AWS KUBO Deploying Guide

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Agenda

1. **AWS Infrastructure Setting**
2. **Deploying Bosh Director on AWS**
3. **Deploying KUBO on AWS**
4. **KUBO** Deployment Architecture on **AWS**

Note: This deployment Guide is targeted only Ubuntu 16.04 users.

1. AWS Infrastructure Setting (1/12)

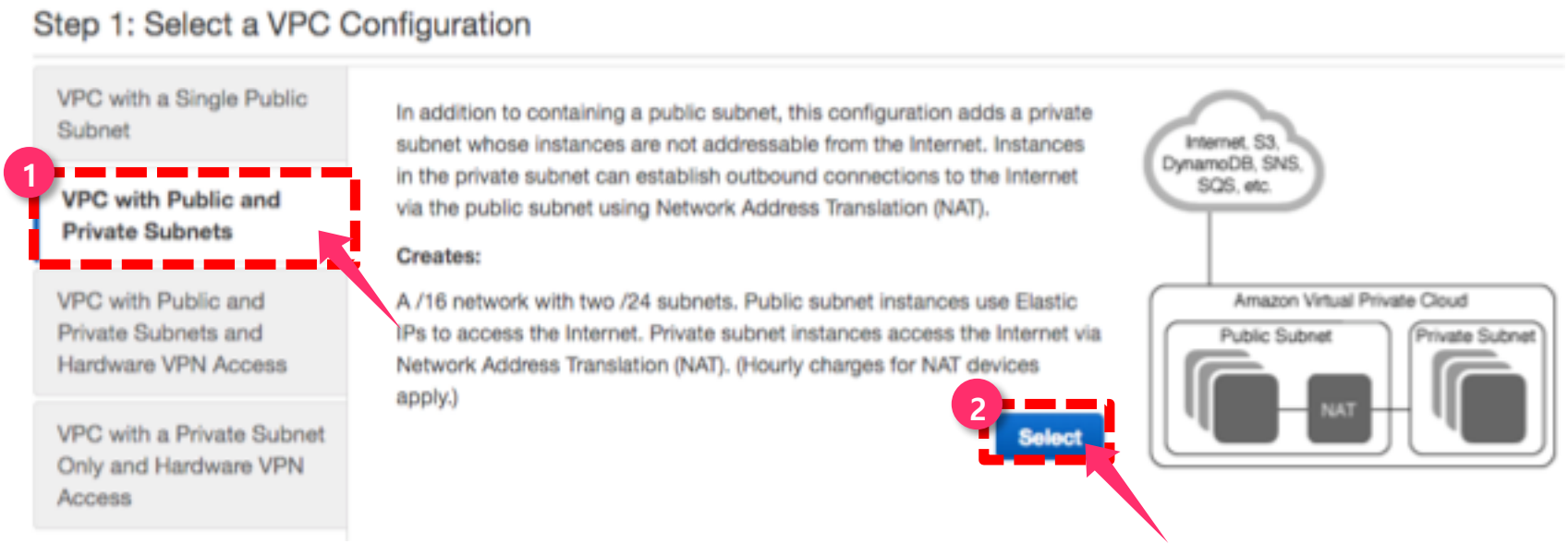
- Creating VPC (1/2)

Note: Install and Configure below Steps on your AWS Console.

❖ Create Elastic IPS in your Preferred Zone.

* AWS Services → EC2 → Elastic IPs → Allocate new address → Allocate

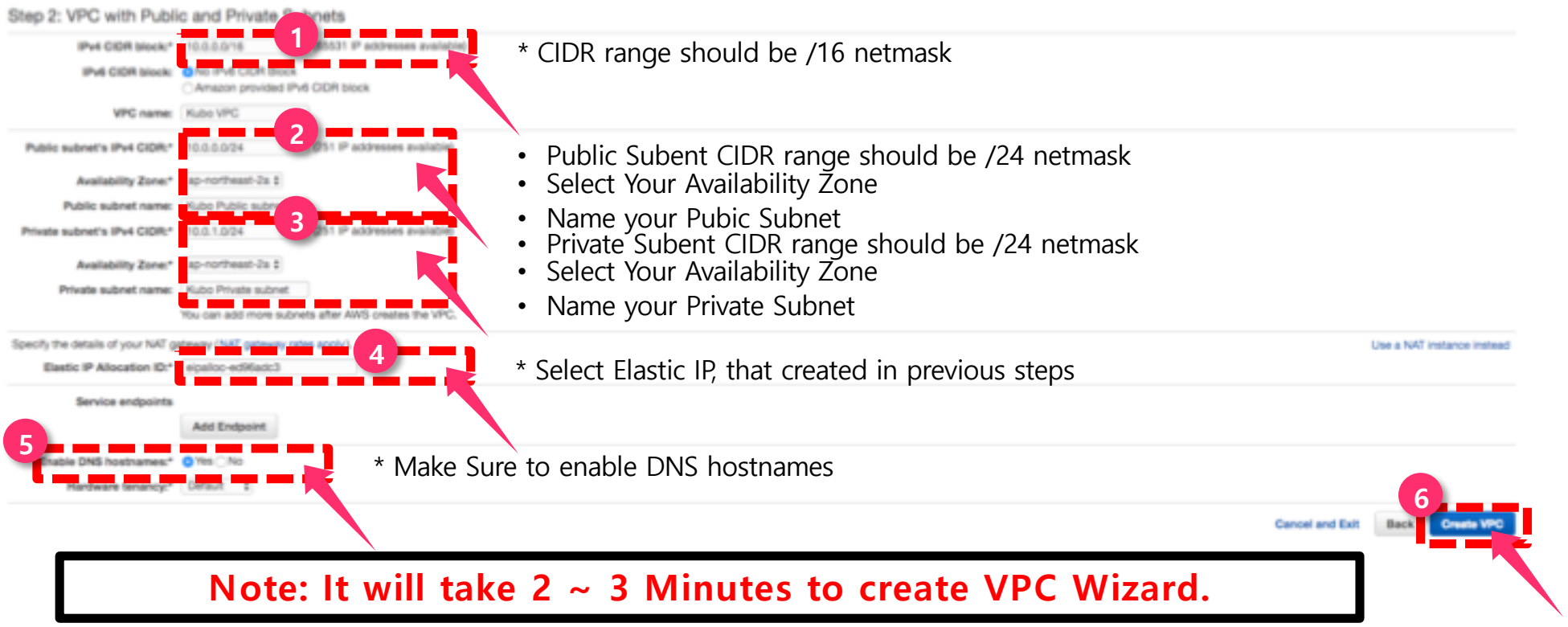
❖ Create VPC Wizard in your Preferred Zone.



* Select VPC with Public and Private Subnets

1. AWS Infrastructure Setting (2/12)

- Creating VPC (2/2)



* CIDR range should be /16 netmask

- Public Subent CIDR range should be /24 netmask
- Select Your Availability Zone
- Name your Pubic Subnet
- Private Subent CIDR range should be /24 netmask
- Select Your Availability Zone
- Name your Private Subnet

* Select Elastic IP, that created in previous steps

* Make Sure to enable DNS hostnames

Note: It will take 2 ~ 3 Minutes to create VPC Wizard.

❖ Check your VPC is created.

