Autoscaling How-To

This How-To expects that you have Terraform set-up successfully with a non-local state and kubectl connected with a Kubernetes Cluster.

In this example we begin with a CCE instance with one default node pool that has 2 nodes.

Create Autoscaling Node pool with Terraform

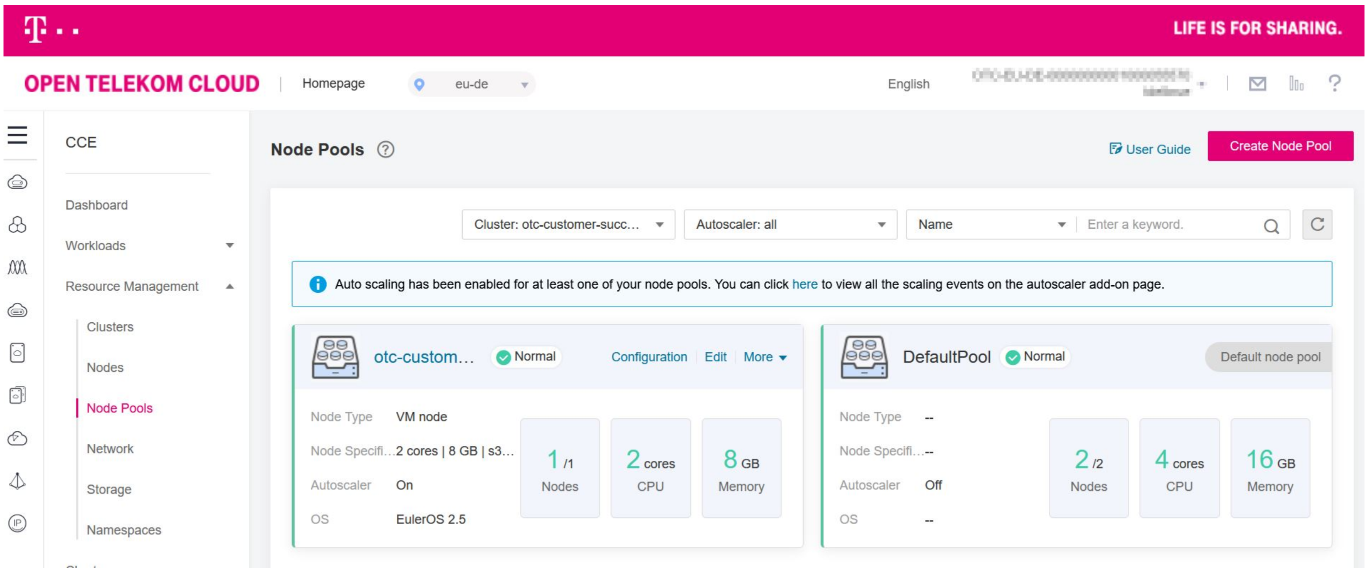
```
resource "opentelekomcloud_cce_node_pool_v3" "node_pool_autoscale" {
  cluster_id         = var.cluster_id
  name               = "${var.cluster_name}-node-pool-autoscale"
  flavor             = var.node_flavor
  initial_node_count = 1
  availability_zone  = var.availability_zone
  key_pair           = var.key_pair_id
  os                 = "EulerOS 2.5"

  scale_enable             = true
  min_node_count           = 1
  max_node_count           = 4
  scale_down_cooldown_time = 30 # minutes
  priority                 = 1

  root_volume {
    size       = 100
    volumetype = "SATA"
  }
  data_volumes {
    size       = 100
    volumetype = "SATA"
  }
}
```

Apply this script with Terraform. Make sure that the availability zone, cluster_id and key_pair_id match the settings of your CCE. The node flavor can differ from the nodes in your default node pool and should be chosen with the specific workloads in mind.

After Terraform yields success, verify success in Web Console:



[redacted]

Node Pools

Cluster: otc-customer-succ... | Autoscaler: all | Name | Enter a keyword.

