From logs to metrics.

on the desperate attempt to combat entropy

Who I am.

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How many logs do we generate every day?

The quantity is not the only factor ...

How many standards - if any - we use to log?

How strictly we follow those standards formats?

—

How to transform kubernetes logs into metrics with the TICK stack.

Almost everyone needs to govern their logs.
Deriving metrics, synthesizing and visualizing them helps in decision making.

git.io/k8s-logs-to-metrics-tick (PoC)

First of all we needed a log parser.

But to parse which format … ?

BSD-syslog - *RFC 3164* - resembled a de-facto standard.

Wide usage, lot of tools, long lifetime span (2001).

But …

messy/informal RFC …

no strict well-defined grammar

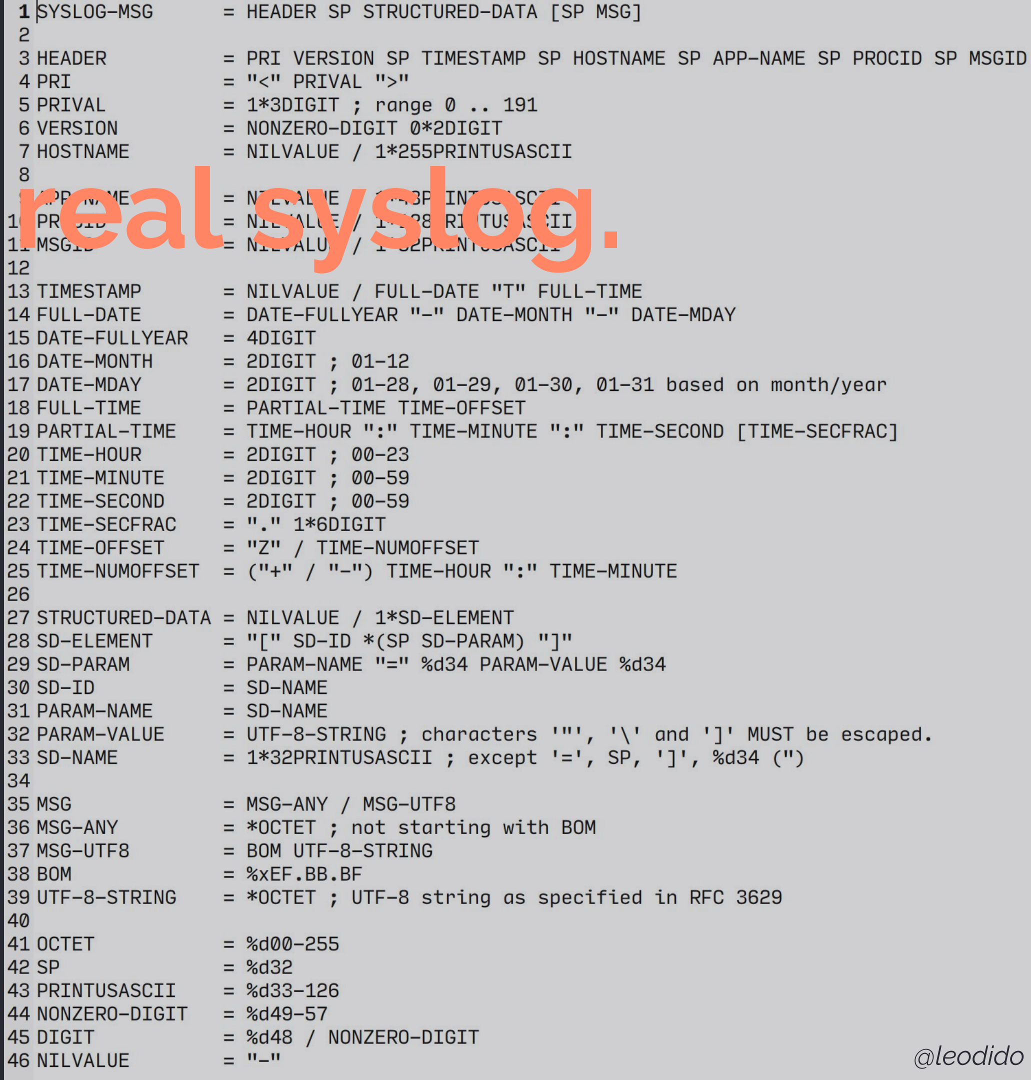
no single stable framing technique

too many customisations around.

Thus we chose real syslog.

RFC 5424 deprecates RFC 3164

- Well-defined grammar
- Octet counting framing
    - finally the stack trace for a panic in a single syslog ...
- TLS transport mapping
    - secure logs
- Only 9 years old - ie., 2009



```
SYSLOG-MSG      = HEADER SP STRUCTURED-DATA [SP MSG]

HEADER          = PRI VERSION SP TIMESTAMP SP HOSTNAME SP APP-NAME SP PROCID SP MSGID
PRI             = "<" PRIVAL ">"
PRIVAL          = 1*3DIGIT ; range 0 .. 191
VERSION         = NONZERO-DIGIT 0*2DIGIT
HOSTNAME        = NILVALUE / 1*255PRINTUSASCII

APP-NAME        = NILVALUE / 1*48PRINTUSASCII
PROCID          = NILVALUE / 1*128PRINTUSASCII
MSGID           = NILVALUE / 1*32PRINTUSASCII

TIMESTAMP       = NILVALUE / FULL-DATE "T" FULL-TIME
FULL-DATE       = DATE-FULLYEAR "-" DATE-MONTH "-" DATE-MDAY
DATE-FULLYEAR   = 4DIGIT
DATE-MONTH      = 2DIGIT ; 01-12
DATE-MDAY       = 2DIGIT ; 01-28, 01-29, 01-30, 01-31 based on month/year
FULL-TIME       = PARTIAL-TIME TIME-OFFSET
PARTIAL-TIME    = TIME-HOUR ":" TIME-MINUTE ":" TIME-SECOND [TIME-SECFRAC]
TIME-HOUR       = 2DIGIT ; 00-23
TIME-MINUTE     = 2DIGIT ; 00-59
TIME-SECOND     = 2DIGIT ; 00-59
TIME-SECFRAC    = "." 1*6DIGIT
TIME-OFFSET     = "Z" / TIME-NUMOFFSET
TIME-NUMOFFSET  = ("+" / "-") TIME-HOUR ":" TIME-MINUTE

STRUCTURED-DATA = NILVALUE / 1*SD-ELEMENT
SD-ELEMENT      = "[" SD-ID *(SP SD-PARAM) "]"
SD-PARAM        = PARAM-NAME "=" %d34 PARAM-VALUE %d34
SD-ID           = SD-NAME
PARAM-NAME      = SD-NAME
PARAM-VALUE     = UTF-8-STRING ; characters '"', '\' and ']' MUST be escaped.
SD-NAME         = 1*32PRINTUSASCII ; except '=', SP, ']', %d34 (")

MSG             = MSG-ANY / MSG-UTF8
MSG-ANY         = *OCTET ; not starting with BOM
MSG-UTF8        = BOM UTF-8-STRING
BOM             = %xEF.BB.BF
UTF-8-STRING    = *OCTET ; UTF-8 string as specified in RFC 3629

OCTET           = %d00-255
SP              = %d32
PRINTUSASCII    = %d33-126
NONZERO-DIGIT   = %d49-57
DIGIT           = %d48 / NONZERO-DIGIT
NILVALUE        = "-"
```

