

Centralized Logging Patterns

Philipp Krenn

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```
java-logging — fish /Users/philipp/Documents/GitHub/java-logging — -fish — 105x26
[philipp@~/Documents/GitHub/java-logging(git*master)>> gradle run 14:47:14]

> Task :run
[2018-05-31 14:47:22.185] TRACE net.xeraa.logging.LogMe [main] - session=29, loop=1 - Iteration '1' and session '29'
[2018-05-31 14:47:22.196] DEBUG net.xeraa.logging.LogMe [main] - session=29, loop=1 - Collect in development
[2018-05-31 14:47:22.200] TRACE net.xeraa.logging.LogMe [main] - session=49, loop=2 - Iteration '2' and session '49'
[2018-05-31 14:47:22.201] DEBUG net.xeraa.logging.LogMe [main] - session=49, loop=2 - Collect in development
[2018-05-31 14:47:22.202] TRACE net.xeraa.logging.LogMe [main] - session=85, loop=3 - Iteration '3' and session '85'
[2018-05-31 14:47:22.203] INFO net.xeraa.logging.LogMe [main] - session=85, loop=3 - Collect in production
[2018-05-31 14:47:22.204] TRACE net.xeraa.logging.LogMe [main] - session=55, loop=4 - Iteration '4' and session '55'
[2018-05-31 14:47:22.204] DEBUG net.xeraa.logging.LogMe [main] - session=55, loop=4 - Collect in development
[2018-05-31 14:47:22.205] TRACE net.xeraa.logging.LogMe [main] - session=83, loop=5 - Iteration '5' and session '83'
[2018-05-31 14:47:22.205] WARN net.xeraa.logging.LogMe [main] - session=83, loop=5 - Investigate tomorrow
[2018-05-31 14:47:22.206] TRACE net.xeraa.logging.LogMe [main] - session=36, loop=6 - Iteration '6' and session '36'
[2018-05-31 14:47:22.206] INFO net.xeraa.logging.LogMe [main] - session=36, loop=6 - Collect in producti
```



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```
java-logging — fish /Users/philipp/Documents/GitHub/java-logging — -fish — 105x26
[philipp@~/Documents/GitHub/java-logging(git*master)✓] cat logs/java-logging.log 14:47:23
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and session '46'
[2018-05-31 14:42:58.961] DEBUG net.xeraa.logging.LogMe [main] - session=46, loop=1 - Collect in development
[2018-05-31 14:42:58.963] TRACE net.xeraa.logging.LogMe [main] - session=13, loop=2 - Iteration '2' and session '13'
[2018-05-31 14:42:58.963] DEBUG net.xeraa.logging.LogMe [main] - session=13, loop=2 - Collect in development
[2018-05-31 14:42:58.964] TRACE net.xeraa.logging.LogMe [main] - session=70, loop=3 - Iteration '3' and session '70'
[2018-05-31 14:42:58.964] INFO net.xeraa.logging.LogMe [main] - session=70, loop=3 - Collect in production
[2018-05-31 14:42:58.965] TRACE net.xeraa.logging.LogMe [main] - session=68, loop=4 - Iteration '4' and session '68'
[2018-05-31 14:42:58.966] DEBUG net.xeraa.logging.LogMe [main] - session=68, loop=4 - Collect in development
[2018-05-31 14:42:58.966] TRACE net.xeraa.logging.LogMe [main] - session=84, loop=5 - Iteration '5' and session '84'
[2018-05-31 14:42:58.966] WARN net.xeraa.logging.LogMe [main] - session=84, loop=5 - Investigate tomorrow
[2018-05-31 14:42:58.967] TRACE net.xeraa.logging.LogMe [main] - session=82, loop=6 - Iteration '6' and session '82'
[2018-05-31 14:42:58.969] INFO net.xeraa.logging.LogMe [main] - session=82, loop=6 - Collect in production
[2018-05-31 14:42:58.969] TRACE net.xeraa.logging.LogMe [main] - session=7, loop=7 - Iteration '7' and se
```



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```
java-logging — tail /Users/philipp/Documents/GitHub/java-logging — tail -f logs/java-loggi...
[philipp@~/Documents/GitHub/java-logging(git*master) ~] tail -f logs/java-logging.log 18:39:45
[2018-05-31 17:20:22.874] TRACE net.xeraa.logging.LogMe [main] - session=61, loop=16 - Iteration '16' and session '61'
[2018-05-31 17:20:22.874] DEBUG net.xeraa.logging.LogMe [main] - session=61, loop=16 - Collect in development
[2018-05-31 17:20:22.881] TRACE net.xeraa.logging.LogMe [main] - session=2, loop=17 - Iteration '17' and session '2'
[2018-05-31 17:20:22.882] DEBUG net.xeraa.logging.LogMe [main] - session=2, loop=17 - Collect in development
[2018-05-31 17:20:22.883] TRACE net.xeraa.logging.LogMe [main] - session=35, loop=18 - Iteration '18' and session '35'
[2018-05-31 17:20:22.884] INFO net.xeraa.logging.LogMe [main] - session=35, loop=18 - Collect in production
[2018-05-31 17:20:22.886] TRACE net.xeraa.logging.LogMe [main] - session=86, loop=19 - Iteration '19' and session '86'
[2018-05-31 17:20:22.889] DEBUG net.xeraa.logging.LogMe [main] - session=86, loop=19 - Collect in development
[2018-05-31 17:20:22.890] TRACE net.xeraa.logging.LogMe [main] - session=92, loop=20 - Iteration '20' and session '92'
[2018-05-31 17:20:22.891] WARN net.xeraa.logging.LogMe [main] - session=92, loop=20 - Investigate tomorrow
[2018-05-31 18:40:05.399] TRACE net.xeraa.logging.LogMe [main] - session=40, loop=1 - Iteration '1' and session '40'
[2018-05-31 18:40:05.417] DEBUG net.xeraa.logging.LogMe [main] - session=40, loop=1 - Collect in development
[2018-05-31 18:40:05.420] TRACE net.xeraa.logging.LogMe [main] - session=51, loop=2 - Iteration '2' and s
```



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```
[java-logging — fish /Users/philipp/Documents/GitHub/java-logging — -fish — 105x12]  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and session '46'  
[2018-05-31 14:42:58.961] DEBUG net.xeraa.logging.LogMe [main] - session=46, loop=1 - Collect in development  
[2018-05-31 14:42:58.963] TRACE net.xeraa.logging.LogMe [main] - session=13, loop=2 - Iteration '2' and session '13'  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and session '46'  
[2018-05-31 14:42:58.961] DEBUG net.xeraa.logging.LogMe [main] - session=46, loop=1 - Collect in development  
[2018-05-31 14:42:58.963] TRACE net.xeraa.logging.LogMe [main] - session=13, loop=2 - Iteration '2' and session '13'  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and session '46'  
[2018-05-31 14:42:58.961] DEBUG net.xeraa.logging.LogMe [main] - session=46, loop=1 - Collect in development  
[2018-05-31 14:42:58.963] TRACE net.xeraa.logging.LogMe [main] - session=13, loop=2 - Iteration '2' and session '13'  
[2018-05-31 14:42:58.963] DEBUG net.xeraa.logging.LogMe [main] - session=13, loop=2 - Collect in development  
[2018-05-31 14:42:58.964] TRACE net.xeraa.logging.LogMe [main] - session=70, loop=3 - Iteration '3' and session '70'  
[2018-05-31 14:42:58.964] INFO net.xeraa.logging.LogMe [main] - session=70, loop=3 - Collect in producti
```



