

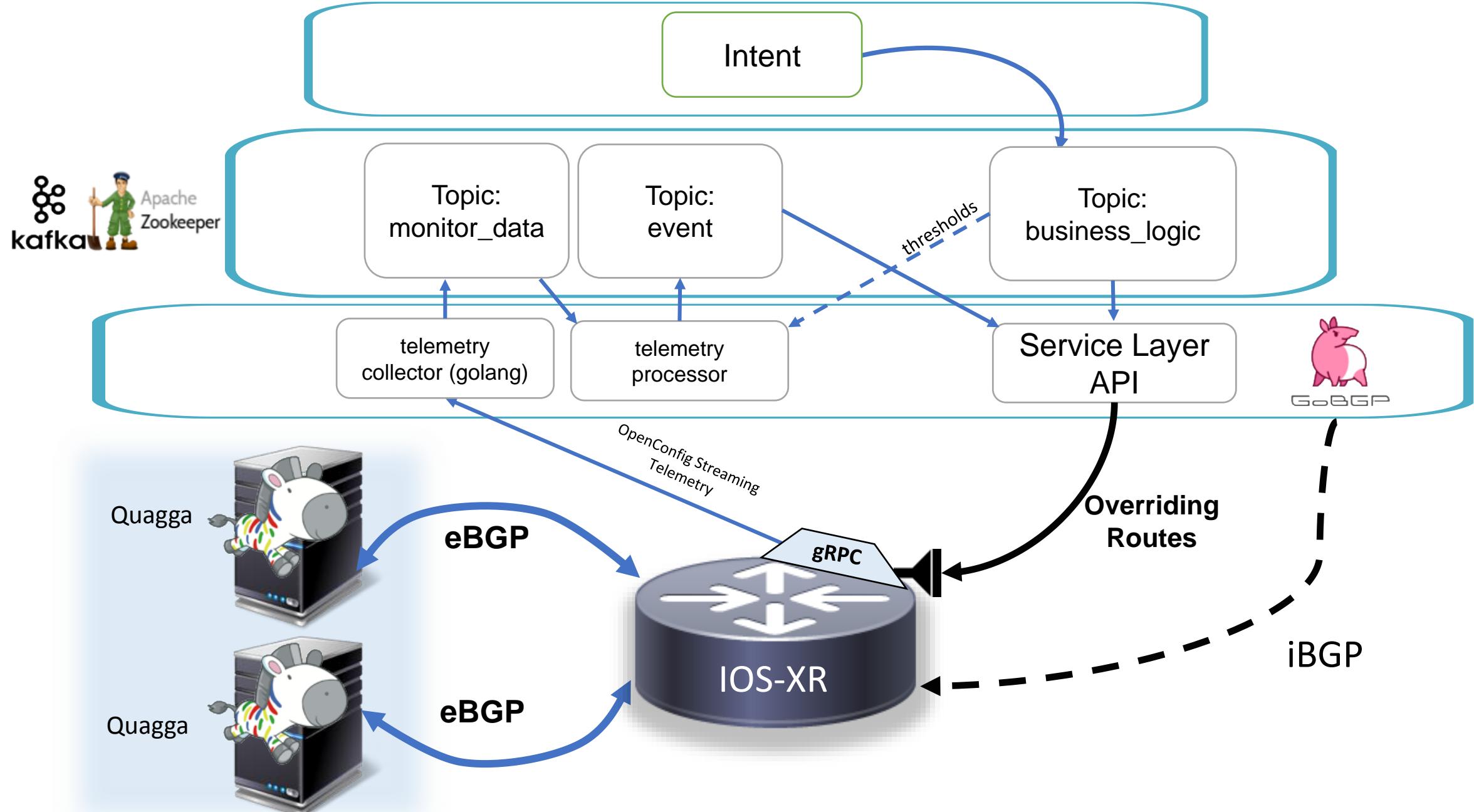
Covfefe Kafka

Team members:

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Github repo: <https://github.com/Maikor/nanog71-hackathon>

Egress Traffic Controller Architecture



Benefits of the solution

- Any type of data could be published to message bus;
- Fully abstracted business logic;
- YAML based monitoring rules – easily replaced to any other format;
- Language agnostic pub-sub mechanism.

Thanks for attention!