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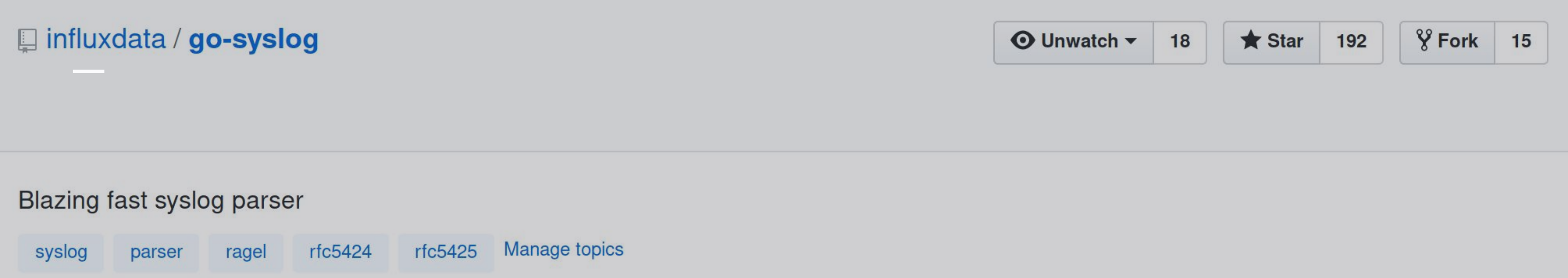

influxdata / go-syslog

Blazing fast syslog parser

We chose Ragel to create the (Go) syslog parser

github.com/influxdata/go-syslog

A state machine compiler

- regular languages -> FSM
- can execute code (actions) at arbitrary points
- non-determinism operators
- table or control flow driven state machines
- various host languages - c, c++, obj-c, asm, d, go, java, ruby, c#, ocaml

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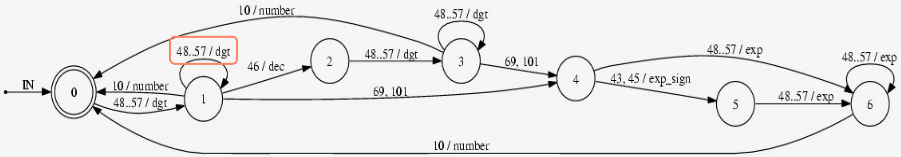
```
action dgt      { printf("DGT: %c\n", fc); }
action dec      { printf("DEC: .\n"); }
action exp      { printf("EXP: %c\n", fc); }
action exp_sign { printf("SGN: %c\n", fc); }
action number   { /*NUMBER*/ }

number = (
    [0-9]+ $dgt ( '.' @dec [0-9]+ $dgt )?
    ( [eE] ( [+\-] $exp_sign )? [0-9]+ $exp )?
) %number;

main := ( number '\n' )*;
```

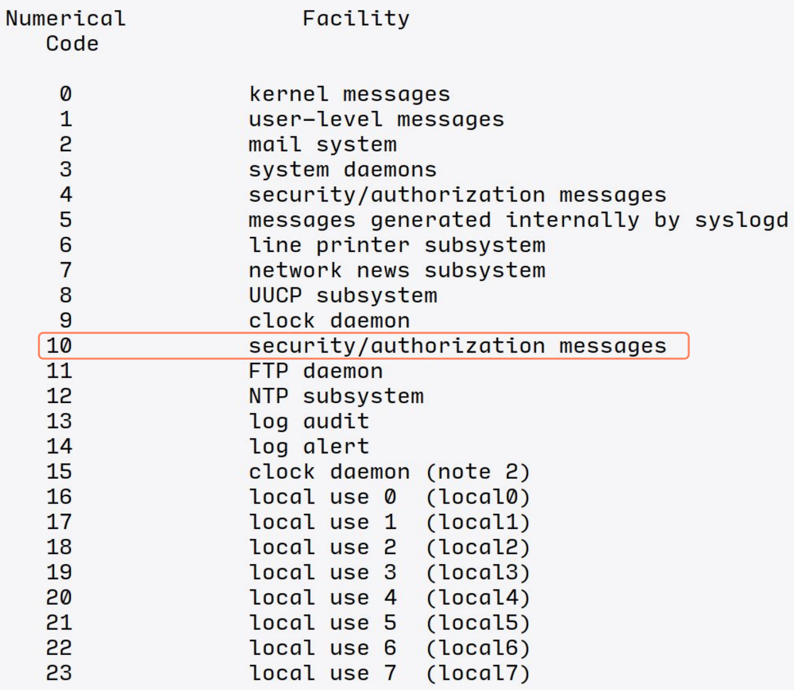


```
st0:
    if ( ++p == pe )
        goto out0;
    if ( 48 <= (*p) && (*p) <= 57 )
        goto tr0;
    goto st_err;
tr0:
    { printf("DGT: %c\n", (*p)); }
st1:
    if ( ++p == pe )
        goto out1;
    switch ( (*p) ) {
        case 10: goto tr5;
        case 46: goto tr7;
        case 69: goto st4;
        case 101: goto st4;
    }
    if ( 48 <= (*p) && (*p) <= 57 )
        goto tr0;
    goto st_err;
// ...
```

The gotos are your best friends. Only when you do not write them!

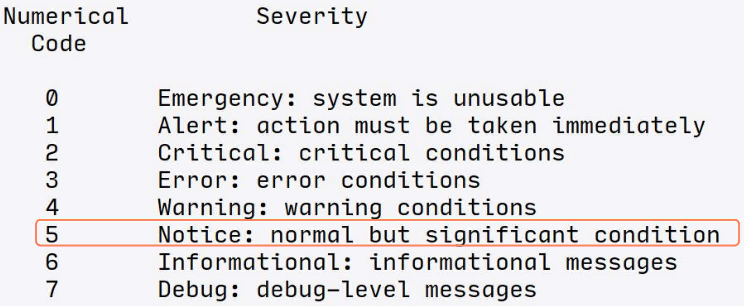
go-syslog provides parsers for RFC 5424 and RFC 5425.

```
<85>1 2018-10-11T22:14:15.003Z leodido - 31932 - [ex@31932 iut="3"] An auth token...
```



Numerical Code	Facility
0	kernel messages
1	user-level messages
2	mail system
3	system daemons
4	security/authorization messages
5	messages generated internally by syslogd
6	line printer subsystem
7	network news subsystem
8	UUCP subsystem
9	clock daemon
10	security/authorization messages
11	FTP daemon
12	NTP subsystem
13	log audit
14	log alert
15	clock daemon (note 2)
16	local use 0 (local0)
17	local use 1 (local1)
18	local use 2 (local2)
19	local use 3 (local3)
20	local use 4 (local4)
21	local use 5 (local5)
22	local use 6 (local6)
23	local use 7 (local7)

Table 1. Syslog Message Facilities



Numerical Code	Severity
0	Emergency: system is unusable
1	Alert: action must be taken immediately
2	Critical: critical conditions
3	Error: error conditions
4	Warning: warning conditions
5	Notice: normal but significant condition
6	Informational: informational messages
7	Debug: debug-level messages

Table 2. Syslog Message Severities

```
prival = facility * 8 + severity
```

- *tools.ietf.org/html/rfc5424.html* (Syslog grammar)
- *tools.ietf.org/html/rfc5425.html* (TLS + octet counting)
- *tools.ietf.org/html/rfc5426.html* (UDP)
- *tools.ietf.org/html/rfc6587.html* (TCP + octet counting)
- *man7.org/linux/man-pages/man3/syslog.3.html*
- *man7.org/linux/man-pages/man0/syslog.h.0p.html*
- *man7.org/linux/man-pages/man1/logger.1.html*

```
bestEffortOn := true
i := []byte(`<165>1 2018-10-11T22:14:15.003Z mymach.it e - 1 [ex@32473 iut="3"] An app event...`)
p := rfc5424.NewParser()
m, e := p.Parse(i, &bestEffortOn) // best effort mode on means both m and e can have value ...
```

This results in `m` being equal to the following `SyslogMessage` instance. While error `e` is `nil` in this case.

```
// (rfc5424.SyslogMessage)({
//  priority: (*uint8)(165),
//  facility: (*uint8)(20),
//  severity: (*uint8)(5),
//  version: (uint16) 1,
//  timestamp: (*time.Time)(2018-10-11 22:14:15.003 +0000 UTC),
//  hostname: (*string)((len=9) "mymach.it"),
//  appname: (*string)((len=1) "e"),
//  procID: (*string)(<nil>),
//  msgID: (*string)((len=1) "1"),
//  structuredData: (*map[string]map[string]string)((len=1) {
//   (string) (len=8) "ex@32473": (map[string]string) (len=1) {
//    (string) (len=3) "iut": (string) (len=1) "3"
//   }
//  }),
//  message: (*string)((len=33) "An app event...")
// })
```

It provides also a builder.