Auto scaling has been enabled for at least one of your node pools. You can click here to view all the scaling events on the autoscaler add-on page.

otc-custom... Normal

Node Type	VM node
Node Specifi...	2 cores | 8 GB | s3...
Autoscaler	On
OS	EulerOS 2.5

1 /1 Nodes | 2 cores CPU | 8 GB Memory

DefaultPool Normal

Node Type	--
Node Specifi...	--
Autoscaler	Off
OS	--

2 /2 Nodes | 4 cores CPU | 16 GB Memory

Create Cluster Autoscaler Addon with Terraform

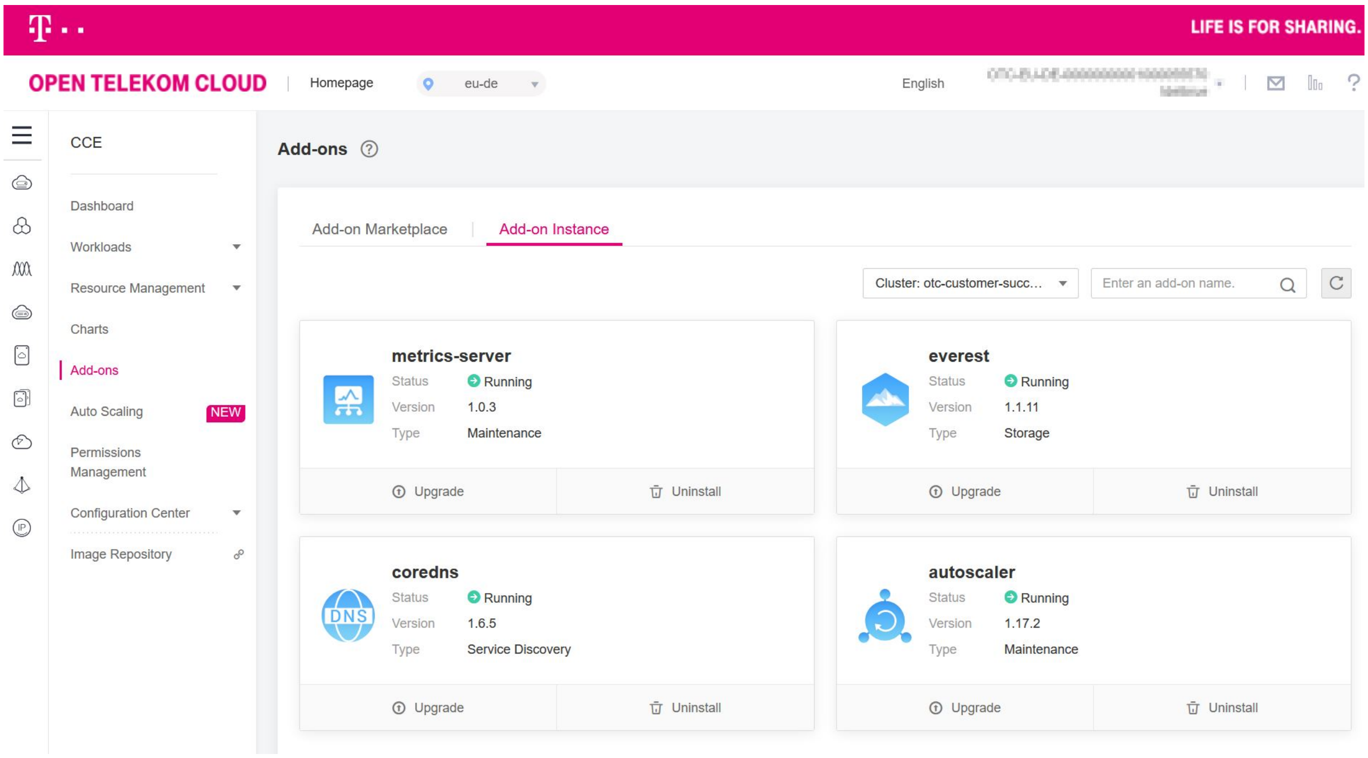
```
resource "opentelekomcloud_cce_addon_v3" "autoscaler" {
  template_name    = "autoscaler"
  template_version = "1.17.2"
  cluster_id       = var.cluster_id

  values {
    basic = {
      "cceEndpoint": "https://cce.eu-de.otc.t-systems.com",
      "ecsEndpoint": "https://ecs.eu-de.otc.t-systems.com",
      "euleros_version": "2.2.5",
      "region": "eu-de",
      "swr_addr": "100.125.7.25:20202",
      "swr_user": "hwofficial"
    }
    custom = {
      "cluster_id": var.cluster_id,
      "tenant_id": var.project_id,
      # Max scaled up cores.
      "coresTotal": 32000,
      # Maximum number of empty nodes that can be deleted at the same time.
      "maxEmptyBulkDeleteFlag": 10,
      # Max scaled up nodes.
      "maxNodesTotal": 1000,
      # Max scaled up memory(GB).
      "memoryTotal": 128000,
      # The time after scale-up that the scale-down evaluation will resume.
      "scaleDownDelayAfterAdd": 10, # minutes
      # The time after node deletion that the scale-down evaluation will resume.
      "scaleDownDelayAfterDelete": 10, # minutes
      # The time after a scale-down failure that the scale-down evaluation will
resume.
      "scaleDownDelayAfterFailure": 3, # minutes
      "scaleDownEnabled": true,
      # The time of node is not used, default 10min.
      "scaleDownUnneededTime": 10,
      # The percent resource of node used to scale down.
      "scaleDownUtilizationThreshold": 0.25,
      "scaleUpCpuUtilizationThreshold": 0.8,
      "scaleUpMemUtilizationThreshold": 0.8,
      # Scale up when a pod cannot be scheduled because of missing resources
      "scaleUpUnscheduledPodEnabled": true,
      # Scale up when the utilization thresholds above are exceeded.
      "scaleUpUtilizationEnabled": true,
      # The timeout before autoscaler checks again the node that could not be
previously removed.
      "unremovableNodeRecheckTimeout": 5 # minutes
    }
  }
}
```