<https://github.com/Maikor/nanog71-hackathon>

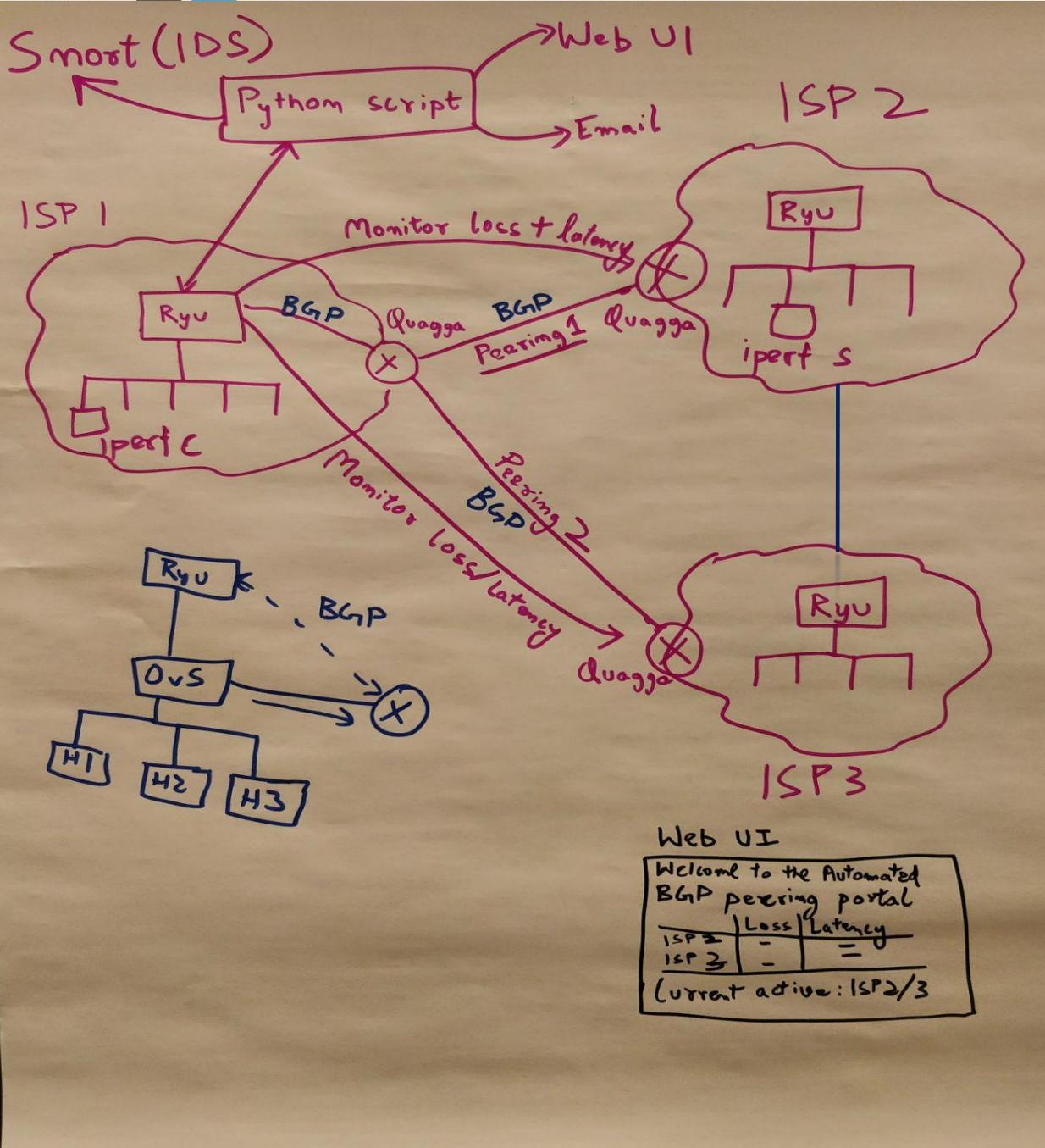
BGP Route control

- HackOverflow -

University of Colorado Boulder



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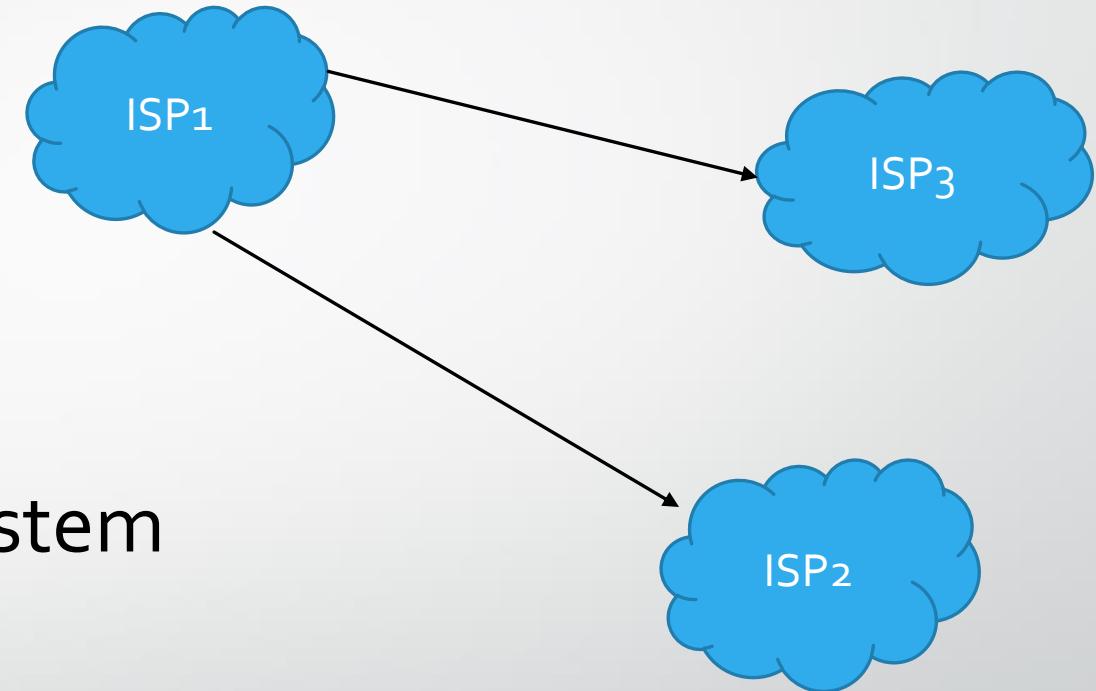
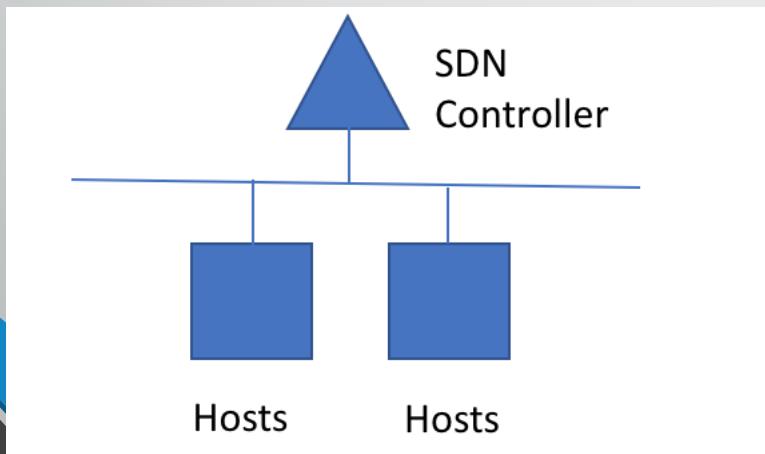


Intelligent BGP Multihoming

- EBGP between ISP (ISP1-ISP2 and ISP1-ISP3)
- IBGP between ISP, Controller and Mininet
- Python script to continuously poll to gather:
 - RTT
 - Packet Loss
 - Python script to control EBGP route – Local preference
 - Email when change occurs

Inventory

- Edge routers: Quagga
- SDN Controller: Ryu or ODL
- Network simulator: Mininet
- Snort: Intrusion Detection System

