TBB Yetiştirme Programı
Proje Bitirme Ödevi

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Hazırlayan Bilgisi

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1 GİRİŞ

1.1 Örnek Uygulama Seçilmesi

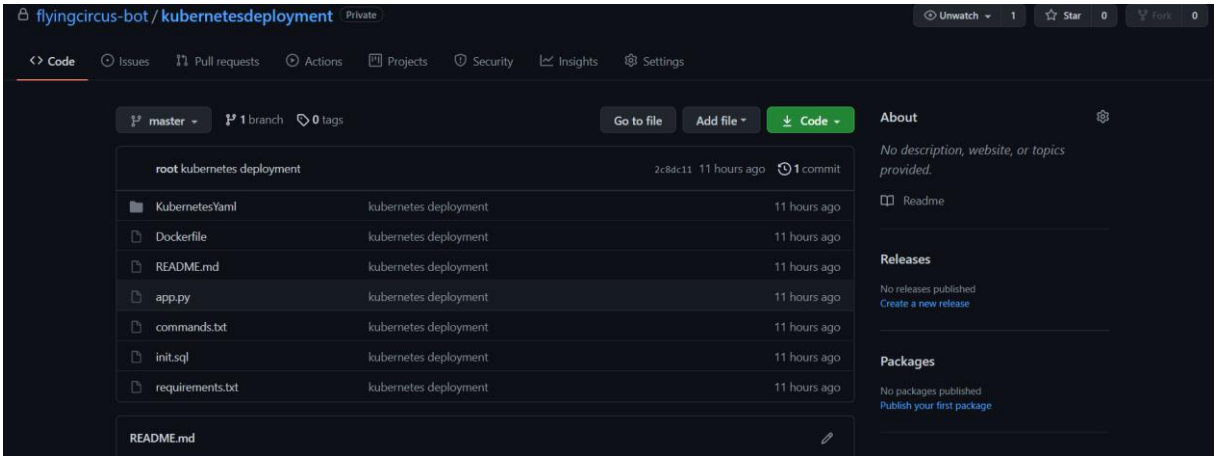
Örnek uygulama olarak aşağıdaki link üzerinde bulunan tbbdevops adlı proje kullanılmıştır.

https://github.com/aydemirkala/tbbdevops.git

1.2 Git Versiyon Kontrol

Dockerfile ve KubernetesYaml dosyalarını içerek repository linki aşağıdaki gibidir.

https://github.com/flyingcircus-bot/kubernetesdeployment



1.3 Seçilen Örnek uygulamanın Dockerize Edilmesi

Docker network oluşturulur ve build edilir.

```
docker build --network=host -t tbbpython .
docker volume create mysql_volume
docker network create -d bridge mynet
docker run --network=mynet -d -h=mydb --name=mydb -e MYSQL_ROOT_PASSWORD=12345 -p 3306:3306 -v mysql_volume:/var/lib/mysql mysql
docker run --network=mynet -d -h=myapp --name=myapp -p 5001:5001 tbbpython
```

```
2de8bef5f4c5   tbbpython   "/bin/sh -c 'python …"   4 days ago   Up 2 minutes   0.0.0.0:5001->5001/tcp, :::5001->5001/tcp
5272259606ef   mysql       "docker-entrypoint.s…"   4 days ago   Up 2 minutes   0.0.0.0:3306->3306/tcp, :::3306->3306/tcp, 33060/tcp
```

Dockerfile içeriği aşağıdaki gibidir. Dockerize file içeriğinde uygulama imaj bilgisi, working directory adresi, port bilgisi, requirement yüklenme aşamaları ve tbbdevops uygulamasına entegre edilmesi aşamaları bulunmaktadır. Son olarak ENV aracılığıyla daha sonra deploy edilecek MYSQL authorization bilgileri bir değişken olarak belirtilmiştir.

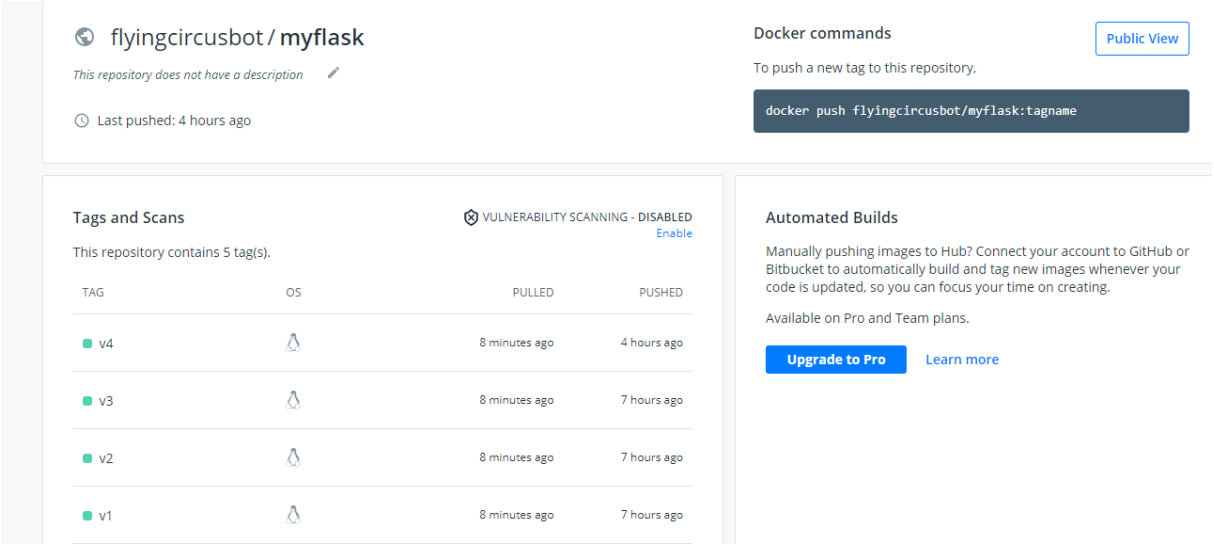
```
root@master:~/tbbdevops# cat Dockerfile
FROM python:3.6

EXPOSE 5001

WORKDIR /app

COPY requirements.txt /app
RUN pip install -r requirements.txt

COPY app.py /app
CMD python app.py

ENV MYSQL_USERNAME="root"
ENV MYSQL_PASSWORD="12345"
ENV MYSQL_INSTANCE_NAME="myapp"
ENV MYSQL_PORT_3306_TCP_ADDR="mydb"
ENV MYSQL_PORT_3306_TCP_PORT=3306
```

Dockerfile build edilip sonrasında Dockerhub üzerine push edilir.

```
root@master:~/tbbdevops# docker build -t myflask .
Sending build context to Docker daemon  90.62kB
Step 1/12 : FROM python:3.6
 ---> 5fad76530472
Step 2/12 : EXPOSE 5001
 ---> Using cache
 ---> 6a30f67f7cd7
Step 3/12 : WORKDIR /app
 ---> Using cache
 ---> e9483f9d838f
Step 4/12 : COPY requirements.txt /app
 ---> Using cache
 ---> 867e1f85e295
Step 5/12 : RUN pip install -r requirements.txt
 ---> Using cache
 ---> dc1aa6a8558e
Step 6/12 : COPY app.py /app
 ---> Using cache
 ---> b0a08d12ff8f
Step 7/12 : CMD python app.py
 ---> Using cache
 ---> 88caa0b7d785
Step 8/12 : ENV MYSQL_USERNAME="root"
 ---> Using cache
 ---> c406bfdc7765
Step 9/12 : ENV MYSQL_PASSWORD="12345"
 ---> Using cache
 ---> db08adf10481
Step 10/12 : ENV MYSQL_INSTANCE_NAME="myapp"
 ---> Using cache
 ---> 2949aa413668
Step 11/12 : ENV MYSQL_PORT_3306_TCP_ADDR="mydb"
 ---> Using cache
 ---> eaa939e53ca6
Step 12/12 : ENV MYSQL_PORT_3306_TCP_PORT=3306
 ---> Using cache
 ---> 6ec16ddb59d9
Successfully built 6ec16ddb59d9
Successfully tagged myflask:latest
```

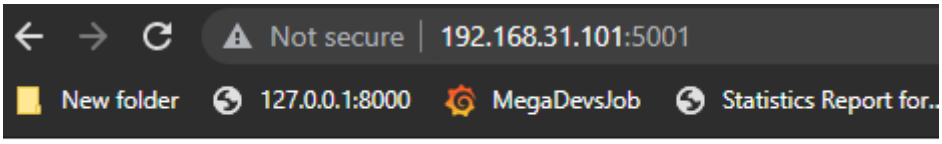
```
root@master:~/tbbdevops# docker tag myflask flyingcircusbot/myflask
```

```
root@master:~/tbbdevops# docker push flyingcircusbot/myflask:latest
```



Sonrasında docker imaj run edilir ve 5001 portu üzerinden API çıktıları incelenir.

```
root@master:~/tbbdevops# docker run -d flyingcircusbot/myflask
b95a9bd6074abd74eb07602c27dfb111d4cb533119ff0d7329039e22c5d9d65d
```



{"buyuk_sehirler": [["Istanbul", "34"], ["Ankara", "06"]]}

1.4 Kubernetes Yamls ve Deployment

Test, prod, preprod adımlı üç ayrı namespace oluşturulur.

```
root@master:~/kubernetesdeployment/KubernetesYaml/prod# kubectl get namespaces
NAME              STATUS   AGE
default           Active   2d20h
kube-node-lease   Active   2d20h
kube-public       Active   2d20h
kube-system       Active   2d20h
preprod           Active   4s
prod              Active   2d4h
test              Active   2d4h
```

Mysql-pv.yaml dosyası ile deployment için gerekli olan fiziksel volume create işlemi gerçekleştirilir.

```
---
apiVersion: v1
kind: PersistentVolume
metadata:
  name: mydb-pv-volume-test
  namespace: test
spec:
  capacity:
    storage: 0.5Gi
  accessModes:
    - ReadWriteOnce
  hostPath:
    path: "/opt/mydb-test"
```

Mysql-pvc.yaml dosyası aracılığıyla oluşturulan fiziksel volume'un claim aşaması gerçekleştirilir.

```
---
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
  name: mydb-pvc
  namespace: test
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 0.1Gi
~
```

Mysql-secret.yaml dosyası ile Dockerize ettiğimiz image içeriğinde gerekli olan ENV bilgisi MYSQL_ROOT_PASSWORD hashlenerek implement edilir.

```
---
apiVersion: v1
data:
  MYSQL_ROOT_PASSWORD: MTIzNDU=
kind: Secret
metadata:
  name: mysql-root-password
  namespace: test
type: Opaque
~
```

Mysql-initdb-config.yaml ile init.sql dosyası tanımlanır.

```
---
apiVersion: v1
kind: ConfigMap
metadata:
  name: mysql-initdb-config
  namespace: test
data:
  initdb.sql: |
    CREATE USER 'root'@'*' IDENTIFIED BY 'root';
    GRANT ALL PRIVILEGES ON *.* TO 'root'@'*' WITH GRANT OPTION;
    FLUSH PRIVILEGES;
    CREATE DATABASE IF NOT EXISTS sehirler;
    use sehirler;
    CREATE TABLE buyuk_sehirler (
        isim VARCHAR(20),
        plaka VARCHAR(10)
    );
    INSERT INTO buyuk_sehirler
        (isim, plaka )
    VALUES
        ('Istanbul', '34'),
        ('Ankara', '06');
~
```

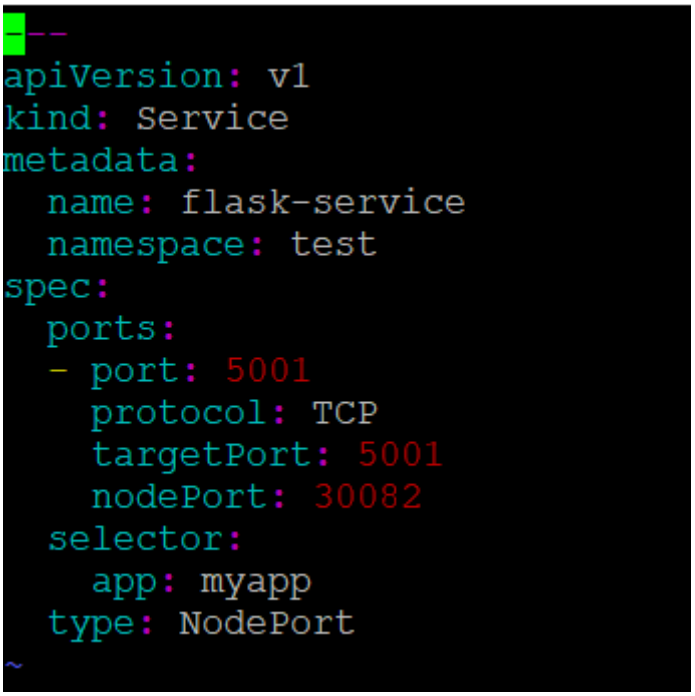
Mysql-service.yaml ile mysql'in üzerinde çalışacağı NodePort belirlenir.

```
---
apiVersion: v1
kind: Service
metadata:
  name: mydb
  namespace: test
  labels:
    app: mydb
spec:
  ports:
  - port: 3306
    protocol: TCP
    targetPort: 3306
    nodePort: 30338
  selector:
    app: mydb
  type: NodePort
~
```

Mysql-deployment.yaml ile ENV bilgileri de girilerek deploy yaml oluşturulur.

```yaml
---
apiVersion: apps/v1
kind: StatefulSet
metadata:
  name: mydb
  namespace: test
  labels:
    app: mydb
spec:
  replicas: 1
  selector:
    matchLabels:
      app: mydb
  serviceName: "mydb"
  template:
    metadata:
      name: mydb
      labels:
        app: mydb
    spec:
      imagePullSecrets:
      - name: secret-key
      containers:
      - name: mysql-test
        image: mysql
        imagePullPolicy: Always
        env:
          - name: MYSQL_ROOT_PASSWORD
            valueFrom:
              secretKeyRef:
                name: mysql-root-password
                key: MYSQL_ROOT_PASSWORD
        args: ["--default-authentication-plugin=mysql_native_password"]
        ports:
        - containerPort: 3306
        resources:
          requests:
            cpu: 200m
            memory: 0.5Gi
        livenessProbe:
          exec:
            command: ["mysqladmin", "ping"]
          initialDelaySeconds: 30
          periodSeconds: 10
          timeoutSeconds: 5
        volumeMounts:
        - name: mydb-pv-volume-test
```

Python-service.yaml ile Python uygulamasının çalışacağı namespace ve NodePort belirtilir.



Son olarak Python_deployment.yaml ile deployment için gerekli bilgiler set edilir.

