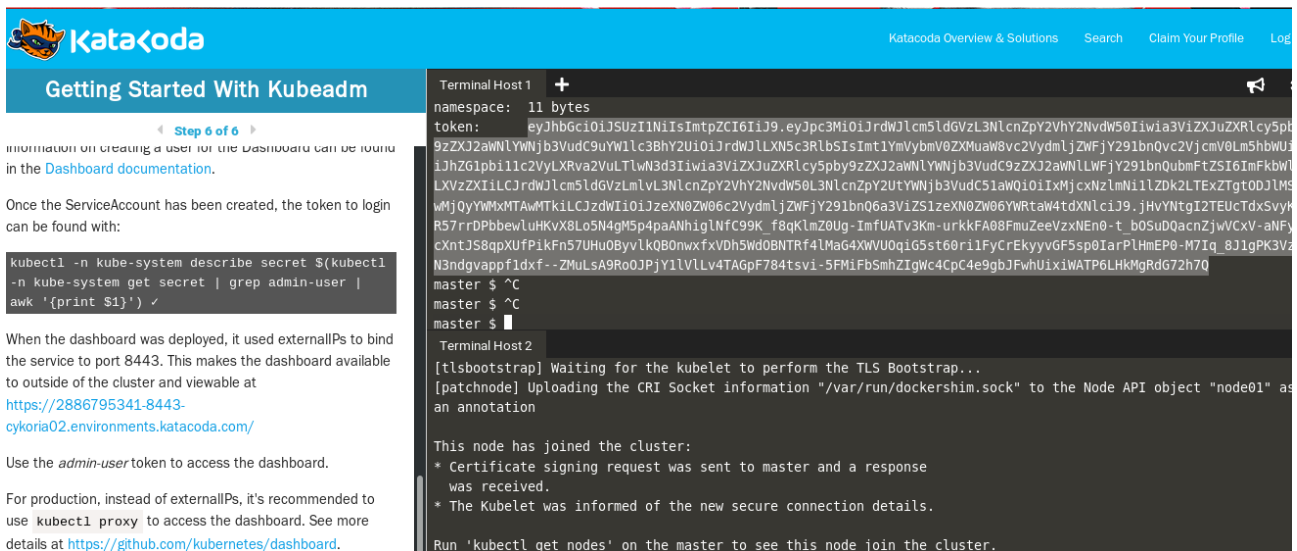


# Práctica 7


## CPD

Por: Rubén Calvo Villazán



## Deploy Containers Using Kubectl

### II.b) Captura donde aparece el puerto modificado.

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Start containers using Kubectl

Step 3 of 5

service which exposes the Pods on a particular port.

Expose the newly deployed `http` deployment via `kubectl expose`. The command allows you to define the different parameters of the service and how to expose the deployment.

Task

Use the following command to expose the container port `80` on the host `8000` binding to the *external-ip* of the host.

```
kubectl expose deployment http --external-ip="172.17.0.24" --port=8000 --target-port=80 ✓
```

You will then be able to ping the host and see the result from the HTTP service.

```
curl http://172.17.0.24:8000 ~
```

CONTINUE

Terminal

```
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
Labels: run=http
Containers:
  http:
    Image:          katacoda/docker-http-server:latest
    Port:           <none>
    Host Port:      <none>
    Environment:    <none>
    Mounts:         <none>
    Volumes:        <none>
Conditions:
  Type            Status  Reason
  ----            -
  Available       False   MinimumReplicasUnavailable
  Progressing     True    ReplicaSetUpdated
OldReplicaSets:  <none>
NewReplicaSet:   http-7b77c4cd66 (1/1 replicas created)
Events:
  Type    Reason              Age   From                  Message
  ----    -
  Normal  ScalingReplicaSet   8s    deployment-controller Scaled up replica set http-7b77c4cd66 to 1
$ kubectl expose deployment http --external-ip="172.17.0.24" --port=8000 --target-port=80
service/http exposed
```

pose the container port `80` on  
*ernal-ip* of the host.

```
http --external-  
000 --target-port=80 ✓
```