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```
java-logging — fish /Users/philipp/Documents/GitHub/java-logging — -fish — 105x1  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
ession '46'  
  
[cat logs/java-logging.log]  
[2018-05-31 14:42:58.951] TRACE net.xeraa.logging.LogMe [main] - session=46, loop=1 - Iteration '1' and s  
  
[cat logs/java-logging.log]
```



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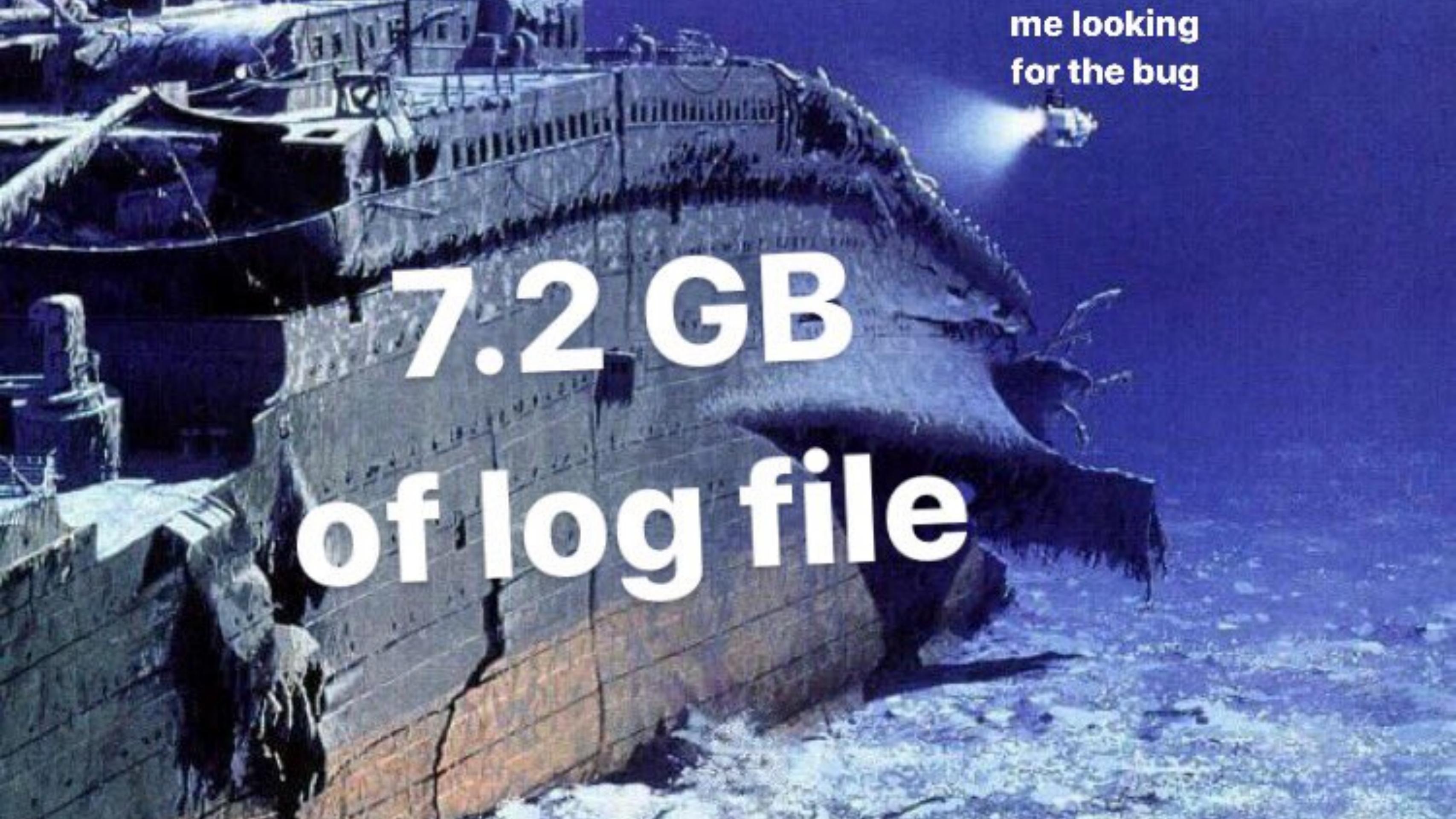


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ALL THE THINGS!



A dark, grainy image of a shipwreck on the ocean floor. A diver in a full scuba suit is positioned near the hull, holding a light that illuminates a portion of the ship's structure. The ship appears to be a large cargo vessel, possibly a steamship, with visible ladders and metal plates. The surrounding water is dark and textured.