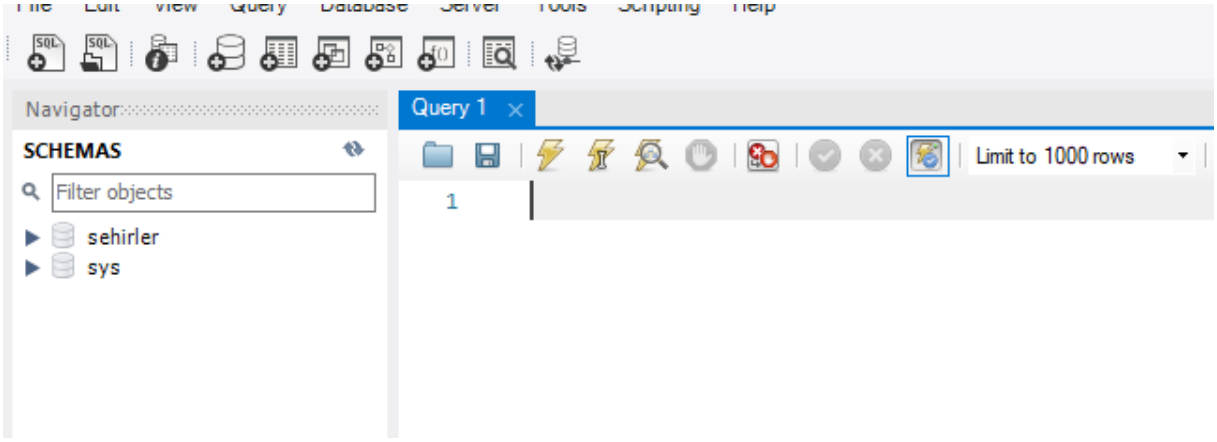
```yaml
---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp-deploy
  namespace: test
  labels:
    app: myapp
spec:
  replicas: 1
  selector:
    matchLabels:
      app: myapp
  template:
    metadata:
      labels:
        app: myapp
    spec:
      imagePullSecrets:
      - name: secret-key
      containers:
      - name: myapp-flask-test
        image: flyingcircusbot/myflask:latest
        imagePullPolicy: Always
        ports:
        - containerPort: 5001
        resources:
          requests:
            cpu: 200m
            memory: 0.5Gi
        livenessProbe:
          httpGet:
            path: /
            port: 5001
          initialDelaySeconds: 30
          periodSeconds: 10
          timeoutSeconds: 5
        env:
        - name: MYSQL_USERNAME
          value: "root"
        - name: MYSQL_PASSWORD
          valueFrom:
            secretKeyRef:
              name: mysql-root-password
              key: MYSQL_ROOT_PASSWORD
        - name: MYSQL_INSTANCE_NAME
          value: "myapp"
```

Bahsedilen yaml dosyaları test ve preprod namespaceleri için oluşturulur ve sonrasında apply işlemi gerçekleştirilir.

```
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f mysql-pv.yaml
persistentvolume/mydb-pv-volume-preprod created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f mysql-pvc.yaml
persistentvolumeclaim/mydb-pvc created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f mysql-service.yaml
service/mydb created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f mysql-initdb-config.yaml
configmap/mysql-initdb-config created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f mysql-secret.yaml
^[[Asecret/mysql-root-password created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f mysql-deployment.yaml
statefulset.apps/mydb created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f python-service.yaml
service/flask-service created
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl apply -f python-deployment.yaml
deployment.apps/myapp-deploy created
```

```
root@master:~/kubernetesdeployment/KubernetesYaml/preprod# kubectl get pods --namespace=preprod
NAME                              READY   STATUS    RESTARTS   AGE
myapp-deploy-86c446fc6-6plsc      1/1     Running   0          73s
mydb-0                            1/1     Running   0          95s
```

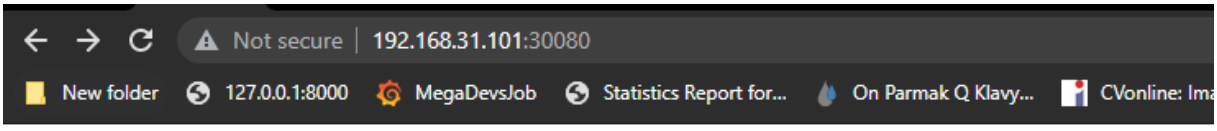
Workbench üzerinden kontrolü yapılır.



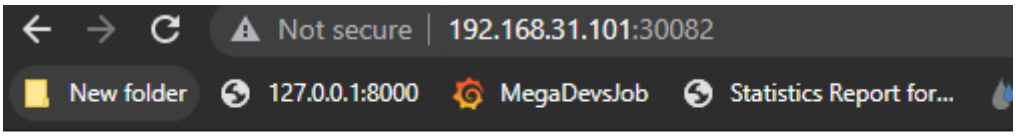
Bu aşamalar test ve prod kısımları için de gerçekleştirilir.

```
preprod     myapp-deploy-86c446fc6-6plsc     1/1     Running   4          52m
preprod     mydb-0                           1/1     Running   6          52m
prod        myapp-deploy-78868d7575-wdw9m    1/1     Running   3          17m
prod        mydb-0                           1/1     Running   5          18m
test        myapp-deploy-57c4bcc68-ns8dw     1/1     Running   9          21m
test        mydb-0                           0/1     Pending   0          28m
```

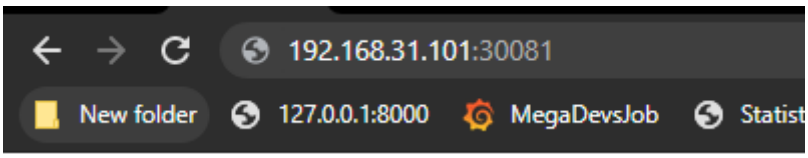
```
preprod     myapp-deploy-86c446fc6-6plsc     1/1     Running   4          52m
preprod     mydb-0                           1/1     Running   6          52m
prod        myapp-deploy-78868d7575-wdw9m    1/1     Running   3          17m
prod        mydb-0                           1/1     Running   5          18m
test        myapp-deploy-57c4bcc68-ns8dw     1/1     Running   9          21m
```



{"buyuk_sehirler": [["Istanbul", "34"], ["Ankara", "06"]]}

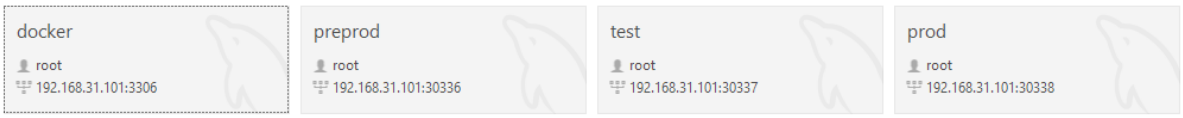


{"buyuk_sehirler": [["Istanbul", "34"], ["Ankara", "06"]]}



{"buyuk_sehirler": [["Istanbul", "34"], ["Ankara", "06"]]}

Workbench üzerinden kontrolü gerçekleştirilir.



1.5 Haproxy ile Load Balancer

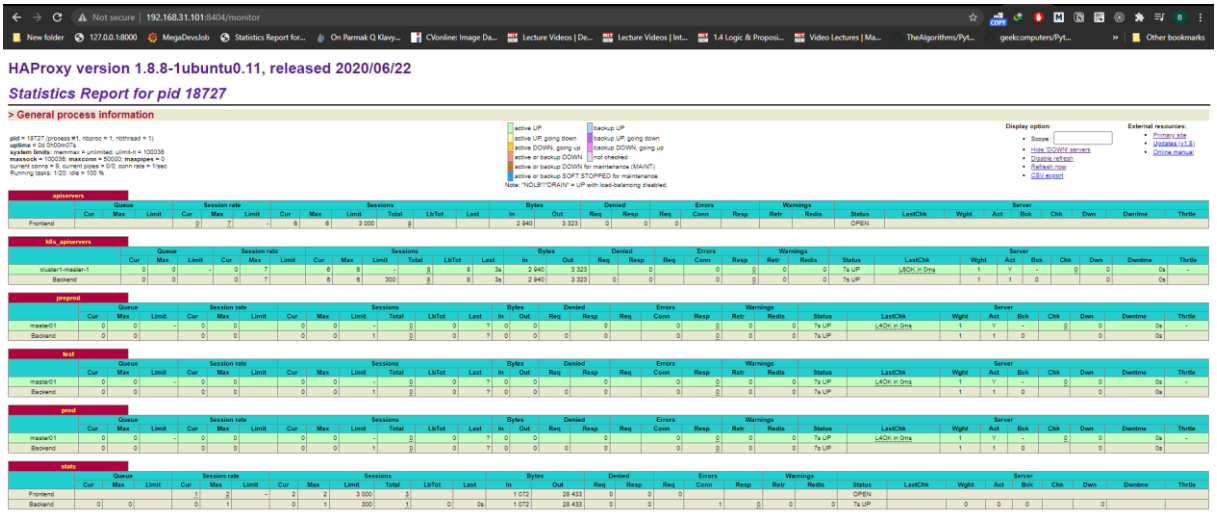
Haproxy kurulumu yapılır ve haproxt etc dosyası düzenlenir.

```
root@master:~# systemctl status haproxy.service
● haproxy.service - HAProxy Load Balancer
   Loaded: loaded (/lib/systemd/system/haproxy.service; enabled; vendor preset: enabled)
   Active: active (running) since Sat 2021-07-10 04:18:35 UTC; 3min 57s ago
     Docs: man:haproxy(1)
           file:/usr/share/doc/haproxy/configuration.txt.gz
  Process: 1198 ExecStartPre=/usr/sbin/haproxy -f $CONFIG -c -q $EXTRAOPTS (code=exited, status=0/SUCCESS)
Main PID: 1304 (haproxy)
    Tasks: 2 (limit: 4915)
   CGroup: /system.slice/haproxy.service
           ├─1304 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -p /run/haproxy.pid
           └─1306 /usr/sbin/haproxy -Ws -f /etc/haproxy/haproxy.cfg -p /run/haproxy.pid
```

Config dosyası içinde load balance IP adresleri ilgile namespaces'lere göre girilir.

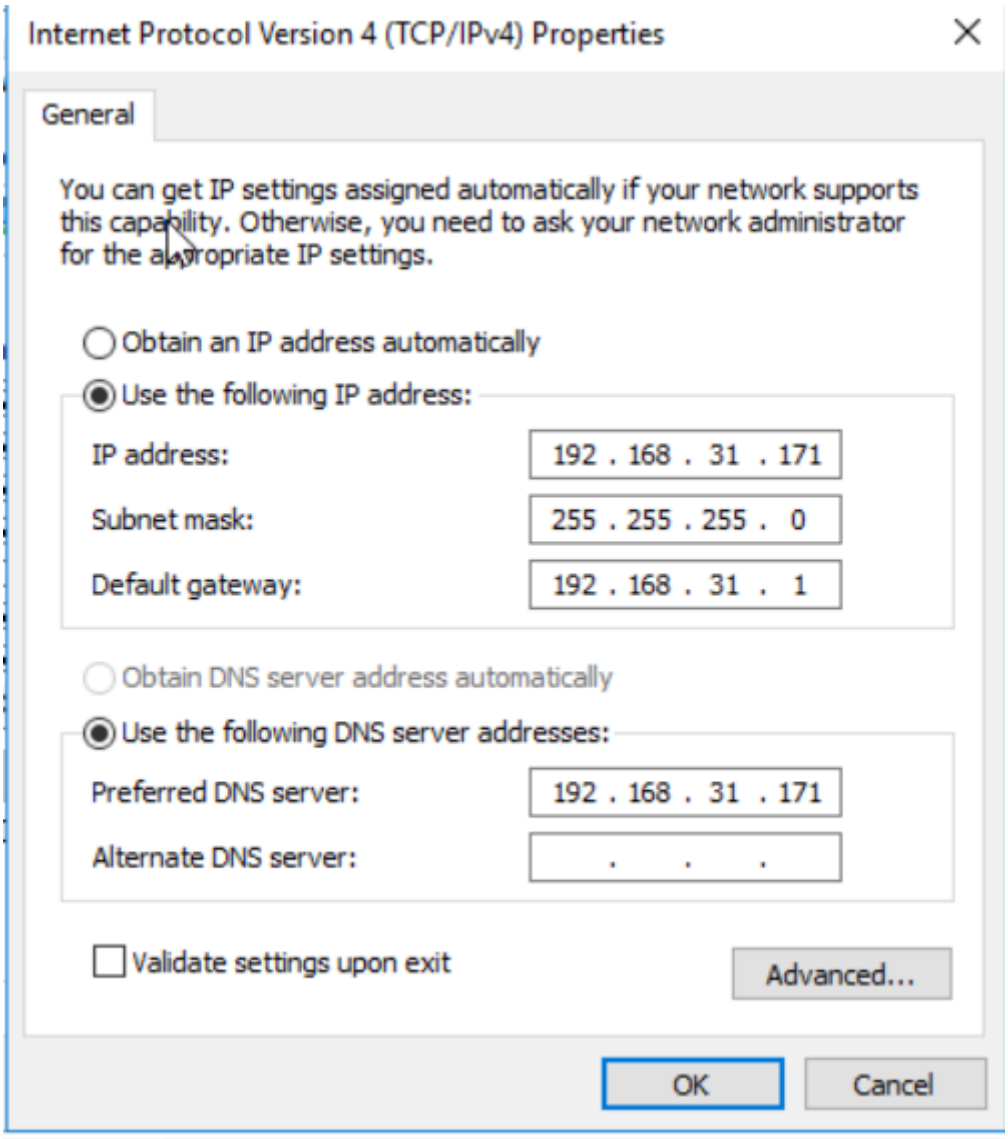
```
backend k8s_apiservers
        mode tcp
        balance leastconn
        option ssl-hello-chk
        option log-health-checks
        default-server inter 10s fall 2
        server cluster1-master-1 192.168.31.101:6443 check

backend preprod
        balance roundrobin
        mode http
        server master01 192.168.31.101:30080 check

backend test
        balance roundrobin
        mode http
        server master01 192.168.31.101:30081 check

backend prod
        balance roundrobin
        mode http
        server master01 192.168.31.101:30082 check
```

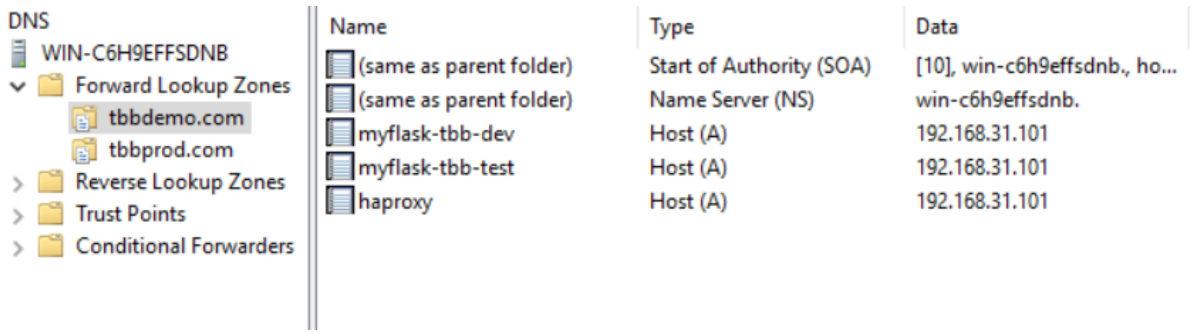
Haproxy üzerinde incelenir.



1.6 DNS Server Konfigürasyonları

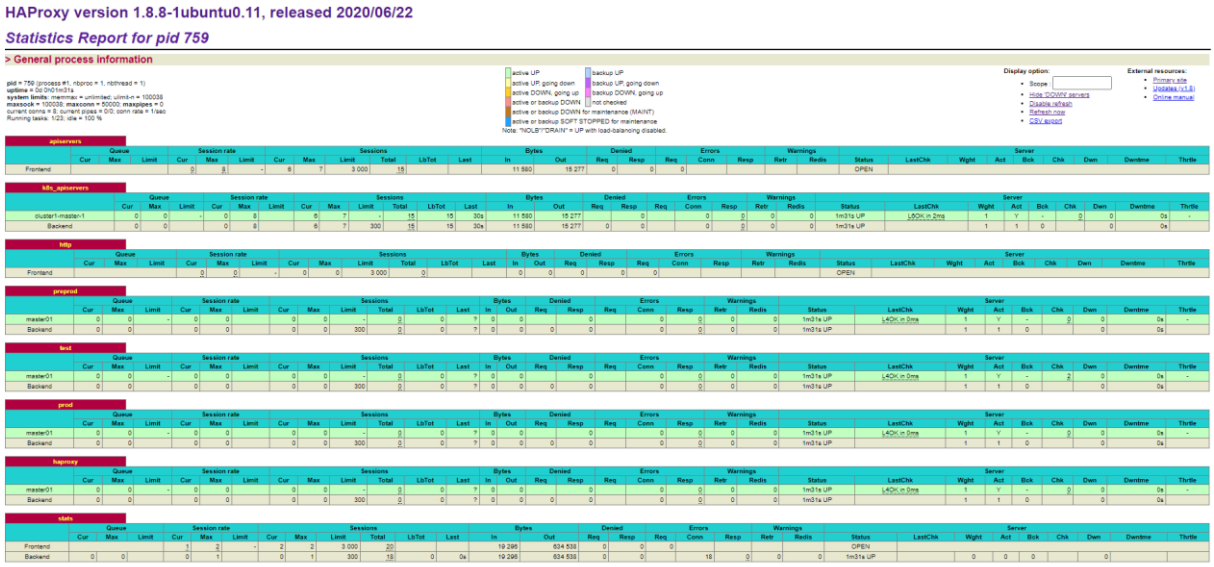
DNS server'ın bulunacağı makine static IP olarak düzenlenir. DNS server kurulur sonrasında 192.168.31.101 (kubespray,haproxy) makinesi ile aralarında bağlantı kurulur. Son olarak DNS kayıtları girilir ve haproxy üzerinde konfigürasyon yapılır.

