

# Evaluation

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# Ist-Zustand

- Microservice System in Kubernetes deployed
- Skalierung über den Horizontal Pod Autoscaler
- Metriken über Prometheus/Grafana

# Events im Dashboard

Name	Min Replicas	Max Replicas	Reference	Created ↑	
inventory	1	7	Deployment / inventory	3 hours ago	⋮

## Events

Message	Source	Sub-object	Count	First Seen	Last Seen
New size: 4; reason: external metric xtraffic(&LabelSelector(MatchLabels:map[string]string(type=prometheus,MatchExpressions:[LabelSelectorRequirement(),)])) above target	horizontal-pod-autoscaler	-	7	<a href="#">an hour ago</a>	<a href="#">5 minutes ago</a>
Scaled up replica set inventory-5646fb4fc8 to 4	deployment-controller	-	7	<a href="#">an hour ago</a>	<a href="#">5 minutes ago</a>
New size: 1; reason: All metrics below target	horizontal-pod-autoscaler	-	6	<a href="#">an hour ago</a>	<a href="#">48 minutes ago</a>
Scaled down replica set inventory-5646fb4fc8 to 1	deployment-controller	-	6	<a href="#">an hour ago</a>	<a href="#">48 minutes ago</a>
New size: 7; reason: external metric xtraffic(&LabelSelector(MatchLabels:map[string]string(type=prometheus,MatchExpressions:[LabelSelectorRequirement(),)])) above target	horizontal-pod-autoscaler	-	5	<a href="#">an hour ago</a>	<a href="#">12 minutes ago</a>
Scaled up replica set inventory-5646fb4fc8 to 7	deployment-controller	-	5	<a href="#">an hour ago</a>	<a href="#">12 minutes ago</a>
New size: 2; reason: All metrics below target	horizontal-pod-autoscaler	-	2	<a href="#">an hour ago</a>	<a href="#">12 minutes ago</a>
Scaled down replica set inventory-5646fb4fc8 to 2	deployment-controller	-	2	<a href="#">an hour ago</a>	<a href="#">12 minutes ago</a>
New size: 2; reason: external metric xtraffic(&LabelSelector(MatchLabels:map[string]string(type=prometheus,MatchExpressions:[LabelSelectorRequirement(),)])) above target	horizontal-pod-autoscaler	-	2	<a href="#">an hour ago</a>	<a href="#">36 minutes ago</a>
Scaled up replica set inventory-5646fb4fc8 to 2	deployment-controller	-	2	<a href="#">an hour ago</a>	<a href="#">36 minutes ago</a>

