

1. Launch instance with only private ip and configure NAT so instance can access Internet. (Need to use network tags)

1. Create a VPC with a custom subnet.
2. Create two VM instances, one with only a private IP (i.e. with no external IP) and the other with an external IP, which will act as a bastion host, for testing purposes. Assign a network tag to the bastion host.
 - a) To create a VM instance with no external IP:
 - While creating the instance, you'll see 'Management, security, disks, networking, sole tenancy' option just above the Create button. Click on it and then click on the networking tab.
 - Under Networking interfaces, click on edit.
 - Select your Network and Subnetwork. (perform this step for the bastion host as well).
 - Select External IP as 'None' and click on Done.
3. Change the firewall settings to allow yourself ssh access to the bastion host:
 - a) In the GCP navigation panel, In VPC network, click on Firewall rules.
 - b) Click on 'CREATE NEW FIREWALL RULE'.
 - c) Give the rule a suitable name and description.
 - d) In the Network dropdown list, choose the VPC network that you just created.
 - e) For Targets, select Specified target tags and in target, specify your bastion host's target.
 - f) In the Source IP ranges, specify public IP of bastion host.
 - g) Under Protocols and ports, select tcp and set the port as 22.
4. SSH into your bastion host and then from there, SSH into your private instance using this command:

```
avinash_sidhwani@shriram-vpc1-bastian-host:~$ ssh -A shriram-vpc1-nat-test
The authenticity of host 'shriram-vpc1-nat-test (10.0.1.3)' can't be established.
ECDSA key fingerprint is
SHA256:omA0QLD5cnQY24CikK19iKRLrKKLD3Bg6Q0UZcYhFvk.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'shriram-vpc1-nat-test,10.0.1.3' (ECDSA) to the list of known
hosts.
Linux shriram-vpc1-nat-test 4.9.0-9-amd64 #1 SMP Debian 4.9.168-1+deb9u3 (2019-06-16)
x86_64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
```
5. Test your private host(host with no external IP) for internet access by running the following command:

```
avinash_sidhwani@shriram-vpc1-nat-test:~$ ping www.google.com
PING www.google.com (173.194.197.103) 56(84) bytes of data.
^C
--- www.google.com ping statistics ---21 packets transmitted, 0 received, 100% packet loss, time
20642ms
```
6. Configure the NAT gateway.
 - a) In the GCP navigation panel, In Network services, click on Cloud NAT.
 - b) Click on 'CREATE NAT GATEWAY'.
 - c) Give your gateway a suitable name.
 - d) Select your vpc network and region.
 - e) For Cloud Router, choose 'Create new router'. Give it a name and click on Create.
 - f) Under NAT mapping, Subnet name will be set to your subnet's name and IP ranges will be set to all by default.
 - g) Set NAT IP addresses to Automatic and click on Create.
7. Now, test your primary host(host with no external IP) again by running the same command:

```
avinash_sidhwani@shriram-vpc1-nat-test:~$ ping www.google.com
```

```
PING www.google.com (173.194.197.103) 56(84) bytes of data.  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=1 ttl=52 time=0.885 ms  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=2 ttl=52 time=0.332 ms  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=3 ttl=52 time=0.362 ms  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=4 ttl=52 time=0.310 ms  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=5 ttl=52 time=0.360 ms  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=6 ttl=52 time=0.331 ms  
64 bytes from iy-in-f103.1e100.net (173.194.197.103): icmp_seq=7 ttl=52 time=0.328 ms  
...  
^C  
--- www.google.com ping statistics ---  
23 packets transmitted, 23 received, 0% packet loss, time 22495ms  
rtt min/avg/max/mdev = 0.310/0.404/0.885/0.116 ms
```