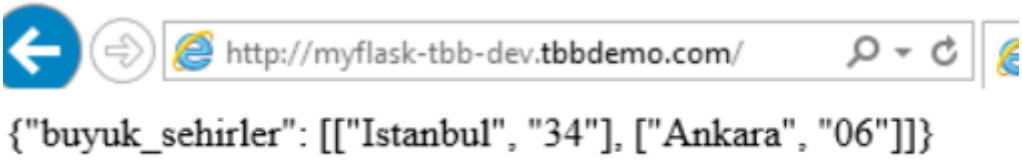

Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 31 . 171
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 31 . 1
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 31 . 171
Alternate DNS server:
Validate settings upon exit
Advanced...
OK
Cancel


DNS
WIN-C6H9EFFSDNB
Forward Lookup Zones
tbbdemo.com
tbbprod.com
Reverse Lookup Zones
Trust Points
Conditional Forwarders
Name
Type
Data
(same as parent folder)
Start of Authority (SOA)
[10], win-c6h9effsdnb., ho...
(same as parent folder)
Name Server (NS)
win-c6h9effsdnb.
myflask-tbb-dev
Host (A)
192.168.31.101
myflask-tbb-test
Host (A)
192.168.31.101
haproxy
Host (A)
192.168.31.101

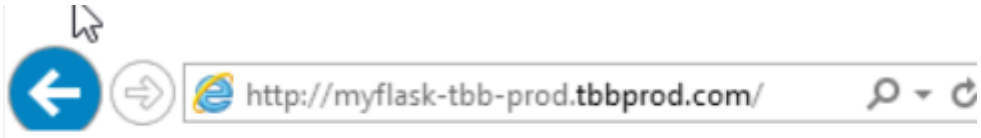
```
# This is the network config written by 'subiquity'
network:
  ethernets:
    enp0s3:
      dhcp4: no
      addresses: [192.168.31.101/24]
      gateway4: 192.168.31.1
      nameservers:
        addresses: [192.168.31.171]
    enp0s8:
      dhcp4: yes
~
~
~
~
```

```
frontend http
        bind *:80
        mode http
        acl acldev hdr(host) -i myflask-tbb-dev.tbbdemo.com
        use_backend preprod if acldev
        acl acltest hdr(host) -i myflask-tbb-test.tbbdemo.com
        use_backend test if acltest
        acl aclprod hdr(host) -i myflask-tbb-dev.tbbdemo.com
        use_backend prod if aclprod
        acl aclhap hdr(host) -i myflask-tbb-dev.tbbdemo.com
        use_backend haproxy if aclhap
backend preprod
        balance roundrobin
        mode http
        server master01 192.168.31.101:30080 check

backend test
        balance roundrobin
        mode http
        server master01 192.168.31.101:30081 check

backend prod
        balance roundrobin
        mode http
        server master01 192.168.31.101:30082 check
backend haproxy
        balance roundrobin
        mode http
        server master01 192.168.31.101:8404 check
```





{"buyuk_sehirler": [["Istanbul", "34"], ["Ankara", "06"]]}

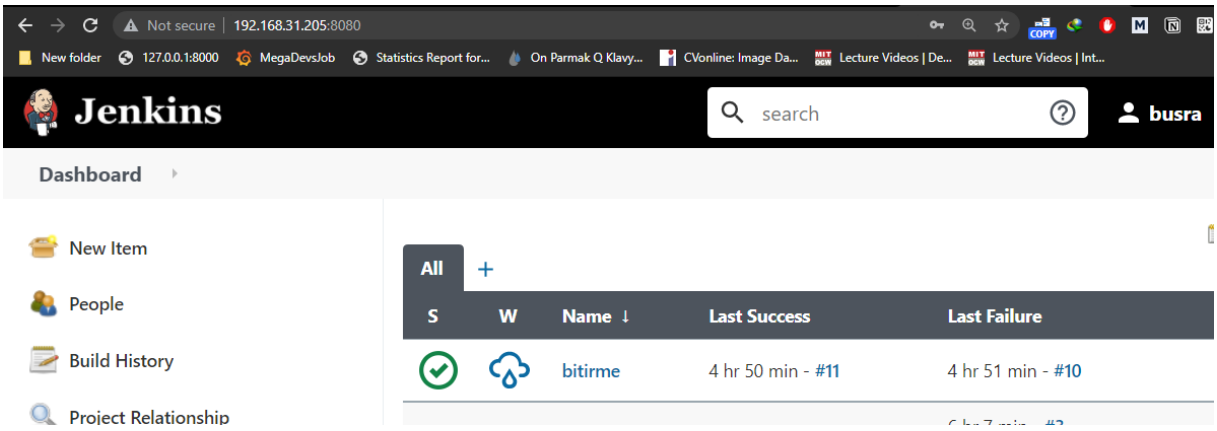


{"buyuk_sehirler": [["Istanbul", "34"], ["Ankara", "06"]]}

1.7 JENKINS CI/CD YÖNETİMİ

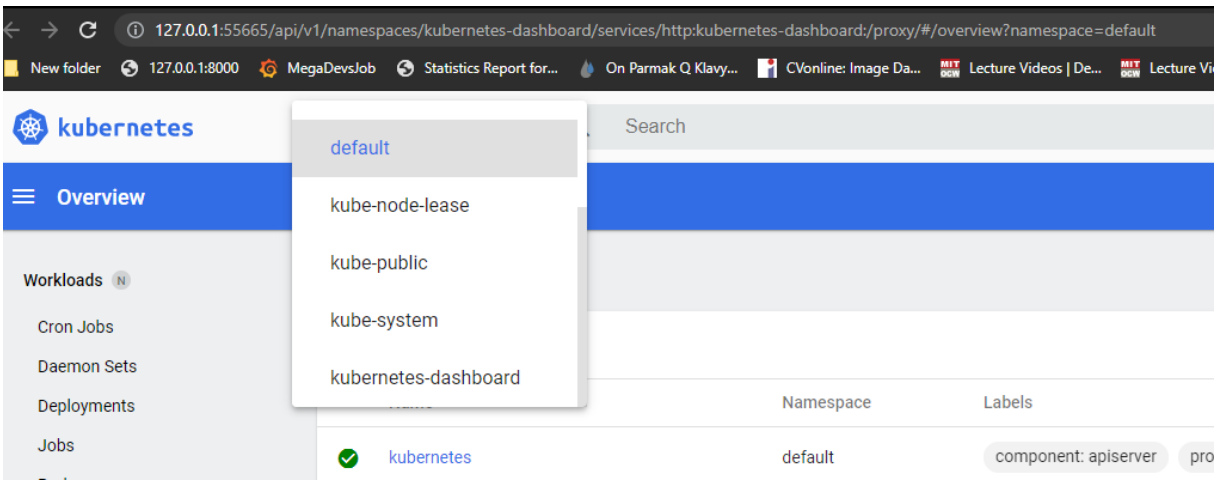
Jenkins Kurulumu yapılır.

```
jenkins@busra:~/.kube$ kubectl get nodes
NAME       STATUS   ROLES                  AGE   VERSION
minikube   Ready    control-plane,master   20m   v1.20.7
jenkins@busra:~/.kube$ kubectl get pods --all-namespaces
NAMESPACE              NAME                                         READY   STATUS    RESTARTS   AGE
kube-system            coredns-74ff55c5b-nqtbh                      1/1     Running   1          20m
kube-system            etcd-minikube                                0/1     Running   1          20m
kube-system            kube-apiserver-minikube                      1/1     Running   1          20m
kube-system            kube-controller-manager-minikube             0/1     Running   1          20m
kube-system            kube-proxy-cq76h                             1/1     Running   1          20m
kube-system            kube-scheduler-minikube                      0/1     Running   1          20m
kube-system            storage-provisioner                          1/1     Running   2          20m
kubernetes-dashboard   dashboard-metrics-scraper-f6647bd8c-r9hlw    1/1     Running   1          20m
kubernetes-dashboard   kubernetes-dashboard-968bcb79-wcx6j          1/1     Running   3          20m
```



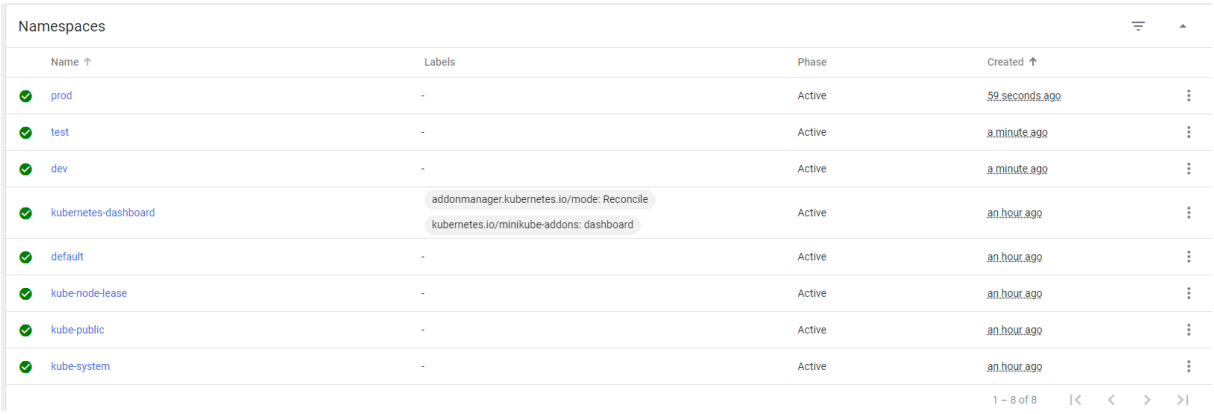
Jenkins'in kubernetes tarafı için minikube kuruldu ve Jenkins /var/lib/jenkins/config dosyasında bağlantı kuruldu.

Jenkins üzerindeki deploy aşamalarını daha iyi gözlemleyebilmek amacıyla minikube tarafından kubernetes dashboard kullanıldı.



Kubernetes üzerinde dev, test ve prod adlarında üç ayrı namespace oluşturuldu.

```
jenkins@busra:/home/busra$ kubectl create namespace dev
namespace/dev created
jenkins@busra:/home/busra$ kubectl create namespace test
namespace/test created
jenkins@busra:/home/busra$ kubectl create namespace prod
namespace/prod created
jenkins@busra:/home/busra$ kubectl get pods --all-namespaces
NAMESPACE              NAME                                         READY   STATUS    RESTARTS   AGE
kube-system            coredns-74ff55c5b-nqtbh                      1/1     Running   2          74m
kube-system            etcd-minikube                                1/1     Running   2          74m
kube-system            kube-apiserver-minikube                      1/1     Running   2          74m
kube-system            kube-controller-manager-minikube             1/1     Running   2          74m
kube-system            kube-proxy-cq76h                             1/1     Running   2          74m
kube-system            kube-scheduler-minikube                      1/1     Running   2          74m
kube-system            storage-provisioner                          1/1     Running   4          74m
kubernetes-dashboard   dashboard-metrics-scraper-f6647bd8c-r9hlw    1/1     Running   2          74m
kubernetes-dashboard   kubernetes-dashboard-968bcb79-wcx6j          1/1     Running   4          74m
```



Namespaces

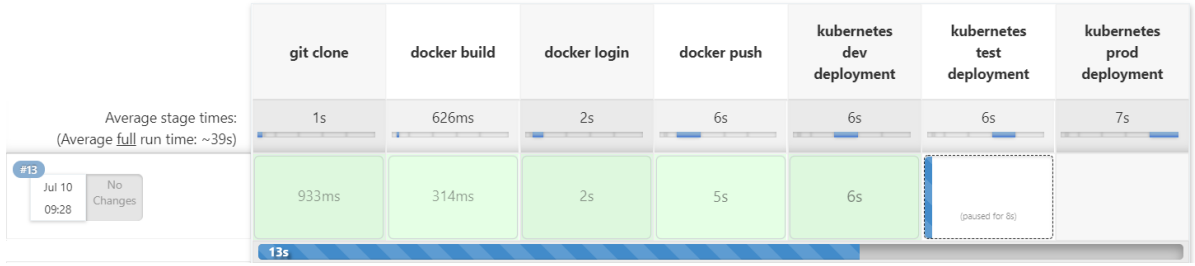
Name	Labels	Phase	Created
prod	-	Active	59 seconds ago
test	-	Active	a minute ago
dev	-	Active	a minute ago
kubernetes-dashboard	addonmanager.kubernetes.io/mode: Reconcile kubernetes.io/minikube-addons: dashboard	Active	an hour ago
default	-	Active	an hour ago
kube-node-lease	-	Active	an hour ago
kube-public	-	Active	an hour ago
kube-system	-	Active	an hour ago

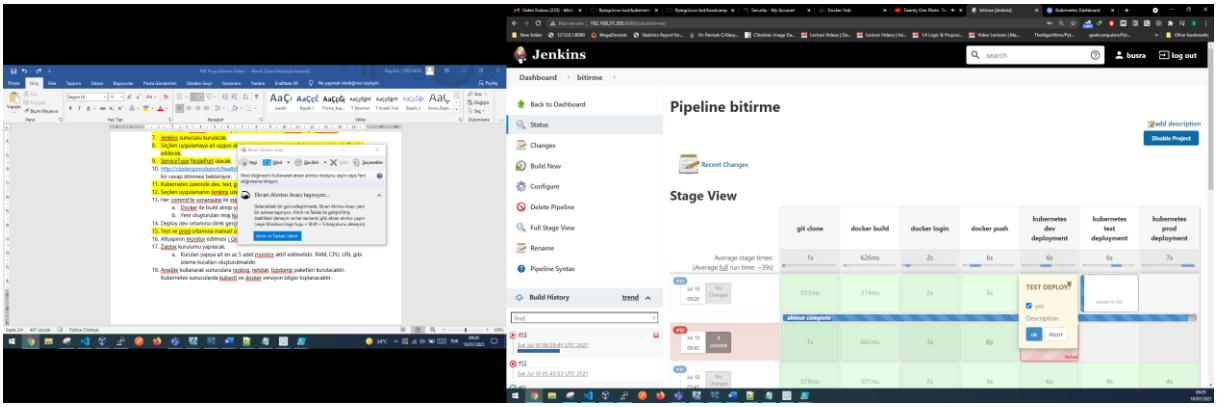
1 – 8 of 8

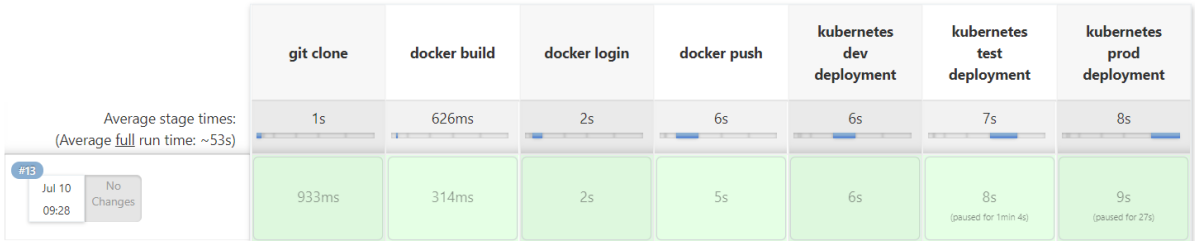
Sunucu üzerinde CI/CD aşamaları gerçekleştirildi. Docker Hub ve Git credential oluşturuldu. Pipeline üzerinde build trigger kullanıldı. Dev ortamını otomatik olarak geçip, test ve prod ortamlarında yaklaşık 1 dakikalık bekleme süresiyle manuel onay beklendi.

```
node {
    stage ("git clone"){
        git credentialsId: 'GITHUB', url: 'https://github.com/flyingcircus-bot/kubernetesdeployment.git'
    }
    stage ("docker build"){
        sh 'docker build -t flyingcircusbot/myflask:v${BUILD_NUMBER} .'
    }
    stage ("docker login"){
        withCredentials([[$class: 'UsernamePasswordMultiBinding', credentialsId: 'DOCKERHUB', usernameVariable: 'USERNAME', pa
        sh 'docker login -u $USERNAME -p $PASSWORD'
        }
    }
    stage ("docker push"){
        sh 'docker push flyingcircusbot/myflask:v${BUILD_NUMBER}'
    }
    stage ("kubernetes dev deployment"){
        script {
            env.DOCKER_BUILD_NUMBER="${BUILD_NUMBER}"
        }
        sh 'echo ${DOCKER_BUILD_NUMBER}'
        sh 'envsubst < ./KubernetesYaml/dev/mysql-deployment.yaml | kubectl apply -f -'
        sh 'envsubst < ./KubernetesYaml/dev/python-deployment.yaml | kubectl apply -f -'
        sh 'kubectl apply -f ./KubernetesYaml/dev/mysql-pv.yaml'
        sh 'kubectl apply -f ./KubernetesYaml/dev/mysql-pvc.yaml'
        sh 'kubectl apply -f ./KubernetesYaml/dev/mysql-secret.yaml'
        sh 'kubectl apply -f ./KubernetesYaml/dev/mysql-initdb-config.yaml'
        sh 'kubectl apply -f ./KubernetesYaml/dev/mysql-service.yaml'
        sh 'kubectl apply -f ./KubernetesYaml/dev/python-service.yaml'
    }
```