* AWS Services → VPC → Your VPCs

1. AWS Infrastructure Setting (3/12)

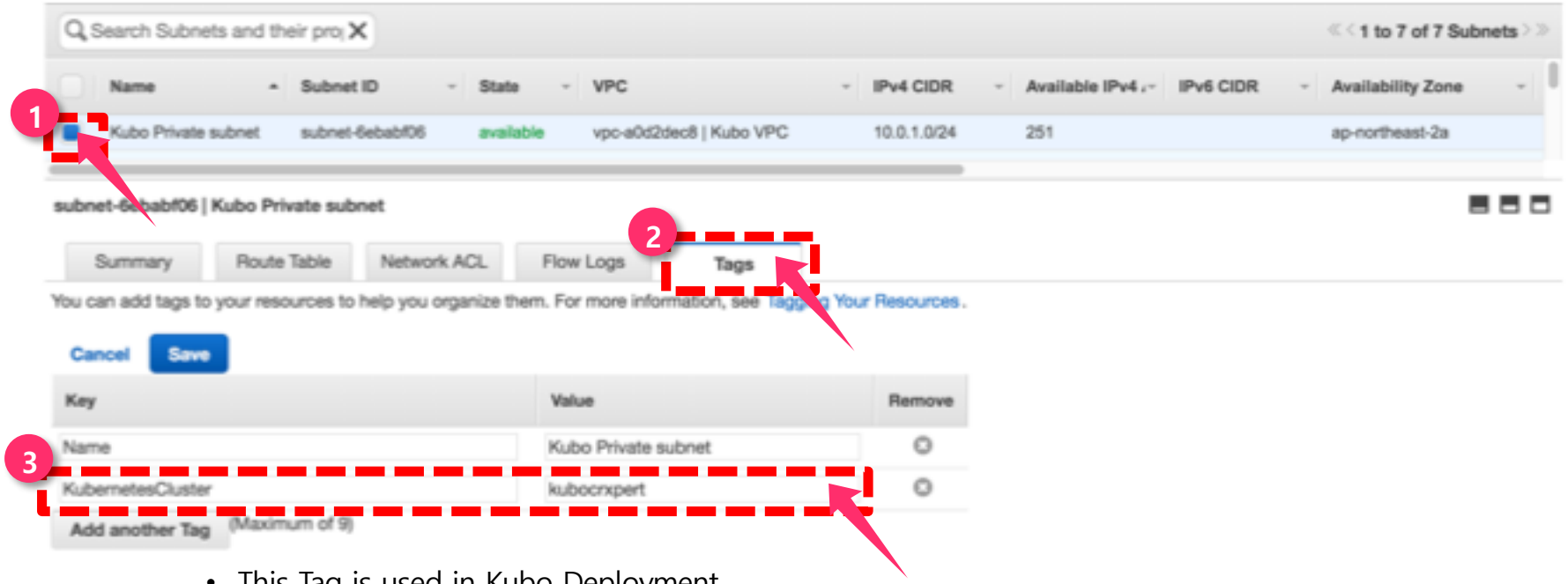
- Configure Tags for Subnets (1/2)

❖ Move to Subnets TAB.

* AWS Services → VPC → Subnets

❖ Create Tags for Your Private Subnets.

* AWS Services → VPC → Subnets → Kubo Private subnet → Tags → Edit



- This Tag is used in Kubo Deployment
- Make Sure to have same Tag Key and Value for Private and Public Subnets

1. AWS Infrastructure Setting (4/12)

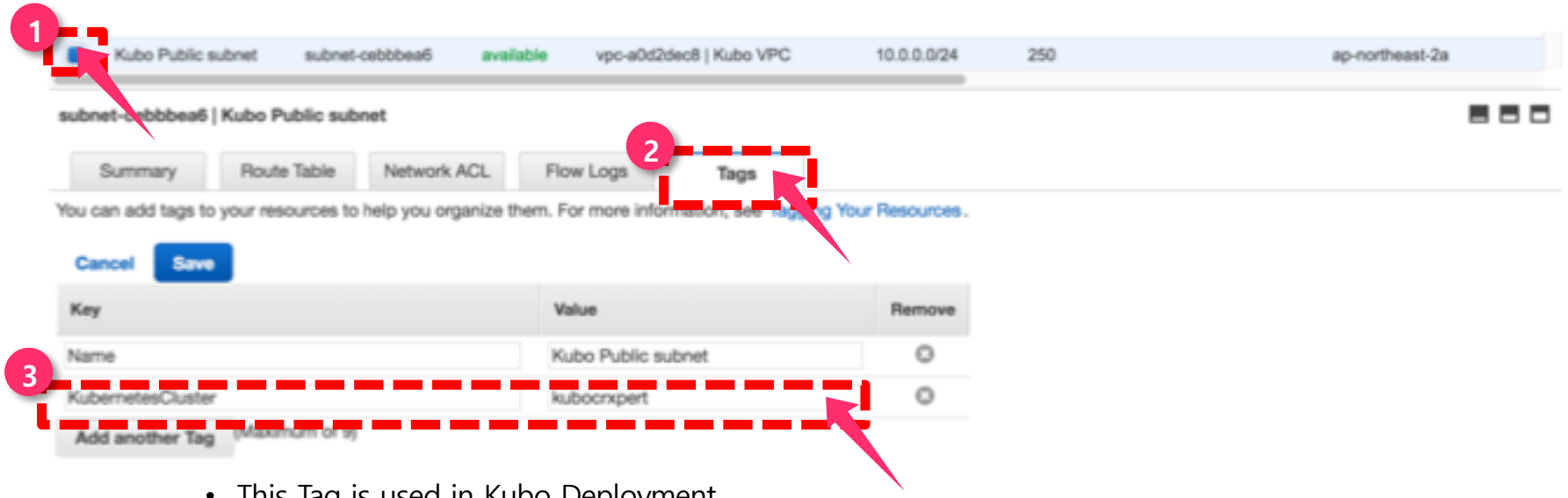
- Configure Tags for Subnets (2/2)

❖ Move to Subnets TAB.

* AWS Services → VPC → Subnets

❖ Create Tags for Your Private Subnets.

* AWS Services → VPC → Subnets → Kubo Public subnet → Tags → Edit



- This Tag is used in Kubo Deployment
- Make Sure to have same Tag Key and Value for Public and Private Subnets

1. AWS Infrastructure Setting (5/12)

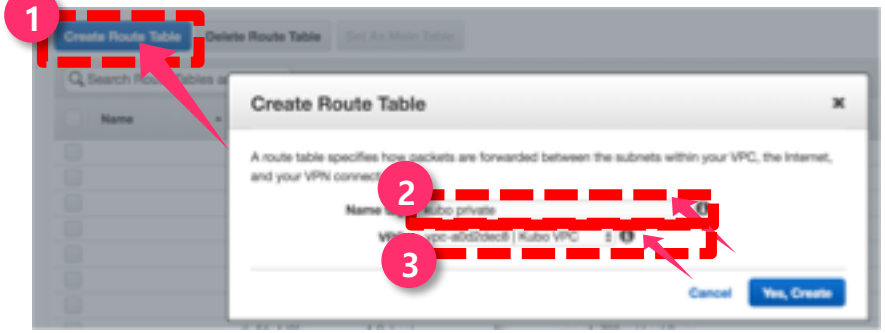
- Configure Route Tables

❖ Move to Route Tables TAB.

* AWS Services → VPC → Route Tables

❖ Create Route Table for Your Private Subnet.

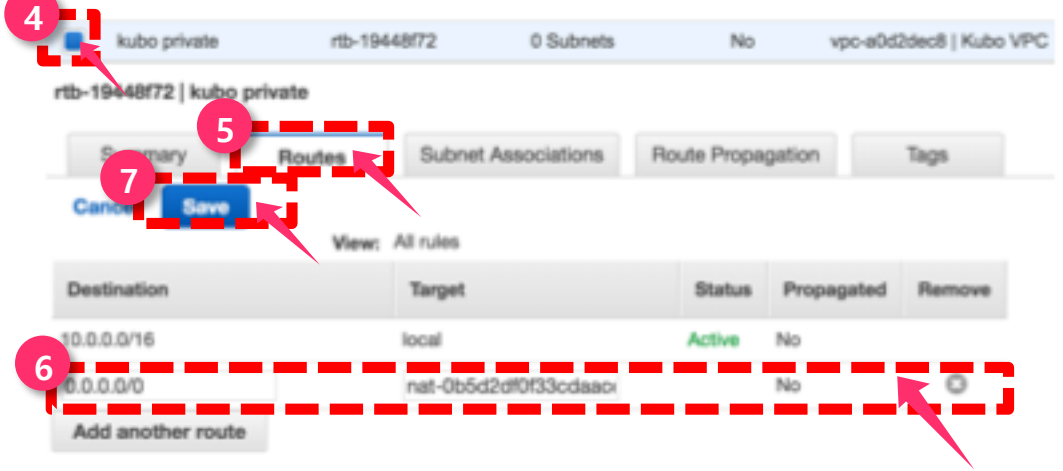
* AWS Services → VPC → Route Tables



- Name Your Route Table
- Select your VPC created in previous steps

❖ Create Routes in your Created Route Table.