host and see the result from

```
000 ✓
```

CONTINUE

```
Progressing True ReplicaSetUpdated
OldReplicaSets: <none>
NewReplicaSet: http-7b77c4cd66 (1/1 replicas created)
Events:
  Type    Reason              Age   From                  Message
  ----    -
  Normal  ScalingReplicaSet   8s    deployment-controller Scaled up replica set http-7b77c4cd66 to 1
$ kubectl expose deployment http --external-ip="172.17.0.24" --port=8000 --target-port=80
service/http exposed
$ curl http://172.17.0.24:8000
<h1>This request was processed by host: http-7b77c4cd66-xqs92</h1>
$ curl http://172.17.0.24:8000
<h1>This request was processed by host: http-7b77c4cd66-xqs92</h1>
$ curl http://172.17.0.24:8000
<h1>This request was processed by host: http-7b77c4cd66-xqs92</h1>
$
```

```
$ curl http://172.17.0.24:8001
curl: (7) Failed to connect to 172.17.0.24 port 8001: Connection refused
$ curl http://172.17.0.24:8001
curl: (7) Failed to connect to 172.17.0.24 port 8001: Connection refused
$ kubectl run httpexposed --image=katacoda/docker-http-server:latest --replicas=1 --port=80 --hostport=8001
deployment.apps/httpexposed created
$ curl http://172.17.0.24:8001
<h1>This request was processed by host: httpexposed-5c4cf8b7d8-4crl2</h1>
$ curl http://172.17.0.24:8001
<h1>This request was processed by host: httpexposed-5c4cf8b7d8-4crl2</h1>
$
```

## Deploy Containers Using YAML

### II.c) Captura donde se muestran los Deployment y Services.

### Deploy Containers Using YAML

Step 1 of 3

containerPort: 80

This is deployed to the cluster with the command

```
kubectl create -f deployment.yaml ✓
```

As it's a Deployment object, a list of all the deployed objects can be obtained via

```
kubectl get deployment ✓
```

Details of individual deployments can be outputted with

```
kubectl describe deployment webapp1 ✓
```

CONTINUE

deployment.yaml

service.yaml

```
1 apiVersion: extensions/v1beta1
2 kind: Deployment
3 metadata:
4   name: webapp1
5 spec:
6   replicas: 1
7   template:
8     metadata:
9       labels:
10        app: webapp1
11 spec:
12   containers:
13     - name: webapp1
14       image: katacoda/docker-http-server:latest
15       ports:
16         - containerPort: 80
```

Terminal

```
Connecting to cluster...
Setting up kubeconfig...
Starting cluster components...
Kubectl is now configured to use the cluster.
Loading cached images from config file.
$ kubectl create -f deployment.yaml
deployment.extensions/webapp1 created
$ kubectl get deployment
NAME          DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
webapp1       1         1         1            1           7s
$
```

### Deploy Containers Using YAML

Step 2 of 3

Deploy the Service with

```
kubectl create -f service.yaml ✓
```

As before, details of all the Service objects deployed with

```
kubectl get svc ✓
```

By describing the object it's possible to discover more details about the configuration

```
kubectl describe svc webapp1-svc ✓
```

```
curl host01:30080 ✓
```

CONTINUE

deployment.yaml

service.yaml

```
1 apiVersion: v1
2 kind: Service
3 metadata:
4   name: webapp1-svc
5 labels:
6   app: webapp1
7 spec:
8   type: NodePort
9   ports:
10    - port: 80
11      nodePort: 30080
12    selector:
13      app: webapp1
```

Terminal


```
Events:
Type      Reason      Age    From      Message
----      -
Normal    ScalingReplicaSet  57s    deployment-controller  Scaled up replica set webapp1-6c66d9cb4f to 1
$ kubectl create -f service.yaml
service/webapp1-svc created
$ kubectl get svc
NAME          TYPE          CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
kubernetes    ClusterIP     10.96.0.1        <none>            443/TCP          10m
webapp1-svc   NodePort      10.101.99.114    <none>            80:30080/TCP     7s
$ kubectl describe svc webapp1-svc
```