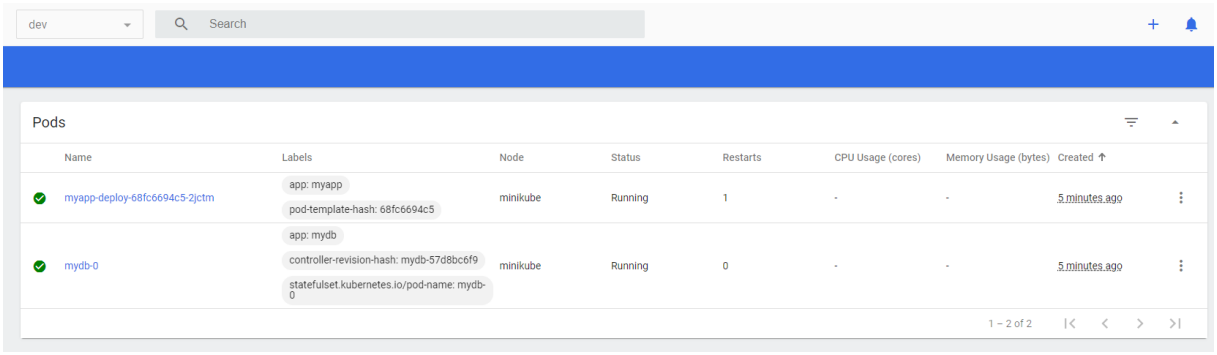
```
stage ("kubernetes test deployment"){
    def deployment= input(message: 'TEST DEPLOY?', ok:'ok', parameters:[booleanParam(defaultValue:true,description:'Descri
    if (deployment == true){
    script {
        env.DOCKER_BUILD_NUMBER="${BUILD_NUMBER}"
    }
    sh 'echo ${DOCKER_BUILD_NUMBER}'
    sh 'envsubst < ./KubernetesYaml/test/mysql-deployment.yaml | kubectl apply -f -'
    sh 'envsubst < ./KubernetesYaml/test/python-deployment.yaml | kubectl apply -f -'
    sh 'kubectl apply -f ./KubernetesYaml/test/mysql-pv.yaml'
    sh 'kubectl apply -f ./KubernetesYaml/test/mysql-pvc.yaml'
    sh 'kubectl apply -f ./KubernetesYaml/test/mysql-secret.yaml'
    sh 'kubectl apply -f ./KubernetesYaml/test/mysql-initdb-config.yaml'
    sh 'kubectl apply -f ./KubernetesYaml/test/mysql-service.yaml'
    sh 'kubectl apply -f ./KubernetesYaml/test/python-service.yaml'
    } else {
            echo "Deploy Skipped"
    }
```

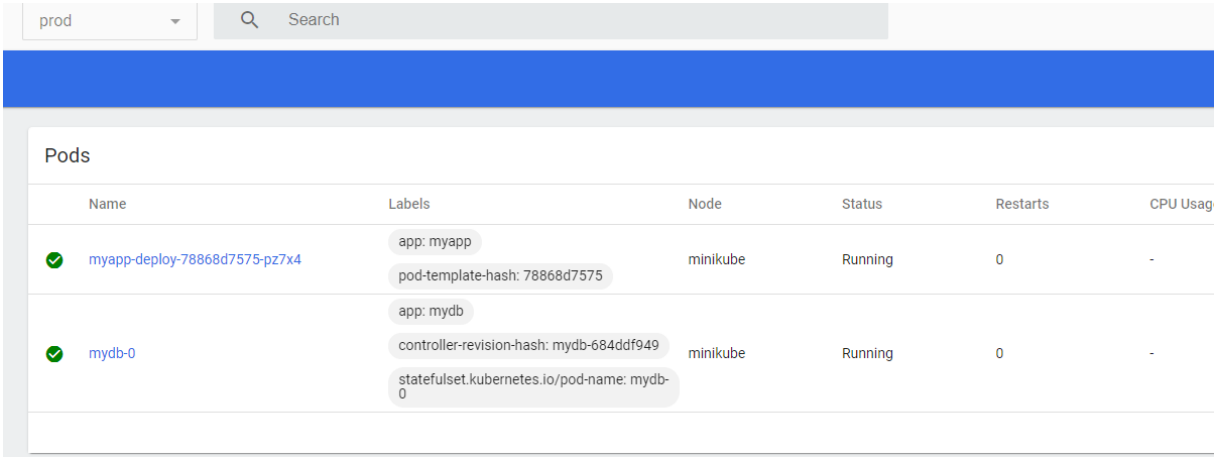


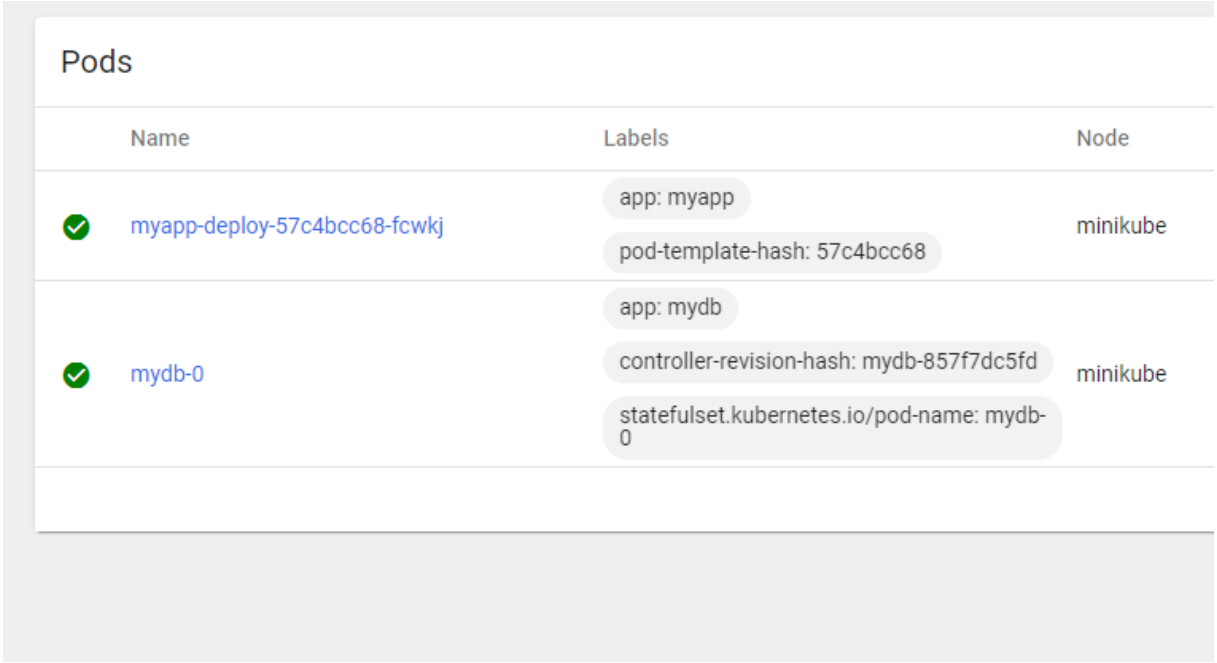




Dashboard ve jenkins üzerinde kontrolü gerçekleştirildi.



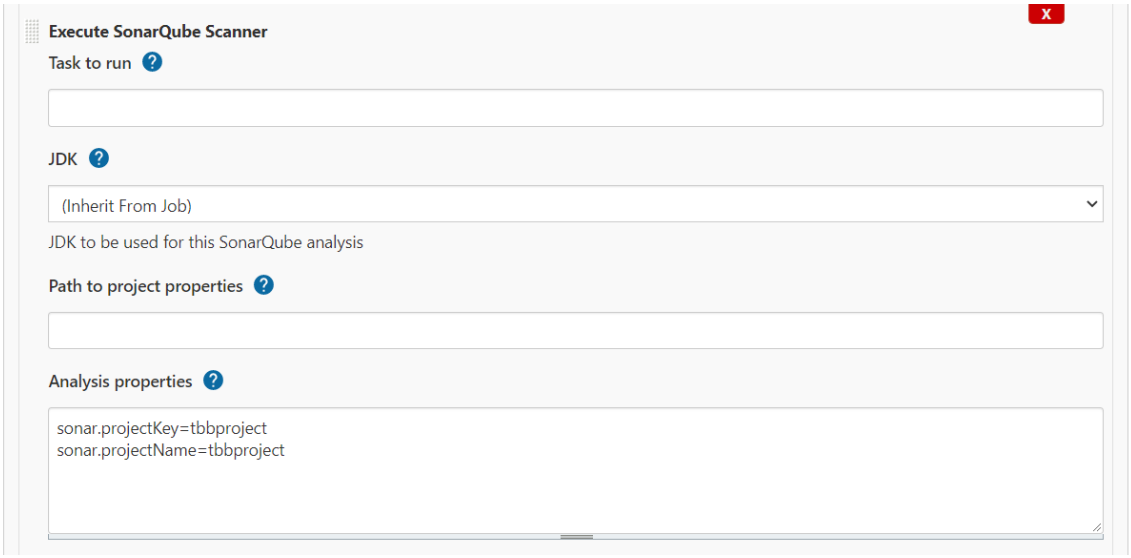




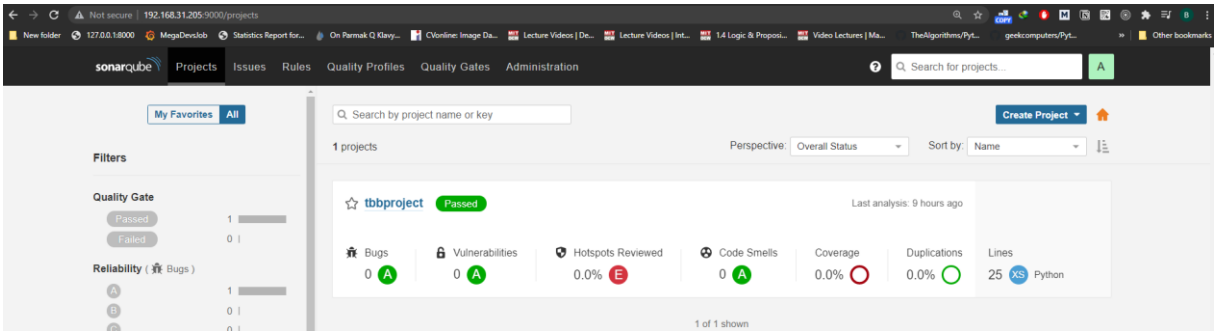

```
jenkins@busra:/home/busra$ kubectl get pods --all-namespaces
NAMESPACE              NAME                                         READY   STATUS    RESTARTS   AGE
dev                    myapp-deploy-68fc6694c5-2jctm                1/1     Running   1          5m33s
dev                    mydb-0                                       1/1     Running   0          5m34s
kube-system            coredns-74ff55c5b-nqtbh                      1/1     Running   2          84m
kube-system            etcd-minikube                                1/1     Running   2          84m
kube-system            kube-apiserver-minikube                      1/1     Running   2          84m
kube-system            kube-controller-manager-minikube             1/1     Running   2          84m
kube-system            kube-proxy-cq76h                             1/1     Running   2          84m
kube-system            kube-scheduler-minikube                      1/1     Running   2          84m
kube-system            storage-provisioner                          1/1     Running   4          84m
kubernetes-dashboard   dashboard-metrics-scraper-f6647bd8c-r9hlw    1/1     Running   2          84m
kubernetes-dashboard   kubernetes-dashboard-968bcb79-wcx6j          1/1     Running   4          84m
prod                   myapp-deploy-78868d7575-pz7x4                1/1     Running   0          3m47s
prod                   mydb-0                                       1/1     Running   0          3m47s
test                   myapp-deploy-57c4bcc68-fcwkj                 1/1     Running   0          4m21s
test                   mydb-0                                       1/1     Running   0          4m23s
```

1.8 Sonarqube ile Kod Kalite Kontrolü

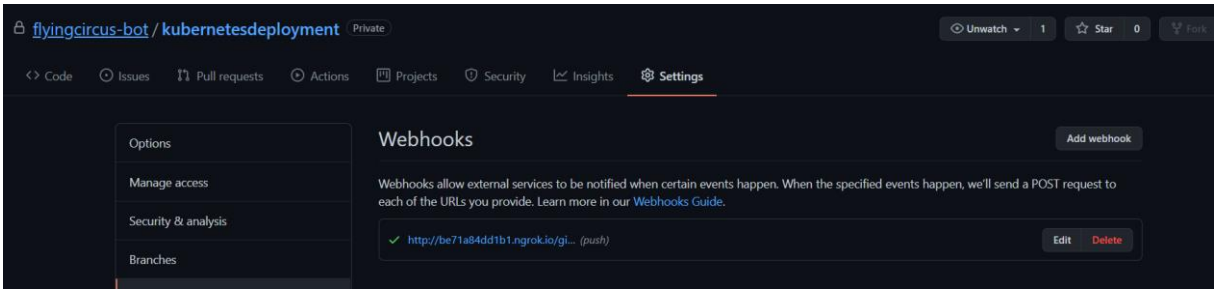
Freestyle bir proje oluşturulup sonarqube üzerinde kalite kontrol yapılabilmesi için gerekli ayarlar yapıldı ve aynı şekilde ön ihtiyaçlar karşılandı.