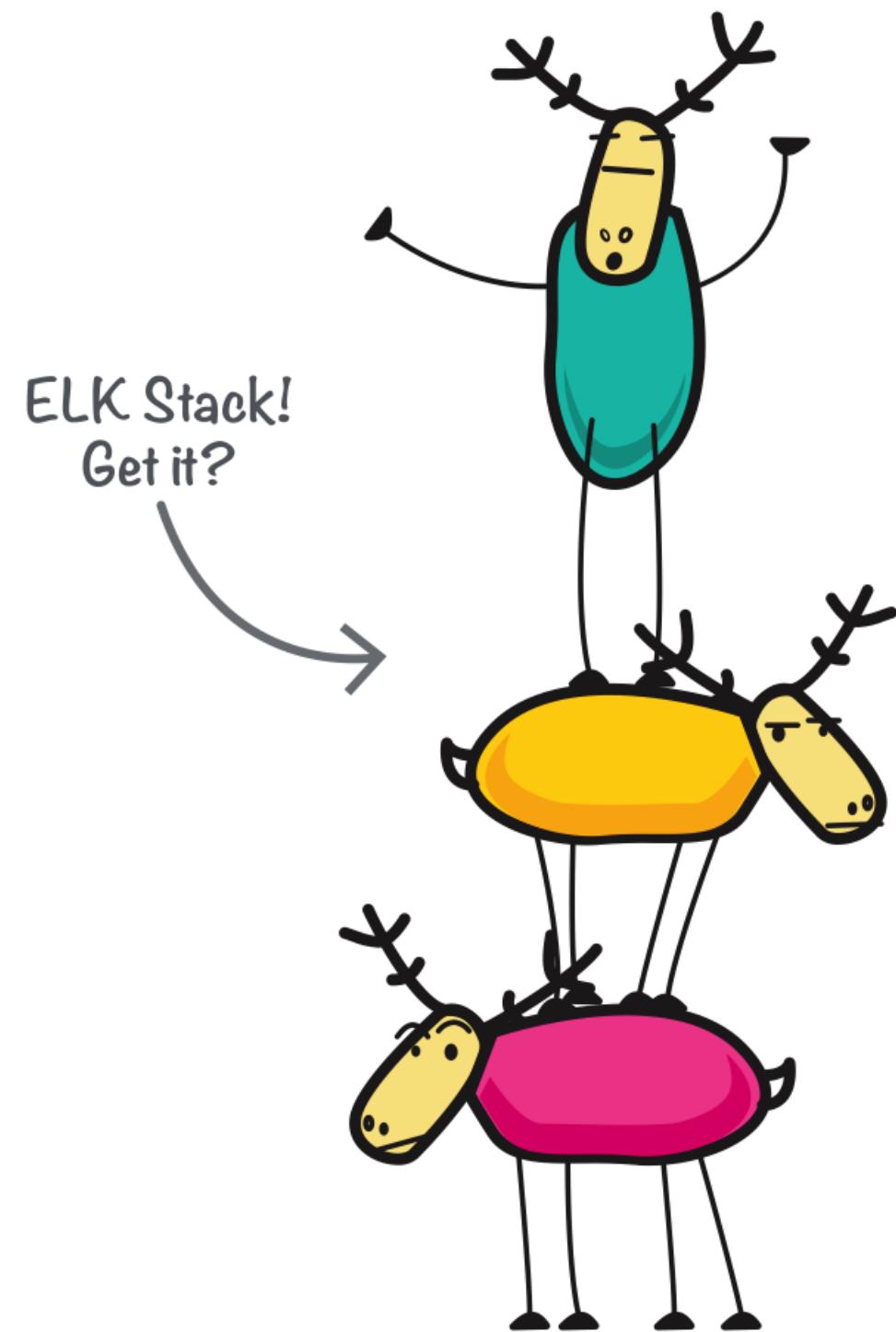
me looking
for the bug

**7.2 GB
of logfile**



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Developer 

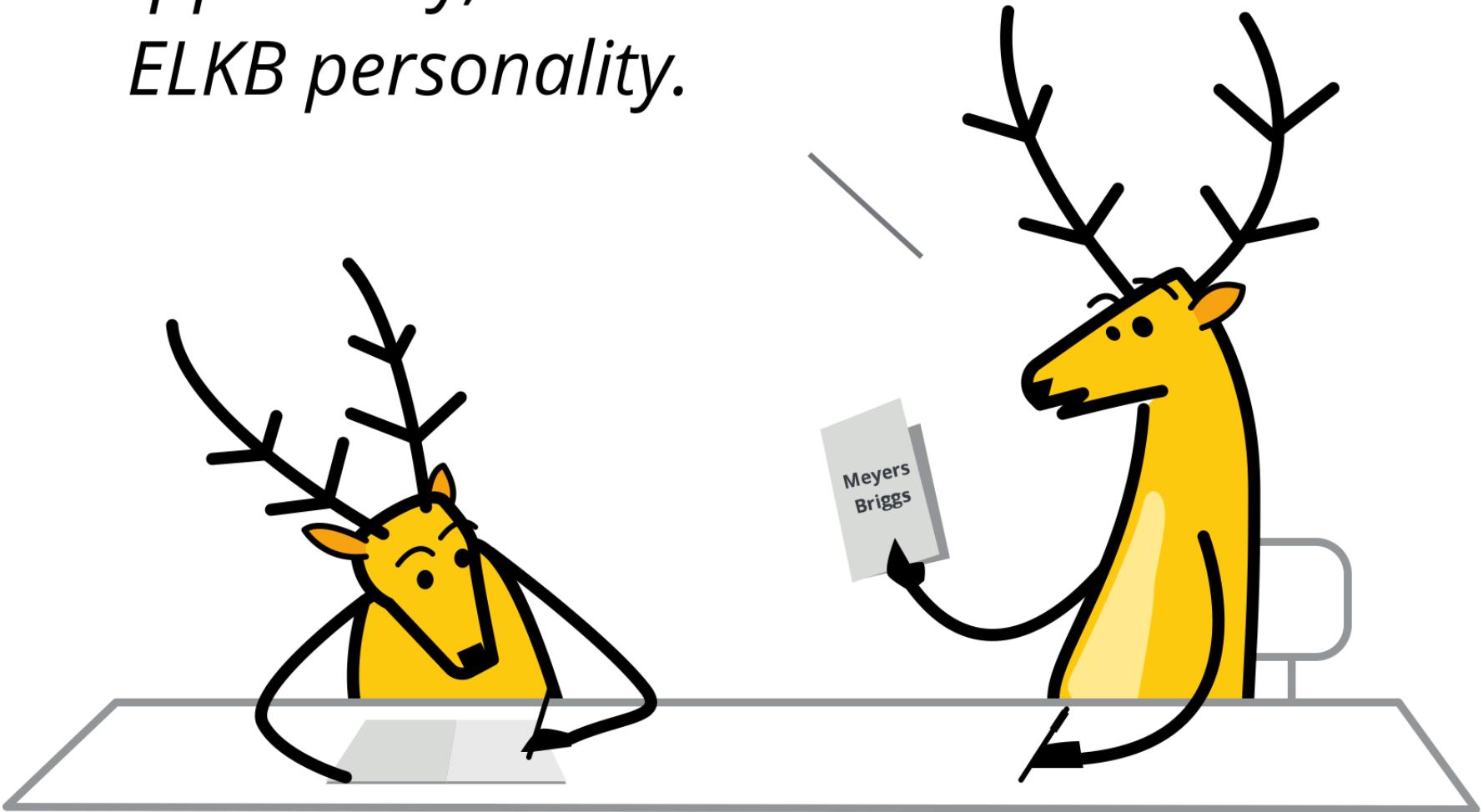


E Elasticsearch

L Logstash

K Kibana

*Apparently, I'm an
ELKB personality.*



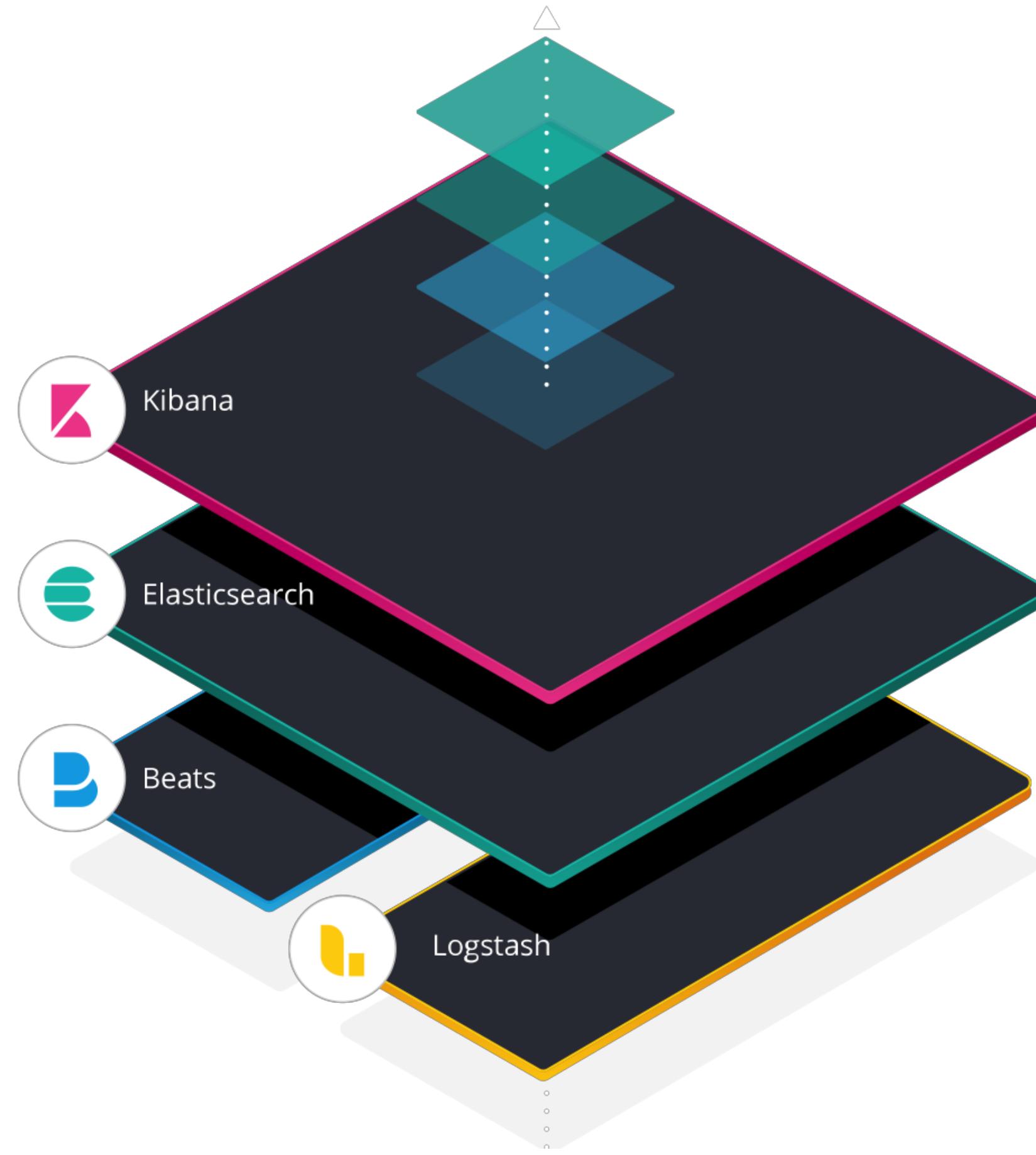


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Disclaimer

I build **highly** monitored Hello World
apps



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Example: Java

SLF4J, Logback, MDC with logstash-logback-encoder

Alternative <https://github.com/vy/log4j2-logstash-layout>

And Everywhere Else

.NET: NLog

JavaScript: Winston

Python: structlog

PHP: Monolog

Anti-Pattern: print

