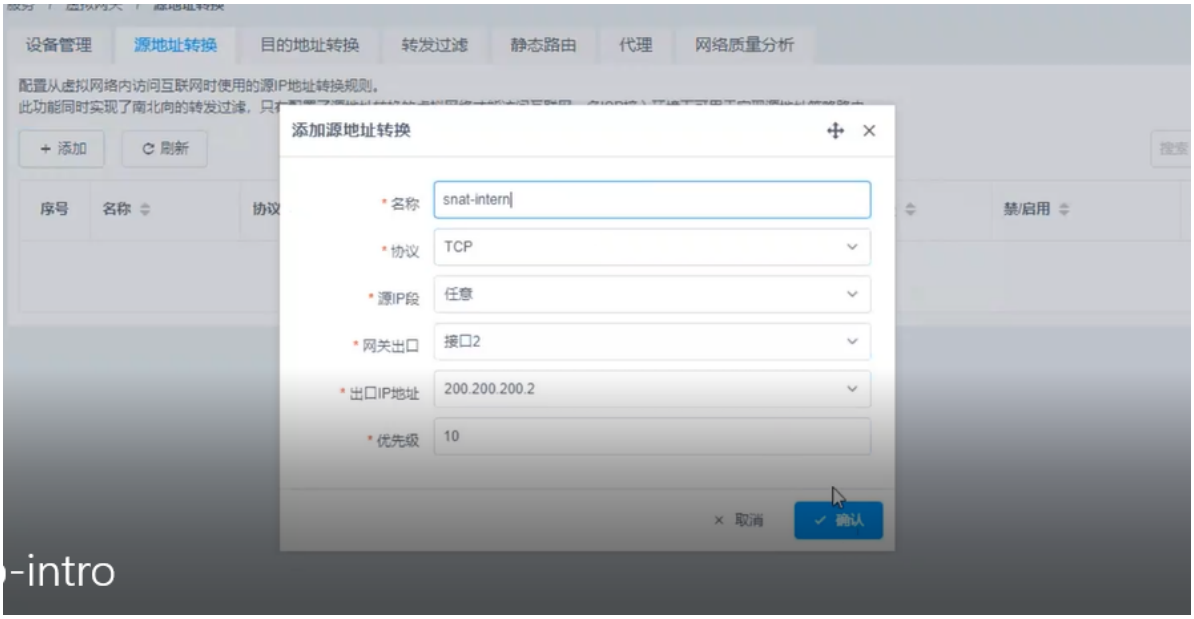
(2) lr-intern 新建连接到 ls-intern（接口ip自动填写在Openstack中设置的子网网关，一般是x.x.x.1）

