

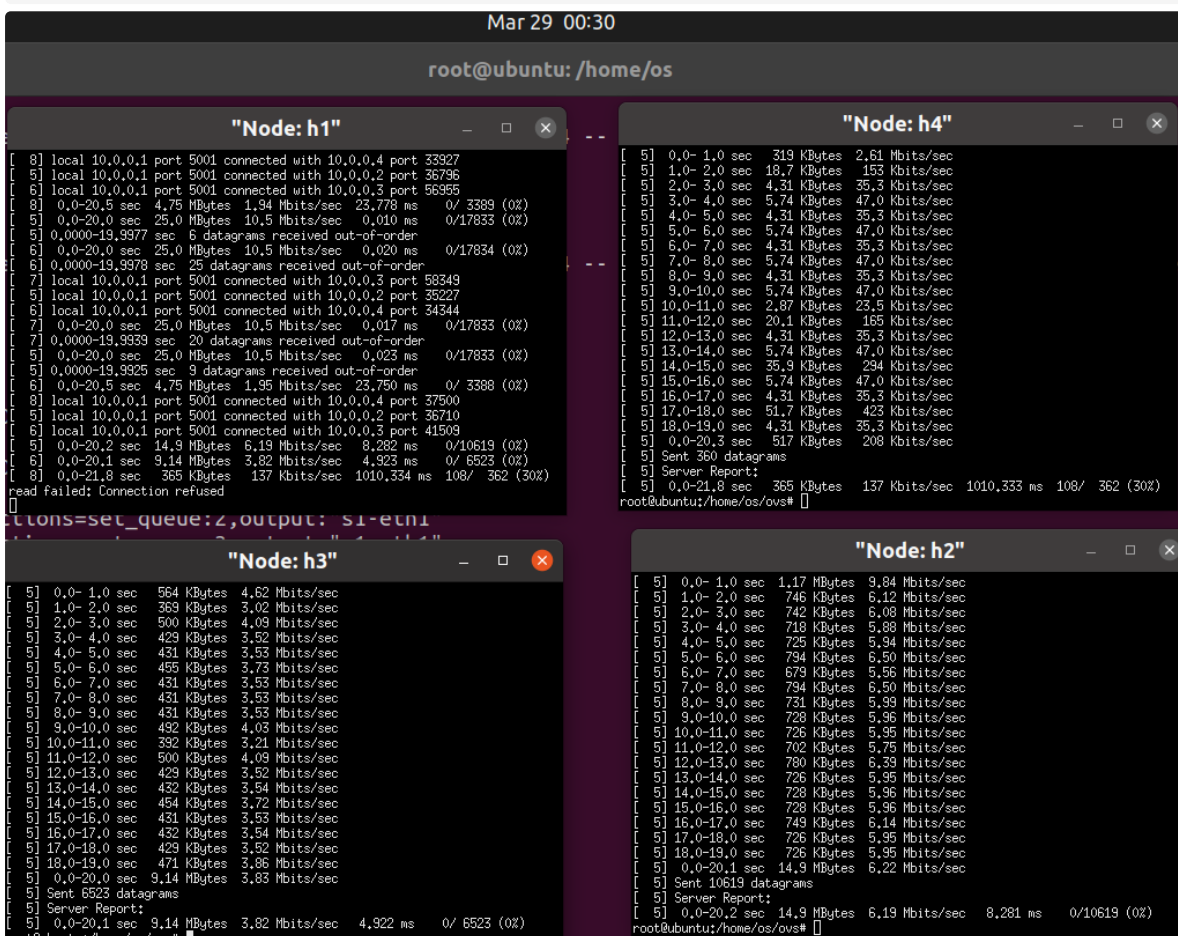
# Task4

Task4 你可以通过上述三种限速的方法来达成目标，请记录你的设计过程（思路及运行指令），并将你稳定后的三个 Client 的带宽结果截图。

由于网卡限速和 meter 表限速并不能进行精确控制，因此采用队列限速。设计四个队列，总队列限速 10Mbps，其中两个限制最低速度，最后一个限制最大速度为 2Mbps。

Python

```
ovs-vsctl set port s1-eth1 qos=@newqos1 --  
--id=@newqos1 create qos type=linux-htb \  
other-config:max-rate=10000000 queues=2=@q2,3=@q3,4=@q4 -- \  
--id=@q2 create queue other-config:min-rate=5000000 -- \  
--id=@q3 create queue other-config:min-rate=3000000 -- \  
--id=@q4 create queue other-config:max-rate=2000000
```



