Final Task

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Task 1 :- A) Bootstrap kubernetes cluster on your laptop using kubeadm

task 1.A.A) I have created the shell script and put all neccessary commands in that file for creating.

1.A.A) KUBEADM INIT

File name:- kubeadmInit.sh

```
#!/bin/sh

#kubeadm init
sudo kubeadm init --kubernetes-version=v1.18.0 --pod-network-cidr=10.244.0.0/16 --
control-plane-endpoint=192.168.1.103 --ignore-preflight-errors=IsPrivilegedUser,preflight

#create directory
mkdir -p $HOME/.kube

#copy admin.conf file
sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config

#add to the super user group
sudo chown $(id -u):$(id -g) $HOME/.kube/config


# create pod network
sudo kubectl apply -f https://docs.projectcalico.org/v3.11/manifests/calico.yaml


# make master node as worker node

kubectl taint nodes --all node-role.kubernetes.io/master-
```

COMMAND - **$ bash kubeadmInit.sh**

Task 1.A.B) KUBEADM RESET

File name:- kubeadmReset.sh

#!/bin/sh

#Reset the kubeadm
sudo kubeadm reset --ignore-preflight-errors=IsPrivilegedUser,preflight -f

#flush out the iptables
sudo iptables -F

sudo rm /etc/cni/net.d/*

sudo ipvsadm --clear

rm /home/nirmalsingh/.kube/config

COMMAND - **$ bash kubeadmReset.sh**

Task 1 . B) Deploy traefik ingress controller on your K8 cluster (you can use helm for this).

1.B.A) **CREATE SERVICE ACCOUNT**

```yaml
apiVersion: v1
kind: ServiceAccount
metadata:
  name: traefik-ingress
  namespace: kube-system
```

```yaml
kind: ClusterRole
apiVersion: rbac.authorization.k8s.io/v1beta1
metadata:
  name: traefik-ingress
rules:
  - apiGroups:
      - ""
    resources:
      - services
      - endpoints
      - secrets
    verbs:
      - get
      - list
      - watch
  - apiGroups:
      - extensions
    resources:
      - ingresses
    verbs:
      - get
      - list
      - watch
```

```yaml
kind: ClusterRoleBinding
apiVersion: rbac.authorization.k8s.io/v1beta1
metadata:
  name: traefik-ingress
roleRef:
  apiGroup: rbac.authorization.k8s.io
  kind: ClusterRole
  name: traefik-ingress
subjects:
- kind: ServiceAccount
  name: traefik-ingress
  namespace: kube-system
```

COMMAND - **$ kubectl create -f traefik-service-acc.yaml**
$ kubectl create -f traefik-cr.yaml
$ kubectl create -f traefik-crb.yaml