A few things to check:

- The tenant_id to give to the autoscaler addon must be the Project ID that you can find in the Web Console under "IAM" and "Projects"
- You can enable scale-up and scale-down independently
- If your loads are fluctuating frequently, you should be careful about not scale down too soon.

Again, we verify the success in the Web Console:



metrics-server
Status Running
Version 1.0.3
Type Maintenance

everest
Status Running
Version 1.1.11
Type Storage

coredns
Status Running
Version 1.6.5
Type Service Discovery

autoscaler
Status Running
Version 1.17.2
Type Maintenance

Testing Scaling up and down

We first test the scaling up by adding a test deployment:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: autoscale-test-deployment
  labels:
    app: autoscale-test
spec:
  replicas: 1
  selector:
    matchLabels:
      app: autoscale-test
  template:
    metadata:
      labels:
        app: autoscale-test
    spec:
      containers:
        - name: hello-world
          image: nginx
          ports:
            - containerPort: 80
          resources:
            requests:
              memory: "64Mi"
              cpu: "250m"
```

We can scale the deployment and see how the cluster responds:

```
> kubectl scale deployment/autoscale-test-deployment --replicas=40
```

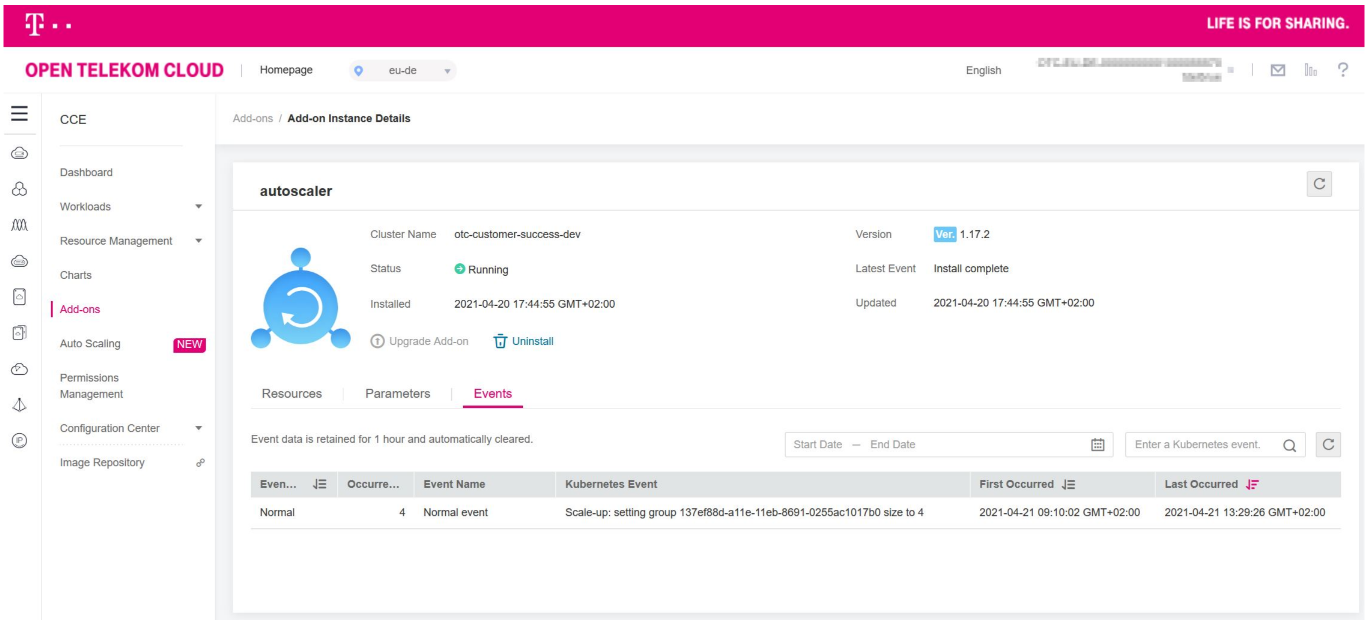
Since the 40 replicas utilize 10 CPUs, these do not fit on the nodes in the default node pool. Therefore the autoscaler will kick in and create an additional node.