可以看到，这样设置的三个队列只设置了两个条件，q2 最低带宽是 5Mbps,q3 最低带宽是 3Mbps,但有两个缺点。

1. 没有指定队列给指定的端口
2. H4 竞争力过低，并且有较高的丢包率，不符合在保障其他的情况下尽量快的要求。

改进方法为分别指定不同队列给不同端口,并且限制 h2 和 h3 的速度

Python

```
ovs-vsctl set port s1-eth1 qos=@newqos1 --
--id=@newqos1 create qos type=linux-htb \
other-config:max-rate=10000000 queues=2=@q2,3=@q3,4=@q4 -- \
--id=@q2 create queue other-config:max-rate=5500000 other-config:min-rate
=5000000 -- \
--id=@q3 create queue other-config:max-rate=3300000 other-config:min-rate
=3000000 -- \
--id=@q4 create queue other-config:max-rate=2000000
```

Python

```
ovs-ofctl add-flow s1 in_port=2,action=set_queue:2,output:1 -0 openflow13
ovs-ofctl add-flow s1 in_port=3,action=set_queue:3,output:1 -0 openflow13
ovs-ofctl add-flow s1 in_port=4,action=set_queue:4,output:1 -0 openflow13
```

```
Mar 29 00:46
root@ubuntu: /home/os

"Node: h1"
[ 5] 0.0-20.2 sec 14.9 MBytes 6.19 Mbits/sec 8.282 ms 0/10619 (0%)
[ 6] 0.0-20.1 sec 9.14 MBytes 3.82 Mbits/sec 4.923 ms 0/ 6523 (0%)
[ 8] 0.0-21.8 sec 365 KBytes 137 Kbits/sec 1010.334 ms 108/ 362 (30%)
read failed: Connection refused
[ 7] local 10.0.0.1 port 5001 connected with 10.0.0.3 port 58478
[ 5] local 10.0.0.1 port 5001 connected with 10.0.0.2 port 60623
[ 6] local 10.0.0.1 port 5001 connected with 10.0.0.4 port 36188
[ 7] 0.0-20.2 sec 9.10 MBytes 3.78 Mbits/sec 12.787 ms 0/ 6488 (0%)
[ 5] 0.0-20.1 sec 14.6 MBytes 6.11 Mbits/sec 0.355 ms 0/10438 (0%)
[ 5] 0.0000-20.0834 sec 1 datagrams received out-of-order
[ 6] 0.0-20.6 sec 373 KBytes 149 Kbits/sec 35.999 ms 64/ 324 (20%)
[ 8] local 10.0.0.1 port 5001 connected with 10.0.0.3 port 53819
[ 5] local 10.0.0.1 port 5001 connected with 10.0.0.2 port 40865
[ 6] local 10.0.0.1 port 5001 connected with 10.0.0.4 port 60583
[ 8] 0.0-20.2 sec 7.29 MBytes 3.02 Mbits/sec 13.837 ms 0/ 5197 (0%)
[ 5] 0.0-20.1 sec 12.0 MBytes 4.98 Mbits/sec 7.047 ms 0/ 8526 (0%)
[ 6] 0.0-20.5 sec 2.84 MBytes 1.16 Mbits/sec 51.598 ms 0/ 2027 (0%)
[ 7] local 10.0.0.1 port 5001 connected with 10.0.0.2 port 40317
[ 5] local 10.0.0.1 port 5001 connected with 10.0.0.3 port 60350
[ 6] local 10.0.0.1 port 5001 connected with 10.0.0.4 port 51799
[ 7] 0.0-20.1 sec 12.0 MBytes 5.00 Mbits/sec 1.192 ms 0/ 8562 (0%)
[ 5] 0.0-20.3 sec 7.77 MBytes 3.21 Mbits/sec 13.213 ms 0/ 5539 (0%)
[ 6] 0.0-20.5 sec 3.09 MBytes 1.26 Mbits/sec 5.921 ms 0/ 2201 (0%)

"Node: h4"
[ 5] 1.0- 2.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 2.0- 3.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 3.0- 4.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 4.0- 5.0 sec 144 KBytes 1.18 Mbits/sec
[ 5] 5.0- 6.0 sec 144 KBytes 1.18 Mbits/sec
[ 5] 6.0- 7.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 7.0- 8.0 sec 141 KBytes 1.15 Mbits/sec