Deployment file for traefik ingress controller

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: traefik-ingress-controller
  namespace: kube-system
  labels:
    k8s-app: traefik-ingress-lb  # selector v
spec:
  replicas: 1
  selector:
    matchLabels:
      k8s-app: traefik-ingress-lb
  template:
    metadata:
      labels:
        k8s-app: traefik-ingress-lb
        name: traefik-ingress-lb
    spec:
      serviceAccountName: traefik-ingress
      terminationGracePeriodSeconds: 60
      containers:
      - image: traefik:v1.7
        name: traefik-ingress-lb
        ports:
        - name: http
          containerPort: 80
        - name: admin
          containerPort: 8080
        args:
        - --api
        - --kubernetes
        - --logLevel=INFO
---
apiVersion: v1
kind: Service
metadata:
  name: traefik-ingress-service
  namespace: kube-system
spec:
  selector:
    k8s-app: traefik-ingress-lb
  type: NodePort
  ports:
  - protocol: TCP
    name: web
    port: 80
  - protocol: TCP
    port: 8080
    name: admin
```

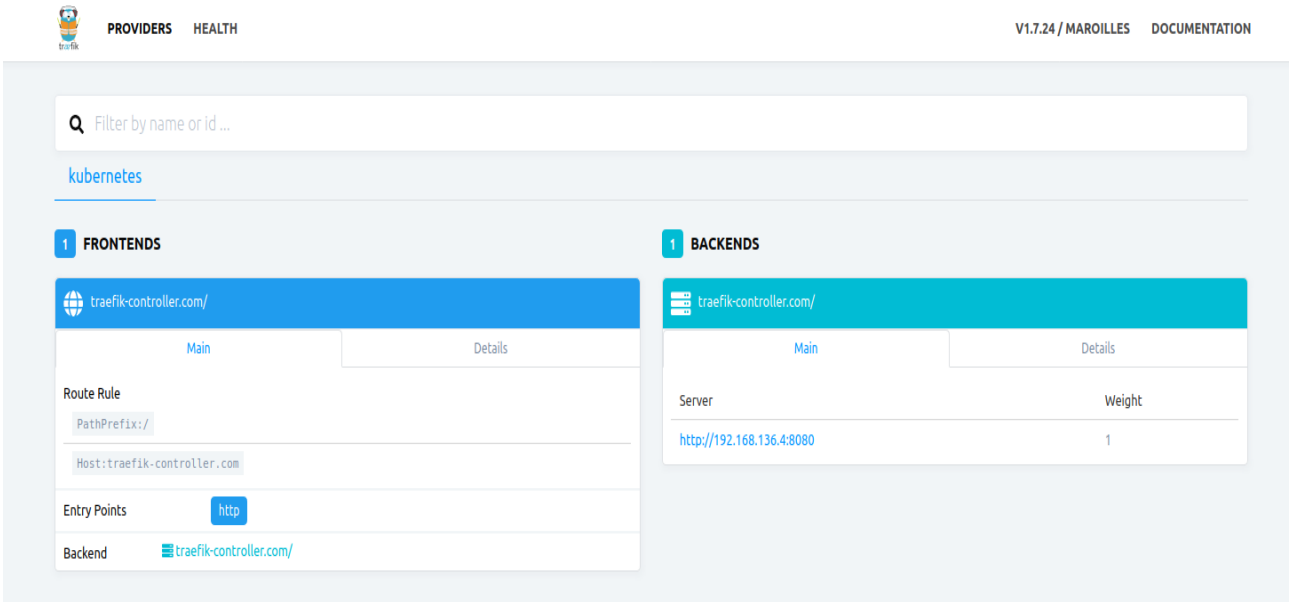
COMMAND - **$ kubectl create -f traefik-deployment.yaml**

Ingress Resource:-

```yaml
apiVersion: v1
kind: Service
metadata:
  name: traefik-web-ui
  namespace: kube-system
spec:
  selector:
    k8s-app: traefik-ingress-lb
  ports:
  - name: web
    port: 8080
    targetPort: 8080
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: traefik-ingress-resource
  namespace: kube-system
spec:
  rules:
  - host: traefik-controller.com
    http:
      paths:
      - path: /
        backend:
          serviceName: traefik-web-ui
          servicePort: web
```

COMMAND - **$ kubectl create -f traefik-ingress.yaml**

Verify the cluster/ingress controller is operational or not, once things seems good follow below guidelines: 192.168.1.103:8080



Task 2:
Dockerize the App mentioned by the URL https://github.com/M1TKO/my-note-webapp and deploy it on Kubernetes using following guidelines

A. Database should be external (deploy external DB on Kubernetes)
B. app should use persistent volumes (hostpath would work here for us)
C. ingress name to access via web should be notes.xenon.team
D. app should always scheduled by tolerating the taint
E. Demonstrate usage of Readiness and Liveness probe via your application

Task 2) Create docker file : Dockerfile

```
FROM php:7.3.3-apache

WORKDIR /var/www/html

COPY . .

RUN apt-get update && apt-get upgrade -y

RUN docker-php-ext-install mysqli pdo_mysql
```

2.1 Now build and push image to the docker hub

COMMAND - $ docker build -t docker-repo/php-mysql-image:v3 .
$ docker push docker-repo/php-mysql-image:v3

2.2 Create the persistent volume for application

1. persistent volume:

```yaml
#pv-volume.yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: task-pv-volume
  namespace: kube-system
  labels:
    type: local
spec:
  storageClassName: manual
  capacity:
    storage: 10Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: "/mnt/data"
```

2. persistent Volume Claim

```yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: task-pv-claim
  namespace: kube-system
spec:
  storageClassName: manual
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 3Gi
```

COMMAND - $ kubectl create -f pv-volume.yaml
$ kubectl create -f pv-claim.yaml

2.3 Create Deployment for php app, mysql and phpmyadmin in single file :

webserver.yaml

php-deploy