```
> kubectl get pods
NAME                                         READY   STATUS            RESTARTS
AGE
autoscale-test-deployment-6f9ff6448-4x248    0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-5kdcn    0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-6pcmv    0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-8ftc8    1/2     Running           0
14s
autoscale-test-deployment-6f9ff6448-9kxvt    0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-9scj5    0/2     Pending           0
13s
```

```
autoscale-test-deployment-6f9ff6448-d7btf   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-dsrvs   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-dxf58   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-gdjvx   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-grwsl   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-gxbr9   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-h27z2   0/2     Init:0/1          0
14s
autoscale-test-deployment-6f9ff6448-h89vw   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-hltfb   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-hs5q8   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-m5zn9   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-m6fxx   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-mmtz2   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-mrpjt   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-mzkrn   2/2     Running           0
26h
autoscale-test-deployment-6f9ff6448-n6hrq   1/2     Running           0
14s
autoscale-test-deployment-6f9ff6448-p2p9v   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-pt4vj   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-q2ksm   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-q7p7t   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-qfbqq   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-qs949   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-qszsx   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-rm6c9   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-rnfzn   0/2     PodInitializing   0
14s
autoscale-test-deployment-6f9ff6448-rsgh6   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-sgzhb   0/2     Pending           0
13s
```

```
autoscale-test-deployment-6f9ff6448-v8qvm   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-w57gp   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-wfp5p   0/2     Pending           0