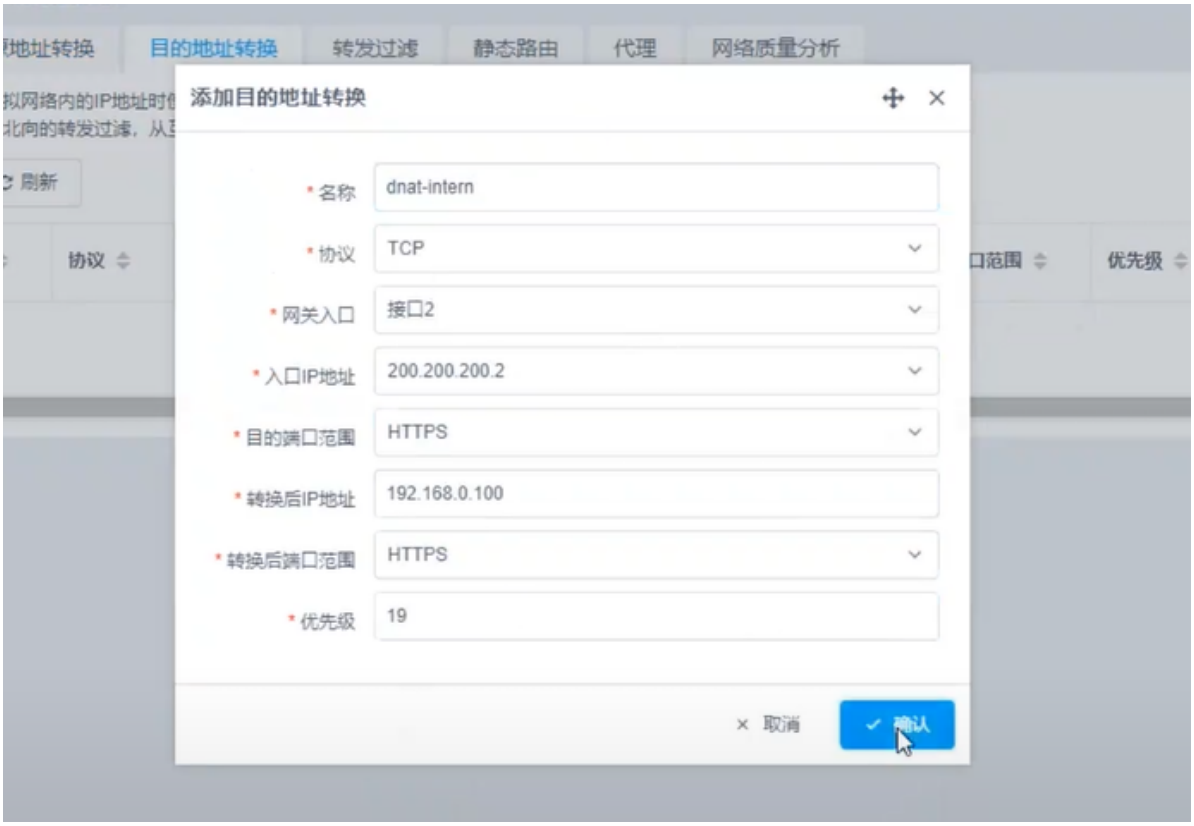
(3) vrb-intern新建连接（往下）到lr-intern

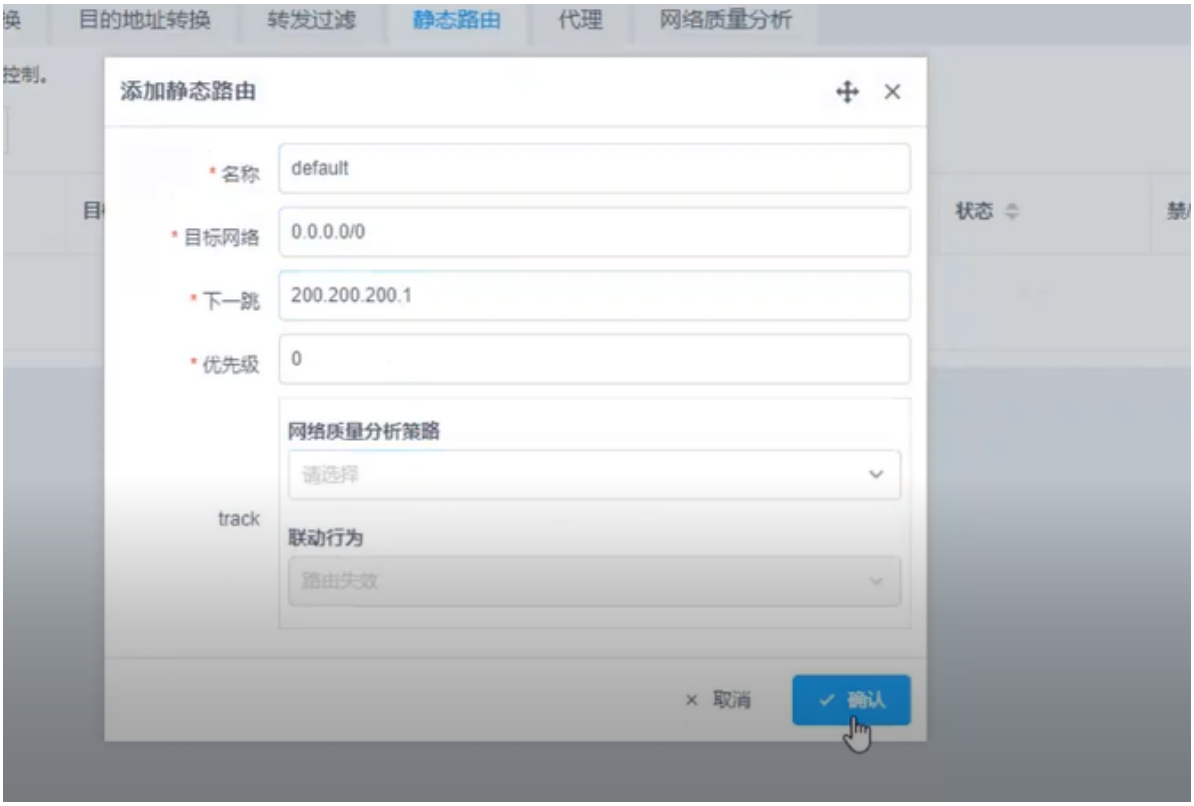
(3)vrb-intern新建连接（往上）到vgw-intern

(4) vgw-intern 连接到外部网络

- **配置NAT和默认路由**


设备管理
源地址转换
目的地址转换
转发过滤
静态路由
代理
网络质量分析
配置从虚拟网络内访问互联网时使用的源IP地址转换规则。
此功能同时实现了南北向的转发过滤，只
+ 添加
刷新
序号
名称
协议
禁/启用
添加源地址转换
* 名称
snat-intern
* 协议
TCP
* 源IP段
任意
* 网关出口
接口2
* 出口IP地址
200.200.200.2
* 优先级
10
× 取消
确认
-intro


地址转换
目的地址转换
转发过滤
静态路由
代理
网络质量分析
拟网络内的IP地址时
北向的转发过滤，从
刷新
协议
口范围
优先级
添加目的地址转换
* 名称
dnat-intern
* 协议
TCP
* 网关入口
接口2
* 入口IP地址
200.200.200.2
* 目的端口范围
HTTPS
* 转换后IP地址
192.168.0.100
* 转换后端口范围
HTTPS
* 优先级
19
× 取消
确认