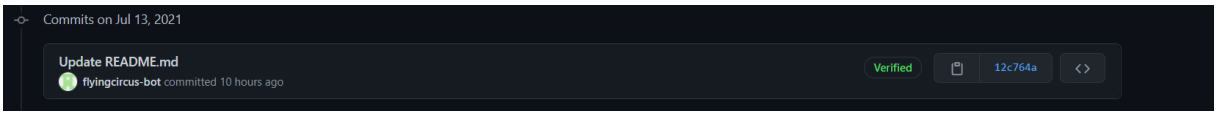


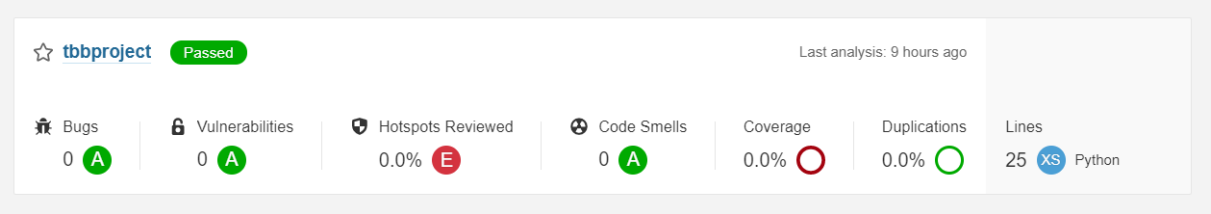
Output çıktısı incelendi.



Commit üzerinde etkilerini görebilmek amacıyla test edildi.





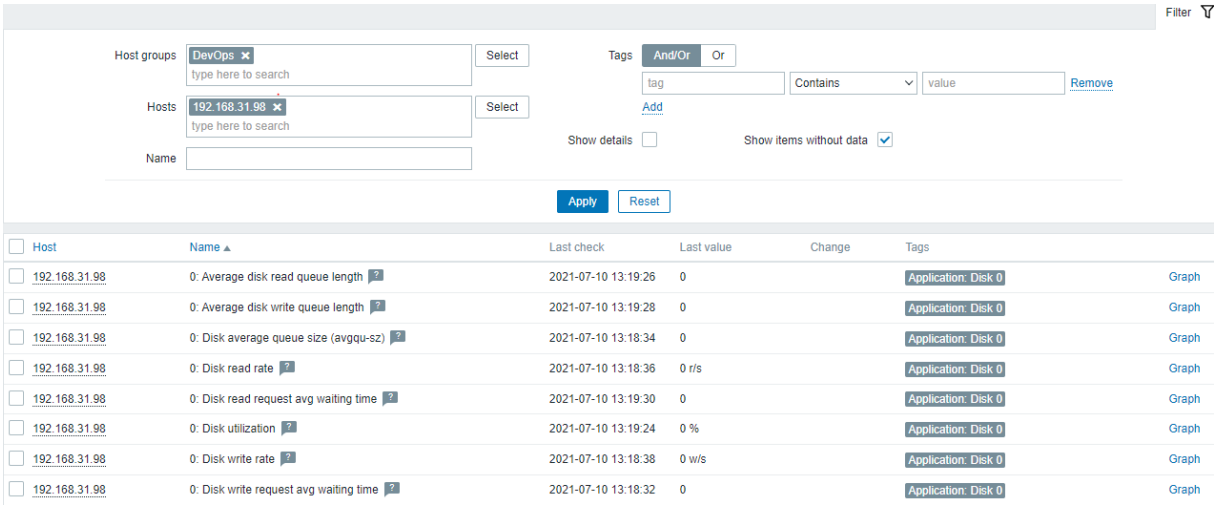


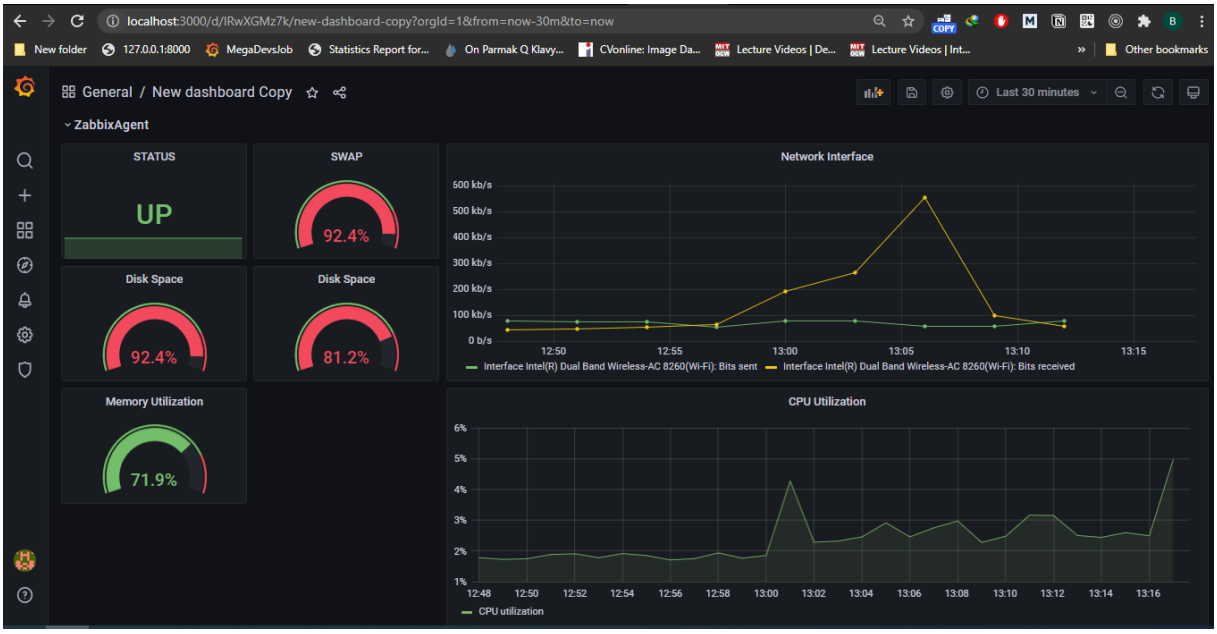
1.9 Monitoring Süreçleri

Monitoring aşamasında Zabbix ve Grafana kuruldu. Monitoring süreçlerinde RAM, CPU, URL Monitoring gerçekleştirildi.

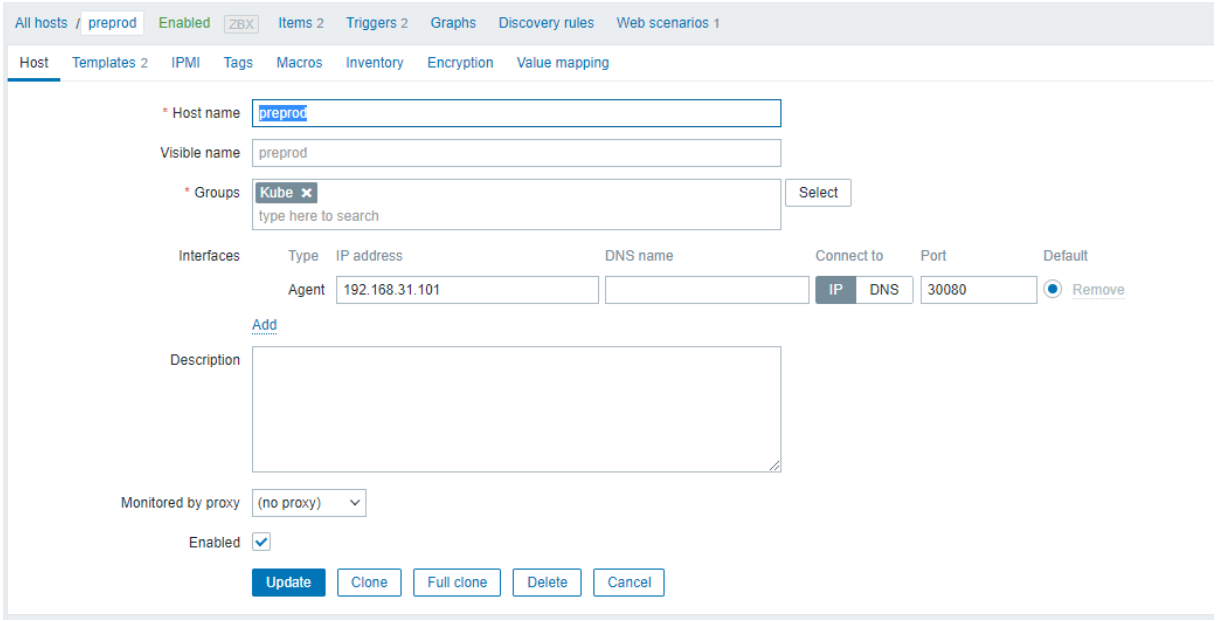
Zabbix üzerinden Configuration>Hosts sekmesinden monitör edilmesi planlanan makine create edilir. Latest Data sekmesinden son datalar arasında inceleme yapılır.

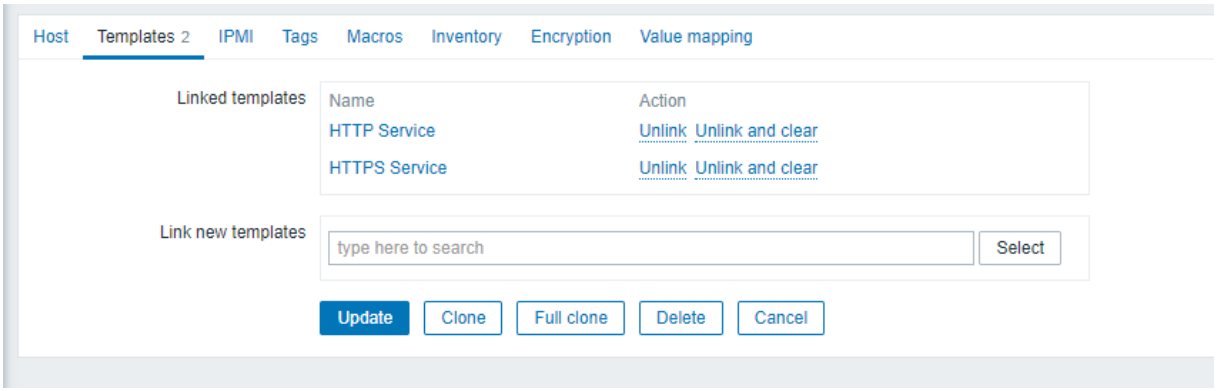
Zabbix Agent Monitoring – Ana Makine

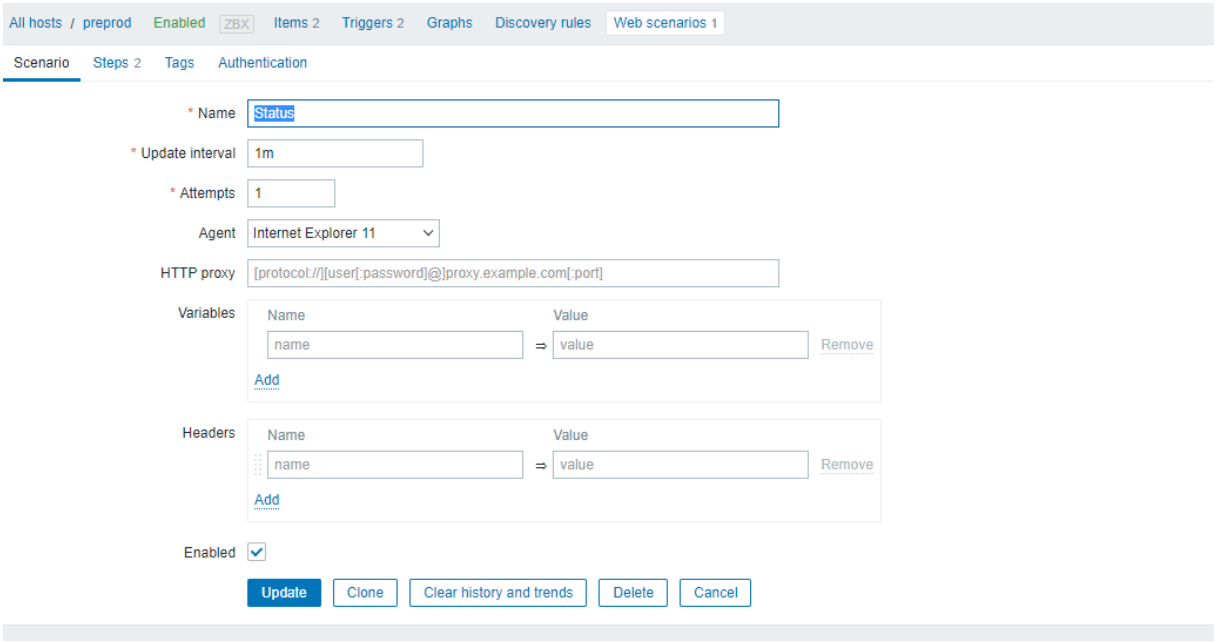




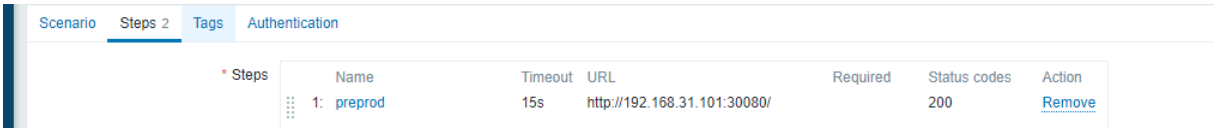
Uygulama halihazırda http üzerinden koşulduğu için URL monitoring gerçekleştirildi. Preprod IP, host olarak Zabbix üzerine eklendi ve sonrasında Web Senaryosu hazırlandı.

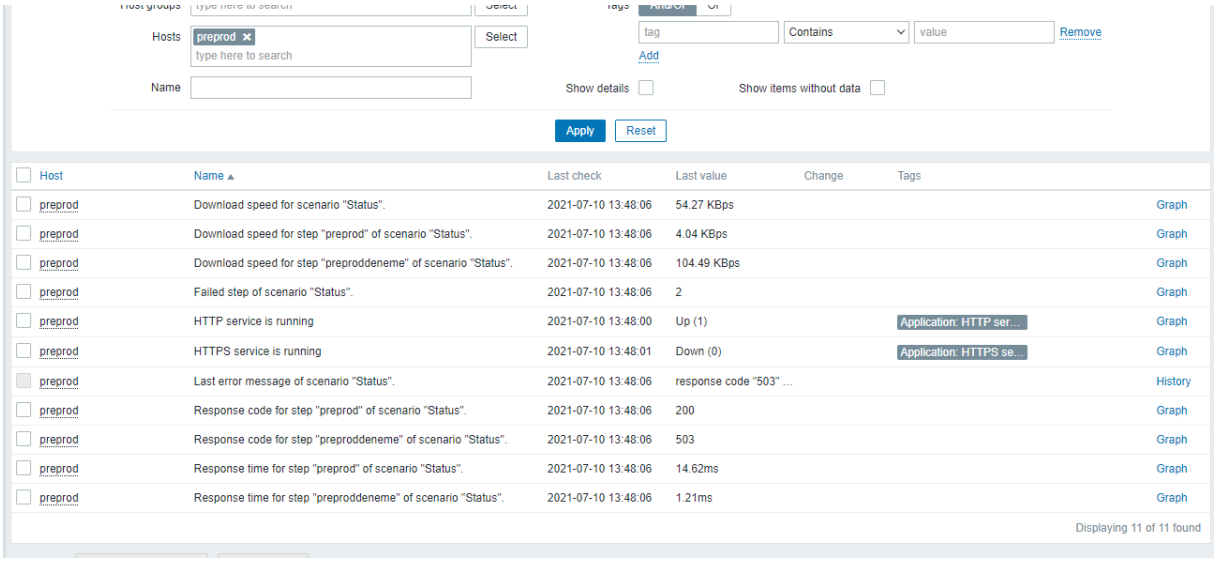


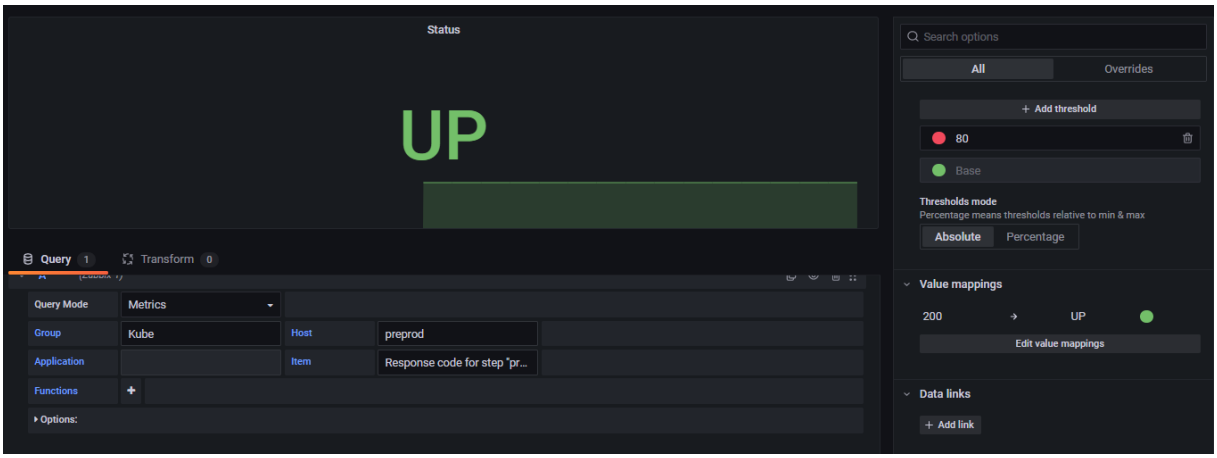




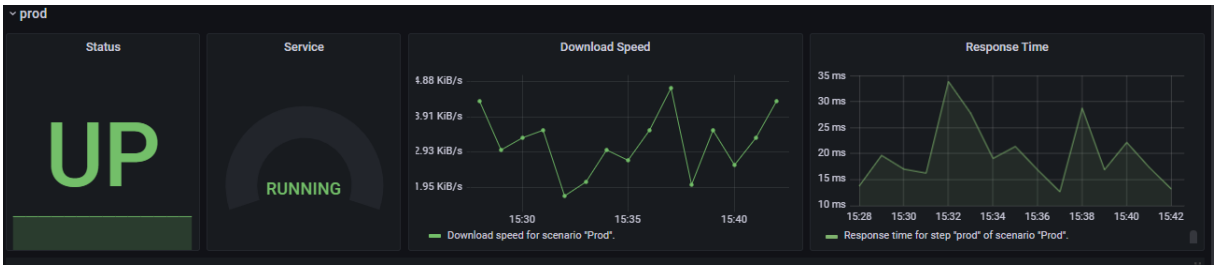
Latest Datalar elde edildikten sonrasında Grafana üzerinden panel oluşturuldu. Bu aşamalar Prod ve Test ortamlarına da uygulandı.