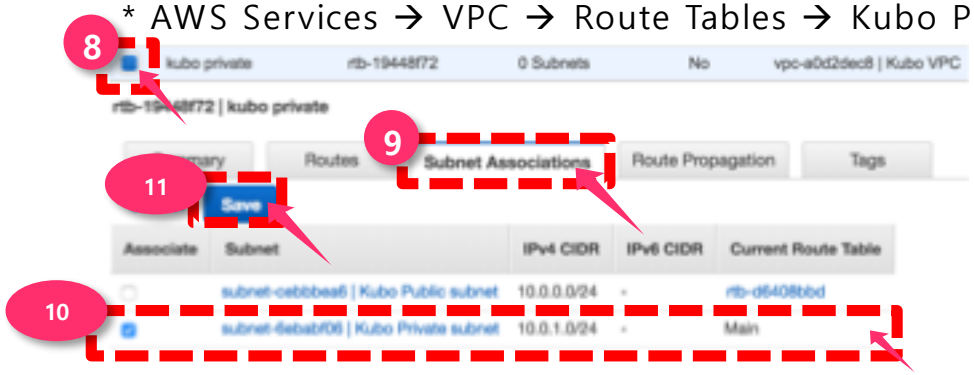
* AWS Services → VPC → Route Tables → Kubo Private



- Make Sure to select Nat Gateway where our deployment access to internet through Nat Gateway.

❖ Edit Subnet Associations in your Route Table.

* AWS Services → VPC → Route Tables → Kubo Private



- Select Your Private Subnet where we deploy Micro-Bosh, and Kubo.

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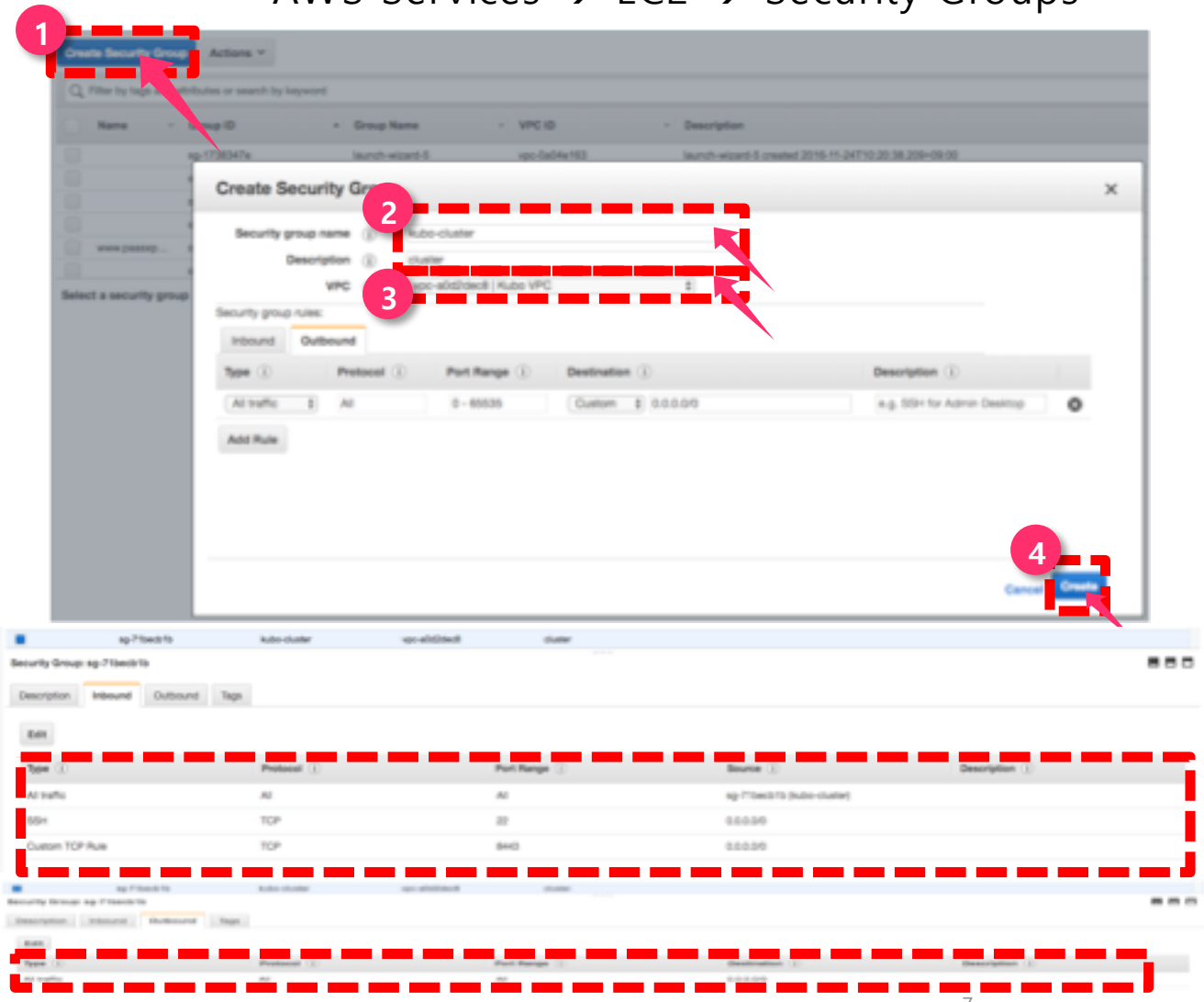
1. AWS Infrastructure Setting (6/12)

- Create Security Groups (1/2)

❖ Move to Security Group TAB.

* AWS Services → EC2 → Security Groups



- This Security Group is Used only for Inception, Micro-Bosh, Kubo VM's.

- Make sure to have Same Inbound and Outbound Values.