4.xShell连接开发环境（10.50.253.12国科的环境），ssh登录到openstackR配置虚拟机ip和默认网关，并测试与网关的连通性

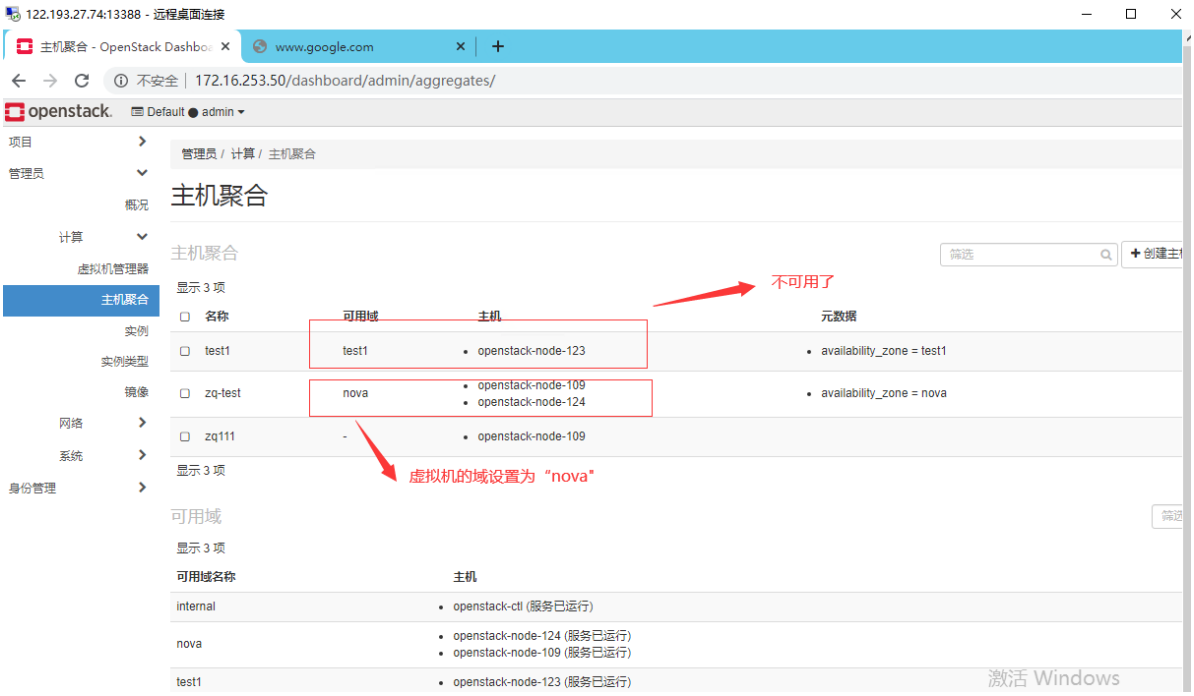
tip:这里的ip和默认网关应该和NSP中组网时的配置保持一致

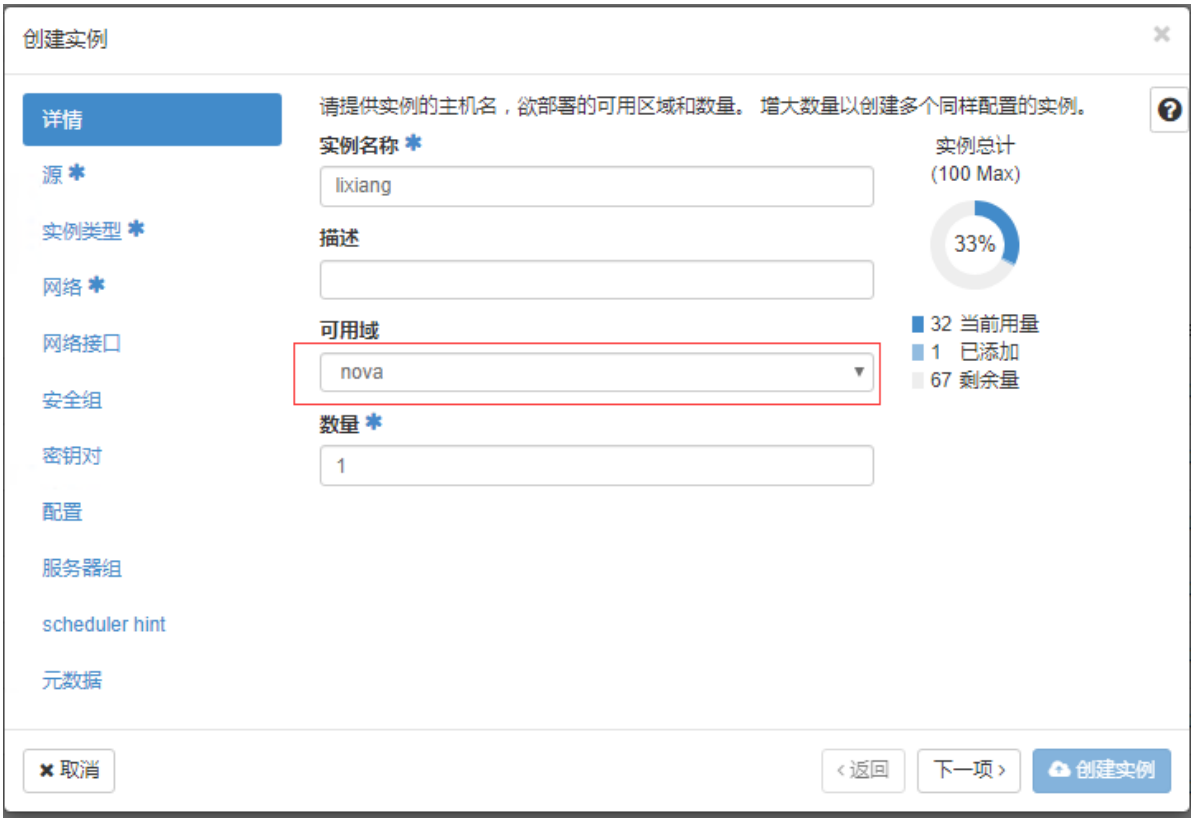
```
Copyright (c) 2020 NetSarang Computer, Inc. All rights reserved.

Type `help' to learn how to use Xshell prompt.
[C:\~]$

Connecting to 10.50.253.12:22...
Connection established.
To escape to local shell, press 'Ctrl+Alt+]'.

WARNING! The remote SSH server rejected X11 forwarding request.
Last login: Wed Jul 28 16:58:34 2021 from 10.33.0.104
Welcome to NSP 5.6.1

 * This is master orchestrator
 * This is slave controller
 * Orchestrator : nsp-ctrl-12, nsp-ctrl-13
 * Peer-controller : nsp-ctrl-13
 * Edge : edge-01, edge-02, edge-03, edge-04

[root@nsp-ctrl-12(o:master c:slave) ~]# ssh root@172.16.253.50  #(OpenstackR)
root@172.16.253.50's password:  #(yunshan3302)
Last login: Wed Jul 28 16:49:50 2021 from 172.16.253.26
[root@openstack-ctl ~]# ssh root@172.16.254.123  #(OpenstackR node-123)
root@172.16.254.123's password:     #(yunshan3302)
Last login: Wed Jul 28 16:59:10 2021 from 172.16.253.50
[root@openstack-node-123 ~]# virsh list
 Id    Name                           State
```