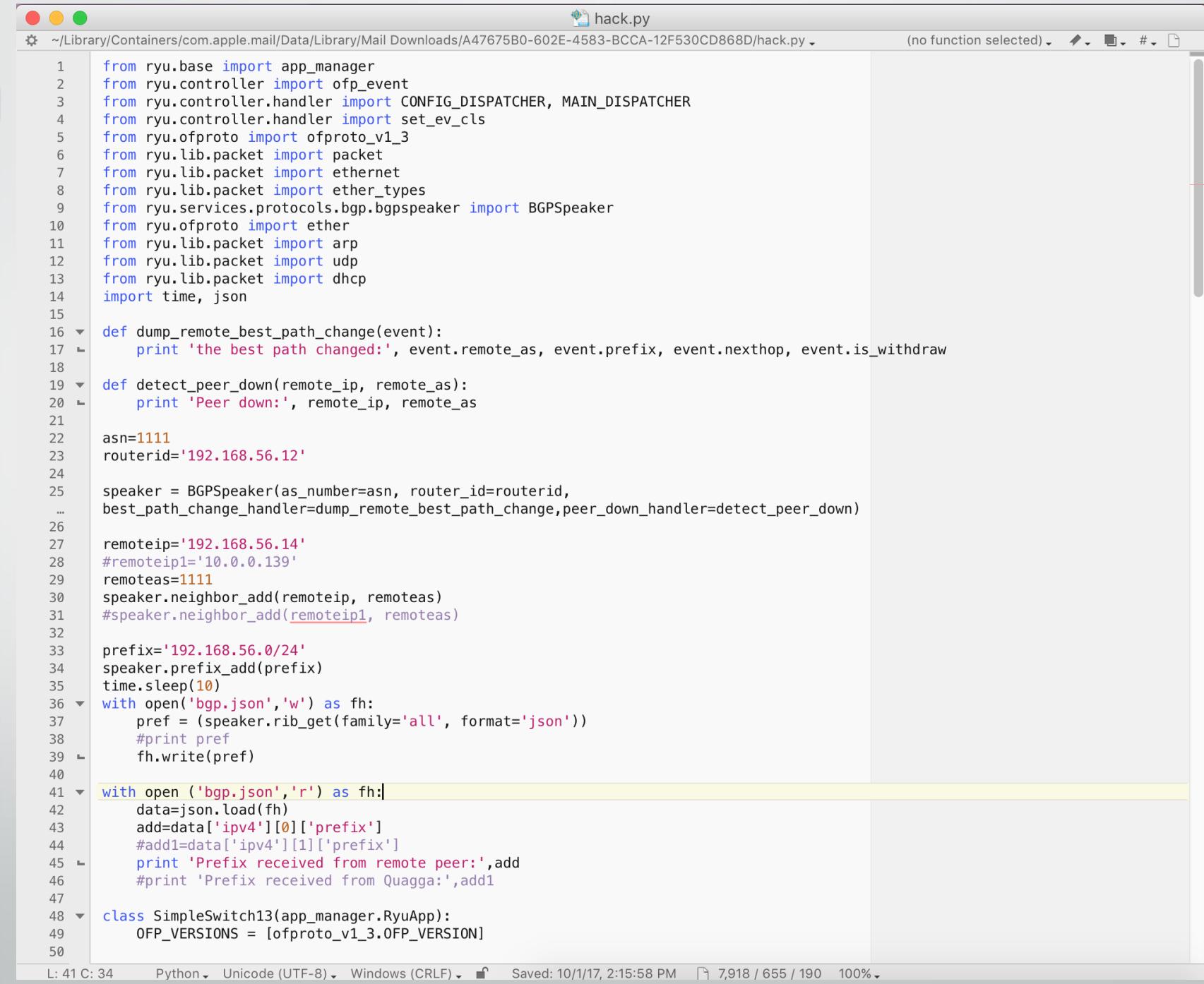


Implementation

SDN Controller

iBGP

Quagga



```
hack.py
~ /Library/Containers/com.apple.mail/Data/Library/Mail Downloads/A47675B0-602E-4583-BCCA-12F530CD868D/hack.py
(no function selected) □ # □

1  from ryu.base import app_manager
2  from ryu.controller import ofp_event
3  from ryu.controller.handler import CONFIG_DISPATCHER, MAIN_DISPATCHER
4  from ryu.controller.handler import set_ev_cls
5  from ryu.ofproto import ofproto_v1_3
6  from ryu.lib.packet import packet
7  from ryu.lib.packet import ethernet
8  from ryu.lib.packet import ether_types
9  from ryu.services.protocols.bgp.bgpspeaker import BGPSpeaker
10 from ryu.ofproto import ether
11 from ryu.lib.packet import arp
12 from ryu.lib.packet import udp
13 from ryu.lib.packet import dhcp
14 import time, json
15
16 def dump_remote_best_path_change(event):
17     print 'the best path changed:', event.remote_as, event.prefix, event.nexthop, event.is_withdraw
18
19 def detect_peer_down(remote_ip, remote_as):
20     print 'Peer down:', remote_ip, remote_as
21
22 asn=1111
23 routerid='192.168.56.12'
24
25 speaker = BGPSpeaker(as_number=asn, router_id=routerid,
26 ... best_path_change_handler=dump_remote_best_path_change, peer_down_handler=detect_peer_down)
27
28 remoteip='192.168.56.14'
29 #remoteip1='10.0.0.139'
30 remoteas=1111
31 speaker.neighbor_add(remoteip, remoteas)
#speaker.neighbor_add(remoteip1, remoteas)
32
33 prefix='192.168.56.0/24'
34 speaker.prefix_add(prefix)
35 time.sleep(10)
36 with open('bgp.json', 'w') as fh:
37     pref = (speaker.rib_get(family='all', format='json'))
#print pref
38     fh.write(pref)
39
40 with open ('bgp.json', 'r') as fh:
41     data=json.load(fh)
42     add=data['ipv4'][0]['prefix']
43     #add1=data['ipv4'][1]['prefix']
44     print 'Prefix received from remote peer:',add
#print 'Prefix received from Quagga:',add1
45
46
47 class SimpleSwitch13(app_manager.RyuApp):
48     OFP_VERSIONS = [ofproto_v1_3.OFP_VERSION]
49
50
```