```
System.out.println("Oops");
```



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Anti-Pattern: Coupling

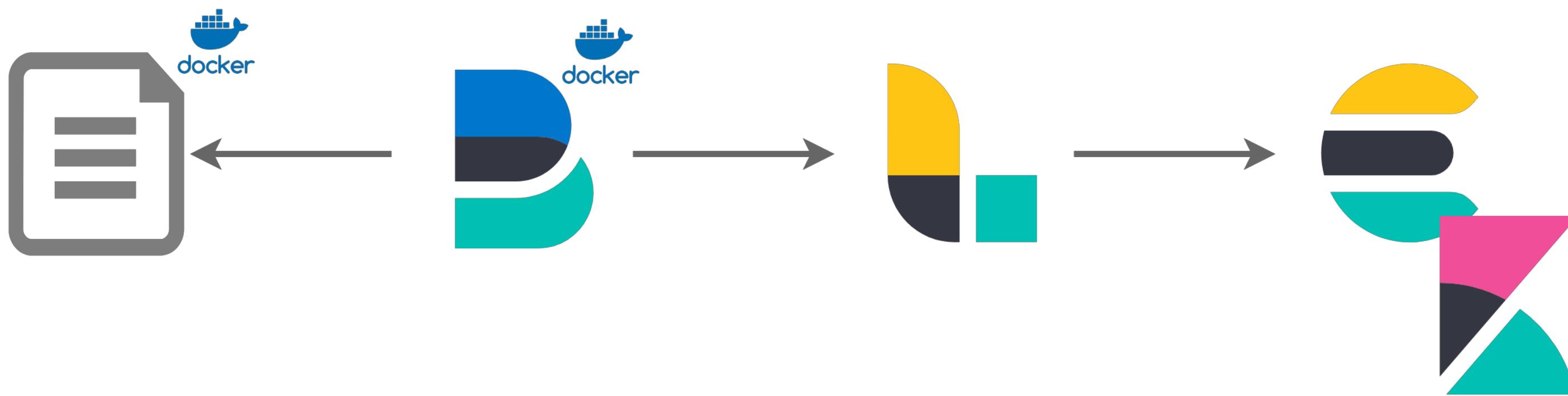


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Parse





Bind Mount Logs

```
java_app:  
  volumes:  
    - './logs-docker/:/logs/'  
  ...
```

```
filebeat_for_logstash:  
  volumes:  
    - './logs-docker/:/mnt/logs/:ro'  
  ...
```

Collect Log Lines

```
filebeat.inputs:
```

```
- type: log
```

```
paths:
```

```
  - /mnt/logs/*.log
```

Metadata

processors:

- add_host_metadata: ~

Setting for **Setting** **Result**

negate for match

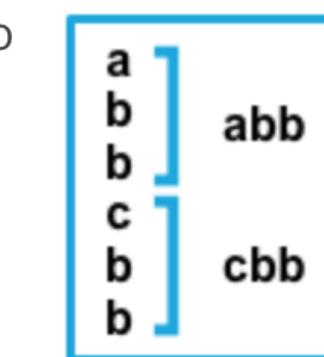
Example

pattern: ^b

false

after

Consecutive lines that match the pattern are appended to the previous line that doesn't match.



false

before

Consecutive lines that match the pattern are prepended to the next line that doesn't match.



true

after

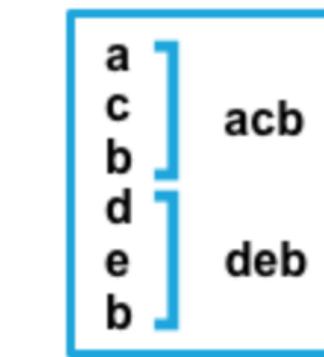
Consecutive lines that don't match the pattern are appended to the previous line that does match.



true

before

Consecutive lines that don't match the pattern are prepended to the next line that does match.



Test Multiline Pattern

https://www.elastic.co/guide/en/beats/filebeat/current/_test_your_regexp_pattern_for_multiline.html

The Go Playground Run Format Imports Share