1 – 10 of 14

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# Events im CLI

```
trod@trodspec -  
File Edit View Search Terminal Tabs Help  
trod@trodspec: ~/Documents/hpa_config/hpa_test x trod@trodspec: ~/Documents/kubernetes-event-exporte... x trod@trodspec: ~/Documents/hpa_config/hpa_test x trod@trodspec: ~  
55m Normal Killing pod/inventory-5646fb4fc8-wp9zt Stopping container inventory  
54m Normal Scheduled pod/inventory-5646fb4fc8-zj5pd Successfully assigned default/inventory-5646fb4fc8-zj5pd to minikube  
54m Normal Pulling pod/inventory-5646fb4fc8-zj5pd Pulling image "t2project/inventory:main"  
54m Normal Pulled pod/inventory-5646fb4fc8-zj5pd Successfully pulled image "t2project/inventory:main" in 4.258249339s  
54m Normal Created pod/inventory-5646fb4fc8-zj5pd Created container inventory  
54m Normal Started pod/inventory-5646fb4fc8-zj5pd Started container inventory  
49m Normal Killing pod/inventory-5646fb4fc8-zj5pd Stopping container inventory  
13m Normal Scheduled pod/inventory-5646fb4fc8-zlldf Successfully assigned default/inventory-5646fb4fc8-zlldf to minikube  
13m Normal Pulling pod/inventory-5646fb4fc8-zlldf Pulling image "t2project/inventory:main"  
13m Normal Pulled pod/inventory-5646fb4fc8-zlldf Successfully pulled image "t2project/inventory:main" in 1.322963424s  
13m Normal Created pod/inventory-5646fb4fc8-zlldf Created container inventory  
13m Normal Started pod/inventory-5646fb4fc8-zlldf Started container inventory  
7h54s Normal Killing pod/inventory-5646fb4fc8-zlldf Stopping container inventory  
60m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-lpnzb  
60m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-jrnhd  
55m Normal SuccessfulDelete replicaset/inventory-5646fb4fc8 Deleted pod: inventory-5646fb4fc8-jrnhd  
49m Normal SuccessfulDelete replicaset/inventory-5646fb4fc8 Deleted pod: inventory-5646fb4fc8-7k856  
37m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-qphl4  
29m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-l2sv8  
29m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-vxc2b  
20m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-5xg4k  
20m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-ho1vw  
20m Normal SuccessfulCreate replicaset/inventory-5646fb4fc8 Created pod: inventory-5646fb4fc8-7tcs9  
14m Normal SuccessfulDelete replicaset/inventory-5646fb4fc8 Deleted pod: inventory-5646fb4fc8-5xg4k  
7h54s Normal SuccessfulDelete replicaset/inventory-5646fb4fc8 Deleted pod: inventory-5646fb4fc8-zlldf  
6h39s Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 4; reason: external metric xtrafficx(8LabelSelector[MatchLabels:map[string]string{type: prometheus,},MatchExpressio  
ns:[]LabelSelectorRequirement{,}) above target  
6h39s Normal ScalingReplicaSet deployment/inventory Scaled up replica set inventory-5646fb4fc8 to 4  
49m Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 1; reason: All metrics below target  
49m Normal ScalingReplicaSet deployment/inventory Scaled down replica set inventory-5646fb4fc8 to 1  
13m Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 7; reason: external metric xtrafficx(8LabelSelector[MatchLabels:map[string]string{type: prometheus,},MatchExpressio  
ns:[]LabelSelectorRequirement{,}) above target  
13m Normal ScalingReplicaSet deployment/inventory Scaled up replica set inventory-5646fb4fc8 to 7  
13m Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 2; reason: All metrics below target  
13m Normal ScalingReplicaSet deployment/inventory Scaled down replica set inventory-5646fb4fc8 to 2  
37m Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 2; reason: external metric xtrafficx(8LabelSelector[MatchLabels:map[string]string{type: prometheus,},MatchExpressio  
ns:[]LabelSelectorRequirement{,}) above target  
37m Normal ScalingReplicaSet deployment/inventory Scaled up replica set inventory-5646fb4fc8 to 2  
6h54s Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 3; reason: All metrics below target  
6h54s Normal ScalingReplicaSet deployment/inventory Scaled down replica set inventory-5646fb4fc8 to 3  
7h54s Normal SuccessfulRescale horizontalpodautoscaler/inventory New size: 4; reason: All metrics below target  
7h54s Normal ScalingReplicaSet deployment/inventory Scaled down replica set inventory-5646fb4fc8 to 4  
25m Normal Scheduled pod/utbackend-cff658987-wmbnk Successfully assigned default/utbackend-cff658987-wmbnk to minikube  
25m Normal Pulling pod/utbackend-cff658987-wmbnk Pulling image "t2project/utbackend:main"  
25m Normal Pulled pod/utbackend-cff658987-wmbnk Successfully pulled image "t2project/utbackend:main" in 1.404289691s  
25m Normal Created pod/utbackend-cff658987-wmbnk Created container utbackend  
25m Normal Started pod/utbackend-cff658987-wmbnk Started container utbackend  
25m Normal SuccessfulCreate replicaset/utbackend-cff658987 Created pod: utbackend-cff658987-wmbnk  
25m Normal SuccessfulRescale horizontalpodautoscaler/utbackend New size: 2; reason: external metric xcpx(8LabelSelector[MatchLabels:map[string]string{type: prometheus,},MatchExpressions:[  
]LabelSelectorRequirement{,}) above target  
25m Normal ScalingReplicaSet deployment/utbackend Scaled up replica set utbackend-cff658987 to 2  
trod@trodspec: $
```