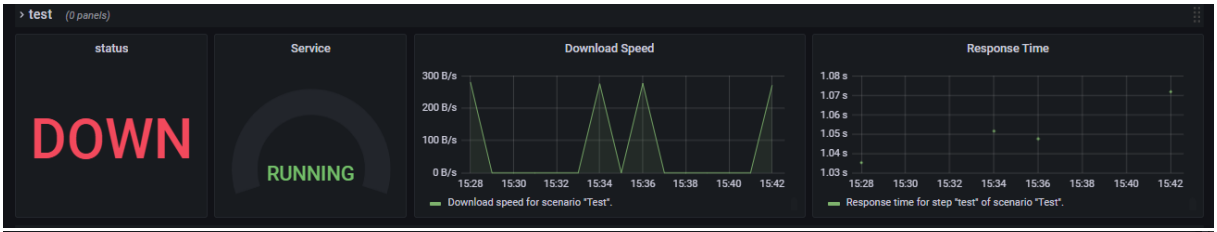


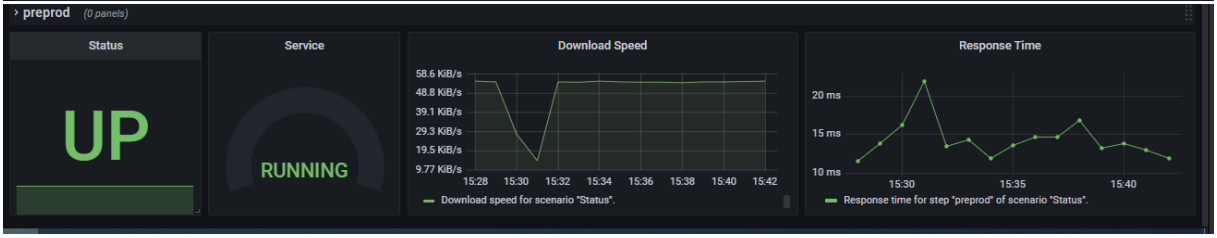




prod	Download speed for scenario "Prod".	2021-07-10 14:22:15	3.54 KBps	+725 Bps		Graph
preprod	Download speed for scenario "Status".	2021-07-10 14:22:09	27.7 KBps	-26.44 KBps		Graph
test	Download speed for scenario "Test".	2021-07-10 14:21:53	283 Bps	+283 Bps		Graph
preprod	Download speed for step "preprod" of scenario "Status".	2021-07-10 14:22:09	3.15 KBps	-644 Bps		Graph
preprod	Download speed for step "preproddeneme" of scenario "Status".	2021-07-10 14:22:09	52.25 KBps	-52.25 KBps		Graph
prod	Download speed for step "prod" of scenario "Prod".	2021-07-10 14:22:15	3.54 KBps	+725 Bps		Graph
test	Download speed for step "test" of scenario "Test".	2021-07-10 14:21:53	283 Bps			Graph
prod	Failed step of scenario "Prod".	2021-07-10 14:22:15	0			Graph
preprod	Failed step of scenario "Status".	2021-07-10 14:22:09	2			Graph
test	Failed step of scenario "Test".	2021-07-10 14:21:53	1			Graph
prod	HTTP service is running	2021-07-10 14:21:18	Up (1)		Application: HTTP ser...	Graph
preprod	HTTP service is running	2021-07-10 14:22:00	Up (1)		Application: HTTP ser...	Graph
test	HTTP service is running	2021-07-10 14:22:11	Up (1)		Application: HTTP ser...	Graph

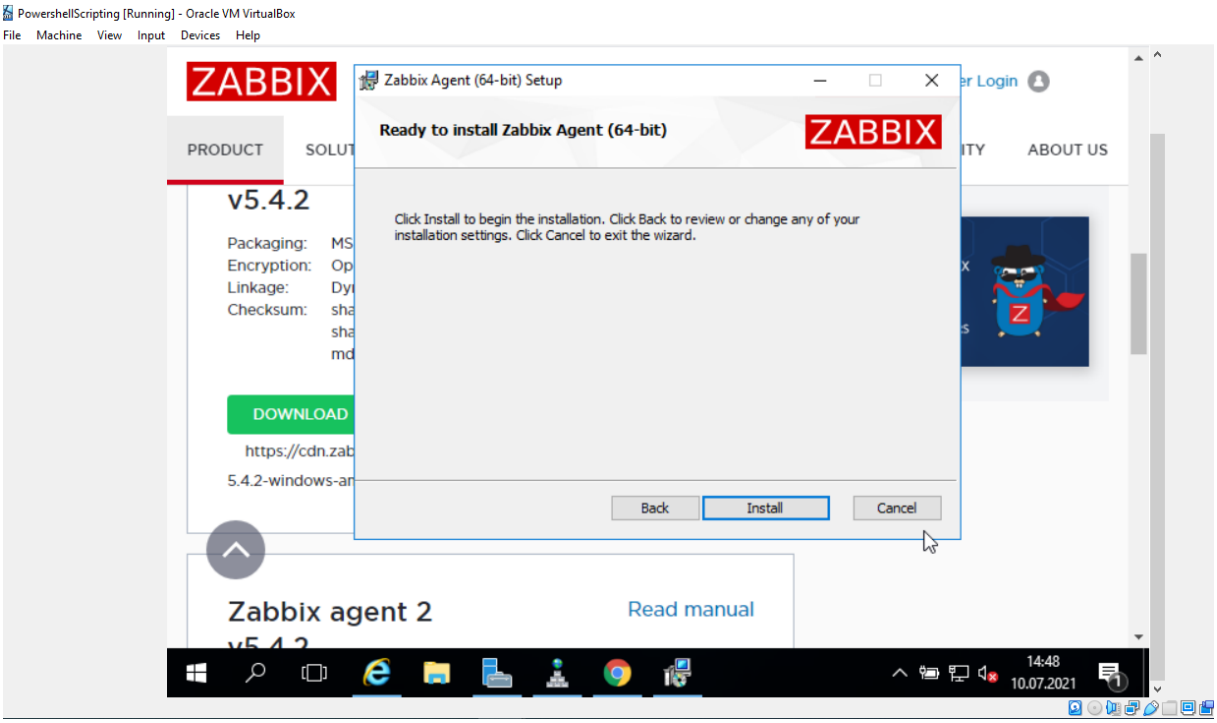






DNS Monitoring

DNS Server Sunucusuna (192.168.31.171) Zabbix Agent yüklendi. Agent ayarlarında aynı ağ üzerinde bulunan Agent Server IP adresi verildi (192.168.31.130).

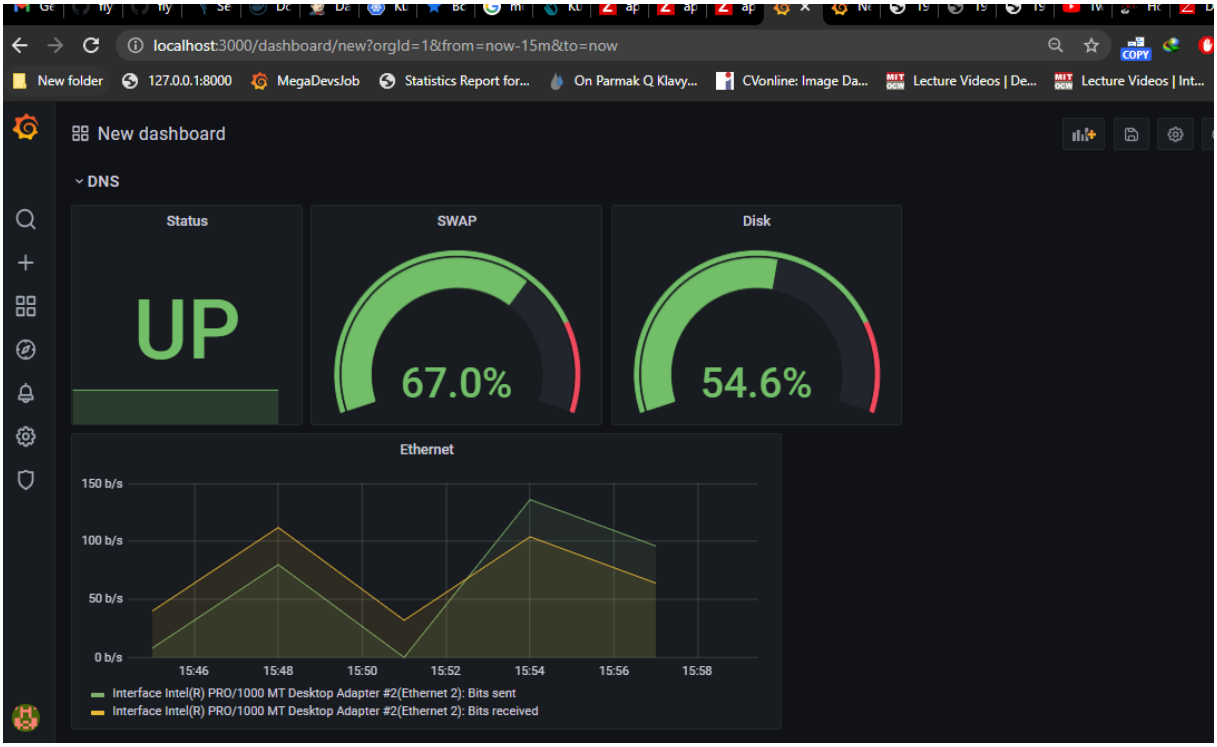


Zabbix üzerine entegrasyonu gerçekleştirildi.

192.168.31.98	192.168.31.97:10050	ZBX	13	Enabled	Latest data	Problems 13	Graphs 18	Dashboards 2	Web
DNS3	192.168.31.171:10050	ZBX		Enabled	Latest data	Problems	Graphs 7	Dashboards 2	Web
MegaDevsJob	127.0.0.1:10050	ZBX		Enabled	Latest data	Problems	Graphs	Dashboards	Web 2
preprod	192.168.31.101:30080	ZBX	1	Enabled	Latest data	Problems 1	Graphs	Dashboards	Web 1
prod	192.168.31.101:30082	ZBX		Enabled	Latest data	Problems	Graphs	Dashboards	Web 1
test	192.168.31.101:30081	ZBX		Enabled	Latest data	Problems	Graphs	Dashboards	Web 1
URL Monitoring	127.0.0.1:10050	ZBX	1	Enabled	Latest data	Problems 1	Graphs	Dashboards	Web 1
Zabbix server	127.0.0.1:10050	ZBX		Enabled	Latest data	Problems	Graphs 27	Dashboards 3	Web

Displaying 8 of 8 found

Grafana üzerinden DNS Sunucusu için bir panel oluşturuldu.



1.10 Ansible ile rsyslog, netsus ve tcpdump kurulumu

Ansible server 192.168.31.101 numaralı sunucu üzerinde kurulup 192.168.31.205 numaralı Jenkins sunucusu ile ssh bağlantısı gerçekleştirildi.

Rsyslog kurulumu

Host dosyasının içeriğinde sunucuların IP bilgileri belirtilmiştir. Rsyslog kurulumu için gerekli aşamaları içeren ansible playbook dosyası aşağıdaki gibidir.

```
[all]
kubespray ansible_host="192.168.31.101"
busra ansible_host="192.168.31.205"
~
~
```

```yaml
- name: my playbook1
  hosts: all
  become: true
  become_method: sudo
  become_user: root
  remote_user: busra
  tasks:
  - name: rsyslog serverı kurma Redhat
    yum:
      name: rsyslog
      state: latest
    when: ansible_os_family=='RedHat'
```

Playbook çalıştırılır ve rsyslog kurulumu yapıldığına dair kontrol edilir.

```
root@master:~/ansible/playbook_example# ansible-playbook -i host.ini playbooks/playbook1.yaml -K
```

```
}

PLAY [my playbook1] ************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************
ok: [kubespray]
ok: [busra]

TASK [rsyslog serverı kurma Redhat] ********************************************************************************
skipping: [kubespray]
skipping: [busra]

TASK [rsyslog serverı kurma Debian] ********************************************************************************
ok: [kubespray]
ok: [busra]

TASK [rsyslog service restart] *************************************************************************************
changed: [kubespray]
changed: [busra]
```

```
busra@busra:~$ systemctl status rsyslog.service
● rsyslog.service - System Logging Service
   Loaded: loaded (/lib/systemd/system/rsyslog.service; enabled; vendor preset: enabled)
   Active: active (running) since Sat 2021-07-10 16:02:16 UTC; 29min ago
     Docs: man:rsyslogd(8)
           http://www.rsyslog.com/doc/
 Main PID: 4092 (rsyslogd)
    Tasks: 4 (limit: 4655)
   CGroup: /system.slice/rsyslog.service
           └─4092 /usr/sbin/rsyslogd -n
```

Netstat Kurulumu

Netstat komutunu içeren net-tools paketini kuramak amacıyla aşağıdaki playbook çalıştırılmıştır. Sonrasında kurulumun status durumunu kontrol etmek amacıyla versiyon bilgileri Output olarak ekran üzerinde belirtilmiştir.

```yaml
---
- name: netstat
  hosts: all
  become: true
  become_method: sudo
  become_user: root
  remote_user: busra
  tasks:
  - name: netstat installation on RedHat
    yum:
      name: net-tools
      state: latest
    when: ansible_os_family=='RedHat'

  tasks:
  - name: netstat installation on RedHat
    apt:
      name: net-tools
      state: latest
    when: ansible_os_family=='Debian'
  tasks:
  - name: chechk netstat version
    shell: "netstat --version"
    args:
      executable: "/bin/bash"
    register: nv

  - name: output
    debug:
      msg: "{{ nv.stdout_lines }}"
```