Incrementally build valid syslog messages

```
msg := &SyslogMessage{}
msg.SetTimestamp("not a RFC3339MICRO timestamp")
// Not yet a valid message (try msg.Valid())
msg.SetPriority(191)
msg.SetVersion(1)
msg.Valid() // Now it is minimally valid
str, _ := msg.String()
// str is “<191>1 - - - - - -”
```

Notice that its API ignores input values that does not follow the grammar.

Performances.

- ~250ns to parse the smallest legal message
- ~2µs to parse an average legal message
- ~4µs to parse a very long legal message

```
[no]_empty_input__________________________________-4  30000000       253 ns/op     224 B/op        3 allocs/op
[no]_multiple_syslog_messages_on_multiple_lines___-4  20000000       433 ns/op     304 B/op       12 allocs/op
[no]_impossible_timestamp_________________________-4  10000000      1080 ns/op     528 B/op       11 allocs/op
[no]_malformed_structured_data____________________-4  20000000       552 ns/op     400 B/op       12 allocs/op
[no]_with_duplicated_structured_data_id___________-4   5000000      1246 ns/op     688 B/op       17 allocs/op
[ok]_minimal______________________________________-4  30000000       264 ns/op     247 B/op        9 allocs/op
[ok]_average_message______________________________-4   5000000      1984 ns/op    1536 B/op       26 allocs/op
[ok]_complicated_message__________________________-4   5000000      1644 ns/op    1280 B/op       25 allocs/op
[ok]_very_long_message____________________________-4   2000000      3826 ns/op    2464 B/op       28 allocs/op
[ok]_all_max_length_and_complete__________________-4   3000000      2792 ns/op    1888 B/op       28 allocs/op
[ok]_all_max_length_except_structured_data_and_mes-4   5000000      1830 ns/op     883 B/op       13 allocs/op
[ok]_minimal_with_message_containing_newline______-4  20000000       294 ns/op     250 B/op       10 allocs/op
[ok]_w/o_procid,_w/o_structured_data,_with_message-4  10000000       956 ns/op     364 B/op       11 allocs/op
[ok]_minimal_with_UTF-8_message___________________-4  20000000       586 ns/op     359 B/op       10 allocs/op
[ok]_with_structured_data_id,_w/o_structured_data_-4  10000000       998 ns/op     592 B/op       14 allocs/op
[ok]_with_multiple_structured_data________________-4   5000000      1538 ns/op    1232 B/op       22 allocs/op
[ok]_with_escaped_backslash_within_structured_data-4   5000000      1316 ns/op     920 B/op       20 allocs/op
[ok]_with_UTF-8_structured_data_param_value,_with_-4   5000000      1580 ns/op    1050 B/op       21 allocs/op
```

—

Telegraf is the plugin-driven server agent for collecting & reporting metrics.

github.com/influxdata/telegraf

Thus we created the *syslog input plugin* for it, using *go-syslog*

- Listens for syslog messages transmitted over UDP - RFC 5426 - or TCP.
- Supports (atm) only messages formatted according to RFC 5424.
- Supports TLS, octet framing (both over TCP - RFC 6587 - and TLS - RFC 5425).
- BSD format - RFC 3164 - in progress.

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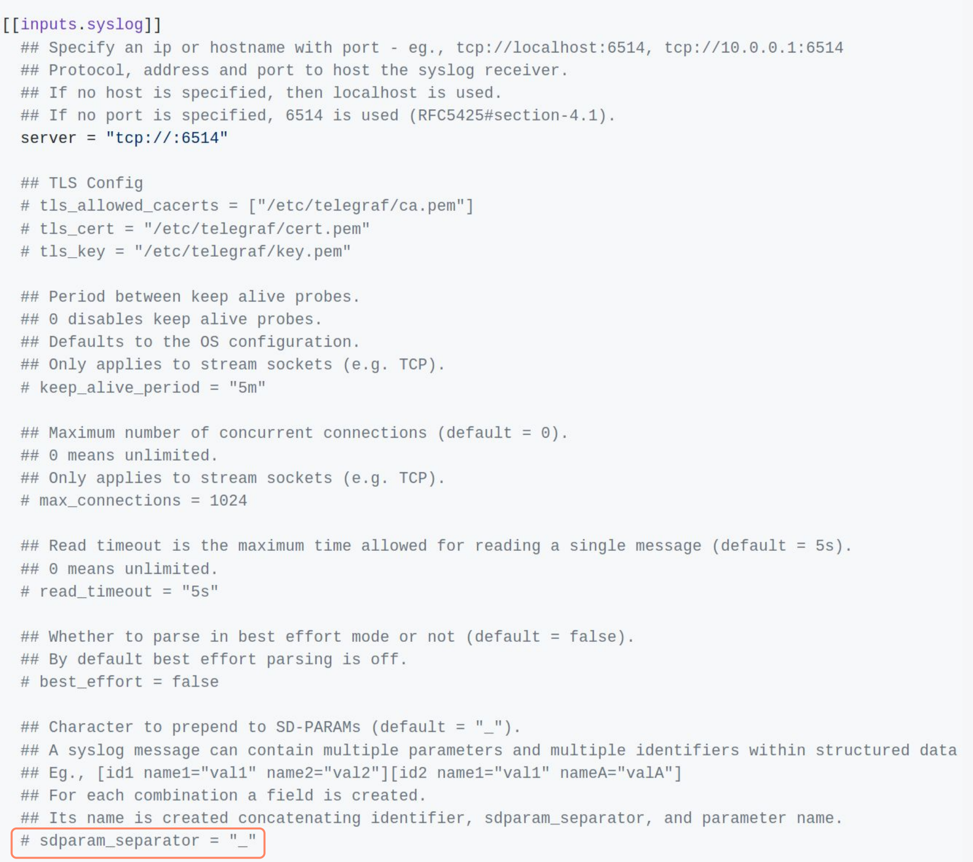
Metrics