```
1 package main
2
3 import (
4     "fmt"
5     "regexp"
6     "strings"
7 )
8
9 var pattern = `^\[`  
10 var negate = true
11
12 var content = `[2019-05-21 09:35:52.004] ERROR net.xeraa.logging.LogMe [main] - user_expe
13 java.lang.RuntimeException: Bad runtime...
14     at net.xeraa.logging.LogMe.main(LogMe.java:30)
15 [2019-05-21 09:35:52.006] TRACE net.xeraa.logging.LogMe [main] - session=59, loop=16 - It
16 [2019-05-21 09:35:52.007] DEBUG net.xeraa.logging.LogMe [main] - session=59, loop=16 - Co
17
18
19 func main() {
20     regex, err := regexp.Compile(pattern)
21     if err != nil {
22         fmt.Println("Failed to compile pattern: ", err)
23
matches line
false  [2019-05-21 09:35:52.004] ERROR net.xeraa.logging.LogMe [main] - user_experience=🤬 ,
true   java.lang.RuntimeException: Bad runtime...
true   at net.xeraa.logging.LogMe.main(LogMe.java:30)
false  [2019-05-21 09:35:52.006] TRACE net.xeraa.logging.LogMe [main] - session=59, loop=16
false  [2019-05-21 09:35:52.007] DEBUG net.xeraa.logging.LogMe [main] - session=59, loop=16
true
```



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Grok

<https://github.com/logstash-plugins/logstash-patterns-core/blob/master/patterns/grok-patterns>

96 lines (85 sloc) | 5.21 KB

```
1 USERNAME [a-zA-Z0-9._-]+
2 USER %{USERNAME}
3 EMAILLOCALPART [a-zA-Z][a-zA-Z0-9_.+--:+]
4 EMAILADDRESS %{EMAILLOCALPART}@%{HOSTNAME}
5 INT (?:[+-]?(?:[0-9]+))
6 BASE10NUM (?<! [0-9.+-])(?>[+-]?(?:(?:[0-9]+(?:\.[0-9]+)?))|(?:\.[0-9]+)))
7 NUMBER (?:%{BASE10NUM})
8 BASE16NUM (?<! [0-9A-Fa-f])(?:[+-]?(?:0x)?(?:[0-9A-Fa-f]+))
9 BASE16FLOAT \b(?<! [0-9A-Fa-f.]) (?:[+-]?(?:0x)?(?:(?:[0-9A-Fa-f]+(?:\.[0-9A-Fa-f]*))|(?:
10
11 POSINT \b(?:[1-9][0-9]*)\b
12 NONNEGINT \b(?:[0-9]+)\b
13 WORD \b\w+\b
14 NOTSPACE \S+
15 SPACE \s*
16 DATA .*?
17 GREEDYDATA .*
18 QUOTEDSTRING (?>(?<!\\)(?>"(?>\\.|[^\\""]+)+"|""|(?>'(?>\\.|[^\\'']+)+')|'|(?>`(?>\\.|[^\`']+)+`)
19 UUID [A-Fa-f0-9]{8}-(?:[A-Fa-f0-9]{4})-{3}[A-Fa-f0-9]{12}
20 # URN, allowing use of RFC 2141 section 2.3 reserved characters
21 URN urn:[0-9A-Za-z][0-9A-Za-z-]{0,31}:(:%{0-9a-fA-F}{2}|[0-9A-Za-z()+,.:=@;$_!*'/?#-])
22
23 # Networking
24 MAC (?:%{CISCOMAC}|%{WINDOWSMAC}|%{COMMONMAC})
25 CISCOMAC (?:(?:[A-Fa-f0-9]{4}\.){2}[A-Fa-f0-9]{4})
26 WINDOWS MAC (?:(?:[A-Fa-f0-9]{2})-{5}[A-Fa-f0-9]{2})
```

Dev Tools

Grok Debugger

Sample Data

```
1 [2018-11-16 01:16:59.983] ERROR net.xeraa.logging.LogMe [main] - user_experience=😡 , ses
```

Grok Pattern

```
1 \[%{TIMESTAMP_ISO8601:timestamp}\] %{LOGLEVEL:loglevel}
```

> Custom Patterns

[Simulate](#)

Structured Data

```
1 {  
2   "loglevel": "ERROR",  
3   "timestamp": "2018-11-16 01:16:59.983"  
4 }
```



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```
[2018-09-28 10:30:38.516] ERROR net.xeraa.logging.LogMe [main] -  
    user_experience=🤬, session=46, loop=15 -  
        Wake me up at night  
java.lang.RuntimeException: Bad runtime...  
    at net.xeraa.logging.LogMe.main(LogMe.java:30)
```

```
^\[%{TIMESTAMP_ISO8601:@timestamp}\ ]%{SPACE}%{LOGLEVEL:log.level}  
%{SPACE}%{USERNAME:log.package}%{SPACE}\[%{WORD:log.method}\ ]  
%{SPACE}-%{SPACE}%{GREEDYDATA:log.labels}%{SPACE}-%{SPACE}  
%{GREEDYDATA:message}(?:\n+(<stacktrace>(?:.|\r|\n)+))?
```



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Machine Learning Data Visualizer

```
28 [2018-11-16 01:16:59.976] DEBUG net.xeraa.logging.LogMe [main] - session=94, loop=14 - Collect ...
29 [2018-11-16 01:16:59.977] TRACE net.xeraa.logging.LogMe [main] - session=43, loop=15 - Iteration...
30 [2018-11-16 01:16:59.983] ERROR net.xeraa.logging.LogMe [main] - user_experience=�述, session=43...
31 java.lang.RuntimeException: Bad runtime...
```

Summary

Number of lines analyzed	293
Format	semi_structured_text
Grok pattern	\[%{TIMESTAMP_ISO8601:timestamp}\] %{LOGLEVEL:loglevel} .*? .*?\[.*?\] .*? .*?\bsessi
Time field	timestamp
Time format	YYYY-MM-dd HH:mm:ss.SSS

[Override settings](#)

File stats

t loglevel	# loop
279 documents (100%) 5 distinct values top values TRACE 50.18% DEBUG 27.6%	279 documents (100%) 20 distinct values min 1 median 10 max 20 top values



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Logstash Key Value Filter for MDC

```
kv {  
    source => "labels"  
    field_split => ","  
    trim_key => ""  
}
```