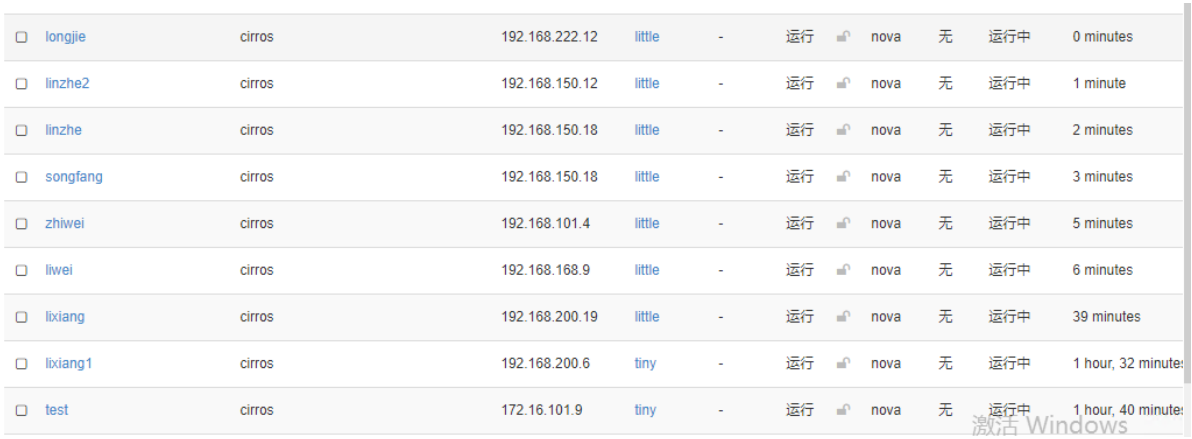
```
----------------------------------------------------
 127   instance-000000b5              running
 133   instance-000000bb              running
 199   instance-00000129              running
 211   instance-00000135              running
 212   instance-00000136              running
 240   instance-00000160              running
 241   instance-00000161              running
 242   instance-00000162              running
 247   instance-00000167              running
 271   instance-0000017f              running
 272   instance-00000180              running
 276   instance-00000184              running
 278   instance-00000186              running
 282   instance-0000018a              running
 283   instance-0000018b              running
 285   instance-0000018d              running
 286   instance-0000018e              running
 288   instance-00000190              running
 291   instance-00000193              running
 292   instance-00000194              running
 293   instance-00000195              running
 294   instance-00000196              running
 295   instance-00000192              running
#查看KVM虚拟机的配置（名称）
[root@openstack-node-123 ~]# virsh dumpxml 288 | grep nova:name
      <nova:name>lixiang</nova:name>
[root@openstack-node-123 ~]# virsh console 288  #连入虚拟机
Connected to domain instance-00000190
Escape character is ^]
error: operation failed: Active console session exists for this domain

[root@openstack-node-123 ~]# virsh console 288
Connected to domain instance-00000190
Escape character is ^]

login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login: cirros
Password:
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:27:d8:1d brd ff:ff:ff:ff:ff:ff
    inet6 fe80::f816:3eff:fe27:d81d/64 scope link
       valid_lft forever preferred_lft forever
$ sudo su
$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
```

```
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:27:d8:1d brd ff:ff:ff:ff:ff:ff
    inet6 fe80::f816:3eff:fe27:d81d/64 scope link
       valid_lft forever preferred_lft forever

#配置接口IP
$ ifconfig eth0 192.168.200.5 netmask 255.255.255.0
$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:27:d8:1d brd ff:ff:ff:ff:ff:ff
    inet 192.168.200.5/24 brd 192.168.200.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::f816:3eff:fe27:d81d/64 scope link
       valid_lft forever preferred_lft forever
#配置默认网关
$ route add default gw 192.168.200.2
$ ping 192.168.200.2
PING 192.168.200.2 (192.168.200.2): 56 data bytes

^Z[1]+  Stopped                    ping 192.168.200.2
$ ping 192.168.200.5
PING 192.168.200.5 (192.168.200.5): 56 data bytes
64 bytes from 192.168.200.5: seq=0 ttl=64 time=0.073 ms
64 bytes from 192.168.200.5: seq=1 ttl=64 time=0.082 ms
64 bytes from 192.168.200.5: seq=2 ttl=64 time=0.093 ms
64 bytes from 192.168.200.5: seq=3 ttl=64 time=0.063 ms
64 bytes from 192.168.200.5: seq=4 ttl=64 time=0.091 ms
64 bytes from 192.168.200.5: seq=5 ttl=64 time=0.075 ms
```