14s
autoscale-test-deployment-6f9ff6448-xh5sm   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-xrnrz   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-z72sp   0/2     Pending           0
13s
autoscale-test-deployment-6f9ff6448-zdgkp   0/2     PodInitializing   0
14s
```

In the Web Console, we see that the Scale Up event takes place:



autoscaler

Cluster Name otc-customer-success-dev
Status Running
Installed 2021-04-20 17:44:55 GMT+02:00
Version Ver. 1.17.2
Latest Event Install complete
Updated 2021-04-20 17:44:55 GMT+02:00

Event data is retained for 1 hour and automatically cleared.

Even...	Occurre...	Event Name	Kubernetes Event	First Occurred	Last Occurred
Normal	4	Normal event	Scale-up: setting group 137ef88d-a11e-11eb-8691-0255ac1017b0 size to 4	2021-04-21 09:10:02 GMT+02:00	2021-04-21 13:29:26 GMT+02:00

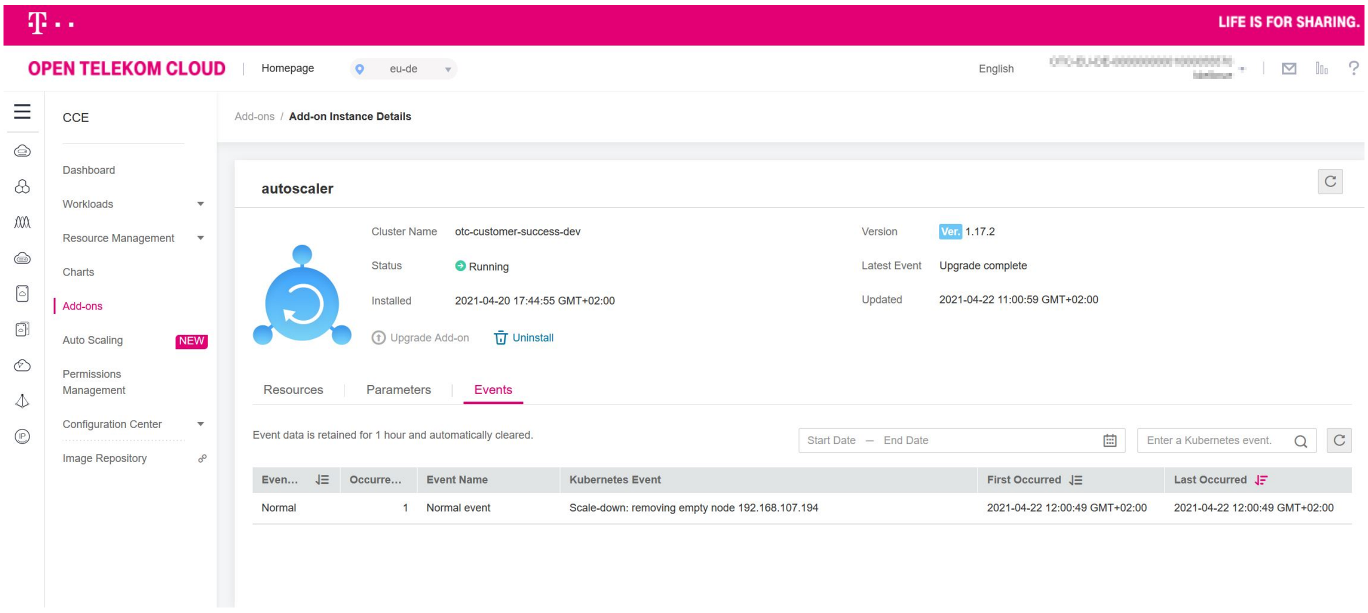
And then we also see the started nodes, 2 in the default node pool and 4 in the autoscale node pool:

```
> kubectl get nodes -L cce.cloud.com/cce-nodepool
NAME               STATUS   ROLES    AGE     VERSION
CCE-NODEPOOL
192.168.13.187     Ready    <none>   6m23s   v1.17.9-r0-CCE20.7.1.B003-17.36.3
otc-customer-success-dev-node-pool-autoscale
192.168.161.247    Ready    <none>   4h15m   v1.17.9-r0-CCE20.7.1.B003-17.36.3
otc-customer-success-dev-node-pool-autoscale
192.168.182.115    Ready    <none>   39d     v1.17.9-r0-CCE20.7.1.B003-17.36.3
192.168.186.181    Ready    <none>   6m23s   v1.17.9-r0-CCE20.7.1.B003-17.36.3
otc-customer-success-dev-node-pool-autoscale
192.168.42.133     Ready    <none>   39d     v1.17.9-r0-CCE20.7.1.B003-17.36.3
192.168.83.154     Ready    <none>   6m17s   v1.17.9-r0-CCE20.7.1.B003-17.36.3
otc-customer-success-dev-node-pool-autoscale
```

Scaling down again...

```
> kubectl scale deployment/autoscale-test-deployment --replicas=1
```

yields removed nodes in the Web Console.



autoscaler

Cluster Name otc-customer-success-dev
Status Running
Installed 2021-04-20 17:44:55 GMT+02:00
Version Ver. 1.17.2
Latest Event Upgrade complete
Updated 2021-04-22 11:00:59 GMT+02:00

Event data is retained for 1 hour and automatically cleared.

Even...	Occurre...	Event Name	Kubernetes Event	First Occurred	Last Occurred
Normal	1	Normal event	Scale-down: removing empty node 192.168.107.194	2021-04-22 12:00:49 GMT+02:00	2021-04-22 12:00:49 GMT+02:00