Modificando el número de replicas a 4:

```
$ kubectl get deployment
NAME          DESIRED   CURRENT   UP-TO-DATE   AVAILABLE   AGE
webapp1       4         4         4            4           3m
$
```

## Kubernetes - Networking Introduction

### II.d) Captura donde aparece personalizado el NodePort.



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## Networking Introduction

◀ Step 3 of 5 ▶

will be reachable based on the port number defined.

```
kubectl apply -f nodeport.yaml ✓
```

When viewing the service definition, notice the additional type and NodePort property defined

```
cat nodeport.yaml ✓
```

```
kubectl get svc ↵
```

```
kubectl describe svc/webapp1-nodeport-svc ↵
```

The service can now be reached via the Node's IP address on the NodePort defined.

```
curl 172.17.0.38:30080 ↵
```

CONTINUE

Terminal

Terminal 2

+

```
service/webapp1-nodeport-svc created
deployment.extensions/webapp1-nodeport-deployment master $ cat nodeport.yaml
apiVersion: v1
kind: Service
metadata:
  name: webapp1-nodeport-svc
  labels:
    app: webapp1-nodeport
spec:
  type: NodePort
  ports:
    - port: 80
      nodePort: 30080
  selector:
    app: webapp1-nodeport
---
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: webapp1-nodeport-deployment
spec:
  replicas: 2
```

## Networking Introduction

◀ Step 5 of 5 ▶

```
kubectl get svc ✓
```

```
kubectl describe svc/webapp1-loadbalancer-svc ✓
```

The service can now be accessed via the IP address assigned, in this case from the 10.10.0.0/26 range.

```
export LoadBalancerIP=$(kubectl get services/webapp1-loadbalancer-svc -o go-template='{{index .status.loadBalancer.ingress 0}.ip}}')
echo LoadBalancerIP=$LoadBalancerIP
curl $LoadBalancerIP ✓
```

```
curl $LoadBalancerIP ✓
```

SUMMARY

Terminal


Terminal 2

+

```
Endpoints: 10.32.0.13:80,10.32.0.14:80
Session Affinity: None
External Traffic Policy: Cluster
Events:
  Type    Reason            Age    From                      Message
  ----    -
  Normal  CreatingLoadBalancer 1m    service-controller        Creating load balancer
  Normal  CreatedLoadBalancer 1m    service-controller        Created load balancer
master $ export LoadBalancerIP=$(kubectl get services/webapp1-loadbalancer-svc -o go-template='{{index .status.loadBalancer.ingress 0}.ip}}')
master $ echo LoadBalancerIP=$LoadBalancerIP
LoadBalancerIP=10.10.0.1
master $ curl $LoadBalancerIP
<h1>This request was processed by host: webapp1-loadbalancer-deployment-69b9f76fd6-6p6rs</h1>
master $ curl $LoadBalancerIP
<h1>This request was processed by host: webapp1-loadbalancer-deployment-69b9f76fd6-vg87c</h1>
master $ curl $LoadBalancerIP
<h1>This request was processed by host: webapp1-loadbalancer-deployment-69b9f76fd6-vg87c</h1>
master $ curl $LoadBalancerIP
<h1>This request was processed by host: webapp1-loadbalancer-deployment-69b9f76fd6-vg87c</h1>
master $ curl $LoadBalancerIP
<h1>This request was processed by host: webapp1-loadbalancer-deployment-69b9f76fd6-6p6rs</h1>
master $
```

## Create Ingress Routing

### II.e) Captura donde personalizamos el enrutamiento de nivel 4.

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Create Ingress Routing

◀ Step 3 of 4 ▶

### Step 3 - Deploy Ingress Rules

Ingress rules are an object type with Kubernetes. The rules can be based on a request host (domain), or the path of the request, or a combination of both.

An example set of rules are defined within `ingress-rules.yaml` ✓


The important parts of the rules are defined below.