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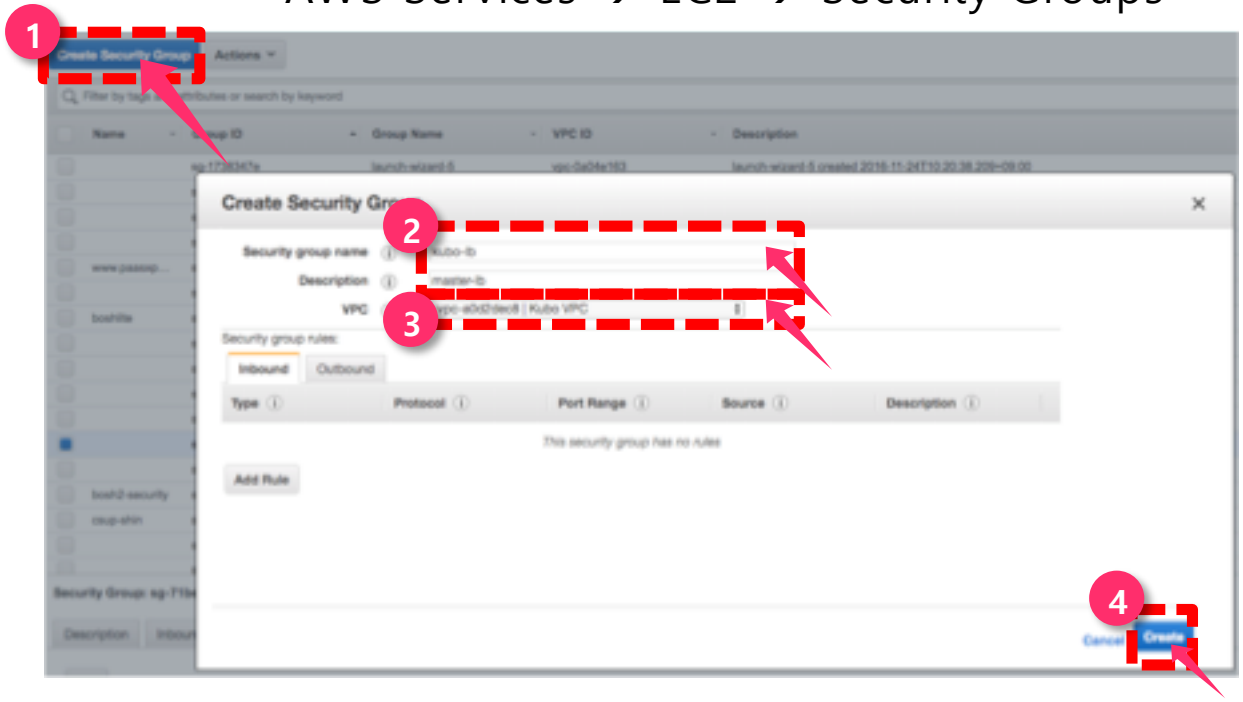
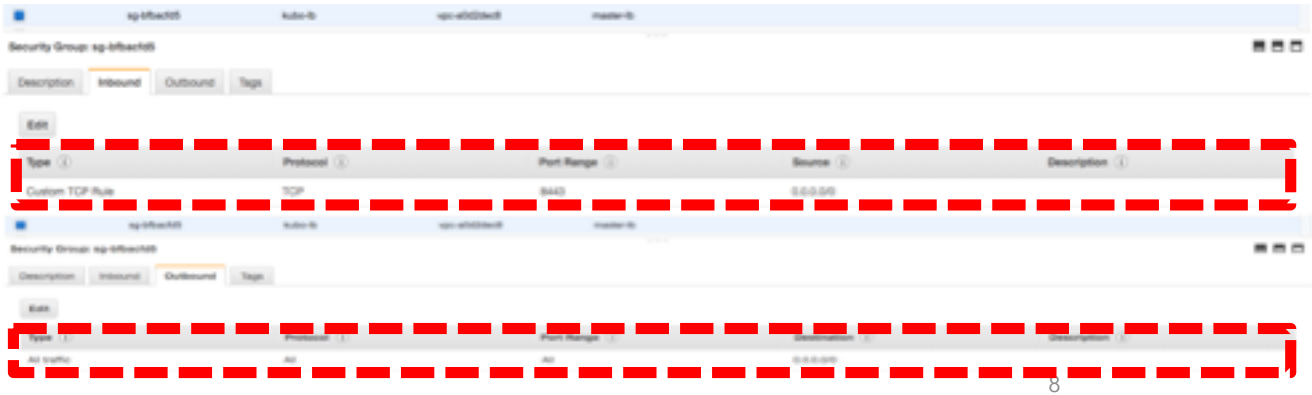
1. AWS Infrastructure Setting (7/12)

- Create Security Groups (2/2)

❖ Move to Security Group TAB.

* AWS Services → EC2 → Security Groups





- This Security Group is Used only for Kubernetes Master Load Balancer.

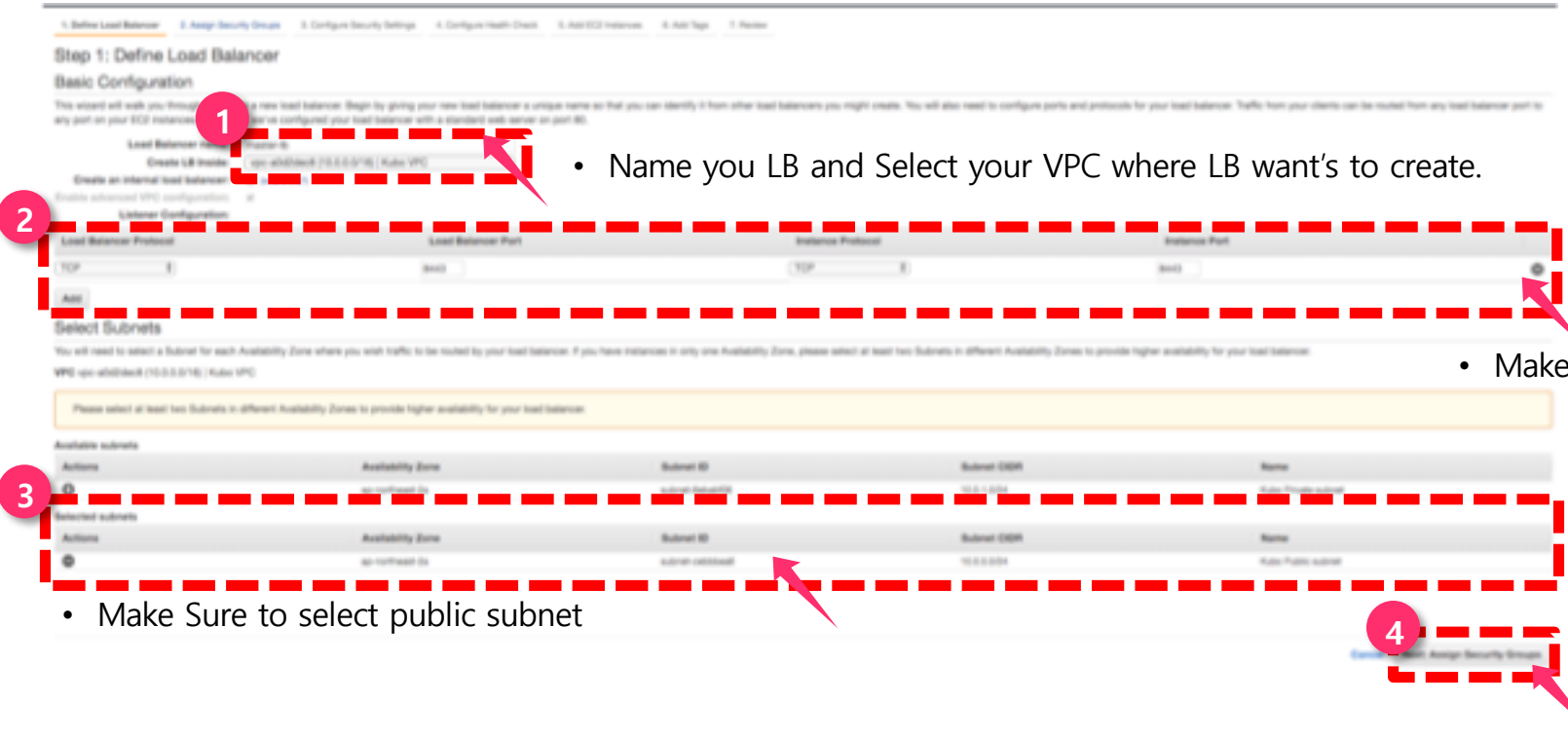
- Make sure to have Same Inbound and Outbound Values.

1. AWS Infrastructure Setting (8/12)

- Create Load Balancer (1/3)

❖ Create Classic Load Balancer.