Output çıktısı aşağıdaki gibidir.

```
TASK [chechk netstat version] ***********************************************************************************
changed: [kubespray]
changed: [busra]

TASK [output] ***************************************************************************************************
ok: [kubespray] => {
    "msg": [
        "net-tools 2.10-alpha",
        "Fred Baumgarten, Alan Cox, Bernd Eckenfels, Phil Blundell, Tuan Hoang, Brian Micek and others",
        "+NEW_ADDRT +RTF_IRTT +RTF_REJECT +FW_MASQUERADE +I18N +SELINUX",
        "AF: (inet) +UNIX +INET +INET6 +IPX +AX25 +NETROM +X25 +ATALK +ECONET +ROSE -BLUETOOTH",
        "HW:  +ETHER +ARC +SLIP +PPP +TUNNEL -TR +AX25 +NETROM +X25 +FR +ROSE +ASH +SIT +FDDI +HIPPI +HDLC/LAPB +EUI64
    ]
}
ok: [busra] => {
    "msg": [
        "net-tools 2.10-alpha",
        "Fred Baumgarten, Alan Cox, Bernd Eckenfels, Phil Blundell, Tuan Hoang, Brian Micek and others",
        "+NEW_ADDRT +RTF_IRTT +RTF_REJECT +FW_MASQUERADE +I18N +SELINUX",
        "AF: (inet) +UNIX +INET +INET6 +IPX +AX25 +NETROM +X25 +ATALK +ECONET +ROSE -BLUETOOTH",
        "HW:  +ETHER +ARC +SLIP +PPP +TUNNEL -TR +AX25 +NETROM +X25 +FR +ROSE +ASH +SIT +FDDI +HIPPI +HDLC/LAPB +EUI64
    ]
}
```

Tcpdump playbook aracılığıyla kurulur ve test edilir.

```yaml
---
- name: tcpdump
  hosts: all
  become: true
  become_method: sudo
  become_user: root
  remote_user: busra
  tasks:
  - name: tcpdump installation on RedHat
    yum:
      name: tcpdump
      state: latest
    when: ansible_os_family=='RedHat'

  tasks:
  - name: tcpdump installation on Debian
    apt:
      name: tcpdump
      state: latest
    when: ansible_os_family=='Debian'
  tasks:
  - name: tcpdump shell
    shell: "tcpdump -D"
    args:
      executable: "/bin/bash"
    register: tdump

  - name: output
    debug:
      msg: "{{ tdump.stdout_lines }}"
```

```
TASK [tcpdump shell] ***********************************************************************************************
changed: [busra]
changed: [kubespray]

TASK [output] ******************************************************************************************************
ok: [kubespray] => {
    "msg": [
        "1.docker0 [Up, Running]",
        "2.datapath [Up, Running]",
        "3.weave [Up, Running]",
        "4.vethwe-datapath [Up, Running]",
        "5.vethwe-bridge [Up, Running]",
        "6.vethwepl1bc6cf0 [Up, Running]",
        "7.vethwepldbac7a1 [Up, Running]",
        "8.enp0s3 [Up, Running]",
        "9.vethwepl33fba5e [Up, Running]",
        "10.enp0s8 [Up, Running]",
        "11.vethwepl9b58f24 [Up, Running]",
        "12.br-1c186d178e26 [Up, Running]",
        "13.vethwepl23ddb28 [Up, Running]",
        "14.vethbcfed85 [Up, Running]",
        "15.vethweplbb74e93 [Up, Running]",
        "16.vethweplc5a6e95 [Up, Running]",
        "17.vethbfcf99f [Up, Running]",
```

Kubernetes ve Docker version bilgileri kubespray sunucusu üzerinden elde edilir.

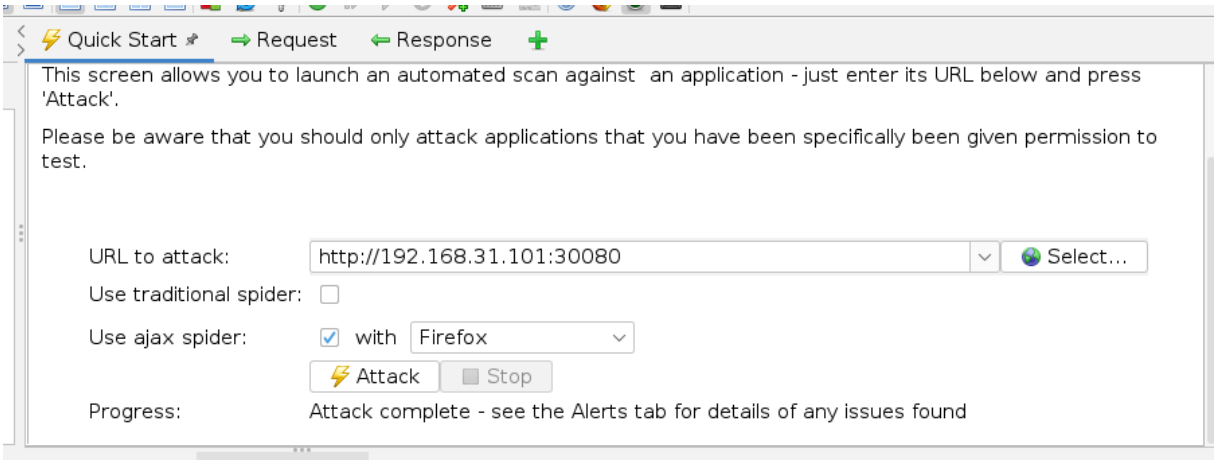
```
  hosts: kubespray
  become: true
  become_method: sudo
  become_user: root
  remote_user: busra
  tasks:
  - name: kubernetes version
    shell: "kubectl version"
    args:
      executable: "/bin/bash"
    register: kv

  - name: output
    debug:
      msg: "{{ kv.stdout_lines }}"

- name: versiondocker
  hosts: kubespray
  become: true
  become_method: sudo
  become_user: root
  remote_user: busra
  tasks:
  - name: docker version
    shell: "docker version"
    args:
      executable: "/bin/bash"
    register: dv

  - name: output
    debug:
      msg: "{{ dv.stdout_lines }}"
```

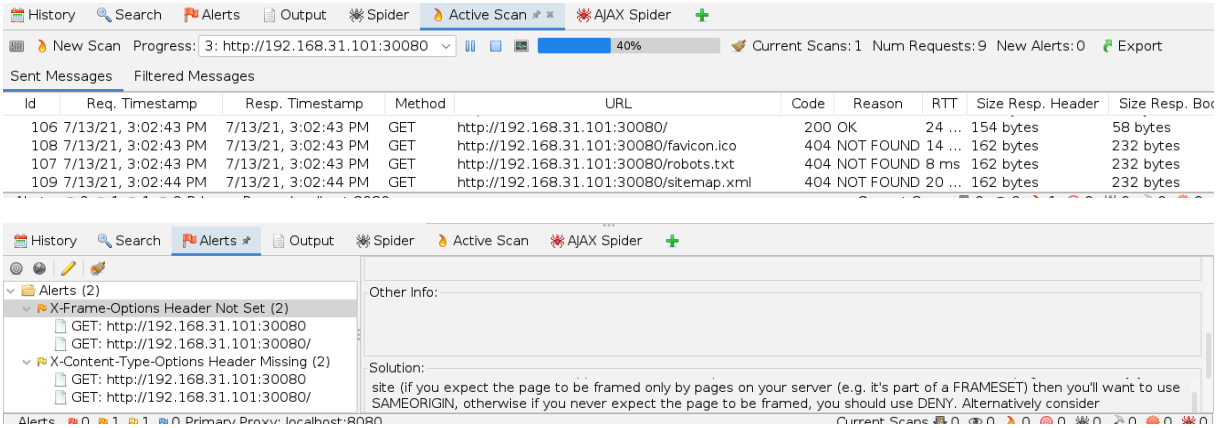
```
TASK [output] ******************************************************************************************
ok: [kubespray] => {
    "msg": [
        "Client: Docker Engine - Community",
        " Version:           20.10.7",
        " API version:       1.41",
        " Go version:        go1.13.15",
        " Git commit:        f0df350",
        " Built:             Wed Jun  2 11:56:40 2021",
        " OS/Arch:           linux/amd64",
        " Context:           default",
        " Experimental:      true",
        "",
        "Server: Docker Engine - Community",
        " Engine:",
        "  Version:          20.10.7",
        "  API version:      1.41 (minimum version 1.12)",
        "  Go version:       go1.13.15",
        "  Git commit:       b0f5bc3",
        "  Built:            Wed Jun  2 11:54:48 2021",
        "  OS/Arch:          linux/amd64",
        "  Experimental:     false",
        " containerd:",
        "  Version:          1.4.6",
        "  GitCommit:        d71fcd7d8303cbf684402823e425e9dd2e99285d",
        " runc:",
        "  Version:          1.0.0-rc95",
        "  GitCommit:        b9ee9c6314599f1b4a7f497e1f1f856fe433d3b7",
        " docker-init:",
        "  Version:          0.19.0",
        "  GitCommit:        de40ad0"
    ]
}
```

```
TASK [output] ******************************************************************************************************************************************
ok: [kubespray] => {
    "msg": [
        "Client Version: version.Info{Major:\"1\", Minor:\"20\", GitVersion:\"v1.20.4\", GitCommit:\"e87da0bd6e03ec3fea7933c4b5263d151aafd07c\", GitTreeState:\"clean\", BuildDate:\"2021-02-18T16:12:00Z\", GoVersion:\"go1.15.8\", Compiler:\"gc\", Platform:\"linux/amd64\"}",
        "Server Version: version.Info{Major:\"1\", Minor:\"20\", GitVersion:\"v1.20.4\", GitCommit:\"e87da0bd6e03ec3fea7933c4b5263d151aafd07c\", GitTreeState:\"clean\", BuildDate:\"2021-02-18T16:03:00Z\", GoVersion:\"go1.15.8\", Compiler:\"gc\", Platform:\"linux/amd64\"}"
    ]
}
```

1.11 OWASP

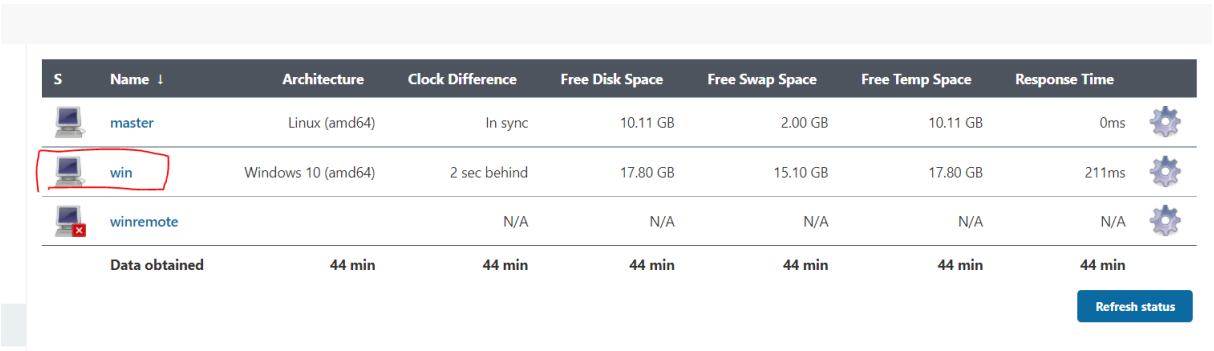
Owasp üzerinden altyapı açıklarını analiz etmek amacıyla ilk olarak Kali kuruldu ve sonrasında ilgili NodePort üzerinden bir attack işlemi gerçekleştirildi.

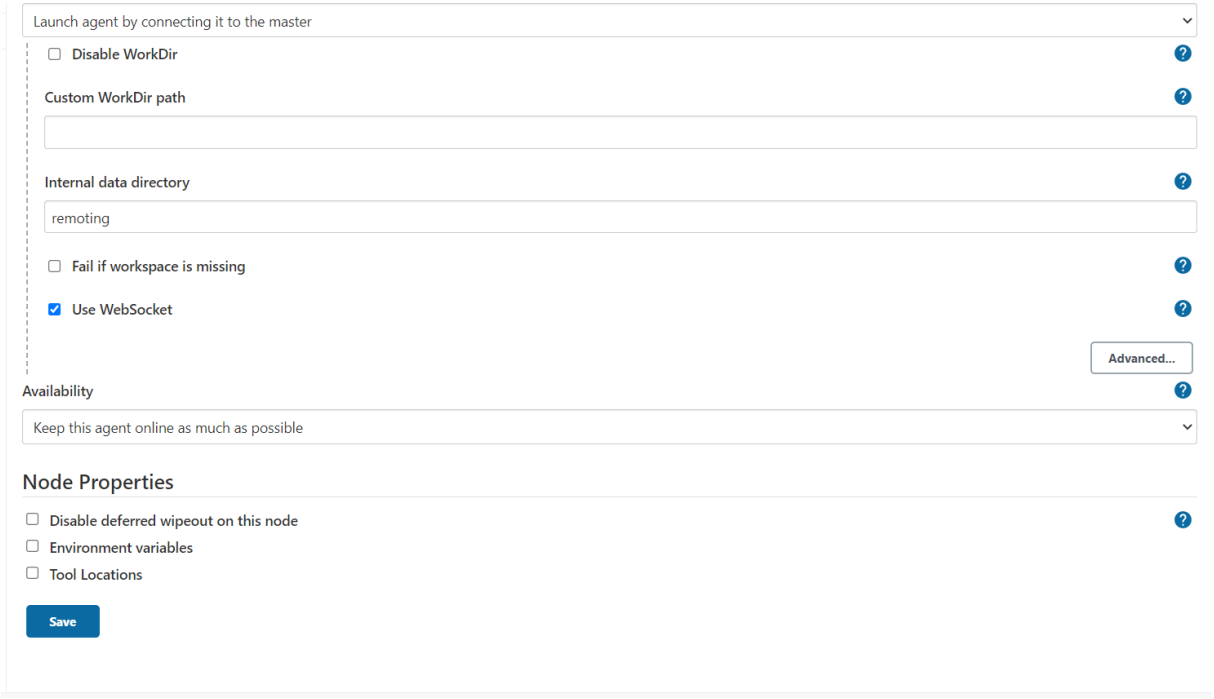




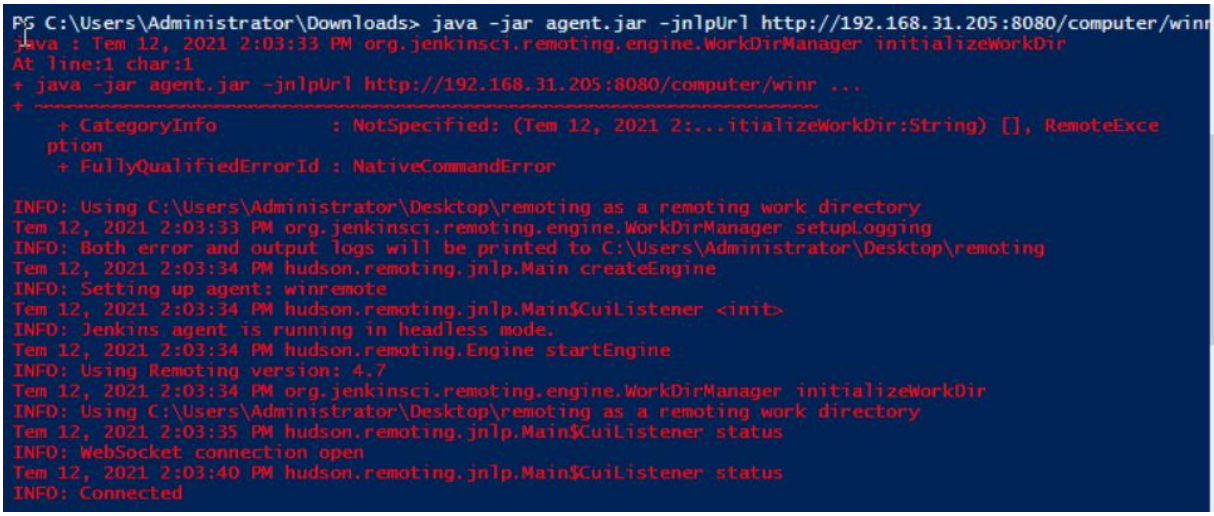
1.12 Powershell Scripting

Windows üzerindeki bir servisi incelemek amacıyla ilk olarak slave konumunda Windows node eklendi.