Pro: No change

Con: Regular expression, multiline,
format changes

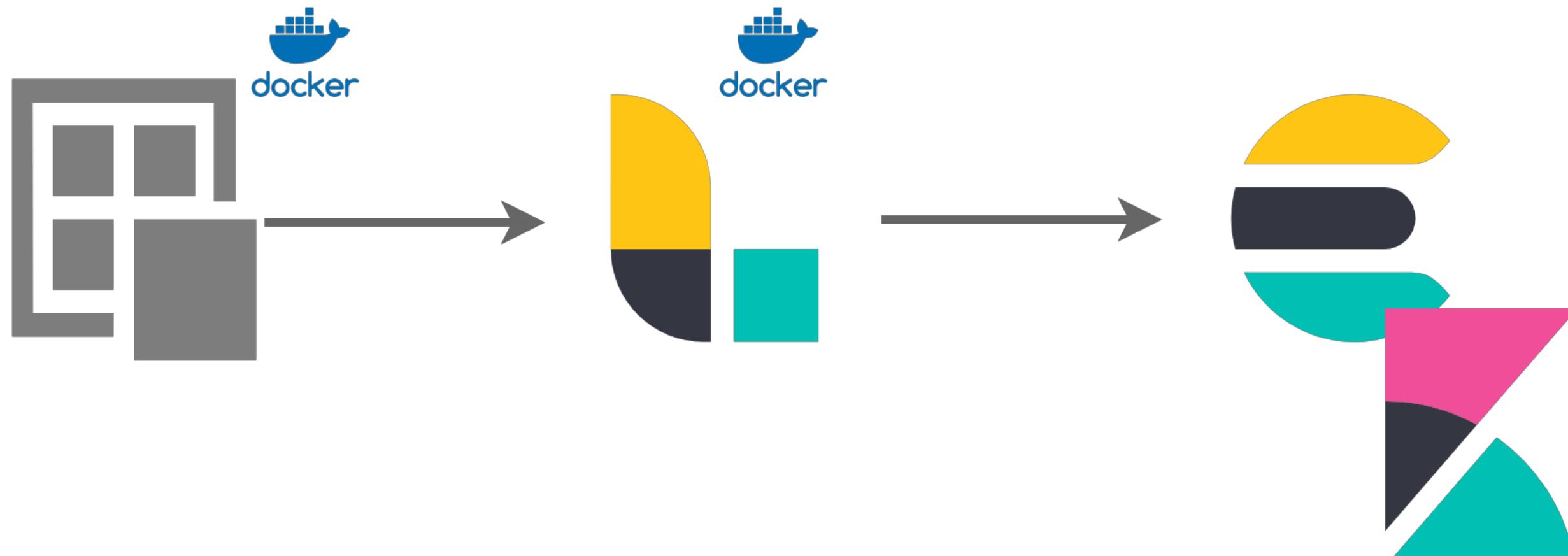


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Send





logback.xml

```
<appender name="logstash" class="net.logstash.logback.appenders.LogstashAccessTcpSocketAppender">
  <destination>logstash:4560</destination>
  <encoder class="net.logstash.logback.encoder.LogstashEncoder"/>
</appender>
```



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Pro: No files

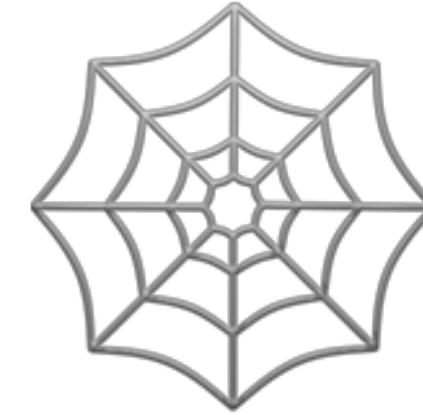
Con: Outages & coupling

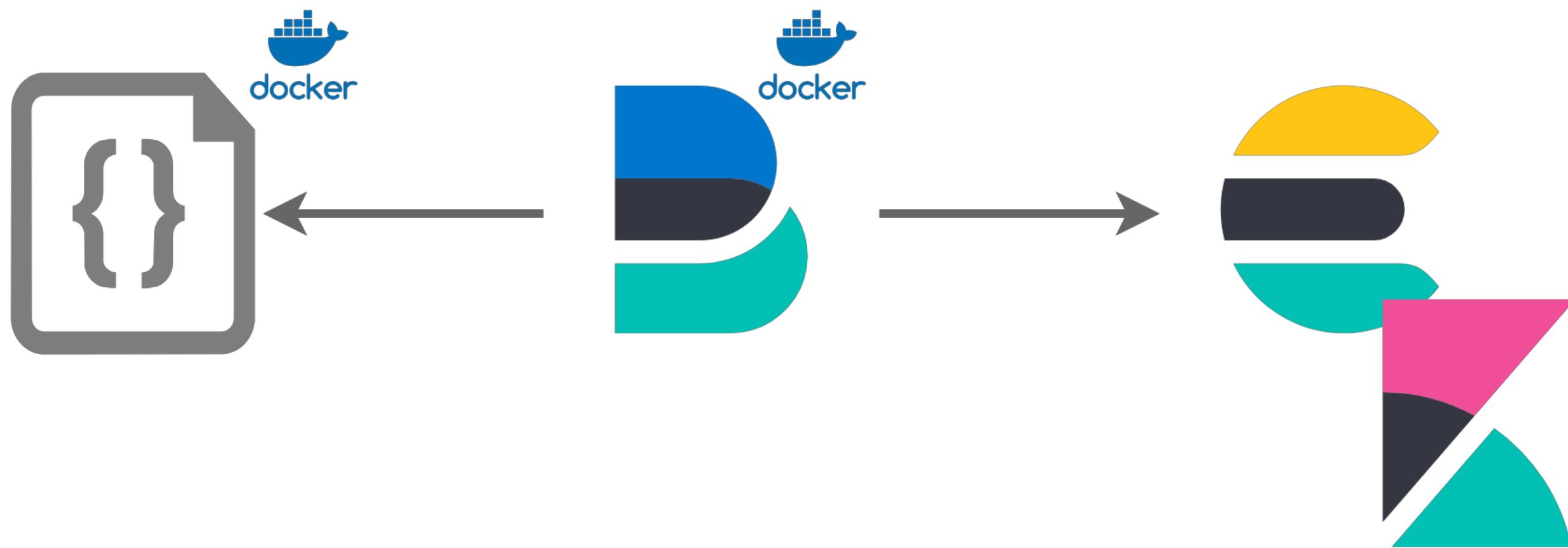


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Structure





Collect JSON

```
filebeat.input:  
- type: log  
  paths:  
    - /mnt/logs/*.json  
  json:  
    message_key: message  
    keys_under_root: true
```