Measurement: syslog

- tags
  - severity (string)
  - facility (string)
  - hostname (string)
  - appname (string)
- fields
  - version (integer)
  - severity_code (integer)
  - facility_code (integer)
  - timestamp (integer) - the time recorded in the syslog message
  - procid (string)
  - msgid (string)
  - sdid (bool)
  - structured data elements (string)
- timestamp - the time the messages was received



```
[[inputs.syslog]]
  ## Specify an ip or hostname with port - eg., tcp://localhost:6514, tcp://10.0.0.1:6514
  ## Protocol, address and port to host the syslog receiver.
  ## If no host is specified, then localhost is used.
  ## If no port is specified, 6514 is used (RFC5425#section-4.1).
  server = "tcp://:6514"

  ## TLS Config
  # tls_allowed_cacerts = ["/etc/telegraf/ca.pem"]
  # tls_cert = "/etc/telegraf/cert.pem"
  # tls_key = "/etc/telegraf/key.pem"

  ## Period between keep alive probes.
  ## 0 disables keep alive probes.
  ## Defaults to the OS configuration.
  ## Only applies to stream sockets (e.g. TCP).
  # keep_alive_period = "5m"

  ## Maximum number of concurrent connections (default = 0).
  ## 0 means unlimited.
  ## Only applies to stream sockets (e.g. TCP).
  # max_connections = 1024

  ## Read timeout is the maximum time allowed for reading a single message (default = 5s).
  ## 0 means unlimited.
  # read_timeout = "5s"

  ## Whether to parse in best effort mode or not (default = false).
  ## By default best effort parsing is off.
  # best_effort = false

  ## Character to prepend to SD-PARAMs (default = "_").
  ## A syslog message can contain multiple parameters and multiple identifiers within structured data
  ## Eg., [id1 name1="val1" name2="val2"][id2 name1="val1" nameA="valA"]
  ## For each combination a field is created.
  ## Its name is created concatenating identifier, sdparam_separator, and parameter name.
  # sdparam_separator = "_"
```

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Input (with octet counting)

```
169 <165>1 2018-10-01:14:15.000Z mymachine.example.com evntslog - ID47 [exampleSDID@32473
iut="3" eventSource="Application" eventID="1011"] An application event log entry...
```

Output

```
syslog,appname=evntslog,facility=local4,hostname=mymachine.example.com,severity=notice
exampleSDID@32473_eventID="1011",exampleSDID@32473_eventSource="Application",exampleSDID@32
473_iut="3",facility_code=20i,message="An application event log
entry...",msgid="ID47",severity_code=5i,timestamp=1065910455003000000i,version=1i
1538421339749472344
```

Source code at *git.io/k8s-logs-to-metrics-tick*

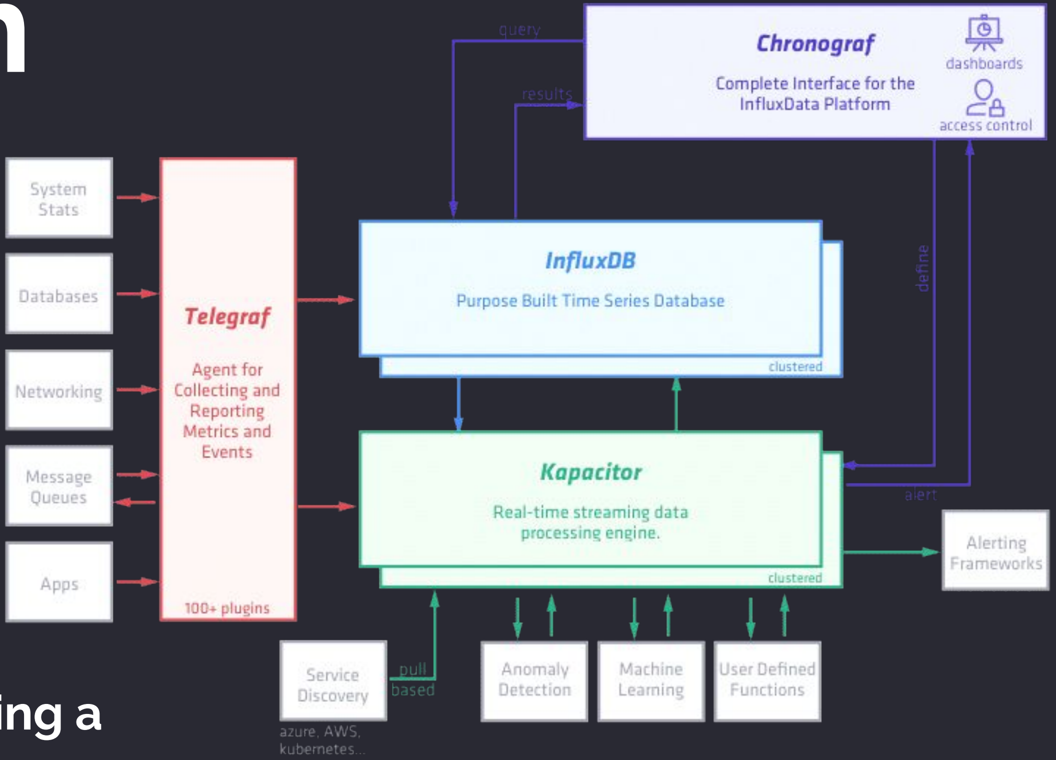
Our solution

Grab k8s and kernel logs from journald.

Parse them via telegraf syslog input plugin.

Visualize logs with chronograf log viewer.

Elicit new metrics to plot applying a kapacitor UDF.



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YAML TIME!

```yaml
apiVersion: apps/v1
kind: StatefulSet
metadata:
  namespace: logging
  name: influxdb
  labels:
    component: influxdb
    app: influxdb
spec:
  serviceName: influxdb
  selector:
    matchLabels:
      component: influxdb
  replicas: 1
  template:
    metadata:
      name: influxdb
      labels:
        component: influxdb
        app: influxdb
    spec:
      containers:
      - name: influxdb
        image: quay.io/influxdb/influxdb:nightly
        imagePullPolicy: Always
        resources:
          limits:
            memory: [illegible]
          requests:
            memory: [illegible]
        env:
          - name: INFLUXDB_IFQL_ENABLED
            value: "true"
          - name: INFLUXDB_LOGGING_LEVEL
            value: "error"
          - name: INFLUXDB_HTTP_LOG_ENABLED
            value: "false"
        volumeMounts:
          - name: data
            mountPath: /var/lib/influxdb
        ports:
          - containerPort: 8086
            name: server
          - containerPort: 8082
            name: ifql
  volumeClaimTemplates:
  - metadata:
      namespace: logging
      name: data
```

Using rsyslog to grab RFC 5424 syslog messages from journald.

```
apiVersion: v1
kind: ConfigMap
metadata:
 name: rsyslog
 namespace: logging
 labels:
   component: rsyslog
   app: rsyslog
data:
 rsyslog.conf: |+
   # …
   module(load="imjournal" ...)
   # This module only works with the journald and json-file docker log drivers
   module(load="mmkubernetes" tls.cacert="..." tokenfile="..." annotation_match=["."])
   # Extracts k8s metadata
   action(type="mmkubernetes")
   # …
   # Compose RFC5424 message
   template(name="rfc5424" type="list") { … }
   action(type="omfwd" target="127.0.0.1" port="6514" protocol="tcp" tcp_framing="octet-counted"
     template="rfc5424" ...)
```