```yaml
# php application  deployment
apiVersion: apps/v1
kind: Deployment
metadata:
  name: php-deploy
  namespace: kube-system
  labels:
    app: php-app
spec:
  selector:
    matchLabels:
      app: php-app
  template:
    metadata:
      labels:
        app: php-app
    spec:
      containers:
        - name: php-app-container
          image: nirmalcontainer/php-mysql-image:v3
          # imagePullPolicy: Never
          ports:
            - containerPort: 80
```

mysql-deploy

```yaml
---
#mysql deployment
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mysql-deploy
  namespace: kube-system
  labels:
    app: mysql-app
spec:
  selector:
    matchLabels:
      app: mysql-app
  template:
    metadata:
      labels:
        app: mysql-app
    spec:
      volumes:
        - name: task-pv-storage
          persistentVolumeClaim:
            claimName: task-pv-claim
      containers:
        - image: mysql:8.0
          name: mysql-app-container
          imagePullPolicy: Always
          env:
            - name: MYSQL_ROOT_PASSWORD
              value: rootpass
            - name: MYSQL_DATABASE
              value: my_note
            - name: MYSQL_USER
              value: root
            - name: MYSQL_PASSWORD
              value:
          args: ["--default-authentication-plugin=mysql_native_password"]
          ports:
            - containerPort: 3306
              name: http
          volumeMounts:
            - mountPath: "/var/lib/mysql"
              name: task-pv-storage
```

phpmyadmin-deploy

```yaml
---
# phpmyadmin deploy
apiVersion: apps/v1
kind: Deployment
metadata:
  name: phpmyadmin-deploy
  namespace: kube-system
  labels:
    app: phpmyadmin-app
spec:
  replicas: 1
  selector:
    matchLabels:
      app: phpmyadmin-app
  template:
    metadata:
      labels:
        app: phpmyadmin-app
    spec:
      containers:
        - name: phpmyadmin-container
          image: phpmyadmin/phpmyadmin
          ports:
            - containerPort: 80
          env:
            - name: PMA_HOST
              value: mysql-svc
            - name: PMA_PORT
              value: "3306"
            - name: MYSQL_ROOT_PASSWORD
              value: rootpass
```

COMMAND - **$ kubectl create -f webserver.yaml**

2.4 Create Service for each deployment : webserver-svc.yaml

COMMAND - **$ kubectl create -f webserver-svc.yaml**

php-svc

```yaml
# php application
apiVersion: v1
kind: Service
metadata:
  name: php-svc
  namespace: kube-system
spec:
  type: NodePort
  selector:
    app: php-app
  ports:
    - port: 80
      targetPort: 80
      protocol: TCP
      name: http
```

mysql-svc

