# K8s monitoring

# PROMETHEUS - GRAFANA

istio\_requests\_total is a COUNTER that aggregates request totals between Kubernetes workloads, and groups them by response codes, response flags and security policy. It is used to record the total number of requests handled by an Istio proxy. This metric is available only for HTTP, HTTP/2, and GRPC traffic. For TCP traffic there is no requests\_total metric because it would be hard to say what to define as a request³.

0 
Prometheus 
Alerts Graph Status • Help 
Enable query history Enable autocomplete 
Use local time 
Q istio_requests total 
Enab'e highlighting 
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Loed time: Sms 
instance: •10.32.0.18:15020", namespace: "prod", 
Resolution: IAS 
Execute 
Result series: 8 
Table 
Graph 
Res. (s) 
reporter: •destination", 
ingressgateway•, 
sou • ist io -syste m 
instance: •1032.0.1&15020", namespace: "prod", 
reporter: •destination", 

Reference:

<https://istio.io/latest/zh/docs/reference/config/metrics/>.

<https://istio.io/latest/docs/tasks/observability/metrics/querying-metrics/>

In grafana, Go to istio - Istio Workload Dashboard.

Run bash script below to test connection

|  |
| --- |
| while true; do curl -s localhost:30886/increment/22; sleep 1; done |

And you can see metric display in dashboard like below.

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A 
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/ Istio Workload Dashboard 
= 1 1m 
destination 
Q 
O 
datasource default 
v General 
v Inbound Workloads 
1 ops's 
0.750 ops's 
0.500 ops's 
0.250 ops's 
O ops's 
Namespace prod 
Workload 
devsecops 
Reporter 
Inbound Workload Namespace 
All 
Inbound Workload 
All 
Destination Service 
WORKLOAD: devsecops.prod 
Incoming Success Rate (non-5xx responses) 
100% 
INBOUND WORKLOADS 
100% 
75% 
25% 
— istio-ingressgateway.istio-system ("mTLS) 
All 
19:34 
@ Last 5 minutes 
Request Duration 
Incoming Request Volume 
ops/s 
19:35 
19:36 
19:37 
19:38 
TCP server Traffic 
N/A 
Incoming Requests By Source And Response Code 
TCP Client Traffic 
N/A 
Incoming Success Rate (non-5xx responses) By Source 
— istio-ingressgateway.istio-system : 200 ('mTLS) — 
istio-ingressgateway_istio-system : 
500 (d mTLS) 

# FALCO

Falco is the open source standard for runtime security for hosts, containers, Kubernetes and the cloud. Get real-time visibility into unexpected behaviors, config changes, intrusions, and data theft.

Install falco:

<https://falco.org/docs/getting-started/installation/>

Run falco:

|  |
| --- |
| falco |

Now we create nginx and execute bash in nginx to test falco:

|  |
| --- |
| sudo kubectl run nginx --image nginx  pod/nginx created    sudo kubectl get pod nginx  NAME READY STATUS RESTARTS AGE  nginx 1/1 Running 0 13s    sudo kubectl exec -it nginx -- bash |

root@dai : / home/ dai $ 
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13 
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13 
13 
16 : 25 : 03 
16 : 25 : 03 
16:35: 10.331044274 : 
falco 
: Falco version: 8.34.1 (x86_64) 
2023 
Falco initialized with configuration file: /etc/fatco/fatco.yamt 
2023 : 
: Loading rules from file /etc/fatco/fatco_rutes.yamt 
2023 
: Loading rules from file /etc/fatco/fatco_rutes. local.yamt 
2023 
: The chosen syscatt buffer dimension is: 8388608 bytes (8 MBs) 
2023 
Starting health webserver with threadiness 8, listening on port 8765 
2023 : 
Enabled event sources: syscatt 
2023 : 
Opening capture with Kernel module 
2023 : 
Error 
File below a monitored di rectory opened for writing (user=root command=nano / 
usr/tocat/bin/startup_script.sh pid=206288 file=/usr/tocat/bin/ .startup_script.sh.swp parent=sudo pcmdtine=sudo nano /usr/ 
local/bin/startup_script.sh gparent=sudo container_id=host image=<NA>) 
Notice A shell was spawned in a container with an attached terminal (user=root k8s_ng 
(id=aaeab9af4dbd) shen=bash parent=runc cmdtine=bash pid=210334 
terninat=34816 container_id=aaeab9af4dbd image=nginx) 

Comeback falco and we see alert a shell was spawned.