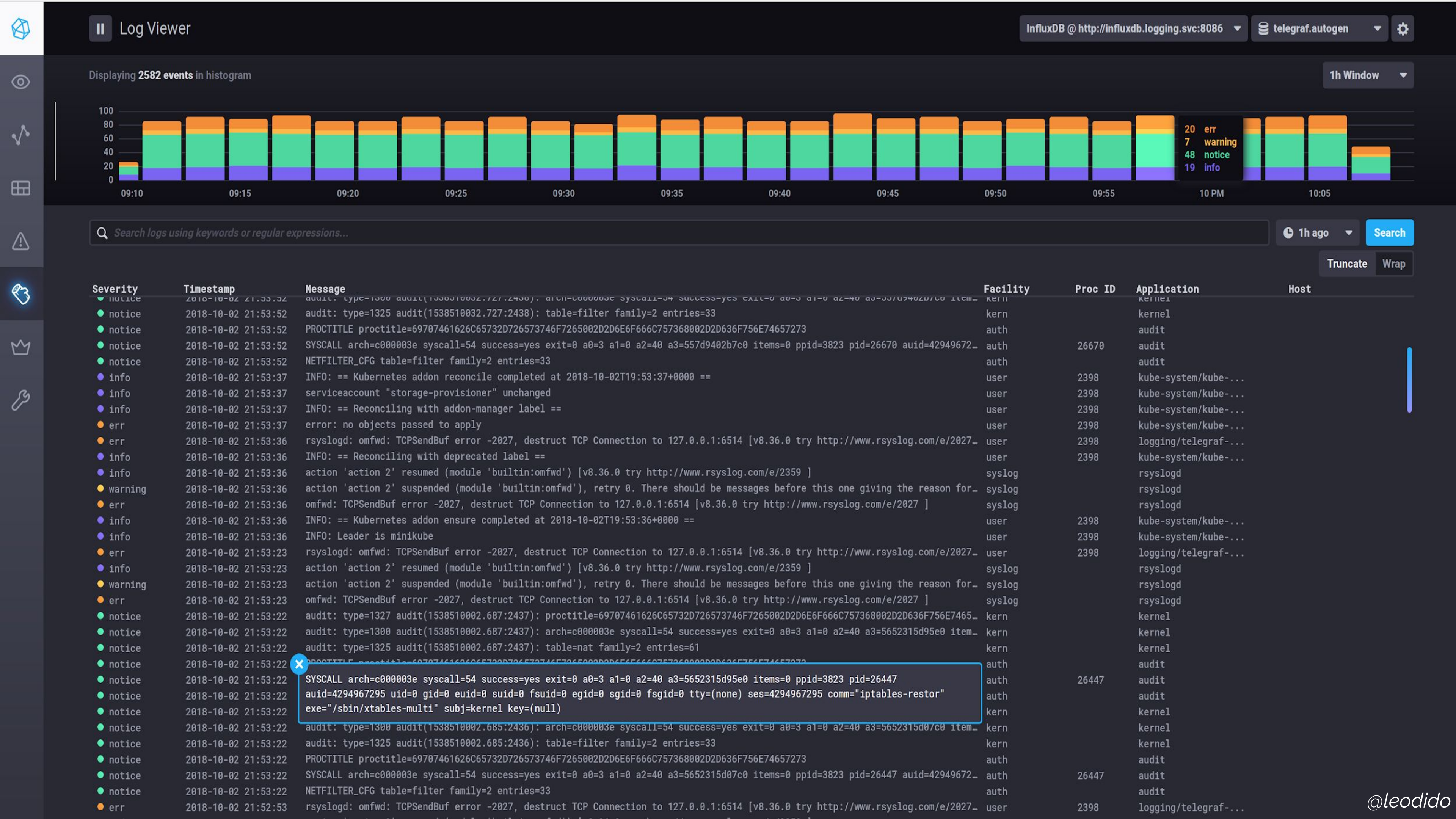
Setup telegraf syslog plugin to receive log messages over TCP.

```
apiVersion: v1
kind: ConfigMap
metadata:
 name: telegraf
 namespace: logging
 labels:
   component: telegraf
   app: telegraf
data:
 telegraf.conf: |+
   # ...
   [agent]
     interval = "10s"
     round_interval = true
     metric_batch_size = 1000
     # ...
   [[outputs.influxdb]]
     urls = ["http://influxdb:8086"] # required
     database = "telegraf" # required
     retention_policy = "autogen"
     write_consistency = "any"
     timeout = "1m"
   [[inputs.syslog]]
     server = "tcp://:6514"
     best_effort = true
```

Let’s deploy chronograf and influxDB

```
apiVersion: v1
kind: Service
metadata:
 name: chronograf
 namespace: logging
 labels:
   component: chronograf
   app: chronograf
spec:
 ports:
 - port: 80
   targetPort: 8888
   name: server
 selector:
   component: chronograf
---
apiVersion: apps/v1
kind: Deployment
# ...
```

```
apiVersion: v1
kind: Service
metadata:
 name: influxdb
 namespace: logging
 labels:
   component: influxdb
   app: influxdb
 annotations:
   service.alpha.kubernetes.io/tolerate-unready-endpoints: “true”
spec:
 clusterIP: None
 ports:
 - port: 8086
   name: server
 selector:
   component: influxdb
---
apiVersion: apps/v1
kind: StatefulSet
# ...
```



```
Severity  Timestamp            Message                                                                                                                      Facility  Proc ID  Application
notice    2018-10-02 21:53:52  audit: type=1300 audit(1538510032.727:2438): arch=c000003e syscall=54 success=yes exit=0 a0=3 a1=0 a2=40 a3=557d9402b7c0 item…   kern               kernel
notice    2018-10-02 21:53:52  audit: type=1325 audit(1538510032.727:2438): table=filter family=2 entries=33                                                kern               kernel
notice    2018-10-02 21:53:52  PROCTITLE proctitle=69707461626C65732D726573746F7265002D2D6E6F666C757368002D2D636F756E74657273                              auth               audit
notice    2018-10-02 21:53:52  SYSCALL arch=c000003e syscall=54 success=yes exit=0 a0=3 a1=0 a2=40 a3=557d9402b7c0 items=0 ppid=3823 pid=26670 auid=42949672…  auth      26670    audit
notice    2018-10-02 21:53:52  NETFILTER_CFG table=filter family=2 entries=33                                                                             auth               audit
info      2018-10-02 21:53:37  INFO: == Kubernetes addon reconcile completed at 2018-10-02T19:53:37+0000 ==                                               user      2398     kube-system/kube-...
info      2018-10-02 21:53:37  serviceaccount "storage-provisioner" unchanged                                                                             user      2398     kube-system/kube-...
info      2018-10-02 21:53:37  INFO: == Reconciling with addon-manager label ==                                                                            user      2398     kube-system/kube-...
err       2018-10-02 21:53:37  error: no objects passed to apply                                                                                          user      2398     kube-system/kube-...
err       2018-10-02 21:53:36  rsyslogd: omfwd: TCPSendBuf error -2027, destruct TCP Connection to 127.0.0.1:6514 [v8.36.0 try http://www.rsyslog.com/e/2027…  user      2398     logging/telegraf-...
info      2018-10-02 21:53:36  INFO: == Reconciling with deprecated label ==                                                                              user      2398     kube-system/kube-...
info      2018-10-02 21:53:36  action 'action 2' resumed (module 'builtin:omfwd') [v8.36.0 try http://www.rsyslog.com/e/2359 ]                            syslog             rsyslogd
warning   2018-10-02 21:53:36  action 'action 2' suspended (module 'builtin:omfwd'), retry 0. There should be messages before this one giving the reason for…  syslog             rsyslogd
err       2018-10-02 21:53:36  omfwd: TCPSendBuf error -2027, destruct TCP Connection to 127.0.0.1:6514 [v8.36.0 try http://www.rsyslog.com/e/2027 ]      syslog             rsyslogd
info      2018-10-02 21:53:36  INFO: == Kubernetes addon ensure completed at 2018-10-02T19:53:36+0000 ==                                                  user      2398     kube-system/kube-...
info      2018-10-02 21:53:36  INFO: Leader is minikube                                                                                                   user      2398     kube-system/kube-...
err       2018-10-02 21:53:23  rsyslogd: omfwd: TCPSendBuf error -2027, destruct TCP Connection to 127.0.0.1:6514 [v8.36.0 try http://www.rsyslog.com/e/2027…  user      2398     logging/telegraf-...
info      2018-10-02 21:53:23  action 'action 2' resumed (module 'builtin:omfwd') [v8.36.0 try http://www.rsyslog.com/e/2359 ]                            syslog             rsyslogd
warning   2018-10-02 21:53:23  action 'action 2' suspended (module 'builtin:omfwd'), retry 0. There should be messages before this one giving the reason for…  syslog             rsyslogd
err       2018-10-02 21:53:23  omfwd: TCPSendBuf error -2027, destruct TCP Connection to 127.0.0.1:6514 [v8.36.0 try http://www.rsyslog.com/e/2027 ]      syslog             rsyslogd
notice    2018-10-02 21:53:22  audit: type=1327 audit(1538510002.687:2437): proctitle=69707461626C65732D726573746F7265002D2D6E6F666C757368002D2D636F756E7465…  kern               kernel
notice    2018-10-02 21:53:22  audit: type=1300 audit(1538510002.687:2437): arch=c000003e syscall=54 success=yes exit=0 a0=3 a1=0 a2=40 a3=5652315d95e0 item…  kern               kernel
notice    2018-10-02 21:53:22  audit: type=1325 audit(1538510002.687:2437): table=nat family=2 entries=61                                                   kern               kernel
notice    2018-10-02 21:53:22  PROCTITLE proctitle=69707461626C65732D726573746F7265002D2D6E6F666C757368002D2D636F756E74657273                              auth               audit
notice    2018-10-02 21:53:22  SYSCALL arch=c000003e syscall=54 success=yes exit=0 a0=3 a1=0 a2=40 a3=5652315d95e0 items=0 ppid=3823 pid=26447              auth      26447    audit
                               auid=4294967295 uid=0 gid=0 euid=0 suid=0 fsuid=0 egid=0 sgid=0 fsgid=0 tty=(none) ses=4294967295 comm="iptables-restor"
                               exe="/sbin/xtables-multi" subj=kernel key=(null)
notice    2018-10-02 21:53:22                                                                                                                             auth               audit
notice    2018-10-02 21:53:22                                                                                                                             kern               kernel
notice    2018-10-02 21:53:22  audit: type=1300 audit(1538510002.685:2436): arch=c000003e syscall=54 success=yes exit=0 a0=3 a1=0 a2=40 a3=5652315d07c0 item…  kern               kernel
notice    2018-10-02 21:53:22  audit: type=1325 audit(1538510002.685:2436): table=filter family=2 entries=33                                                kern               kernel
notice    2018-10-02 21:53:22  PROCTITLE proctitle=69707461626C65732D726573746F7265002D2D6E6F666C757368002D2D636F756E74657273                              auth               audit
notice    2018-10-02 21:53:22  SYSCALL arch=c000003e syscall=54 success=yes exit=0 a0=3 a1=0 a2=40 a3=5652315d07c0 items=0 ppid=3823 pid=26447 auid=42949672…  auth      26447    audit
notice    2018-10-02 21:53:22  NETFILTER_CFG table=filter family=2 entries=33                                                                             auth               audit
err       2018-10-02 21:52:53  rsyslogd: omfwd: TCPSendBuf error -2027, destruct TCP Connection to 127.0.0.1:6514 [v8.36.0 try http://www.rsyslog.com/e/2027…  user      2398     logging/telegraf-...
```