* AWS Services → EC2 → Load Balancers → Classic Load Balancer



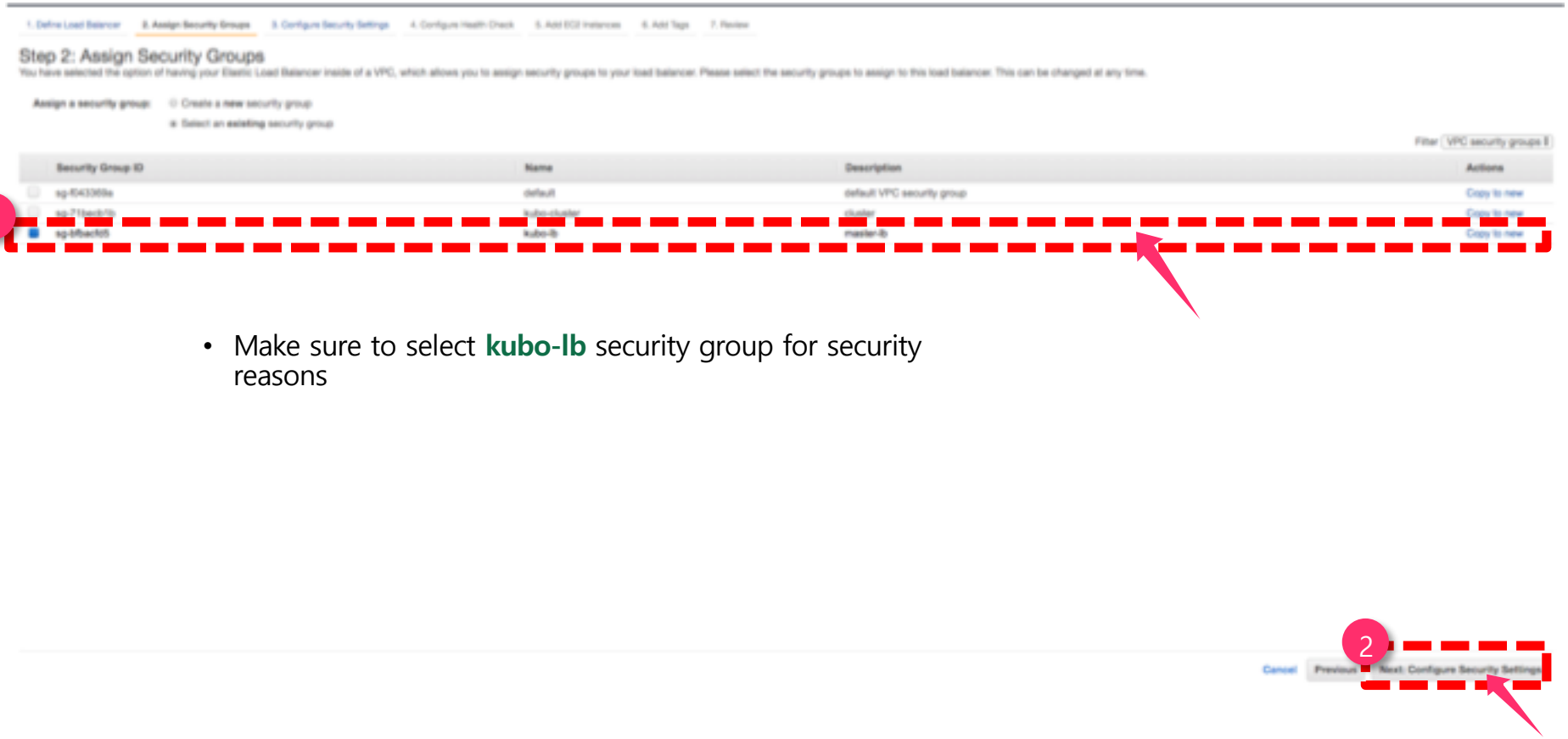
- Name you LB and Select your VPC where LB want's to create.
- Make sure to listen TCP 8443 Port
- Make Sure to select public subnet

1. AWS Infrastructure Setting (9/12)

- Create Load Balancer (2/3)

❖ Create Classic Load Balancer.

* AWS Services → EC2 → Load Balancers → Classic Load Balancer



- Make sure to select **kubo-lb** security group for security reasons

1. AWS Infrastructure Setting (10/12)

- Create Load Balancer (3/3)

❖ Create Classic Load Balancer.

* AWS Services → EC2 → Load Balancers → Classic Load Balancer

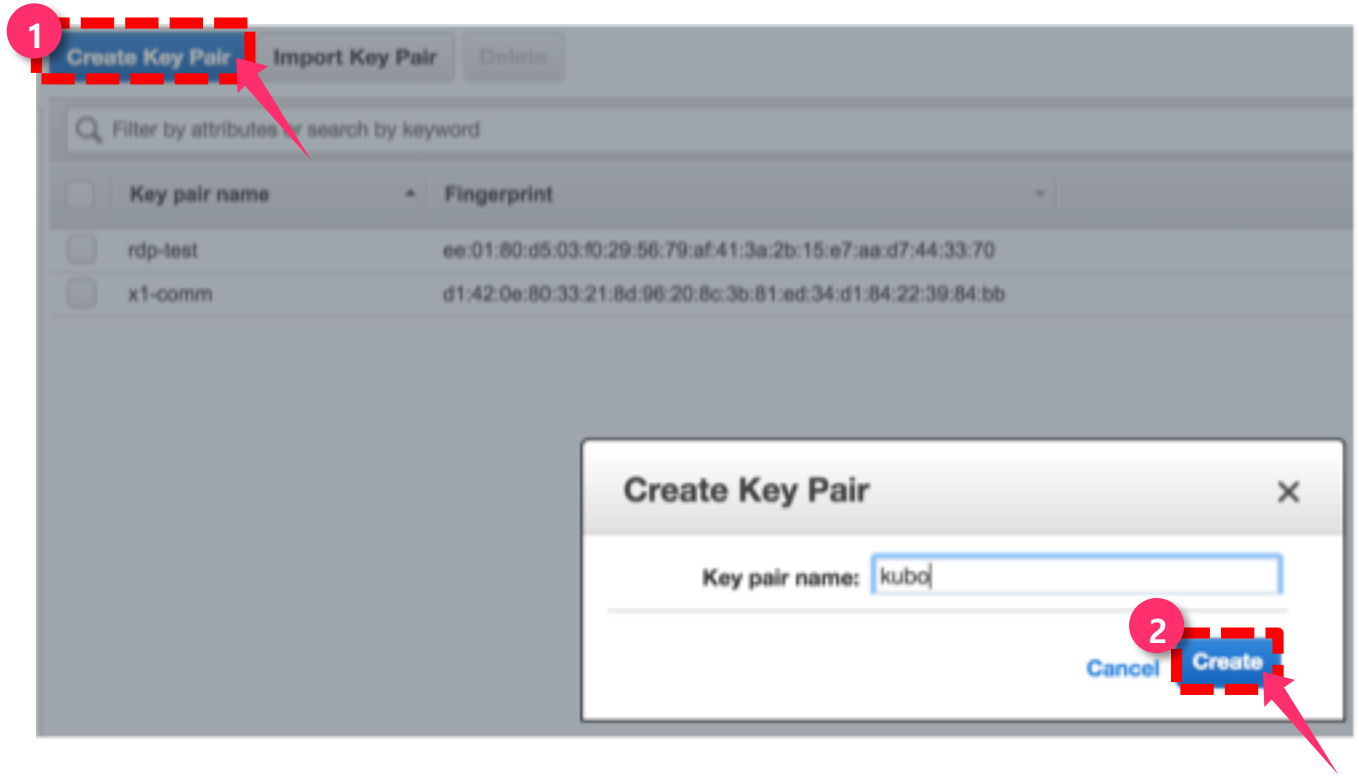
- Make sure to check all the above properties match your requirements.

1. AWS Infrastructure Setting (11/12)

- Create Keypairs

❖ Create Classic Load Balancer.

* AWS Services → EC2 → Key Pairs → Classic Load Balancer



- Make sure to save key pair in safe place for future proceedings.

1. AWS Infrastructure Setting (12/12)

- Create Instance

❖ Create Classic Load Balancer.

* AWS Services → EC2 → Instances

Requirements	Description
OS	Select Ubuntu 14.04 LTS
Instance Size	Select t2.micro
Network	Select your VPC (**Kubo VPC**)
Subnet	Select Your Public Subnet (**Kubo Public subnet**)
Auto-assign Public IP	Manually Enable
Storage	Minimum 40 GB
Security Group	Select **kubo-cluster** Security Group
Key	Select Key Pair you created before

2. Deploying Bosh Director on AWS (1/8)

- Installing Pre-Requirements (1/3)

Note: Perform below steps in your AWS Inception.