The rules apply to requests for the host `my.kubernetes.example`. Two rules are defined based on the path request with a single catch all definition. Requests to the path `/webapp1` are forwarded onto the service `webapp1-svc`. Likewise, the requests to the path `/webapp2` are forwarded to `webapp2-svc`. If no rules

Terminal

```
webapp-ingress my.kubernetes.example 80 7s
master $ cat ingress-rules.yaml
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
  name: webapp-ingress
spec:
  rules:
  - host: my.kubernetes.example
    http:
      paths:
      - path: /webapp1
        backend:
          serviceName: webapp1-svc
          servicePort: 80
      - path: /webapp2
        backend:
          serviceName: webapp2-svc
          servicePort: 80
      - backend:
          serviceName: webapp3-svc
          servicePort: 80
master $
```

```
master $ kubectl get ing
NAME                                HOSTS                                ADDRESS    PORTS    AGE
webapp-ingress                      my.kubernetes.example              80        7s
```

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Create Ingress Routing

◀ Step 4 of 4 ▶

deployment.

```
curl -H "Host: my.kubernetes.example" 172.17.0.47/webapp1 ✓
```

The second request will be processed by the `webapp2` deployment.

```
curl -H "Host: my.kubernetes.example" 172.17.0.47/webapp2 ✓
```

Finally, all other requests will be processed by `webapp3` deployment.

```
curl -H "Host: my.kubernetes.example" 172.17.0.47 ✓
```


SUMMARY

Terminal

```
master $ curl -H "Host: my.kubernetes.example" 172.17.0.47/webapp1
<h1>This request was processed by host: webapp1-7d67d68676-sqbjp</h1>
master $ curl -H "Host: my.kubernetes.example" 172.17.0.47/webapp2
<h1>This request was processed by host: webapp2-64d4844b78-xk96g</h1>
master $ curl -H "Host: my.kubernetes.example" 172.17.0.47
<h1>This request was processed by host: webapp3-5b8ff7484d-q8dkf</h1>
master $
```

## Running Stateful Services on Kubernetes

### II.f) Captura donde personalizamos el mensaje de salida en el almacenamiento persistente.

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### Running Stateful Services on Kubernetes

◀ Step 5 of 6 ▶

To test the HTTP server, write a 'Hello World' *index.html* homepage. In this scenario, we know the HTTP directory will be based on *data-0001* as the volume definition hasn't driven enough space to satisfy the MySQL size requirement.

```
docker exec -it nfs-server bash -c "echo 'Hello World' > /exports/data-0001/index.html" ↵
```

Based on the IP of the Pod, when accessing the Pod, it should return the expected response.

```
ip=$(kubectl get pod www -o yaml | grep podIP | awk '{split($0,a,"."); print a[2]}'); echo $ip ↵
```

```
curl $ip ↵
```

**Terminal** +


```
spec:
  containers:
  - name: www
    image: nginx:alpine
    ports:
    - containerPort: 80
      name: www
    volumeMounts:
    - name: www-persistent-storage
      mountPath: /usr/share/nginx/html
  volumes:
  - name: www-persistent-storage
    persistentVolumeClaim:
      claimName: claim-http

master $ kubectl get pods
NAME      READY   STATUS             RESTARTS   AGE
mysql     0/1     ContainerCreating   0           12s
www       0/1     ContainerCreating   0           10s

master $ kubectl get pods
NAME      READY   STATUS    RESTARTS   AGE
mysql     1/1     Running   0           1m
www       1/1     Running   0           1m

master $
```

### Modificando el “HOLA MUNDO”.

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### Running Stateful Services on Kubernetes

◀ Step 5 of 6 ▶

Our Pods can now read/write. MySQL will store all database changes to the NFS Server while the HTTP Server will serve static from the NFS drive. When upgrading, restarting or moving containers to a different machine the data will still be accessible.