L: 41 C: 34 Python ▾ Unicode (UTF-8) ▾ Windows (CRLF) ▾ Saved: 10/1/17, 2:15:58 PM ▾ 7,918 / 655 / 190 100% ▾

Route Manipulation - Python

```
try:  
    import os  
    import pingparser  
    import time  
    from collections import *  
except Exception as e:  
    print e  
os.system("sudo ping -c 5 199.187.219.230 | ./pingparser.py -f '%h %s %r %p %m %M %a' > /home/ashutosh/abcd.txt")  
if os.path.isfile("/home/ashutosh/abcd.txt"):  
    fh = open("/home/ashutosh/abcd.txt","r")  
    f = fh.readlines()  
    loss = (f[0].split(" "))[3]  
    print("LOSS: "+loss)  
    RTT = (f[0].split(" "))[6]  
    print("RTT: "+RTT)  
    os.system("sudo cp /etc/quagga/changebgp.conf /etc/quagga/bgpd.conf")  
    os.system("sudo /etc/init.d/quagga restart")  
else:  
    print "NO"
```

Results

```
! -- bgp --
!
! BGPd sample configuration file
!
! $Id: bgpd.conf.sample,v 1.1 2002/12/13 20:15:29 paul Exp $
!
hostname bgpd
password zebra
!enable password please-set-at-here
!
!bgp multiple-instance
!
router bgp 2222
  bgp router-id 192.168.122.1
  network 192.168.100.0/24
  neighbor 199.187.219.230 remote-as 1111
  neighbor 192.168.1.2 remote-as 3333
  neighbor 199.187.219.230 route-map LOCALPREF in
  neighbor 192.168.1.2 route-map LOCALPREF1 in
!
  route-map LOCALPREF permit 10
    set local-preference 100
  route-map LOCALPREF1 permit 10
    set local-preference 120
!
!log file /var/log/quagga/bgpd.log
!
log stdout
```

```
BGP router identifier 192.168.122.1, local AS number 2222
RIB entries 3, using 336 bytes of memory
Peers 2, using 9136 bytes of memory
```

| Neighbor | V | AS | MsgRcvd | MsgSent | TblVer | InQ | OutQ | Up/Down | State/PfxRcd |
|-----------------|---|------|---------|---------|--------|-----|------|----------|--------------|
| 192.168.1.2 | 4 | 3333 | 6 | 10 | 0 | 0 | 0 | 00:03:22 | 1 |
| 199.187.219.230 | 4 | 1111 | 6 | 8 | 0 | 0 | 0 | 00:03:44 | 1 |

```
Total number of neighbors 2
(END)
```

```
ashutosh@ashutosh-VirtualBox:~/code.py
LOSS: 0
RTT: 59.478
[ ok ] Restarting quagga (via systemctl): quagga.service.
ashutosh@ashutosh-VirtualBox:~$
```

```
BGP table version is 0, local router ID is 192.168.122.1
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
              i internal, r RIB-failure, S Stale, R Removed
Origin codes: i - IGP, e - EGP, ? - incomplete
```

| Network | Next Hop | Metric | LocPrf | Weight | Path |
|------------------|-----------------|--------|--------|--------|--------|
| *> 192.168.56.0 | 192.168.1.2 | 0 | 120 | 0 | 3333 i |
| * | 199.187.219.230 | 0 | 100 | 0 | 1111 i |
| *> 192.168.100.0 | 0.0.0.0 | 0 | | 32768 | i |

```
Total number of prefixes 2
(END)
```

```
|QuaggaISP2(config)# do sh ip bgp summ
BGP router identifier 199.187.219.230, local AS number 1111
RIB entries 3, using 336 bytes of memory
Peers 1, using 4560 bytes of memory

Neighbor      V   AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
199.187.221.1  4  2222       48      54          0     0    0 00:03:46           2

Total number of neighbors 1
QuaggaISP2(config)# do sh ip bgp
BGP table version is 0, local router ID is 199.187.219.230
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, R Removed
Origin codes: i - IGP, e - EGP, ? - incomplete

      Network          Next Hop            Metric LocPrf Weight Path
* 192.168.56.0      199.187.221.1        0 2222 3333 i
*>                 0.0.0.0             0          32768 i
*> 192.168.100.0    199.187.221.1        0 2222 i

Total number of prefixes 2
QuaggaISP2(config)# |
```