Host

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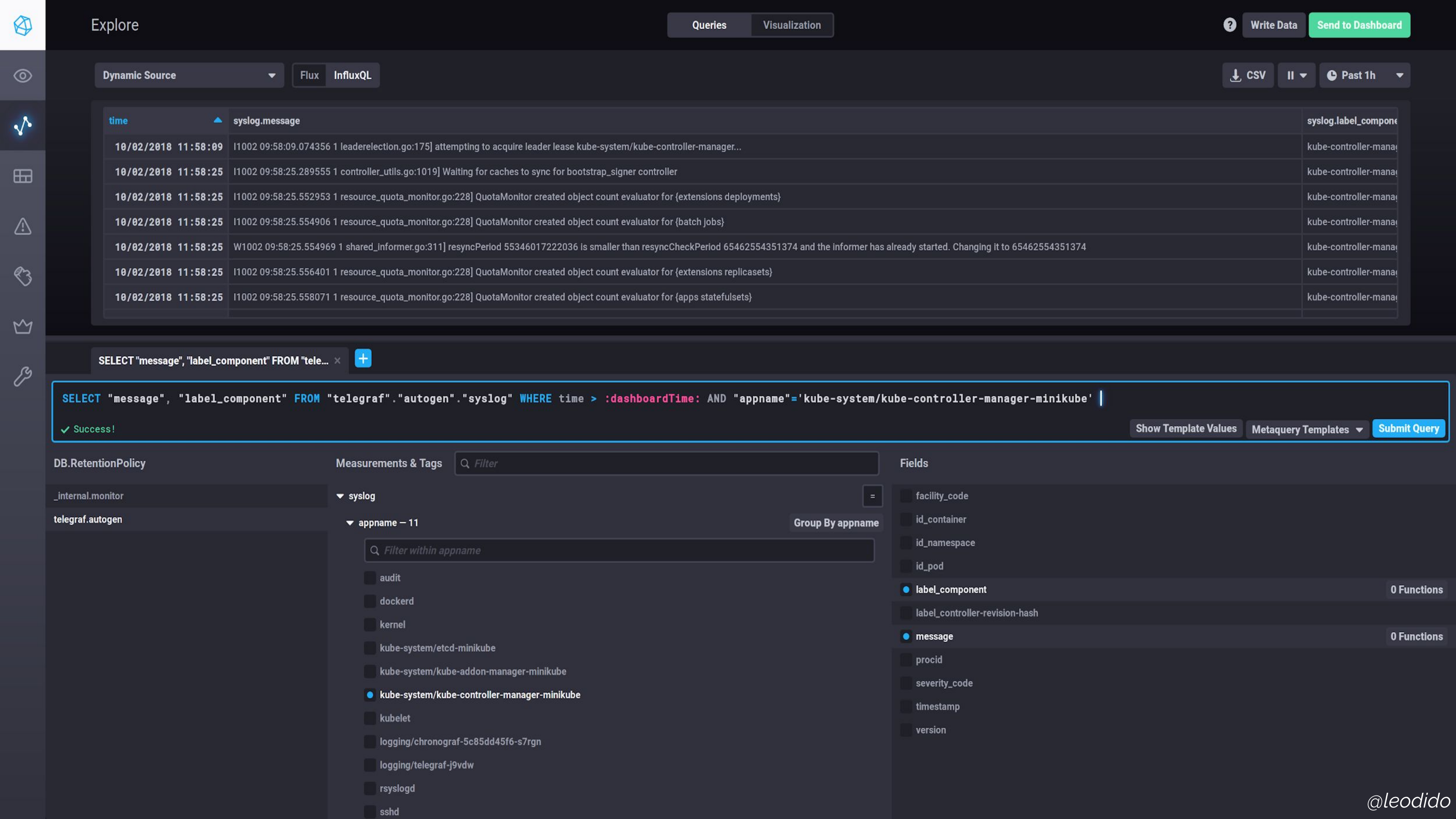

time	syslog.message	syslog.label_compone
10/02/2018 11:58:09	I1002 09:58:09.074356 1 leaderelection.go:175] attempting to acquire leader lease kube-system/kube-controller-manager...	kube-controller-mana
10/02/2018 11:58:25	I1002 09:58:25.289555 1 controller_utils.go:1019] Waiting for caches to sync for bootstrap_signer controller	kube-controller-mana
10/02/2018 11:58:25	I1002 09:58:25.552953 1 resource_quota_monitor.go:228] QuotaMonitor created object count evaluator for {extensions deployments}	kube-controller-mana
10/02/2018 11:58:25	I1002 09:58:25.554906 1 resource_quota_monitor.go:228] QuotaMonitor created object count evaluator for {batch jobs}	kube-controller-mana
10/02/2018 11:58:25	W1002 09:58:25.554969 1 shared_informer.go:311] resyncPeriod 55346017222036 is smaller than resyncCheckPeriod 65462554351374 and the informer has already started. Changing it to 65462554351374	kube-controller-mana
10/02/2018 11:58:25	I1002 09:58:25.556401 1 resource_quota_monitor.go:228] QuotaMonitor created object count evaluator for {extensions replicasets}	kube-controller-mana
10/02/2018 11:58:25	I1002 09:58:25.558071 1 resource_quota_monitor.go:228] QuotaMonitor created object count evaluator for {apps statefulsets}	kube-controller-mana