❖ ssh into inception

```
$ ssh ubuntu@your-aws-inception-public-domain
```

❖ Install bosh-cli-2.0

```
$ wget https://s3.amazonaws.com/bosh-cli-artifacts/bosh-cli-3.0.1-linux-amd64
$ chmod +x bosh-cli-3.0.1-linux-amd64
$ sudo mv bosh-cli-3.0.1-linux-amd64 /usr/local/bin/bosh
```

❖ Check the bosh version

```
$ bosh -v
   version 3.0.1-712bfd7-2018-03-13T23:26:42Z
```

❖ Check the bosh version

```
$ sudo apt-get install -y build-essential zlibc zlib1g-dev ruby ruby-dev openssl libxslt-dev libxml2-dev libssl-dev libreadline6 libreadline6-dev libyaml-dev libsqlite3-dev sqlite3
```

2. Deploying Bosh Director on AWS (2/8)

- Installing Pre-Requirements (2/3)

❖ Install Git

```
$ sudo apt-get install git
$ git --version
   git version 2.14.3
```

❖ Install Credhub-Cli

```
 $ wget https://github.com/cloudfoundry-incubator/credhub-cli/releases/download/1.7
.6/credhub-linux-1.7.6.tgz
 $ tar -xvf credhub-linux-1.7.6.tgz
 $ chmod +x credhub
 $ sudo mv credhub /usr/local/bin/credhub
```

❖ Check the credhub version

```
 $ credhub --version
    CLI Version: 1.6.0
```

2. Deploying Bosh Director on AWS (3/8)

- Installing Pre-Requirements (3/3)

❖ Install Kubectl-Cli

```
$ curl -LO https://storage.googleapis.com/kubernetes-release/release/v1.10.3/bin/linux/amd64/kubectl
$ chmod +x kubectl
$ sudo mv kubectl /usr/local/bin/kubectl
$ kubectl version
```

2. Deploying Bosh Director on AWS (4/8)

- Deploying Bosh-Director (1/5)

❖ In your Inception

```
$ mkdir ~/workspace && cd ~/workspace
```

❖ Next clone the bosh-deployment and kubo-deployment repositories

```
$ git clone https://github.com/cloudfoundry/bosh-deployment.git
$ git clone https://github.com/cloudfoundry-incubator/kubo-deployment.git -b v0.17.0
```

❖ Edit AWS cpi.yml file to configure Nat VM.

```
$ vi ~/workspace/bosh-deployment/aws/cpi.yml
```

Before Editing

```
# Configure AWS sizes
- type: replace
  path: /resource_pools/name=vms/cloud_properties?
  value:
    instance_type: m4.xlarge
    ephemeral_disk:
      type: gp2
      size: 25_000
    availability_zone: ((az))
```

After Editing

```
# Configure AWS sizes
- type: replace
  path: /resource_pools/name=vms/cloud_properties?
  value:
    instance_type: t2.medium
    ephemeral_disk:
      type: gp2
      size: 25_000
    availability_zone: ((az))
```

Change your instance_type according to your usage

2. Deploying Bosh Director on AWS (5/8)

- Deploying Bosh-Director (2/5)

❖ Edit Bosh bosh.yml file to configure Nat VM.

```
$ vi ~/workspace/bosh-deployment/bosh.yml
```

Before Editing

```
disk_pools:
- name: disks
  disk_size: 65_536

networks:
- name: default
  type: manual
  subnets:
  - range: ((internal_cidr))
    gateway: ((internal_gw))
    static: [((internal_ip))]
    dns: [8.8.8.8]
```

After Editing

```
disk_pools:
- name: disks
  disk_size: 40_960

networks:
- name: default
  type: manual
  subnets:
  - range: ((internal_cidr))
    gateway: ((internal_gw))
    static: [((internal_ip))]
    dns: [10.0.1.1]
```

Your Private Subnet CIDR & Nat Gateway

❖ Create directory to store director deployment state and credentials.

```
$ cd ~/workspace/bosh-deployment/ && mkdir kubo && cd kubo
```

2. Deploying Bosh Director on AWS (6/8)

- Deploying Bosh-Director (3/5)

- Below command create bosh-init vm on virtualbox by means of bosh.yml as base manifest.
- Yaml files with –o command set variables director_name, internal_ip, internal_gw, internal_cidr, outbound_network_name using –v command.
- It also create state.json to record running state and creds.yml **(for certs & credentails)** in your ~/deployments/vbox directory
- Following Command Creates Director's vm and install it's jobs

```
$ bosh create-env ~/workspace/bosh-deployment/bosh.yml
  --state=~/workspace/bosh-deployment/kubo/state.json
  -o ~/workspace/bosh-deployment/aws/cpi.yml
  -o ~/workspace/bosh-deployment/jumpbox-user.yml
  -o ~/workspace/bosh-deployment/uaa.yml
  -o ~/workspace/bosh-deployment/credhub.yml
  --vars-store=~/workspace/bosh-deployment/kubo/creds.yml
  -v director_name="kubo"
  -v internal_ip=10.0.1.6
  -v internal_gw=10.0.1.1
  -v internal_cidr=10.0.1.0/24
  -v access_key_id=Your IAM User Access Key
  -v secret_access_key=Your IAM User Secret Access Key
  -v region=ap-northeast-2
  -v az= ap-northeast-2a
  -v default_key_name=Your Key Name Created Before (kubo)
  -v default_security_groups= Your Secirity Group Name Created Before (kubo-cluster)
  --var-file private_key=~/kubo.pem  (Copy your key to your inception home director)
  -v subnet_id=subnet-6ebabf06 (Your Private Subnet in Your VPC)
```

2. Deploying Bosh Director on AWS (7/8)

- Deploying Bosh-Director (4/5)

❖ Log into director with your alias name.

```
$ bosh alias-env kubo -e 10.0.1.6 --ca-cert <(bosh int  ~/workspace/bosh-deployment/kubo/creds.yml --path /director_ssl/ca)

$ export BOSH_CLIENT=admin

$ export BOSH_CLIENT_SECRET=`bosh int ~/workspace/bosh-deployment/kubo/creds.yml --path /admin_password`
```

❖ Create directory to download releases and stemcells

```
$ mkdir ~/workspace/releases && cd ~/workspace/releases
```

❖ Download Upload AWS Stemcell

```
$ wget https://s3.amazonaws.com/bosh-core-stemcells/aws/bosh-stemcell-3586.16-aws-xen-hvm-ubuntu-trusty-go_agent.tgz
$ bosh -e kubo upload-stemcell bosh-stemcell-3586.16-aws-xen-hvm-ubuntu-trusty-go_agent.tgz
```

2. Deploying Bosh Director on AWS (8/8)

- Deploying Bosh-Director (5/5)

❖ Target & Log into director credhub

```
$ export CREDHUB_CLIENT=credhub-admin
$ export CREDHUB_SECRET=$(bosh int --path /credhub_admin_client_secret ~/workspace/bosh-deployment/kubo/creds.yml)
$ export CREDHUB_CA_CERT=$(bosh int --path /credhub_tls/ca ~/workspace/bosh-deployment/kubo/creds.yml)
$ credhub login -s https://10.0.1.252:8844 --skip-tls-validation
```

❖ List out Certificates and Passwords in credhub

```
$ credhub find
```

❖ To Delete Certificates and Passwords in credhub

```
$ credhub delete -n /director_name/deployment-name/certificate-name
```

3. Deploying KUBO on AWS (1/8)

- Deploying Kubo (1/5)

❖ Download kubo-release.

```
$ cd ~/workspace && mkdir releases && cd ~/workspace/releases
$ wget https://github.com/cloudfoundry-incubator/kubo-release/releases/download/v0.17.0/kubo-release-0.17.0.tgz
```

❖ Upload kubo-release

```
$ bosh -e kubo upload-release ~/workspace/releases/kubo-release-0.17.0.tgz
```

❖ Edit kubo-deployment cfcr.yml file for deploying kubernetes master bosh-lite

```
$ cd ~/workspace/kubo-deployment
$ vi ~/workspace/kubo-deployment/manifests/cfcr.yml
```

Before Editing

```
77  - name: master
78    instances: 3
79    networks:
80    - name: default
81    azs: [z1,z2,z3]
```

After Editing

```
69  - name: master
70    instances: 1
71    networks:
72    - name: default
73    azs: [z1]
```

3. Deploying KUBO on AWS (2/8)

- Deploying Kubo (2/5)

❖ Edit kubo-deployment cfcr.yml file for deploying Kubernetes worker-nodes AWS

```
$ vi ~/workspace/kubo-deployment/manifests/cfcr.yml
```