Quagga ISP2

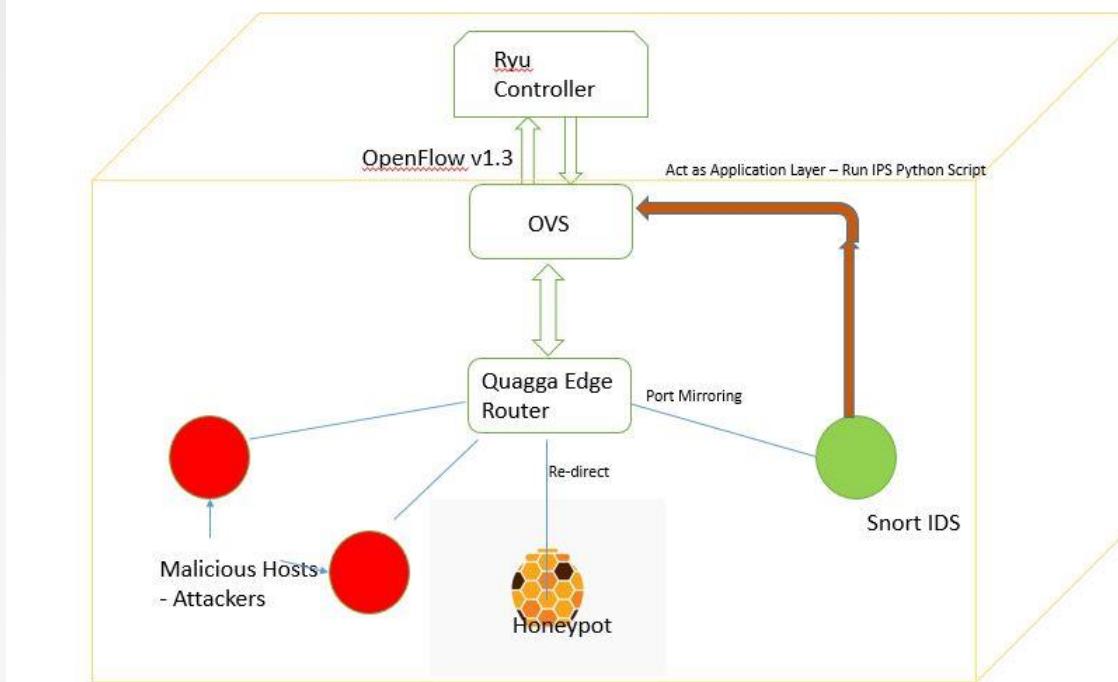
Quagga ISP3

```
QuaggaISP3# sh ip bgp
BGP table version is 0, local router ID is 199.187.219.210
Status codes: s suppressed, d damped, h history, * valid, = multipath,
              i internal, r RIB-failure, S Stale, R Removed
Origin codes: i - IGP, e - EGP, ? - incomplete

      Network          Next Hop            Metric LocPrf Weight Path
* 192.168.56.0      192.168.1.3        0 2222 1111 i
*>                 0.0.0.0             0          32768 i
*> 192.168.100.0    192.168.1.3        0 2222 i

Displayed 2 out of 3 total prefixes
QuaggaISP3# |
```

Snort IDS



```
import smtplib
server = smtplib.SMTP('smtp.gmail.com', 587)
try:
    server = smtplib.SMTP('smtp.gmail.com', 587)
    server.starttls()
    server.login("hackathonfeb2017@gmail.com", "rahilgandotra") # from email login
    email = 'rahil.25.92@gmail.com' #To email
    text = 'Msg to be sent'
    msg='To: '+email+'\n'+ 'Subject: ' +'\n'+text
    server.sendmail("hackathonfeb2017@gmail.com", email, msg)
    print ('Mail sent to',email)
    server.quit()
except:
    pass
```

Email Notification



Thank you !