Stack(trace) Hash



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Pro: Right format

Con: JSON serialization overhead

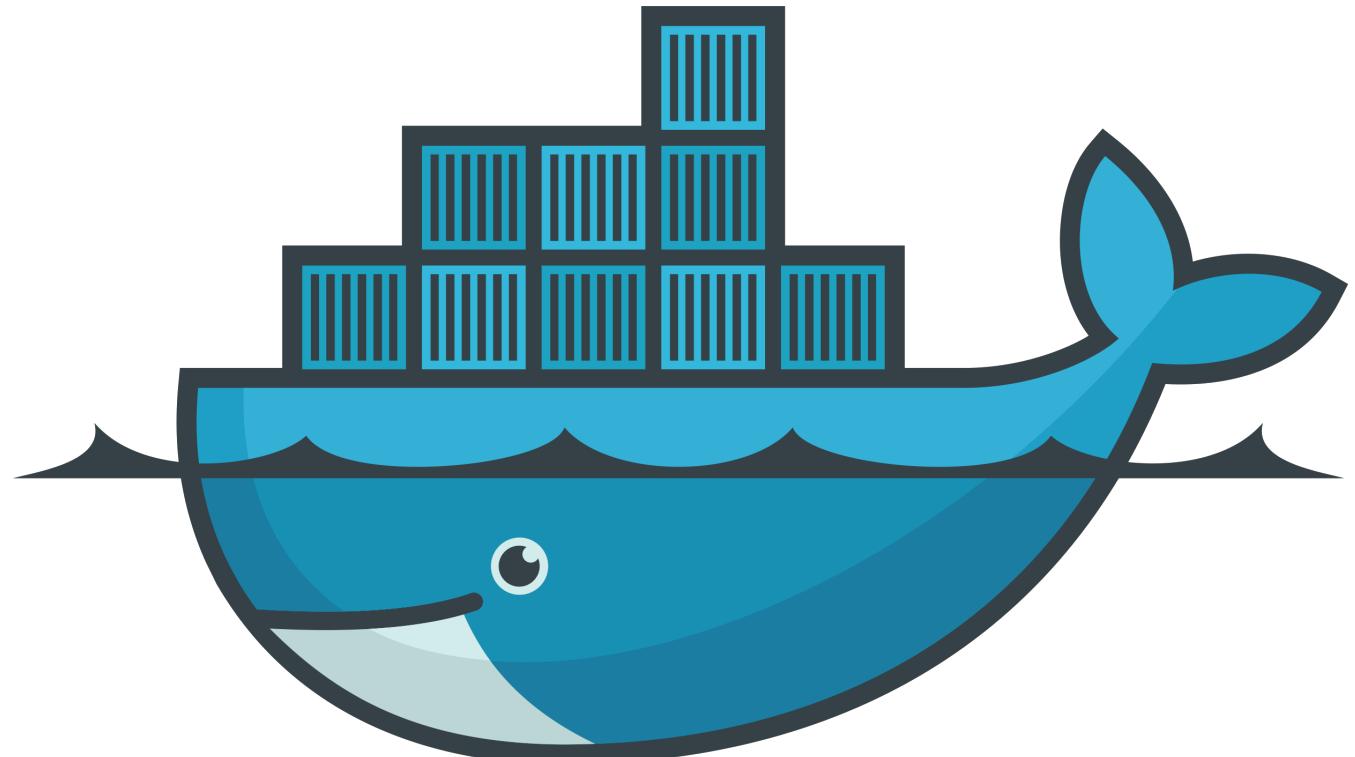


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Containerize





docker

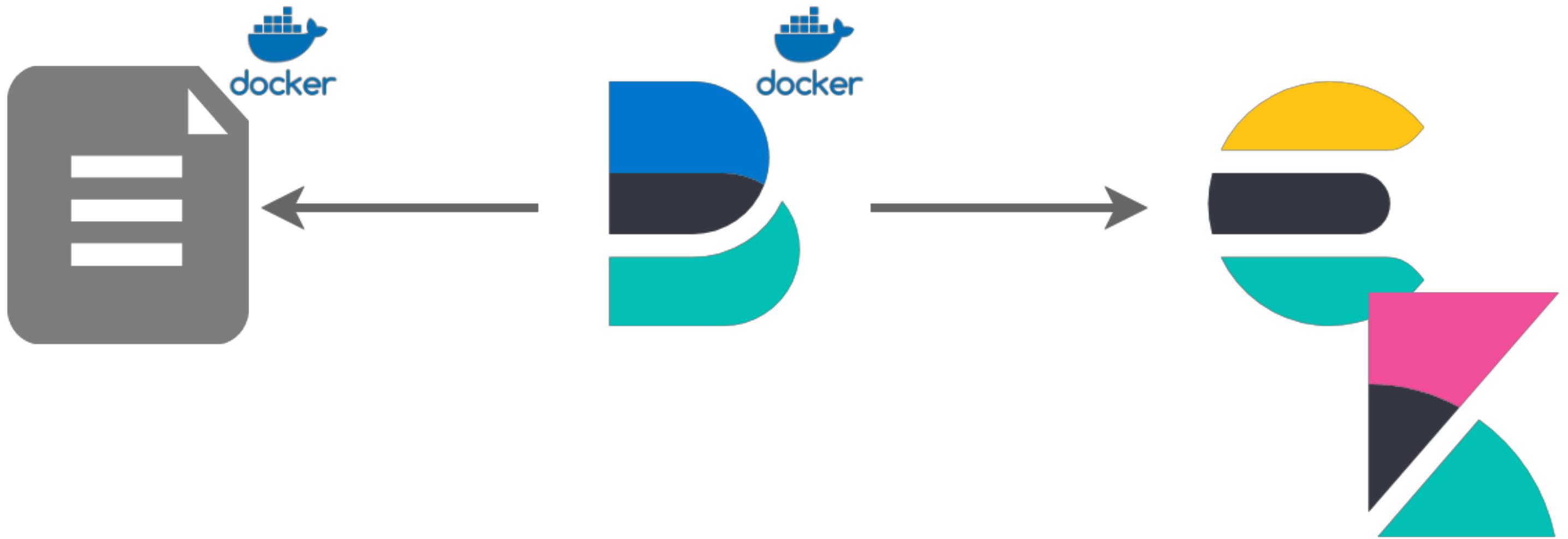
Where to put Filebeat?

Sidecar



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[https://github.com/elastic/beats/tree/
master/deploy/docker](https://github.com/elastic/beats/tree/master/deploy/docker)

Docker Logs

```
filebeat.autodiscover:  
  providers:  
    - type: docker  
      hints.enabled: true  
  
  processors:  
    - add_docker_metadata: ~
```

Metadata

No Docker metadata with the other methods



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```
"docker": {  
    "container": {  
        "labels": {  
            "app": "fizzbuzz",  
            "co_elastic_logs/multiline_match": "after",  
            "com_docker_compose_config-hash": "41520c6cf2b6a1f3dae4f16d0a6fd76760cdfc38fbfe43a3a3be2e09bdd1b8b5",  
            "environment": "production",  
            "co_elastic_logs/multiline_pattern": "^\\[",  
            "co_elastic_logs/multiline_negate": "true",  
            "com_docker_compose_oneoff": "False",  
            "com_docker_compose_project": "java-logging",  
            "com_docker_compose_service": "java_app",  
            "com_docker_compose_container-number": "1",  
            "com_docker_compose_version": "1.23.2"  
        }  
    }  
}
```

Missing the Last Line

Waiting for the newline



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Hints

labels:

- "app=fizzbuzz"
- "co.elastic.logs/multiline.pattern^\\\[
- "co.elastic.logs/multiline.negate=true"
- "co.elastic.logs/multiline.match=after"

Registry File

`filebeat.registry.path: /usr/share/filebeat/data/registry`



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Multi-Index

```
output.elasticsearch:  
  hosts: ["http://localhost:9200"]  
  indices:  
    - index: "docker-java-%{+yyyy.MM}-00"  
      when.contains:  
        container.name: "java_app"
```

Ingest Pipeline

```
output.elasticsearch:  
  hosts: ["http://elasticsearch:9200"]  
  index: "docker"  
  
pipelines:  
  - pipeline: "parse_java"  
    when.contains:  
      container.name: "java_app"
```

Ingest Pipeline