Before Editing

```
155   - name: worker
156     instances: 3
157     networks:
158     - name: default
159     azs: [z1,z2,z3]
```

After Editing

```
- name: worker
  instances: 2
  networks:
  - name: default
  azs: [z1]
```

❖ Edit kubo-deployment cfcr.yml file for deploying kubernetes master certificates

```
$ vi ~/workspace/kubo-deployment/manifests/cfcr.yml
```

Before Editing

```
237 - name: tls-kubernetes
238   type: certificate
239   options:
240     ca: kubo_ca
241     organization: "system:masters"
242     common_name: master.cfcr.internal
243     alternative_names:
244     - 10.100.200.1
245     - kubernetes
246     - kubernetes.default
247     - kubernetes.default.svc
248     - kubernetes.default.svc.cluster.local
249     - master.cfcr.internal
```

After Editing

```
- name: tls-kubernetes
  type: certificate
  options:
    ca: kubo_ca
    organization: "system:masters"
    common_name: cfcr-cfcr-api-980222485.ap-northeast-2.elb.amazonaws.com
    alternative_names:
    - 10.100.200.1
    - kubernetes
    - kubernetes.default
    - kubernetes.default.svc
    - kubernetes.default.svc.cluster.local
    - master.cfcr.internal
    - cfcr-cfcr-api-980222485.ap-northeast-2.elb.amazonaws.com
```

Note: Change cfcr-cfcr-api-980222485.ap-northeast-2.elb.amazonaws.com according to your LB DNS Name Created in Previous Steps.

3. Deploying KUBO on AWS (3/8)

- Deploying Kubo (3/5)

❖ Create and Save bosh director cloud-config

```
$ vi ~/workspace/kubo-deployment/manifests/cloud-config.yml
```

```
azs:
- cloud_properties:
    availability_zone: ap-northeast-2a
  name: z1
- cloud_properties:
    availability_zone: ap-northeast-2a
  name: z2
- cloud_properties:
    availability_zone: ap-northeast-2a
  name: z3
compilation:
  az: z1
  network: default
  reuse_compilation_vms: true
  vm_type: worker
  workers: 3
disk_types:
- cloud_properties:
    encrypted: true
    type: gp2
  disk_size: 5120
  name: 5120
- cloud_properties:
    encrypted: true
    type: gp2
  disk_size: 10240
  name: 10240
networks:
- name: default
  subnets:
  - azs:
    - z1
    - z2
    - z3
    cloud_properties:
      subnet: subnet-c45451ac
    dns:
    - 10.0.1.1
    gateway: 10.0.1.1
    range: 10.0.1.0/24
    reserved:
    - 10.0.1.1/30
  type: manual
vm_types:
- cloud_properties:
    ephemeral_disk:
      size: 25000
    instance_type: t2.small
  name: minimal
- cloud_properties:
    elbs:
    - cfcr-cfcr-api
    ephemeral_disk:
      size: 25000
    instance_type: t2.small
  name: small
- cloud_properties:
    ephemeral_disk:
      size: 60000
    instance_type: t2.medium
  name: small-highmem
```

3. Deploying KUBO on AWS (4/8)

- Deploying Kubo (4/5)

❖ Update bosh director cloud-config

```
$ bosh -e kubo update-cloud-config ~/workspace/kubo-deployment/manifests/cloud-config.yml
```

❖ Check the desired releases and stemcell to deploy kubo on AWS bosh

```
$ bosh -e kubo releases
```

Output

```
Using environment '10.0.1.252' as client 'admin'

Name       Version  Commit Hash
bosh-dns   1.5.0*   f5a8d25
bpm        0.6.0*   b6f4675
cfcr-etcd  1.3*     6a62d8f
docker     32.0.0*  542c382
kubo       0.17.0*  ad9ef809

(*) Currently deployed
(+) Uncommitted changes

5 releases

Succeeded
```

```
$ bosh -e kubo stemcells
```

3. Deploying KUBO on AWS (5/8)

- Deploying Kubo (5/5)

❖ Deploy Kubo on AWS

```
$ bosh -e kubo -d cfcr deploy ~/workspace/kubo-deployment/manifests/cfcr.yml -o ~/workspace/kubo-deployment/manifests/ops-files/iaas/aws/cloud-provider.yml -o ~/workspace/kubo-deployment/manifests/ops-files/iaas/aws/add-master-credentials.yml -o ~/workspace/kubo-deployment/manifests/ops-files/iaas/aws/add-worker-credentials.yml -v aws_access_key_id_master=XXXX -v aws_secret_access_key_master=XXXX -v aws_access_key_id_worker=XXXX -v aws_secret_access_key_worker=XXXX -o ~/workspace/kubo-deployment/manifests/ops-files/iaas/aws/lb.yml -v kubernetes_cluster_tag=kubocrxpert
```

❖ Deploy Kubernetes add-ons

```
$ bosh -e kubo -d cfcr run-errand apply-specs
```

❖ Check Kubernetes Deployment

```
$ bosh -e kubo -d cfcr vms
```

Output

```
Using environment '10.0.1.252' as client 'admin'

Task 141. Done

Deployment 'cfcr'

Instance                                     Process State  AZ  IPs         VM CID                                   VM Type          Active
master/528ffe75-5391-4313-aec6-6c1941a17685  running        z1  10.0.1.101  vm-befdca1f-ebdd-4018-44d8-feb6bc8ab462  small            true
worker/61b51092-6a00-4c74-8c10-e3e6b479487e  running        z1  10.0.1.102  vm-e4827bef-3225-4860-4bfa-efb283438085  small-highmem    true
worker/bd7caa22-39c1-40f9-bc8a-efe3471220ca  running        z1  10.0.1.103  vm-c8582161-1077-41f4-7058-22feba0b4840  small-highmem    true

3 vms

Succeeded
```

❖ ssh into master and work vms

```
$ bosh -e kubo -d cfcr ssh master
```

```
$ bosh -e kubo -d cfcr ssh worker/61b51092-6a00-4c74-8c10-e3e6b479487e
```

3. Deploying KUBO on AWS (6/8)

- Accessing Kubernetes (1/3)

❖ Download tls-kubernetes certificate from credhub

```
$ bosh -e kubo -d cfcr int <(credhub get -n "/kubo/cfcr/tls-kubernetes" --output-json) --path=/value
/ca > ~/workspace/kubo-deployment/kubo/kubernetes.crt
```

❖ Download kubo-admin-password password from credhub

```
$ bosh -e kubo -d cfcr int <(credhub get -n "/kubo/cfcr/kubo-admin-password" --output-json) --pat
h=/value >  ~/workspace/kubo-deployment/kubo/kubernetes_pwd.crt
```

❖ Configure Kubernetes Cluster by using above Certificate (kubernetes.crt)

```
$ kubectl config set-cluster "dev" --server https://you-lb-dns:8443 --embed-certs=true --certificate-a
uthority=~/workspace/kubo-deployment/kubo/kubernetes.crt
```

❖ Configure Kubernetes User and Context (Note: Use Kubernets User Password from above kubernetes_pwd.crt)

```
$ kubectl config set-credentials "dev" --token=your-kubernetes_pwd.crt-password
```

```
$ kubectl config set-context "dev" --cluster="dev" --user="dev
```

```
$ kubectl config use-context "dev"
```

3. Deploying KUBO on AWS (7/8)

- Accessing Kubernetes (2/3)

❖ Obtain kubernetes node Information

```
$ kubectl get node -o wide
```

Output

```
NAME                                  STATUS   ROLES    AGE   VERSION   EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION      CONTAINER-RUNTIME
vm-c8582161-1077-41f4-7058-22feba084840   Ready    <none>   21h   v1.10.3                 Ubuntu 14.04.5 LTS   4.4.0-127-generic   docker://17.12.1-ce
vm-e48278ef-3225-4860-4bfa-efb283438085   Ready    <none>   21h   v1.10.3                 Ubuntu 14.04.5 LTS   4.4.0-127-generic   docker://17.12.1-ce
```

❖ Obtain kubernetes Cluster Information

```
$ kubectl cluster-info
```

❖ Get all information regarding your Namespace

```
$ kubectl get pods --namespace=kube-system
$ kubectl get all -n kube-system
```