5.ping网关失败，原因是test1域不可用了。改到nova(openstack-node-124)


122.193.27.74:13388 - 远程桌面连接
主机聚合 - OpenStack Dashbo
www.google.com
不安全 | 172.16.253.50/dashboard/admin/aggregates/
openstack.
Default admin
项目
管理员
概况
计算
虚拟机管理器
主机聚合
实例
实例类型
镜像
网络
系统
身份管理
管理员 / 计算 / 主机聚合
主机聚合
主机聚合
显示 3 项
名称
可用域
主机
元数据
test1
test1
openstack-node-123
availability_zone = test1
zq-test
nova
openstack-node-109
openstack-node-124
availability_zone = nova
zq111
-
openstack-node-109
显示 3 项
不可用了
虚拟机的域设置为“nova”
可用域
显示 3 项
可用域名称
主机
internal
openstack-ctl (服务已运行)
nova
openstack-node-124 (服务已运行)
openstack-node-109 (服务已运行)
test1
openstack-node-123 (服务已运行)
激活 Windows


创建实例
详情
源 *
实例类型 *
网络 *
网络接口
安全组
密钥对
配置
服务器组
scheduler hint
元数据
请提供实例的主机名，欲部署的可用区域和数量。 增大数量以创建多个同样配置的实例。
实例名称 *
lixiang
描述
可用域
nova
数量 *
1
实例总计
(100 Max)
33%
32 当前用量
1 已添加
67 剩余量
取消
返回
下一项
创建实例


longjie cirros 192.168.222.12 little - 运行 nova 无 运行中 0 minutes
linzhe2 cirros 192.168.150.12 little - 运行 nova 无 运行中 1 minute
linzhe cirros 192.168.150.18 little - 运行 nova 无 运行中 2 minutes
songfang cirros 192.168.150.18 little - 运行 nova 无 运行中 3 minutes
zhiwei cirros 192.168.101.4 little - 运行 nova 无 运行中 5 minutes
liwei cirros 192.168.168.9 little - 运行 nova 无 运行中 6 minutes
lixiang cirros 192.168.200.19 little - 运行 nova 无 运行中 39 minutes
lixiang1 cirros 192.168.200.6 tiny - 运行 nova 无 运行中 1 hour, 32 minute
test cirros 172.16.101.9 tiny - 运行 nova 无 运行中 1 hour, 40 minute
激活 Windows

lixiang1:192.168.200.6 43

lixiang2:192.168.200.7 53

```
[root@nsp-ctrl-13(o:master c:master) ~]# ssh root@172.16.253.50
root@172.16.253.50's password:
Last login: Thu Jul 29 12:20:37 2021 from 172.16.253.13
[root@openstack-ctl ~]# ssh root@172.16.254.124
root@172.16.254.124's password:
Last login: Thu Jul 29 12:21:23 2021 from openstack-ctl
[root@openstack-node-124 ~]# virsh list
 Id    Name                           State
----------------------------------------------------
 1     CR22                           running
 23    instance-0000007f              running
 24    instance-00000080              running
 32    instance-00000155              running
 41    vsrx-124                       running
 42    instance-0000019a              running
 43    instance-0000019b              running
 44    instance-0000019c              running
 45    instance-0000019d              running
 46    instance-0000019e              running
 47    instance-0000019f              running
 48    instance-000001a0              running
 49    instance-000001a1              running
 50    instance-000001a2              running


[root@openstack-node-124 ~]# virsh dumpxml 43 |grep nova:name
      <nova:name>lixiang1</nova:name>
[root@openstack-node-124 ~]# virsh dumpxml 44 |grep nova:name
      <nova:name>lixiang</nova:name>


[root@openstack-node-124 ~]# virsh console 43
Connected to domain instance-0000019b
Escape character is ^]
error: 操作失败: 这个域有活跃控制台会话

[root@openstack-node-124 ~]# virsh console 44
Connected to domain instance-0000019c
Escape character is ^]

login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login: cirros
Password:

Login incorrect
cirros login: cirros
Password:
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
```