```yaml
---
apiVersion: v1
kind: Service
metadata:
  name: mysql-svc
  namespace: kube-system
  labels:
    app: mysql-app
spec:
  selector:
    app: mysql-app
  type: NodePort
  ports:
  - port: 3306
    protocol: TCP
    targetPort: 3306
    name: mysqlhttp
```

phpmyadmin-svc

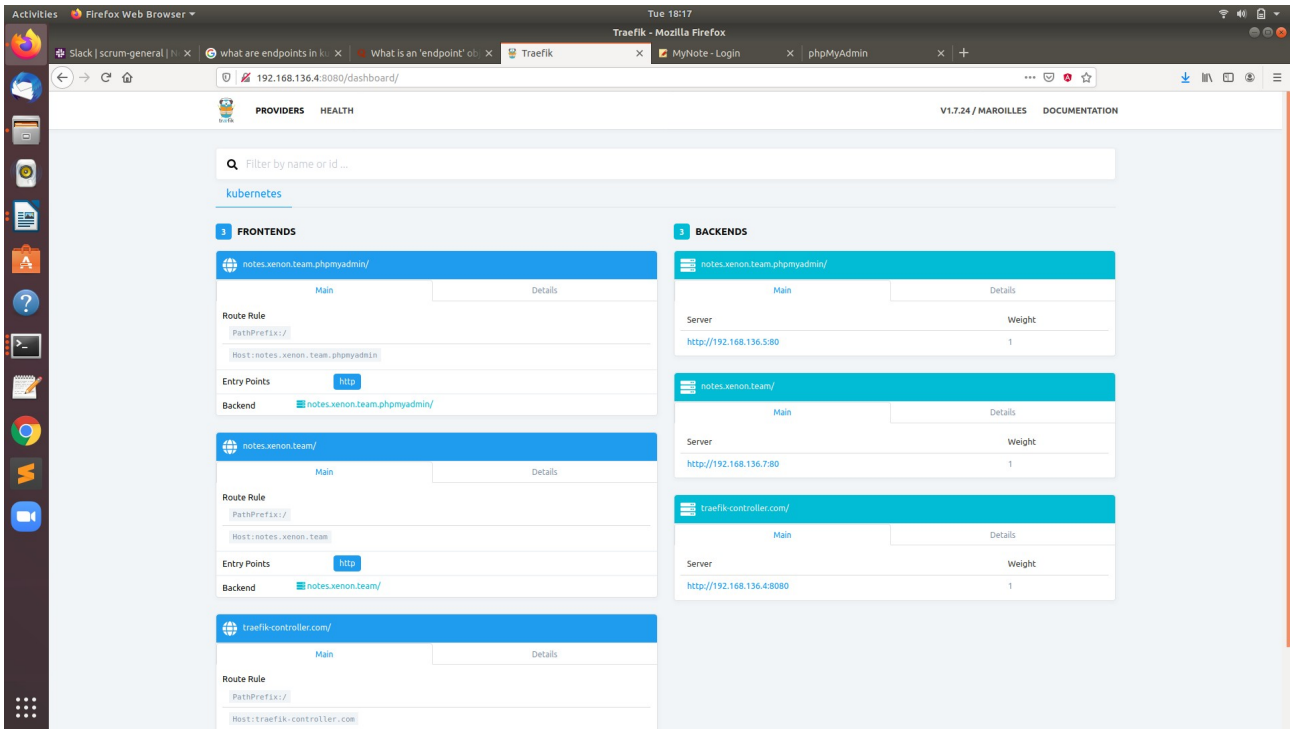
```yaml
---
# phpmyadmin service
apiVersion: v1
kind: Service
metadata:
  name: phpmyadmin-svc
  namespace: kube-system
  labels:
spec:
  type: NodePort
  selector:
    app: phpmyadmin-app
  ports:
  - protocol: TCP
    port: 80
    targetPort: 80
    name: phpmyadminhttp
```

2.5 Create ingress-Resource file

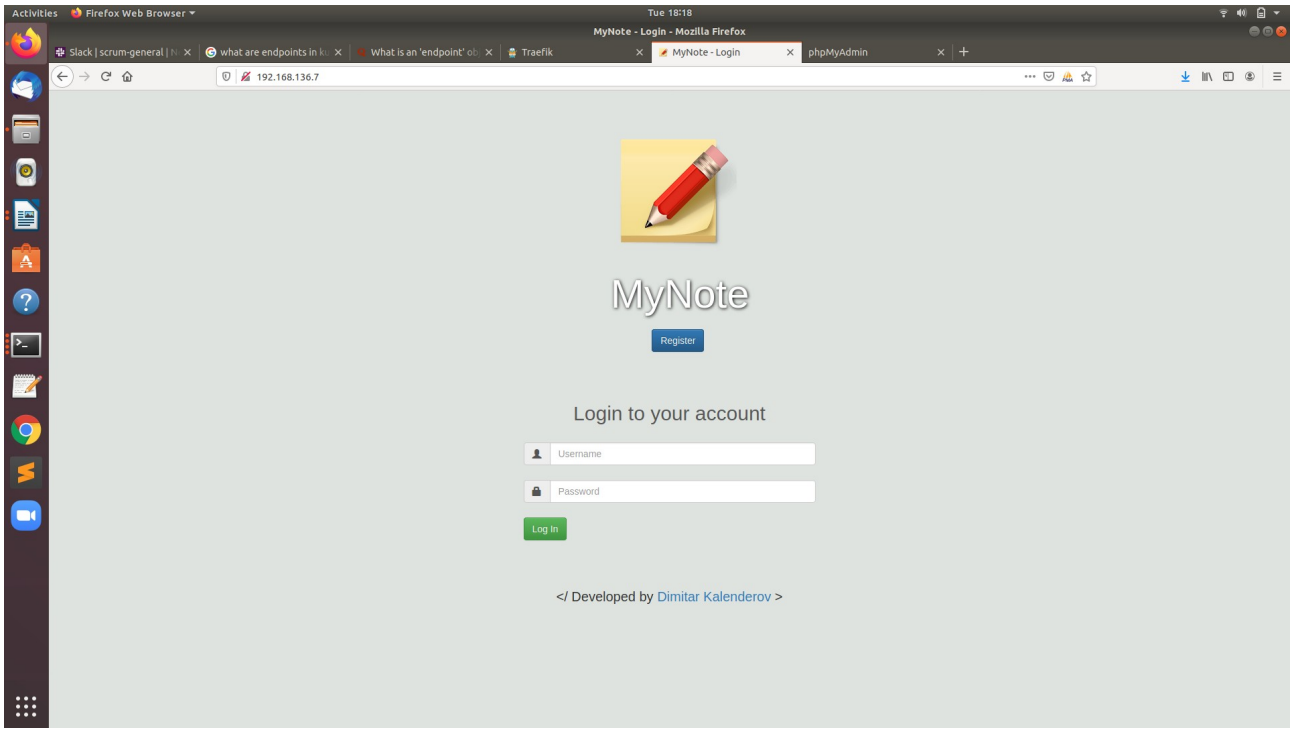
```
# this is ingress resource file used to hit th
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: php-ingress
  namespace: kube-system
  annotations:
    kubernetes.io/ingress.class: traefik
spec:
  rules:
  - host: notes.xenon.team
    http:
      paths:
      - path: /
        backend:
          serviceName: php-svc
          servicePort: http