SELECT "message", "label_component" FROM "tele... ×

```
SELECT "message", "label_component" FROM "telegraf"."autogen"."syslog" WHERE time > :dashboardTime: AND "appname"='kube-system/kube-controller-manager-minikube'
```

✓ Success!

DB.RetentionPolicy

- _internal.monitor
- telegraf.autogen

Measurements & Tags

- syslog
  - appname — 11 (Group By appname)
    - □ audit
    - □ dockerd
    - □ kernel
    - □ kube-system/etcd-minikube
    - □ kube-system/kube-addon-manager-minikube
    - ● kube-system/kube-controller-manager-minikube
    - □ kubelet
    - □ logging/chronograf-5c85dd45f6-s7rgn
    - □ logging/telegraf-j9vdw
    - □ rsyslogd
    - □ sshd

Fields

- □ facility_code
- □ id_container
- □ id_namespace
- □ id_pod
- ● label_component — 0 Functions
- □ label_controller-revision-hash
- ● message — 0 Functions
- □ procid
- □ severity_code
- □ timestamp
- □ version

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Max throughput (function of the last 90 minutes data) vs current requests - Service without disruption under this limit
0 req/sec
Requeset Count
Mean response time (ms)
Efficiency (λ coefficient)
50.12 λ
Contention (σ coefficient)
0.921σ
Coherence / Cross-talk (κ coefficient)
0.1436533 κ

Logs are just a mess!

Inspecting logs coming from a single server is easy.
Inspecting logs coming from a distributed system is hard.

We need metrics!

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Now we want to detect and count the OOMs.

Logs are streams.
We need a streaming processor!

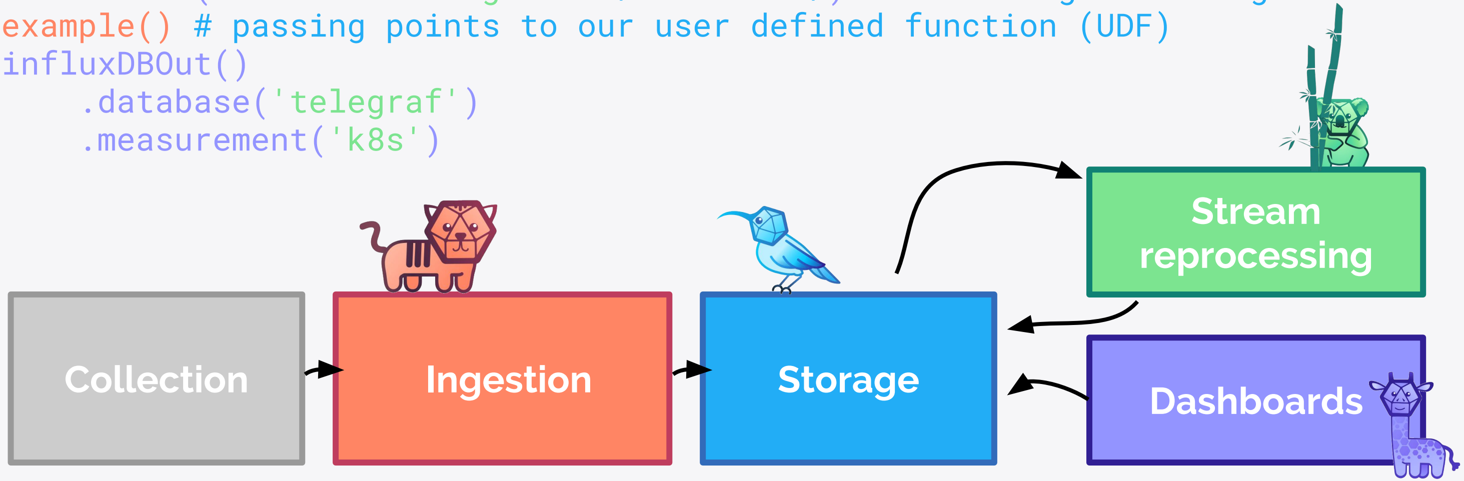
github.com/influxdata/kapacitor

A streaming processor can be programmed to identify the patterns we want and act on them, e.g: OOM Kills.

```
Memory cgroup out of memory: Kill process 13012 (stress) score 1958 or sacrifice child
```

Let's write a tick script to grab log points

```
dbrp "telegraf"."autogen"
stream
    |from()
        .measurement('syslog')
        .truncate(1ms)
        .where(lambda: "appname" == 'kernel') # filter by points tag
        .where(lambda: "message" =~ /sacrifice/) # filtering on messages with regex
    @example() # passing points to our user defined function (UDF)
    |influxDBOut()
        .database('telegraf')
        .measurement('k8s')
```