And we can see rule list in falco\_rules.yaml

|  |
| --- |
| cat /etc/falco/falco\_rules.yaml | grep -i "A shell was spawned in a container with an attached terminal"  A shell was spawned in a container with an attached terminal (user=%user.name user\_loginuid=%user.loginuid %container.info |

|  |
| --- |
| cat /etc/falco/falco\_rules.yaml | grep -i "A shell was spawned in a container with an attached terminal" -A15 -B20  - rule: System user interactive  desc: an attempt to run interactive commands by a system (i.e. non-login) user  condition: spawned\_process and system\_users and interactive and not user\_known\_system\_user\_login  output: "System user ran an interactive command (user=%user.name user\_loginuid=%user.loginuid command=%proc.cmdline pid=%proc.pid container\_id=%container.id image=%container.image.repository)"  priority: INFO  tags: [host, container, users, mitre\_execution, T1059]  *# In some cases, a shell is expected to be run in a container. For example, configuration*  *# management software may do this, which is expected.*  - macro: user\_expected\_terminal\_shell\_in\_container\_conditions  condition: (never\_true)  - rule: Terminal shell in container  desc: A shell was used as the entrypoint/exec point into a container with an attached terminal.  condition: >  spawned\_process and container  and shell\_procs and proc.tty != 0  and container\_entrypoint  and not user\_expected\_terminal\_shell\_in\_container\_conditions  output: >  A shell was spawned in a container with an attached terminal (user=%user.name user\_loginuid=%user.loginuid %container.info  shell=%proc.name parent=%proc.pname cmdline=%proc.cmdline pid=%proc.pid terminal=%proc.tty container\_id=%container.id image=%container.image.repository)  priority: NOTICE  tags: [container, shell, mitre\_execution, T1059]  *# For some container types (mesos), there isn't a container image to*  *# work with, and the container name is autogenerated, so there isn't*  *# any stable aspect of the software to work with. In this case, we*  *# fall back to allowing certain command lines.*  - list: known\_shell\_spawn\_cmdlines  items: [  '"sh -c uname -p 2> /dev/null"',  '"sh -c uname -s 2>&1"',  '"sh -c uname -r 2>&1"',  '"sh -c uname -v 2>&1"', |

This command displays the same lines as the first command but also includes the 15 lines after and 20 lines before the line containing the text. This is useful for understanding the context of the rule, as it also shows the related rules and conditions, such as the "user\_expected\_terminal\_shell\_in\_container\_conditions" macro, which defines the conditions when a shell in a container is expected and should not trigger the rule. The command also includes the list of known command lines that are allowed for some container types.

The falco rules listed are used to monitor and alert on certain events happening within a containerized environment.

The first rule, "System user interactive", is triggered when a non-login system user attempts to run interactive commands. The condition for this rule to trigger is when a process is spawned, the user is a system user, the command is interactive, and the user is not a known system user login. The output of this rule includes information such as the user name, login UID, command, process ID, container ID, and container image repository. The priority for this rule is set to INFO and the associated tags include host, container, users, mitre\_execution, and T1059.

The second rule, "Terminal shell in container", is triggered when a shell is used as the entry point or execution point within a container that has an attached terminal. The conditions for this rule include the spawning of a process within a container, the process is a shell process, the process has a TTY attached, the container has an entry point, and the user did not expect a terminal shell in the container. The output of this rule includes information such as the user name, login UID, container information, shell process name, parent process name, command line, process ID, terminal, container ID, and container image repository. The priority for this rule is set to NOTICE and the associated tags include container, shell, mitre\_execution, and T1059.