  # - host: notes.xenon.team.mysql
  #   http:
  #     paths:
  #     - path: /
  #       backend:
  #         serviceName: mysql-svc
  #         servicePort: mysqlhttp
  - host: notes.xenon.team.phpmyadmin
    http:
      paths:
      - path: /
        backend:
          serviceName: phpmyadmin-svc
          servicePort: phpmyadminhttp
```

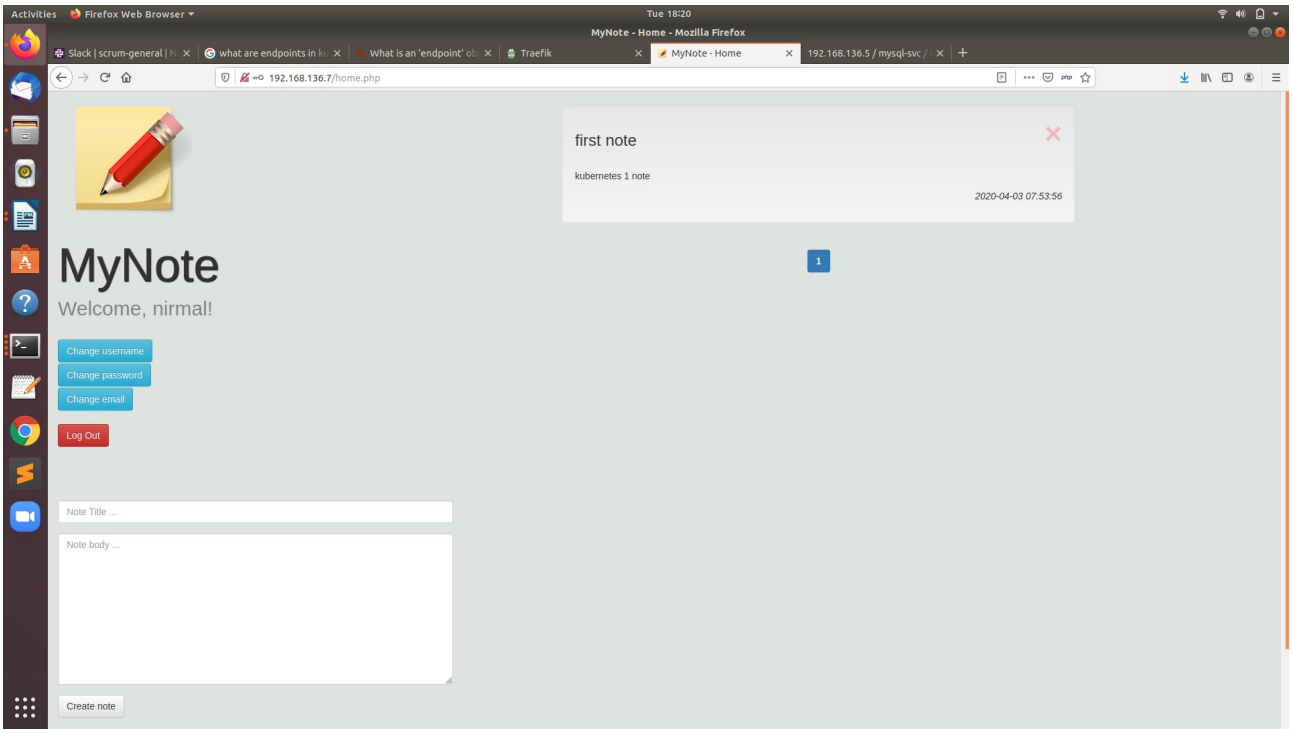
COMMAND - **$ kubectl create -f php-mysql-ingress.yaml**

SCREENSHOTS – traefik-ingress-controller

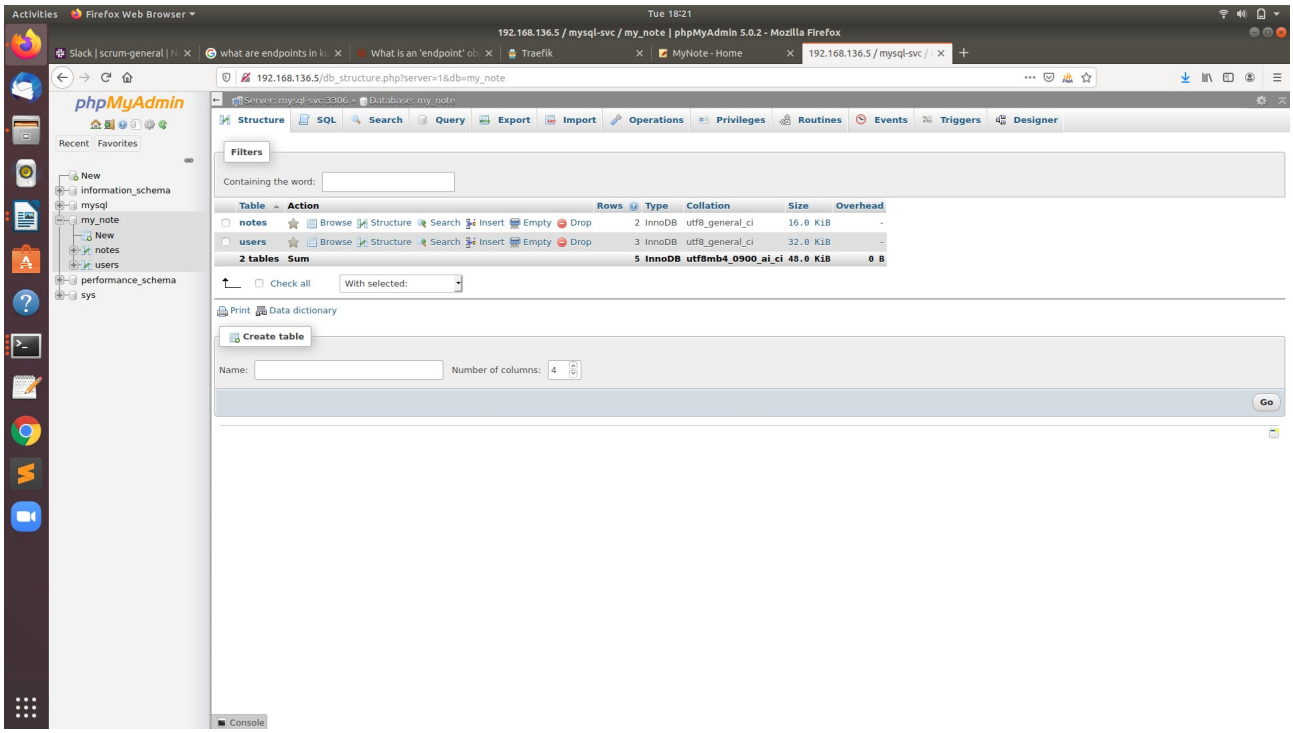


php-app UI screen shots





Mysql Database

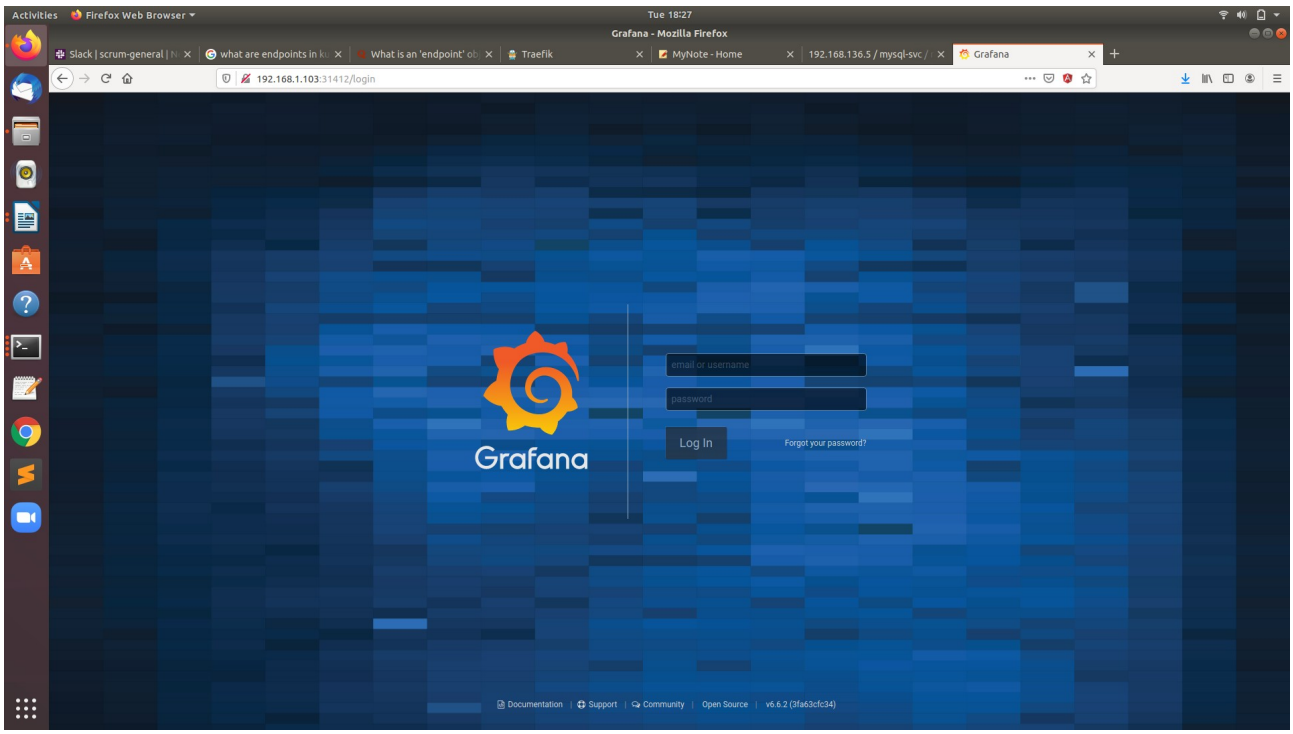


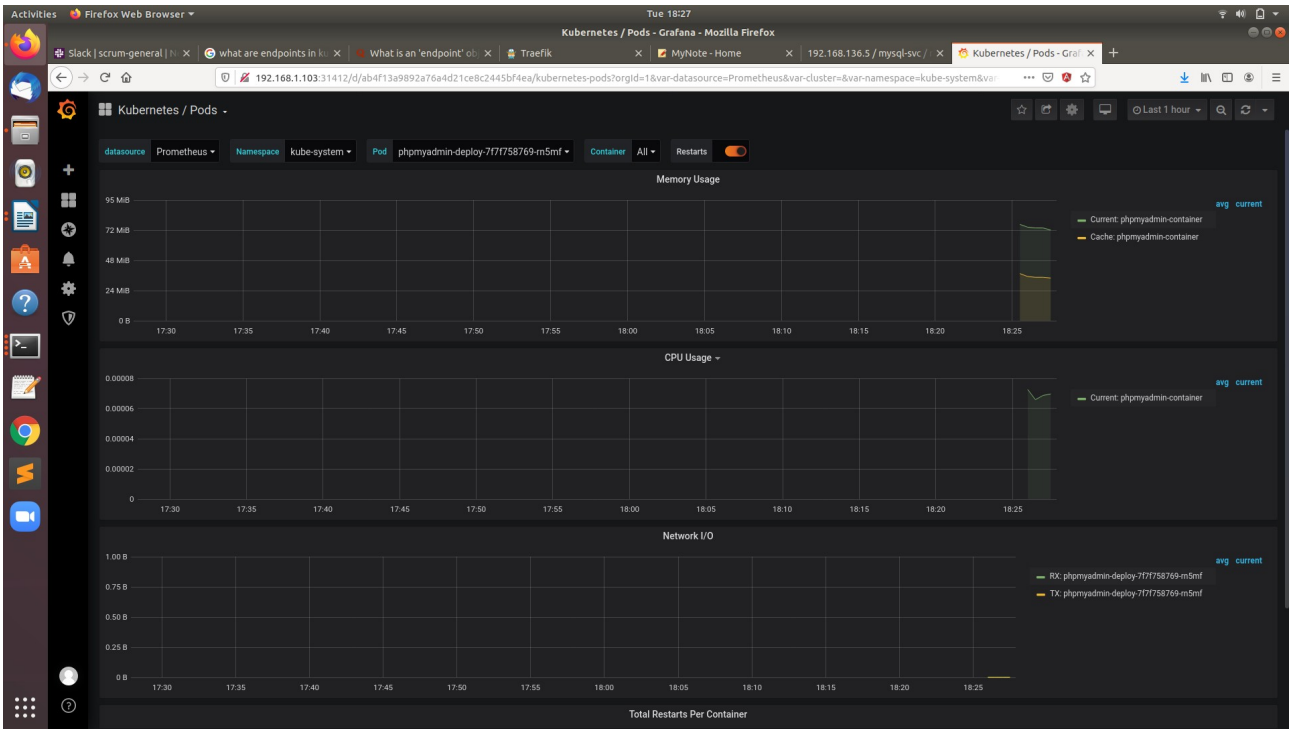
Task to be done via Helm3

Step 1 – create namespace monitoring - **$ kubectl create namespace monitoring.**
Step 2 – create helm chart : **$ helm install metrics stable/prometheus-operator --namespace monitoring.**