```
{  
  "description" : "Parse Java log lines",  
  "processors": [  
    {  
      "grok": {  
        "field": "message",  
        "patterns": [ "^\\"[{\%{TIMESTAMP_ISO8601:timestamp}\\"}]{\%{SPACE}}%{LOGLEVEL:log.level}  
          {\%{SPACE}}%{USERNAME:log.package}{\%{SPACE}}\"[{\%{WORD:log.method}\\"}]{\%{SPACE}}-  
          {\%{SPACE}}%{GREEDYDATA:labels}{\%{SPACE}}-%{\%{SPACE}}%{GREEDYDATA:message_parsed}  
          (?:\\"n+(?<stacktrace>(?:.|\\r|\\n)+))?" ],  
        "ignore_failure": true  
      }  
    }  
  ]  
}
```



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Unknown Fields

```
? log.labels  
t log.level  
? log.method  
# log.offset  
? log.package  
t message  
? message_parsed  
t stream  
⌚ suricata.eve.timestamp  
? timestamp
```

⚠ session=69, loop=20
WARN

⚠ main
19,744

⚠ net.xeraa.logging.LogMe
[2019-05-21 05:02:07.458] WARN net.xeraa.logging.LogMe
[main] - session=69, loop=20 - Investigate tomorrow

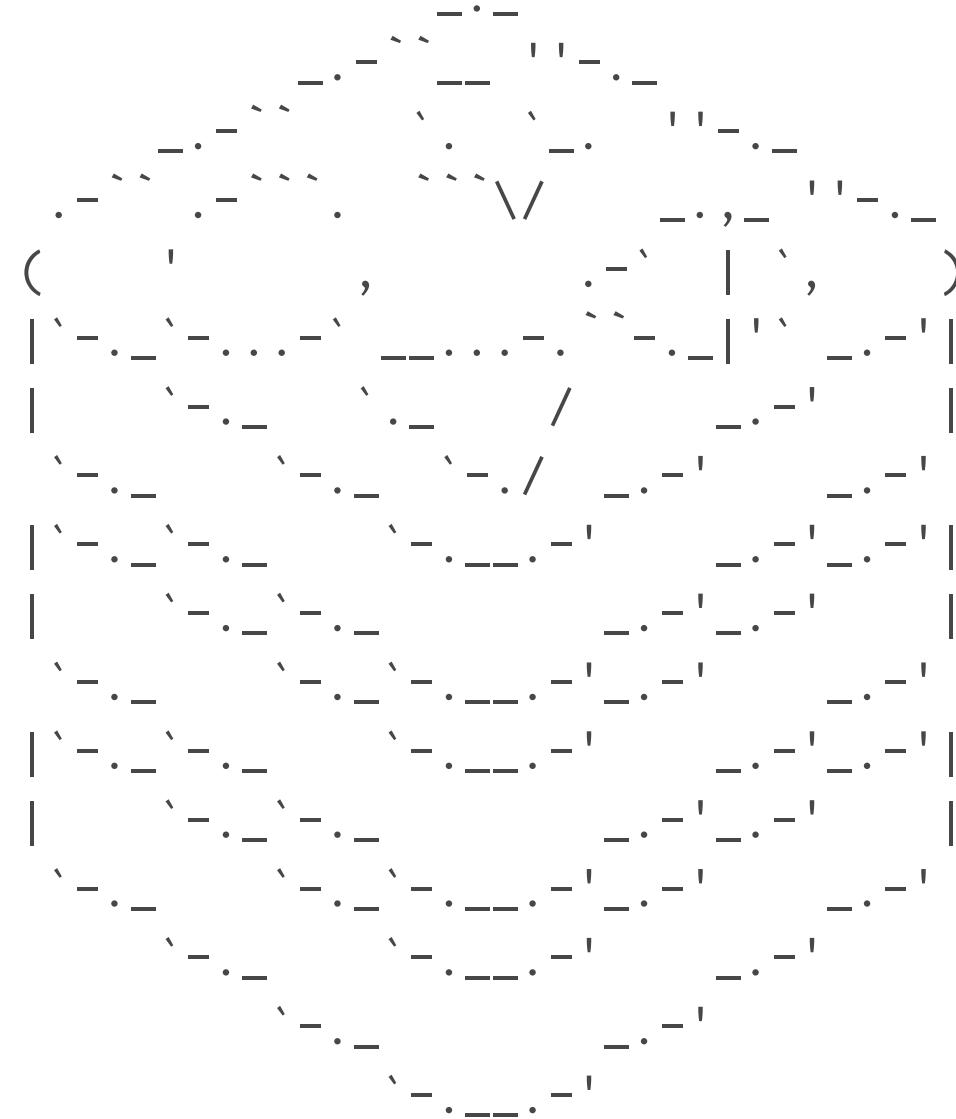
⚠ Investigate tomorrow
stdout

May 21, 2019 @ 07:02:07.459

⚠ 2019-05-21 05:02:07.458



ASCII Art



Redis 4.0.9 (0000000/0) 64 bit

Running in stand alone mode

Port: 6379

PID: 55757

<http://redis.io>



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Configuration Templates

```
filebeat.autodiscover:  
  providers:  
    - type: docker  
      templates:  
        - condition:  
          equals:  
            docker.container.image: redis  
      config:  
        - type: docker  
          containers.ids:  
            - "${data.docker.container.id}"  
      exclude_lines: ["^\\s+[-('.|_]" ]
```

Who Logs the Logger

Avoid loops

Process without -e

filebeat.yml: logging.to_files: true

Pro: Hot 💩

Con: Complexity

Orchestrate





kubernetes



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Where to put Filebeat?

DaemonSet



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[https://github.com/elastic/beats/tree/
master/deploy/kubernetes](https://github.com/elastic/beats/tree/master/deploy/kubernetes)



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Metadata

Either in cluster or outside

processors:

- add_kubernetes_metadata:
 in_cluster: true
- add_kubernetes_metadata:
 in_cluster: false
 host: <hostname>
 kube_config: \${HOME}/.kube/config

```
{  
  "host": "172.17.0.21",  
  "port": 9090,  
  "kubernetes": {  
    "container": {  
      "id": "382184ecdb385cf5d1f1a65f78911054c8511ae009635300ac28b4fc357ce51",  
      "image": "my-java:1.0.0",  
      "name": "my-java"  
    },  
    "labels": {  
      "app": "java",  
    },  
    "namespace": "default",  
    "node": {  
      "name": "minikube"  
    },  
    "pod": {  
      "name": "java-2657348378-k1pnh"  
    }  
  },  
}
```

More Metadata

Add: Cloud, local timezone, process

Drop: Events, fields

Rename: Fields

Dissect, DNS reverse lookup

Configuration Templates

```
filebeat.autodiscover:  
  providers:  
    - type: kubernetes  
      templates:  
        - condition:  
          equals:  
            kubernetes.namespace: redis  
  config:  
    - type: docker  
      containers.ids:  
        - "${data.kubernetes.container.id}"  
  exclude_lines: ["^\\s+[-('.|_]" ]
```

Customize Indices

```
output.elasticsearch:  
  index: "%{[kubernetes.namespace]:filebeat}-%{[beat.version]}-%{+yyyy.MM.dd}"
```



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Pro: Hot 💩💩💩

Con: Complexity++

Conclusion



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Examples

<https://github.com/xeraa/java-logging>



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Parse 

Send 

Structure 

Containerize 

Orchestrate 

Questions?

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