[ 5] 8.0- 9.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 9.0-10.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 10.0-11.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 11.0-12.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 12.0-13.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 13.0-14.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 14.0-15.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 15.0-16.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 16.0-17.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 17.0-18.0 sec 144 KBytes 1.18 Mbits/sec
[ 5] 18.0-19.0 sec 142 KBytes 1.16 Mbits/sec
[ 5] 19.0-20.0 sec 280 KBytes 2.29 Mbits/sec
[ 5] 0.0-20.0 sec 3.09 MBytes 1.29 Mbits/sec
[ 5] Sent 2201 datagrams
[ 5] Server Report:
[ 5] 0.0-20.5 sec 3.09 MBytes 1.26 Mbits/sec 5.921 ms 0/ 2201 (0%)
root@ubuntu:/home/os/ovs#

"Node: h3"
[ 5] 0.0- 1.0 sec 497 KBytes 4.07 Mbits/sec
[ 5] 1.0- 2.0 sec 368 KBytes 2.99 Mbits/sec
[ 5] 2.0- 3.0 sec 434 KBytes 3.55 Mbits/sec
[ 5] 3.0- 4.0 sec 393 KBytes 3.22 Mbits/sec
[ 5] 4.0- 5.0 sec 366 KBytes 3.00 Mbits/sec
[ 5] 5.0- 6.0 sec 432 KBytes 3.54 Mbits/sec
[ 5] 6.0- 7.0 sec 386 KBytes 3.16 Mbits/sec
[ 5] 7.0- 8.0 sec 375 KBytes 3.07 Mbits/sec
[ 5] 8.0- 9.0 sec 366 KBytes 3.00 Mbits/sec
[ 5] 9.0-10.0 sec 330 KBytes 3.20 Mbits/sec
[ 5] 10.0-11.0 sec 456 KBytes 3.58 Mbits/sec
[ 5] 11.0-12.0 sec 366 KBytes 3.00 Mbits/sec
[ 5] 12.0-13.0 sec 366 KBytes 3.00 Mbits/sec
[ 5] 13.0-14.0 sec 395 KBytes 3.23 Mbits/sec
[ 5] 14.0-15.0 sec 434 KBytes 3.55 Mbits/sec
[ 5] 15.0-16.0 sec 365 KBytes 2.99 Mbits/sec
[ 5] 16.0-17.0 sec 393 KBytes 3.22 Mbits/sec
[ 5] 17.0-18.0 sec 366 KBytes 3.00 Mbits/sec
[ 5] 18.0-19.0 sec 434 KBytes 3.55 Mbits/sec
[ 5] 0.0-20.1 sec 7.77 MBytes 3.24 Mbits/sec
[ 5] Sent 5539 datagrams
[ 5] Server Report:
[ 5] 0.0-20.3 sec 7.77 MBytes 3.21 Mbits/sec 13.213 ms 0/ 5539 (0%)
root@ubuntu:/home/os/ovs#

"Node: h2"
[ 5] 0.0- 1.0 sec 280 KBytes 2.29 Mbits/sec
[ 5] 1.0- 2.0 sec 80.4 KBytes 659 Kbits/sec
[ 5] 2.0- 3.0 sec 876 KBytes 7.17 Mbits/sec
[ 5] 3.0- 4.0 sec 607 KBytes 4.97 Mbits/sec
[ 5] 4.0- 5.0 sec 675 KBytes 5.54 Mbits/sec
[ 5] 5.0- 6.0 sec 675 KBytes 5.54 Mbits/sec
[ 5] 6.0- 7.0 sec 609 KBytes 4.99 Mbits/sec
[ 5] 7.0- 8.0 sec 675 KBytes 5.53 Mbits/sec
[ 5] 8.0- 9.0 sec 675 KBytes 5.54 Mbits/sec
[ 5] 9.0-10.0 sec 606 KBytes 4.96 Mbits/sec
[ 5] 10.0-11.0 sec 678 KBytes 5.55 Mbits/sec
[ 5] 11.0-12.0 sec 675 KBytes 5.53 Mbits/sec
[ 5] 12.0-13.0 sec 606 KBytes 4.96 Mbits/sec
[ 5] 13.0-14.0 sec 675 KBytes 5.53 Mbits/sec
[ 5] 14.0-15.0 sec 675 KBytes 5.53 Mbits/sec
[ 5] 15.0-16.0 sec 609 KBytes 4.99 Mbits/sec
[ 5] 16.0-17.0 sec 675 KBytes 5.53 Mbits/sec
[ 5] 17.0-18.0 sec 675 KBytes 5.53 Mbits/sec
[ 5] 18.0-19.0 sec 607 KBytes 4.97 Mbits/sec
[ 5] 0.0-19.9 sec 12.0 MBytes 5.05 Mbits/sec
[ 5] Sent 8562 datagrams
[ 5] Server Report:
[ 5] 0.0-20.1 sec 12.0 MBytes 5.00 Mbits/sec 1.192 ms 0/ 8562 (0%)
root@ubuntu:/home/os/ovs#
```

由于是手动启动发送数据，h2 最后启动，因此平均带宽会相对实际较低，但这里也符合最低 5Mbps 的要求，丢包率为 0，三条队列的带宽情况也符合要求。总带宽为 9.47Mbps，接近于要求的 10Mbps。