İzlenecek sunucu üzerinde jenkins agent kuruldu ve bağlantı aktif hale getirildi.



Agent win (PowershellScript2)

Agent is connected.

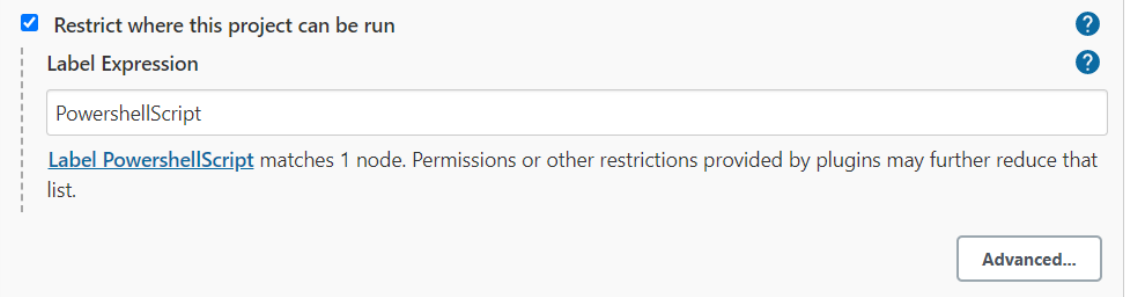
Labels

PowershellScript2

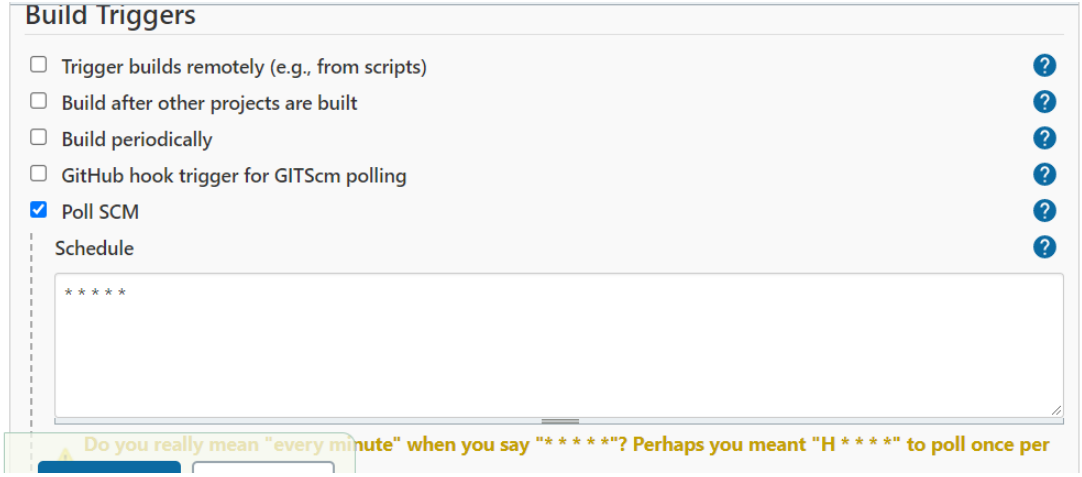
Projects tied to win

None

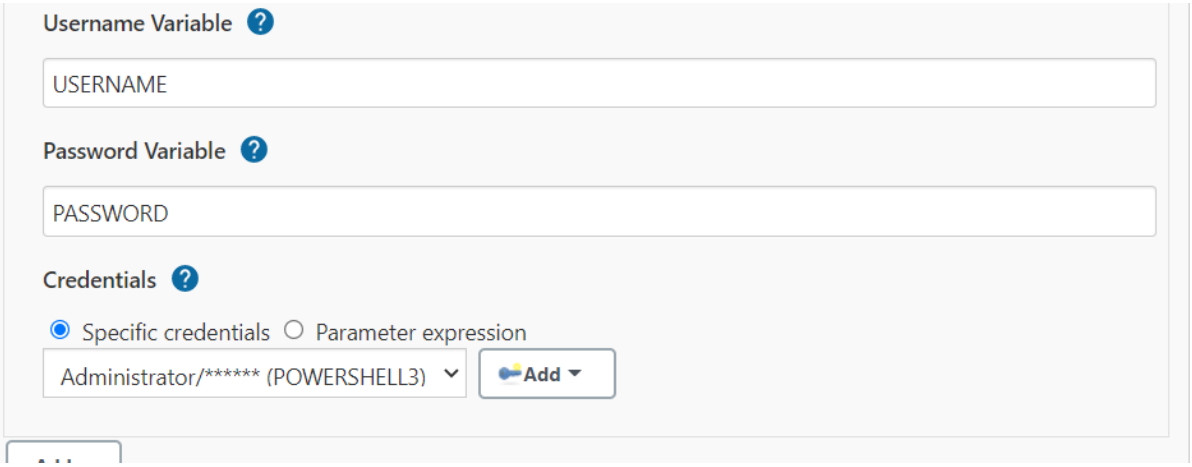
Yeni bir pipeline oluşturup label üzerinden hangi sunucu üzerinde çalıştırılacağı (win) belirtildi.



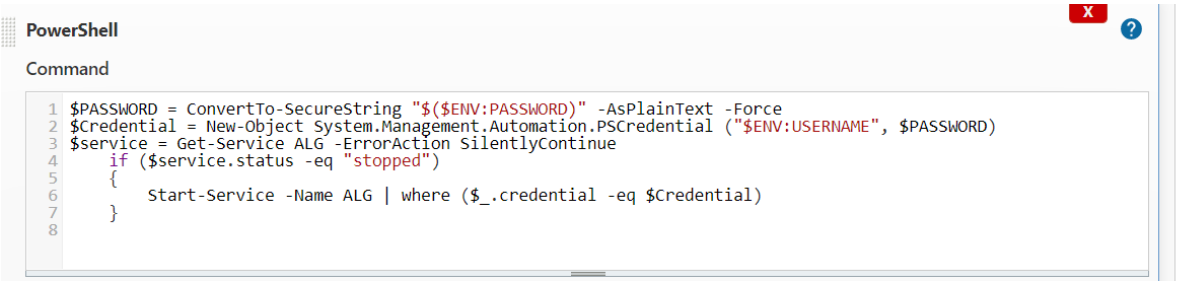
Sunucuyu her saniye kontrol etmesi sağlandı.



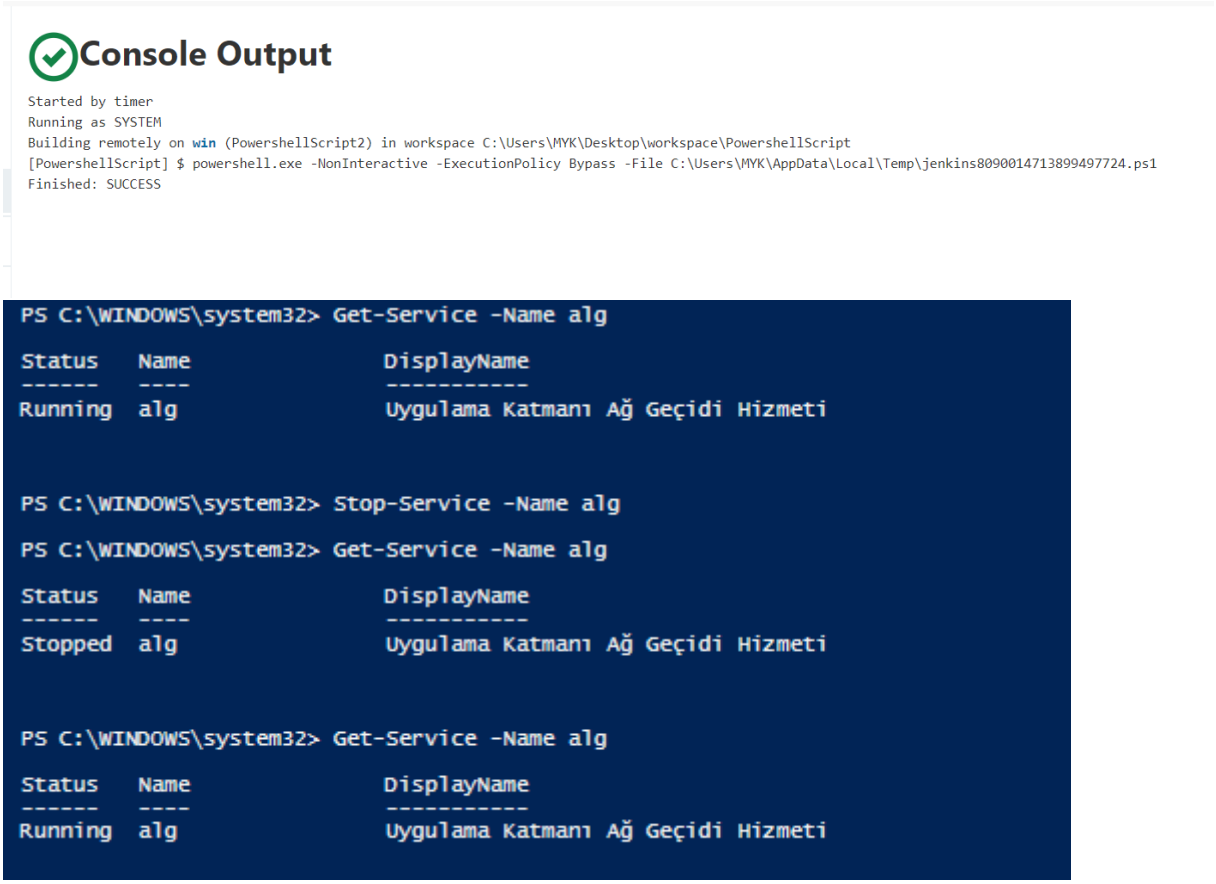
Credential Bilgileri girildi.



Powershell Script yazıldı ve bu kısımda notepad process durumuna bakıldı, process içerisinde olmaması durumunda başlatıldı.



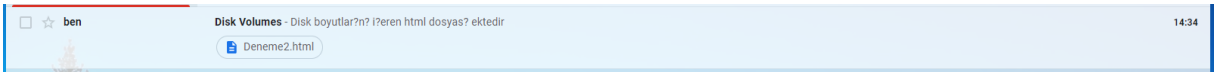
Output aşağıdaki gibidir.



Sunucu üzerinde bulunan Disk Boyutları HTML formatında raporlandı ve Credential ve STMP kullanılarak mail olarak atıldı.

```
PS C:\WINDOWS\system32> Get-Volume | Where-Object {$PSItem.DriveType -eq "Fixed"} | ConvertTo-Html | Out-File -FilePath C:\Volume.html
$From = "kllcbusra13@gmail.com"
$To = "kllcbusra13@gmail.com"
$Attachment = "C:\Volume.html"
$Subject = "Disk Volumes"
$Body = "Disk boyutlarını içeren html dosyası ektedir"
$SMTPServer = "smtp.gmail.com"
$SMTPPort = "587"
Send-MailMessage -From $From -to $To -Subject $Subject `
-Body $Body -SmtpServer $SMTPServer -port $SMTPPort -UseSsl `
-Credential (Get-Credential) -Attachments $Attachment
cmdlet Get-Credential at command pipeline position 1
Supply values for the following parameters:
```

Output ve rapor içerikleri aşağıdaki gibidir.



OperationalStatus	HealthStatus	DriveType	FileSystemType	DedupMode	ObjectId	PassThroughClass	PassThroughIds	PassThroughNamespace	PassThroughServer	UniqueId	AllocationUnitSize	Driv
OK	Healthy	Fixed	NTFS	NotAvailable	{1}\\DESKTOP-B9NQMK6\root/Microsoft/Windows/Storage/Providers_v2\WSP_Volume.ObjectId="{dfa6a1b9-a180-11e8-b91a-806e6f6e6963}:VO:\\?\Volume{0848a398-8daf-4a79-b278-c0a6fec3ba9d}\"					\\?\Volume{0848a398-8daf-4a79-b278-c0a6fec3ba9d}\	4096	C
OK	Healthy	Fixed	NTFS	NotAvailable	{1}\\DESKTOP-B9NQMK6\root/Microsoft/Windows/Storage/Providers_v2\WSP_Volume.ObjectId="{dfa6a1b9-a180-11e8-b91a-806e6f6e6963}:VO:\\?\Volume{8871ac23-b251-4c9e-847d-81b90a15d912}\"					\\?\Volume{8871ac23-b251-4c9e-847d-81b90a15d912}\	4096	
OK	Healthy	Fixed	NTFS	NotAvailable	{1}\\DESKTOP-B9NQMK6\root/Microsoft/Windows/Storage/Providers_v2\WSP_Volume.ObjectId="{dfa6a1b9-a180-11e8-b91a-806e6f6e6963}:VO:\\?\Volume{95ea1490-0567-4676-83c7-7043ce3e82dc}\"					\\?\Volume{95ea1490-0567-4676-83c7-7043ce3e82dc}\	4096	D
OK	Healthy	Fixed	FAT32	NotAvailable	{1}\\DESKTOP-B9NQMK6\root/Microsoft/Windows/Storage/Providers_v2\WSP_Volume.ObjectId="{dfa6a1b9-a180-11e8-b91a-806e6f6e6963}:VO:\\?\Volume{d4764e9d-c57a-45ab-9fe2-277fbc614970}\"					\\?\Volume{d4764e9d-c57a-45ab-9fe2-277fbc614970}\	1024	
OK	Healthy	Fixed	NTFS	NotAvailable	{1}\\DESKTOP-B9NQMK6\root/Microsoft/Windows/Storage/Providers_v2\WSP_Volume.ObjectId="{dfa6a1b9-a180-11e8-b91a-806e6f6e6963}:VO:\\?\Volume{d4bc2e85-de32-4751-988c-0b9f2ce5d5b7}\"					\\?\Volume{d4bc2e85-de32-4751-988c-0b9f2ce5d5b7}\	4096	
OK	Healthy	Fixed	FAT32	NotAvailable	{1}\\DESKTOP-B9NQMK6\root/Microsoft/Windows/Storage/Providers_v2\WSP_Volume.ObjectId="{dfa6a1b9-a180-11e8-b91a-806e6f6e6963}:VO:\\?\Volume{dbc3deef-f5fa-4c2a-b3fb-c0a5e9331527}\"					\\?\Volume{dbc3deef-f5fa-4c2a-b3fb-c0a5e9331527}\	4096	

Web API üzerinden GET isteği için http://open-notify.org/ üzerinde ISS location bilgilerini bulunduran API kullanıldı.

```
#api üzerinde get ve post işlemleri
$sp=Invoke-RestMethod -Method GET -Uri http://api.open-notify.org/iss-now.json
$sp.iss_position
```

```
PS C:\WINDOWS\system32> $sp=Invoke-RestMethod -Method GET -Uri http://api.open-notify.org/iss-now.json
$sp.iss_position

latitude longitude
-------- ---------
-25.2051 84.5167
```

POST API için http://jsonplaceholder.typicode.com/todos adresin de bulunan API kullanıldı.

```
#Post İşlemi
$toDo = @{
    title= "Finish TBB Final Project";
    completed="True";
}
$Json = $ToDo | ConvertTo-Json
Invoke-RestMethod -Method Post -Uri "http://jsonplaceholder.typicode.com/todos" -Body $Json -ContentType 'application/json'
```

```
PS C:\WINDOWS\system32> $toDo = @{
    title= "Finish TBB Final Project";
    completed="True";
}
$Json = $ToDo | ConvertTo-Json
Invoke-RestMethod -Method Post -Uri "http://jsonplaceholder.typicode.com/todos" -Body $Json -ContentType 'application/json'

completed title                  id
--------- -----                  --
True      Finish TBB Final Project 201
```