Step 3 - get all objects under monitoring namespace - **$ kubectl get all -n monitoring**
Step 4 - Now edit the grafana service. Change its type from **ClusterIP** to **NodePort - $ kubectl edit service/metrics-grafana -n monitoring**
Step 5 – Goto browser and write URL = IP address of worker machine on which chart installed with service nodeport like : - **192.168.1.1:32412**

Next page consist screenshots of this

username – admin
password - prom-operator


Activities
Firefox Web Browser
Tue 18:27
Grafana - Mozilla Firefox
Slack | scrum-general
what are endpoints in ku
What is an 'endpoint' ob
Traefik
MyNote - Home
192.168.136.5 / mysql-svc /
Grafana
192.168.1.103:31412/login
Grafana
email or username
password
Log In
Forgot your password?
Documentation
Support
Community
Open Source
v6.6.2 (3fa63cfc34)


Activities
Firefox Web Browser
Tue 18:27
Kubernetes / Pods - Grafana - Mozilla Firefox
192.168.1.103:31412/d/ab4f13a9892a76a4d21ce8c2445bf4ea/kubernetes-pods?orgId=1&var-datasource=Prometheus&var-cluster=&var-namespace=kube-system&var
Kubernetes / Pods
Last 1 hour
datasource
Prometheus
Namespace
kube-system
Pod
phpmyadmin-deploy-7f7f758769-m5mf
Container
All
Restarts
Memory Usage
95 MiB
72 MiB
48 MiB
24 MiB
0 B
17:30
17:35
17:40
17:45
17:50
17:55
18:00
18:05
18:10
18:15
18:20
18:25
avg
current
Current: phpmyadmin-container
Cache: phpmyadmin-container
CPU Usage
0.00008
0.00006
0.00004
0.00002
0
Current: phpmyadmin-container
Network I/O
1.00 B
0.75 B
0.50 B
0.25 B
0 B
RX: phpmyadmin-deploy-7f7f758769-m5mf
TX: phpmyadmin-deploy-7f7f758769-m5mf
Total Restarts Per Container