# Events im CLI

```
trod@trodspc: ~  
File Edit View Search Terminal Tabs Help  
trod@trodspc: ~/Documents/hpa_config/hpa_test x trod@trodspc: ~/Documents/kubernetes-event-exporte... x trod@trodspc: ~/Documents/hpa_config/hpa_test x trod@trodspc: ~  
trod@trodspc:~$ kubectl get events --field-selector reason=SuccessfulRescale  
LAST SEEN   TYPE      REASON             OBJECT                                         MESSAGE  
13m         Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 4; reason: external metric xtrafficx(&LabelSelector{MatchLabels:map[string]string{type: prometheus,},MatchExpression  
s:[[]LabelSelectorRequirement{[]}) above target  
55m         Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 1; reason: All metrics below target  
3m17s       Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 7; reason: external metric xtrafficx(&LabelSelector{MatchLabels:map[string]string{type: prometheus,},MatchExpression  
s:[[]LabelSelectorRequirement{[]}) above target  
20m         Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 2; reason: All metrics below target  
44m         Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 2; reason: external metric xtrafficx(&LabelSelector{MatchLabels:map[string]string{type: prometheus,},MatchExpression  
s:[[]LabelSelectorRequirement{[]}) above target  
13m         Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 3; reason: All metrics below target  
14m         Normal    SuccessfulRescale   horizontalpodautoscaler/inventory             New size: 4; reason: All metrics below target  
32m         Normal    SuccessfulRescale   horizontalpodautoscaler/uibackend             New size: 2; reason: external metric xcpux(&LabelSelector{MatchLabels:map[string]string{type: prometheus,},MatchExpressions:[[]  
LabelSelectorRequirement{[]}) above target  
2m3s        Normal    SuccessfulRescale   horizontalpodautoscaler/uibackend             New size: 1; reason: All metrics below target  
trod@trodspc:~$
```

# Ablauf

## Empfangen von Events

1. In ein schönes Format umwandeln
2. Informationen extrahieren
  - a. Metric
  - b. Scaling type
  - c. Replica size

## Zusammenhang von Events

Zusammenhang von Events nach:

- Scaling type
- Zeitlicher Abstand
- Metric type
- Ableitung

## Performance Probleme

- Klassifiziere Load
- Sammle Metriken
- Analysiere auf Performance Probleme

# Issues erstellen

Fehler im HPA:

- Metrik nicht verfügbar

Adaption nicht erfolgreich:

- Skalierung bis maxReplica

Performance Problem:

- Meldung des Problemtypen

# Evaluationsfragen

1. Was sind die größten Probleme/Herausforderungen, die einem Entwickler begegnen, wenn er versucht das Autoscaling Verhalten eines Micro Service Systems nachzuvollziehen/verifizieren?
2. Bitte ordne die folgenden Punkte danach, wie sehr sie Entwickler herausfordern, wenn sie versuchen, das Autoskalierungsverhalten eines Microservice-Systems zu verstehen/zu verifizieren?
  1. Hoher Aufwand Informationen zur Analyse bereitzustellen
  2. Informationen sind über viele Tools/Dashboard verteilt
  3. Es finden zu viele Skalierungen statt um den Überblick zu behalten



# Evaluationsfragen

3. Welche dieser Probleme aus den Fragen 1 und 2 werden von dem vorgestellten System dieser Bachelorarbeit gelöst?
4. Welche dieser Probleme aus den Fragen 1 und 2 werden von dem vorgestellten System dieser Bachelorarbeit reduziert? Wenn ja, in welchem Maße (1-5) (1 sehr wenig, 5 sehr stark)?
5. Gibt es Features die Deiner Meinung nach fehlen um das skalierungsverhalten eine Micro Service Systems besser verstehen/verifizieren zu können?
6. Würdest Du ein vollständig implementiertes System nutzen?