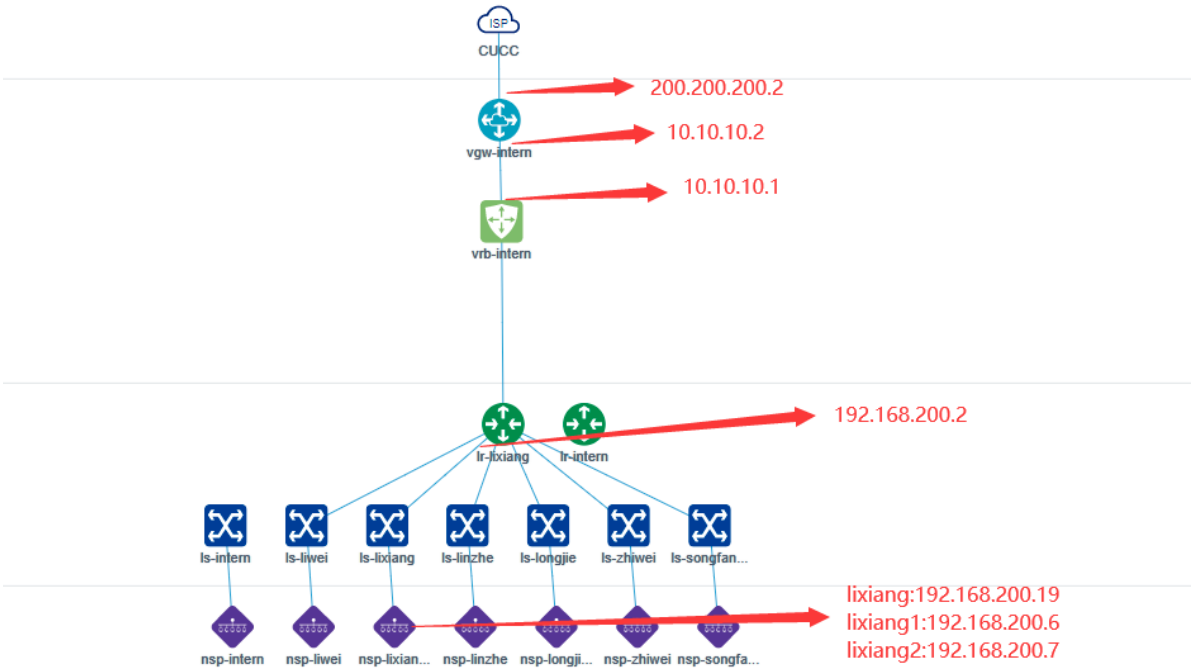
```
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:b4:46:ca brd ff:ff:ff:ff:ff:ff
    inet6 fe80::f816:3eff:feb4:46ca/64 scope link
       valid_lft forever preferred_lft forever
$ sudo su
$ ifconfig eth0 192.168.200.5 netmask 255.255.255.0
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:b4:46:ca brd ff:ff:ff:ff:ff:ff
    inet 192.168.200.5/24 brd 192.168.200.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::f816:3eff:feb4:46ca/64 scope link
       valid_lft forever preferred_lft forever
$ ifconfig eth0 192.168.200.19 netmask 255.255.255.0
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:b4:46:ca brd ff:ff:ff:ff:ff:ff
    inet 192.168.200.19/24 brd 192.168.200.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::f816:3eff:feb4:46ca/64 scope link
       valid_lft forever preferred_lft forever
$ route add default gw 192.168.200.2
$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         192.168.200.2   0.0.0.0         UG    0      0        0 eth0
192.168.200.0   0.0.0.0         255.255.255.0   U     0      0        0 eth0
$ ping 192.168.200.2
PING 192.168.200.2 (192.168.200.2): 56 data bytes
64 bytes from 192.168.200.2: seq=0 ttl=254 time=19.399 ms
64 bytes from 192.168.200.2: seq=1 ttl=254 time=0.856 ms
64 bytes from 192.168.200.2: seq=2 ttl=254 time=0.881 ms
64 bytes from 192.168.200.2: seq=3 ttl=254 time=0.869 ms
64 bytes from 192.168.200.2: seq=4 ttl=254 time=0.928 ms
64 bytes from 192.168.200.2: seq=5 ttl=254 time=0.859 ms
64 bytes from 192.168.200.2: seq=6 ttl=254 time=0.871 ms
```

```
[root@nsp-ctrl-13(o:master c:master) ~]# ssh root@172.16.253.50
root@172.16.253.50's password:
Last login: Thu Jul 29 12:39:33 2021 from 172.16.253.13
```

```
[root@openstack-ctl ~]# ssh root@172.16.254.124
root@172.16.254.124's password:
Last login: Thu Jul 29 12:39:52 2021 from openstack-ctl
[root@openstack-node-124 ~]# virsh list
 Id    Name                           State
----------------------------------------------------
 1     CR22                           running
 23    instance-0000007f              running
 24    instance-00000080              running
 32    instance-00000155              running
 41    vsrx-124                       running
 42    instance-0000019a              running
 43    instance-0000019b              running
 44    instance-0000019c              running
 45    instance-0000019d              running
 46    instance-0000019e              running
 47    instance-0000019f              running
 50    instance-000001a2              running
 51    instance-000001a3              running
 52    instance-000001a4              running
 53    instance-000001a5              running

[root@openstack-node-124 ~]# virsh dumpxml 53 | grep nova:name
      <nova:name>lixiang2</nova:name>