To test the HTTP server, write a 'Hello World' *index.html* homepage. In this scenario, we know the HTTP directory will be based on *data-0001* as the volume definition hasn't driven enough space to satisfy the MySQL size requirement.

```
docker exec -it nfs-server bash -c "echo 'Hello World' > /exports/data-0001/index.html" ↵
```

Based on the IP of the Pod, when accessing the Pod, it should return the expected response.

```
ip=$(kubectl get pod www -o yaml | grep podIP | awk '{split($0,a,"."); print a[2]}'); echo $ip ↵
```

```
curl $ip ↵
```

**Terminal** +

```
spec:
  containers:
  - name: www
    image: nginx:alpine
    ports:
    - containerPort: 80
      name: www
    volumeMounts:
    - name: www-persistent-storage
      mountPath: /usr/share/nginx/html
  volumes:
  - name: www-persistent-storage
    persistentVolumeClaim:
      claimName: claim-http

master $ kubectl get pods
NAME      READY   STATUS             RESTARTS   AGE
mysql     0/1     ContainerCreating   0           11s
www       0/1     ContainerCreating   0           9s

master $ kubectl get pods
NAME      READY   STATUS    RESTARTS   AGE
mysql     1/1     Running   0           20s
www       1/1     Running   0           18s

master $ docker exec -it nfs-server bash -c "echo 'Hello World' > /exports/data-0001/index.html"
master $ docker exec -it nfs-server bash -c "echo 'HOLA MUNDO' > /exports/data-0001/index.html"
```

## Running Stateful Services on Kubernetes

◀ Step 5 of 6 ▶

Based on the IP of the Pod, when accessing the Pod, it should return the expected response.

```
ip=$(kubectl get pod www -o yaml | grep podIP |  
awk '{split($0,a,":"); print a[2]}'); echo $ip ✓
```

```
curl $ip ✓
```

### Update Data

When the data on the NFS share changes, then the Pod will read the newly updated data.

```
docker exec -it nfs-server bash -c "echo 'Hello  
NFS World' > /exports/data-0001/index.html" ↵
```

```
curl $ip ↵
```

CONTINUE

```
Terminal +  
ports:  
- containerPort: 80  
  name: www  
volumeMounts:  
- name: www-persistent-storage  
  mountPath: /usr/share/nginx/html  
volumes:  
- name: www-persistent-storage  
  persistentVolumeClaim:  
    claimName: claim-http  
master $ kubectl get pods  
NAME      READY   STATUS             RESTARTS   AGE  
mysql     0/1     ContainerCreating   0           11s  
www       0/1     ContainerCreating   0           9s  
master $ kubectl get pods  
NAME      READY   STATUS    RESTARTS   AGE  
mysql     1/1     Running   0           20s  
www       1/1     Running   0           18s  
master $ docker exec -it nfs-server bash -c "echo 'Hello World' > /exports/data-0001/index.html"  
master $ ip=$(kubectl get pod www -o yaml | grep podIP | awk '{split($0,a,":"); print a[2]}'); echo $ip  
10.32.0.5  
master $ curl $ip  
HOLA MUNDO  
master $
```

## Deploying a service from source onto Kubernetes

### II.g) Captura de la ejecución de la automatización con forge

## Deploying a service from source onto Kubernetes

◀ Step 6 of 6 ▶

Kubernetes, and it already does the automation (and then some!). Let's try using Forge to do this deployment. We need to do a quick setup of Forge:

```
forge setup ✓
```

To setup Forge, enter the URL for our Docker Registry:

```
2886795268-5000-  
cykoria01.environments.katacoda.com ↵
```

Enter the username for the Registry, in this case `root` ↵.


Enter the organization, again `root` ↵.

Finally, enter `root` ↵ for the password.

With Forge configured, type:

```
Terminal +  
}{{if .nodePort}}{{.nodePort}}{{"\n"}}{{end}}{{end}}' )template='{{range .spec.ports}}  
  
> curl host01:$PORT  
Hello World! (up 0:00:20)  
  
> sed -i -e 's/Hello World!/Hello Hacker News!!!/' app.py  
  
> forge setup  
== Checking Kubernetes Setup ==  
  
| kubectl version --short  
| Client Version: v1.9.0  
| Server Version: v1.11.3  
| 1 tasks run, 0 errors  
| kubectl get service kubernetes --namespace default  
| NAME      TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE  
| kubernetes ClusterIP  10.96.0.1     <none>        443/TCP       2m  
| 1 tasks run, 0 errors  
|  
| == Setting up Docker ==  
|  
| Registry type (one of ecr, gcr, generic)[generic]:
```