❖ Check 8001 port is active on your notebook, if active kill the process

```
$ sudo lsof -PiTCP -sTCP:LISTEN
$ sudo kill -9 your-pid-number
```

❖ Accessing to Kubernetes Dashboard

```
$ kubectl proxy
  Starting to serve on 127.0.0.1:8001
$ http://localhost:8001/api/v1/namespaces/kube-system/services/https:kubernetes-dashboard:/proxy/#!/login
```

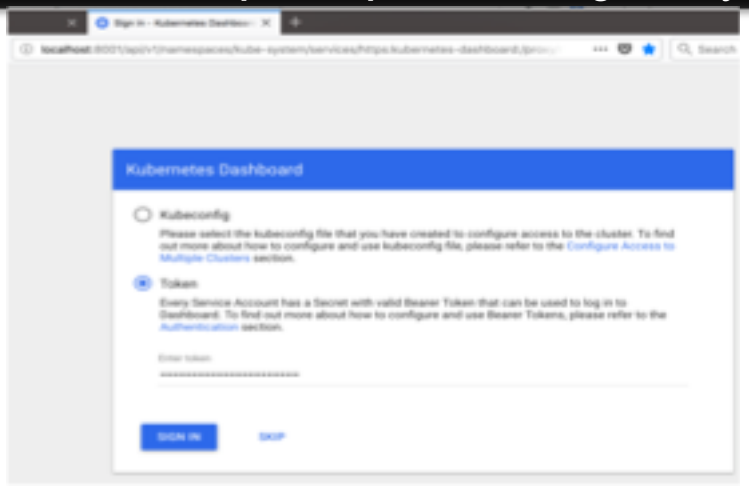
3. Deploying KUBO on AWS (8/8)

- Accessing Kubernetes (3/3)

❖ Accessing Kubernetes Dashboard in your Browser

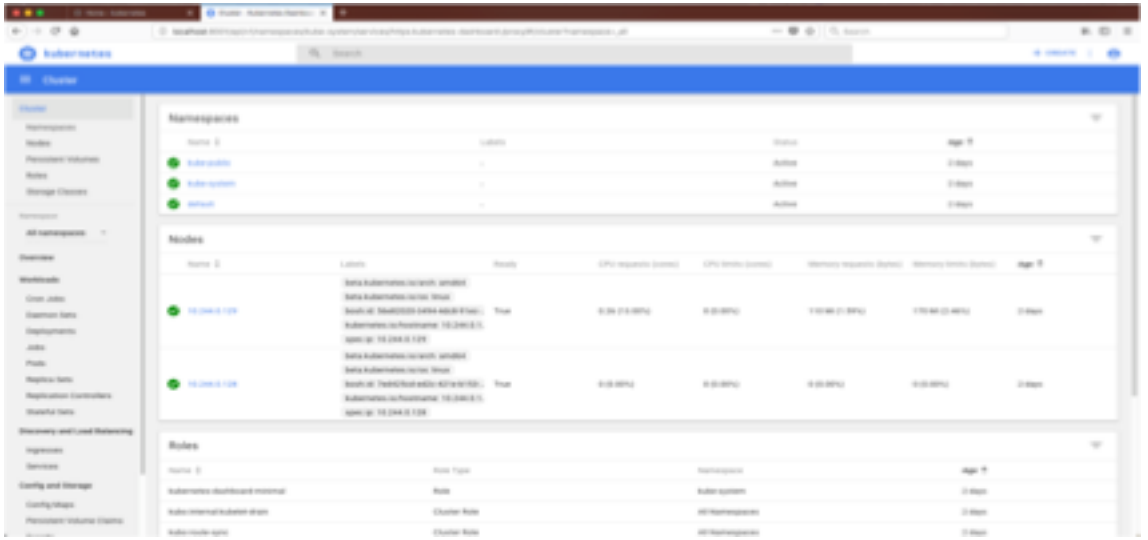
Select token option and paste above kubernetes_pwd.crt password to login into your kubernets cluster

Output



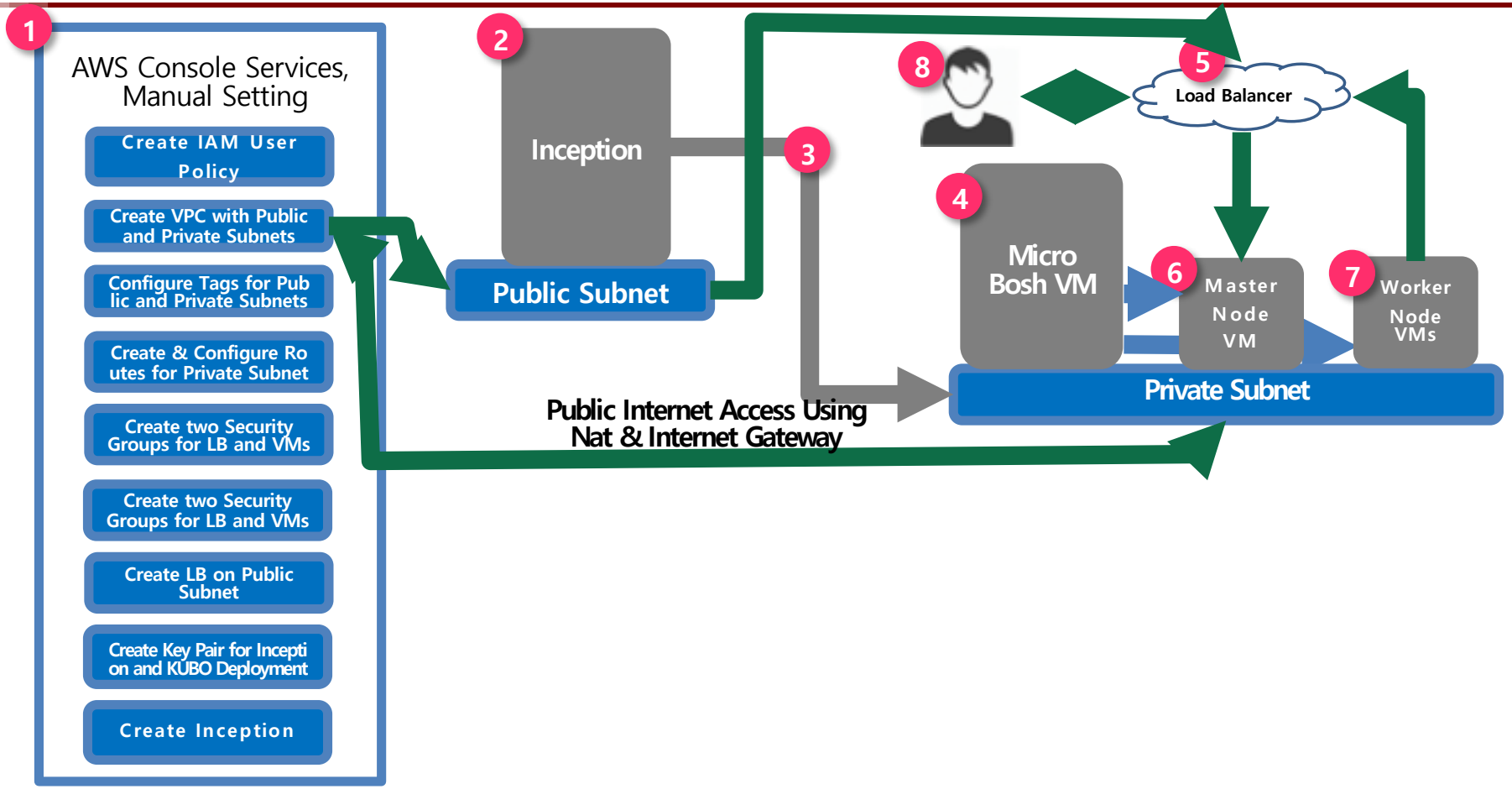
❖ Kubernetes Home Dashboard

Output



4. KUBO Deployment Architecture on AWS

- Deployment Architecture



THANK YOU