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Let’s configure kapacitor

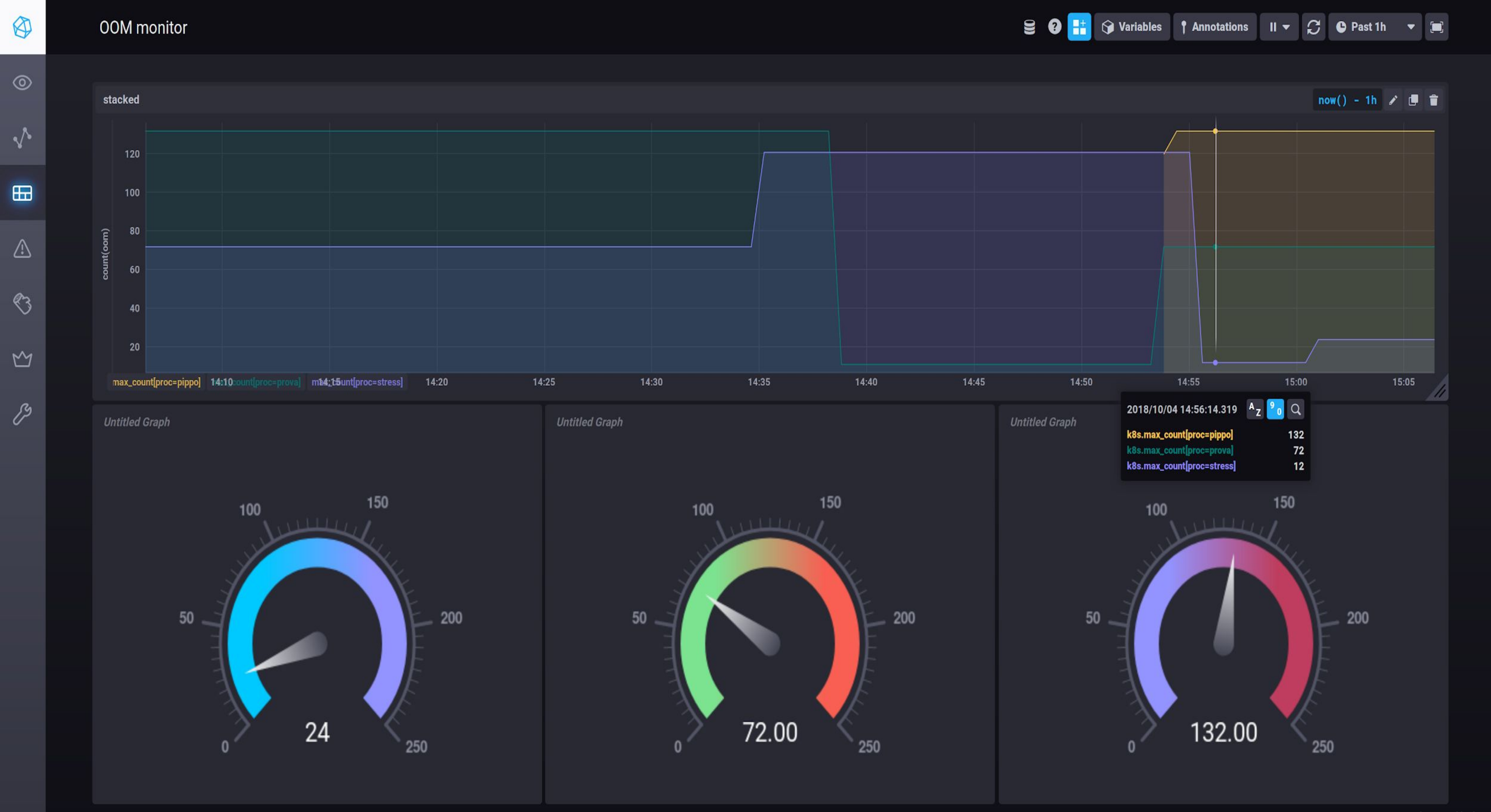
```
# …
[udf]
[udf.functions]
   [udf.functions.example]
     socket = "/tmp/example.sock"
     timeout = "10s"

[[influxdb]]
 enabled = true
 default = true
 name = "logging"
 urls = ["http://localhost:8086"]
 timeout = 0
 startup-timeout = "5m"

 [influxdb.subscriptions]
   telegraf = ["autogen"]
```

Let’s write the UDF

```
func (h *handler) Point(p *agent.Point) error {
    var r = regexp.MustCompile(`(?m).*Kill process (?P<pid>\d+) (?P<proc>\(.*\)) score (?P<score>\d+)`)
    message, ok := p.FieldsString[“message”]
    if ok {
        m := r.FindStringSubmatch(message)
        data := mapSubexpNames(m, r.SubexpNames())
        proc := strings.Trim(data[“proc”], “()”)
        state := h.state[proc]
        if state == nil {
            state := &myState{Counter: 0}
            h.state[proc] = state
        }
        h.state[proc].update()
        newpoint := &agent.Point{
            Time: time.Now().UnixNano(),
            Tags: map[string]string{
                “proc”: proc,
                “pid”:  string(data[“pid”]),
            },
            FieldsInt: map[string]int64{
                “count”: h.state[proc].Counter,
            },
        }
        // Send point
        h.agent.Responses <- &agent.Response{
            Message: &agent.Response_Point{
                Point: newpoint,
            },
        }
    }
    return nil
}
```



2018/10/04 14:56:14.319

k8s.max_count[proc=pippo] 132
k8s.max_count[proc=prova] 72
k8s.max_count[proc=stress] 12

24

72.00

132.00

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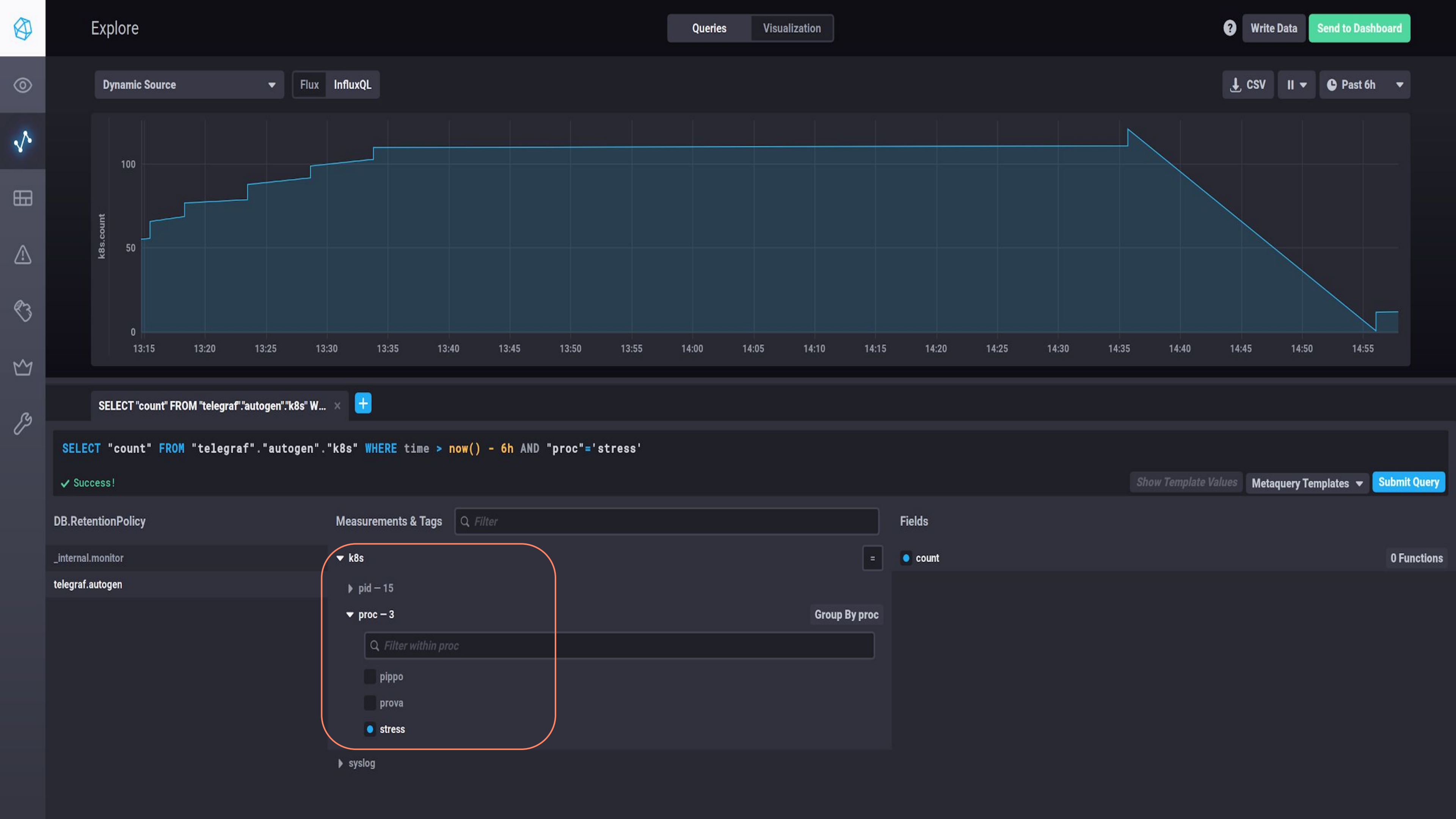

```
SELECT "count" FROM "telegraf"."autogen"."k8s" WHERE time > now() - 6h AND "proc"='stress'
```

✓ Success!

Thanks.

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git.io/k8s-logs-to-metrics-tick
git.io/go-syslog
github.com/influxdata