Lastly, the rule defines a list of known shell spawn command lines that are allowed for certain container types where there is no container image to work with or where the container name is autogenerated.

Reference:

<https://falco.org/docs/rules/>

# HELM - FALCO

# Install helm:

|  |
| --- |
| curl <https://baltocdn.com/helm/signing.asc> | gpg --dearmor | sudo tee /usr/share/keyrings/helm.gpg > /dev/null  sudo apt-get install apt-transport-https --yes  echo "deb [arch=$(dpkg --print-architecture) signed-by=/usr/share/keyrings/helm.gpg] <https://baltocdn.com/helm/stable/debian/> all main" | sudo tee /etc/apt/sources.list.d/helm-stable-debian.list  sudo apt-get update  sudo apt-get install helm |

Install falco-falcosidekick:

|  |
| --- |
| kubectl create namespace falco  helm repo add falcosecurity <https://falcosecurity.github.io/charts>  helm repo update  helm install falco falcosecurity/falco \  --set falcosidekick.enabled=true \  --set falcosidekick.webui.enabled=true \  -n falco  Or  helm install falco falcosecurity/falco --set ebpf.enabled=true --set falcosidekick.enabled=true --set falcosidekick.webui.enabled=true |

If you see falco UI error, you can create PV, PVC file.

PersistentVolume.yaml

|  |
| --- |
| apiVersion: v1  kind: PersistentVolume  metadata:  name: falcosidekick-ui-redis-data-pv  spec:  capacity:  storage: 1Gi  accessModes:  - ReadWriteOnce  persistentVolumeReclaimPolicy: Retain  storageClassName: manual  hostPath:  path: "/mnt/data" |

PersistentVolumeClaim.yaml

|  |
| --- |
| apiVersion: v1  kind: PersistentVolumeClaim  metadata:  name: falco-falcosidekick-ui-redis-data-falco-falcosidekick-ui-redis-0  spec:  accessModes:  - ReadWriteOnce  resources:  requests:  storage: 1Gi  storageClassName: manual    kubectl apply -f persistentVolume.yaml -n falco  kubectl apply -f persistentVolumeClaim.yaml -n falco    or  kubectl create pv -- falco-falcosidekick-ui-redis-data --capacity 1Gi --storage-class standard  kubectl create pvc --name falco-falcosidekick-ui-redis-data-falco-falcosidekick-ui-redis-0 --claim-name falco-falcosidekick-ui-redis-data-falco-falcosidekick-ui-redis-0 --storage-class standard |

If pv and pvc not bound, update pvc spec

|  |
| --- |
| kubectl patch pvc falco-falcosidekick-ui-redis-data-falco-falcosidekick-ui-redis-0 -p '{"spec": {"volumeName": "falcosidekick-ui-redis-data-pv"}}' -n falco |

Check bound status

|  |
| --- |
| kubectl -n falco describe pvc falco-falcosidekick-ui-redis-data-falco-falcosidekick-ui-redis-0 |

Port-forwarding:

|  |
| --- |
| kubectl -n falco port-forward deploy/falco-falcosidekick-ui 2802:2802 --address 192.168.207.129 |

Login falco-UI with user,password: admin

C A Khång bSo mgt 
Falcosidekick UI 
192.168.207.129:2802/dashboard 
INFO 
Priorities 
syscall 
Hostnames 
Priorities 
Rules 
Notice 
8 
Tags 
Tags 
Error 
140 
Informational 
container host 
22 
Notice 3069 
DASHBOARD 
Sources 
Search 
Sources 
Rules 
EVENTS 
refresh 
24h 
IOS 
Tota 
629 
Notice 
221 
629 
mitre_privilege_escalation users 