[root@openstack-node-124 ~]# virsh console 53
Connected to domain instance-000001a5
Escape character is ^]

login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login: cirros
Password:
$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:c7:d6:60 brd ff:ff:ff:ff:ff:ff
    inet6 fe80::f816:3eff:fec7:d660/64 scope link
       valid_lft forever preferred_lft forever
$ sudo ifconfig eth0 192.168.200.7
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast qlen 1000
    link/ether fa:16:3e:c7:d6:60 brd ff:ff:ff:ff:ff:ff
    inet 192.168.200.7/24 brd 192.168.200.255 scope global eth0
       valid_lft forever preferred_lft forever
    inet6 fe80::f816:3eff:fec7:d660/64 scope link
       valid_lft forever preferred_lft forever
$ [  391.408180] random: nonblocking pool is initialized
```

```
$ route add default gw 192.168.200.2
route: SIOCADDRT: Operation not permitted
$ sudo route default gw 192.168.200.2
BusyBox v1.23.2 (2017-11-20 02:37:12 UTC) multi-call binary.

Usage: route [{add|del|delete}]

Edit kernel routing tables

    -n  Don't resolve names
    -e  Display other/more information
    -A inet{6}  Select address family

$ sudo route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
192.168.200.0   0.0.0.0         255.255.255.0   U     0      0        0 eth0
$ sudo su
$ route add default gw 192.168.200.2
$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         192.168.200.2   0.0.0.0         UG    0      0        0 eth0
192.168.200.0   0.0.0.0         255.255.255.0   U     0      0        0 eth0
$ ping 192.168.200.2
PING 192.168.200.2 (192.168.200.2): 56 data bytes
64 bytes from 192.168.200.2: seq=0 ttl=254 time=16.988 ms
64 bytes from 192.168.200.2: seq=1 ttl=254 time=1.035 ms
64 bytes from 192.168.200.2: seq=2 ttl=254 time=0.887 ms
^C
--- 192.168.200.2 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.887/6.303/16.988 ms
$ ping 192.168.200.6
PING 192.168.200.6 (192.168.200.6): 56 data bytes
64 bytes from 192.168.200.6: seq=0 ttl=64 time=1.009 ms
64 bytes from 192.168.200.6: seq=1 ttl=64 time=0.250 ms
64 bytes from 192.168.200.6: seq=2 ttl=64 time=0.238 ms
64 bytes from 192.168.200.6: seq=3 ttl=64 time=0.250 ms
^C
--- 192.168.200.6 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 0.238/0.436/1.009 ms
$ ping 192.168.200.19
PING 192.168.200.19 (192.168.200.19): 56 data bytes
64 bytes from 192.168.200.19: seq=0 ttl=64 time=1.034 ms
64 bytes from 192.168.200.19: seq=1 ttl=64 time=0.222 ms
64 bytes from 192.168.200.19: seq=2 ttl=64 time=0.235 ms
64 bytes from 192.168.200.19: seq=3 ttl=64 time=0.255 ms
^C
--- 192.168.200.19 ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
round-trip min/avg/max = 0.222/0.436/1.034 ms
$ ping 192.168.101.4
PING 192.168.101.4 (192.168.101.4): 56 data bytes
```

6.网络拓扑图



7.配置vrb和vgw的静态路由

8.配置vgw地址转换NAT