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## Deploying a service from source onto Kubernetes

◀ Step 6 of 6 ▶

metes, and it already does the automation (and then el). Let's try using Forge to do this deployment. We need to quick setup of Forge:

ge setup ✓

etup Forge, enter the URL for our Docker Registry:  
6795268-5000-cykoria01.environments.katacoda.com ✓

r the username for the Registry, in this case **root** ✓.


r the organization, again **root** ✓.

lly, enter **root** for the password.

r Forge configured, type:

Terminal +

```
dummy: digest: sha256:1a026b5d417142bfdc4f7733c13eda746a29192a6115d4d27c54ed2908a1ffec
e: 528
GET https://2886795268-5000-cykoria01.environments.katacoda.com/v2/root/forge_test/mani
ts/dummy
16 tasks run, 0 errors
== Writing config to forge.yaml ==
# Global forge configuration
# DO NOT CHECK INTO GITHUB, THIS FILE CONTAINS SECRETS
registry:
  type: docker
  url: 2886795268-5000-cykoria01.environments.katacoda.com
  user: root
  password: 'cm9vdA==
'
  namespace: root
== Done ==
```



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## Deploying a service from source onto Kubernetes

◀ Step 6 of 6 ▶

With Forge configured, type:

forge deploy ✓

Forge will automatically build your Docker container (based on your **Dockerfile** ), push the container to your Docker registry of choice, build a **deployment.yaml** file for you that points to your image, and then deploy the container into Kubernetes.


This process will take a few moments as Kubernetes terminates the existing container and swaps in the new code. We'll need to set up a new port forward command. Let's get the pod status again:

kubectl get pods ↵

As previously, obtain the NodePort assigned to our deployment.

Terminal +

```
f1f63a4ae99b: Preparing
ffd20c106e18: Preparing
df22a708b263: Mounted from hello-webapp
f1f63a4ae99b: Mounted from hello-webapp
ffd20c106e18: Mounted from hello-webapp
943067937345: Mounted from hello-webapp
811b447132de: Pushed
46f06b55cb8bad301f9eeb61045392f2ce1dd69c.sha: digest: sha256:1cd362901a6e6e4
93740f7ce87c243fd2c6114d93e97 size: 1367
warning: 'collections.OrderedDict object' has no attribute 'track' (this will
on)
warning: 'collections.OrderedDict object' has no attribute 'protocol' (this
soon)
warning: 'collections.OrderedDict object' has no attribute 'port' (this will
n)
48 tasks run, 0 errors
built: Dockerfile
pushed: hello-webapp:46f06b55cb8bad301f9eeb61045392f2ce1dd69c.sha
rendered: service/hello-webapp, deployment/hello-webapp
deployed: hello-webapp
>
```



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## Deploying a service from source onto Kubernetes

◀ Step 6 of 6 ▶

As previously, obtain the NodePort assigned to our deployment.

export PORT=\$(kubectl get svc hello-webapp -o go-template='{{range.spec.ports}}{{if .nodePort}}{{.nodePort}}{{"\n"}}{{end}}{{end}}') ✓

Now, let's check out our new welcome message:

curl host01:\$PORT ✓

Congratulations! You've applied the basic concepts necessary for you to develop and deploy source code to Kubernetes.

SUMMARY

Terminal +

```
warning: 'collections.OrderedDict object' has no attribute '
n)
48 tasks run, 0 errors
built: Dockerfile
pushed: hello-webapp:46f06b55cb8bad301f9eeb61045392f2ce1dd
rendered: service/hello-webapp, deployment/hello-webapp
deployed: hello-webapp
> kubectl get pods
NAME                                READY    STATUS    RESTART
hello-webapp-564fd5868c-9xf4r        1/1      Terminating    0
hello-webapp-6fb76fbc7f-f9ltr        1/1      Running          0
> curl host01:$PORT
Hello Hacker News!!! (up 0:00:34)
> curl host01:$PORT
Hello Hacker News!!! (up 0:00:36)
>
```