



How we replaced a Gartner APM Leader with an open-source monitoring solution

Henning Schulz, Tobias Angerstein





MACH HDG LAT HDG VS 39000

CROSS 5td

5td

5td

CROSS 5td

5td

5td

MACH ALT CRZ NAV AP1 1.70.2 A/TWR

2640N 082° 27.00W 08-02

TEMP ON MD

NORTH DEP

ECAM SWITCHING

REARVIEW MIRROR

FF 280 280 320 320 280 280

FF 77.5 77.5 77.5 77.5

FF 280 280 320 320 280 280

FF 77.5 77.5 77.5 77.5

FF 280 280 320 320 280 280

FF 77.5 77.5 77.5 77.5

LOG GEAR

LOG GEAR DRIFTY EXTR

LOG GEAR DRIFTY EXTR

2640N 082° 27.00W 08-02

MACH ALT CRZ NAV AP1 1.70.2 A/TWR

CRUISE

CRZ 13230 - F 12780

20010

16.0 - 15.9

0.0 - 0.1

0.0 - 0.1

0.0 - 0.1

LOG ELEV AUTO 0 FT

AP 0.0 PSI CSO 0.0

CHP 100 HDG 070

CHP	TWR	HDG	ASL	CSO	ALT
25	100	070	25	0	0
26	100	070	25	0	0
27	100	070	25	0	0
28	100	070	25	0	0
29	100	070	25	0	0

120 120 120 120 120 120

280 280 280 280 280 280

360 360 360 360 360 360

LOG SPEAKER

OFF

MAX

LOG SPEAKER

OFF

MAX

LE

FM

OFF

FRONT

FRONT

FRONT

LT

FM

OFF

FRONT

FRONT

FRONT

SWITCHES

SWITCHES

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

LOAD SPEAKER
OFF
ON

Stand
SIDE STICK PRIORITY

CRUISE 5td
THRUST LEVER

BRK HDG LAT HDG VS 39000
ALT - INCL/CH - VS

Stand
SIDE STICK PRIORITY

CRUISE
SIDE STICK PRIORITY

LOAD SPEAKER
OFF
ON

LD
R/L
A/R
P/R
DIR
P/R
DIR
P/R
DIR
P/R



TELE ON HD
NORTH DEP
ECAM SWITCHING
REVERSE SPTS

0729.47
0446



LD
R/L
A/R
P/R
DIR
P/R
DIR
P/R



LOUD SPEAKER
OFF
MAX



CHARGE
SIDE STEEL PROTECT

5td

CESS 50T 100 150 200
1000 1500 2000
PLAN 100 200
1 2 3
OFF OFF OFF



5td

CESS 50T 100 150 200
1000 1500 2000
PLAN 100 200
1 2 3
OFF OFF OFF

CHARGE
SIDE STEEL PROTECT

LOUD SPEAKER
OFF
MAX

LT
OFF
MAX

TR
OFF
MAX

SHIELD
OFF
MAX

FRONT WARMER
OFF
MAX

TELE ON NO
NORTH BEP
ECAM SWITCHING
REARING WITH
OFF

LOG GEAR
AUTO SW
A. POWER & SW. SWING
TELE ON NO
UP
DOWN
LOG GEAR DIRTY EXTR
OFF
DOWN

LT
OFF
MAX

TR
OFF
MAX

SHIELD
OFF
MAX

FRONT WARMER
OFF
MAX

WYATWIT-EL

SWITCHES

A photograph of a vintage aircraft cockpit instrument panel, illuminated with orange light. The panel features numerous analog gauges, dials, and switches. Two digital displays show "Std". The text "...that's how to operate software without monitoring!" is overlaid in white on the center of the panel. The background shows dark curtains.

**...that's how to operate software
without monitoring!**

Commercial APM tools have great features

metric collection

distributed tracing

alerting

visualization & dashboarding

baselining

dynamic instrumentation

user management

"management-ready" reporting

UI-based configuration

dependency discovery

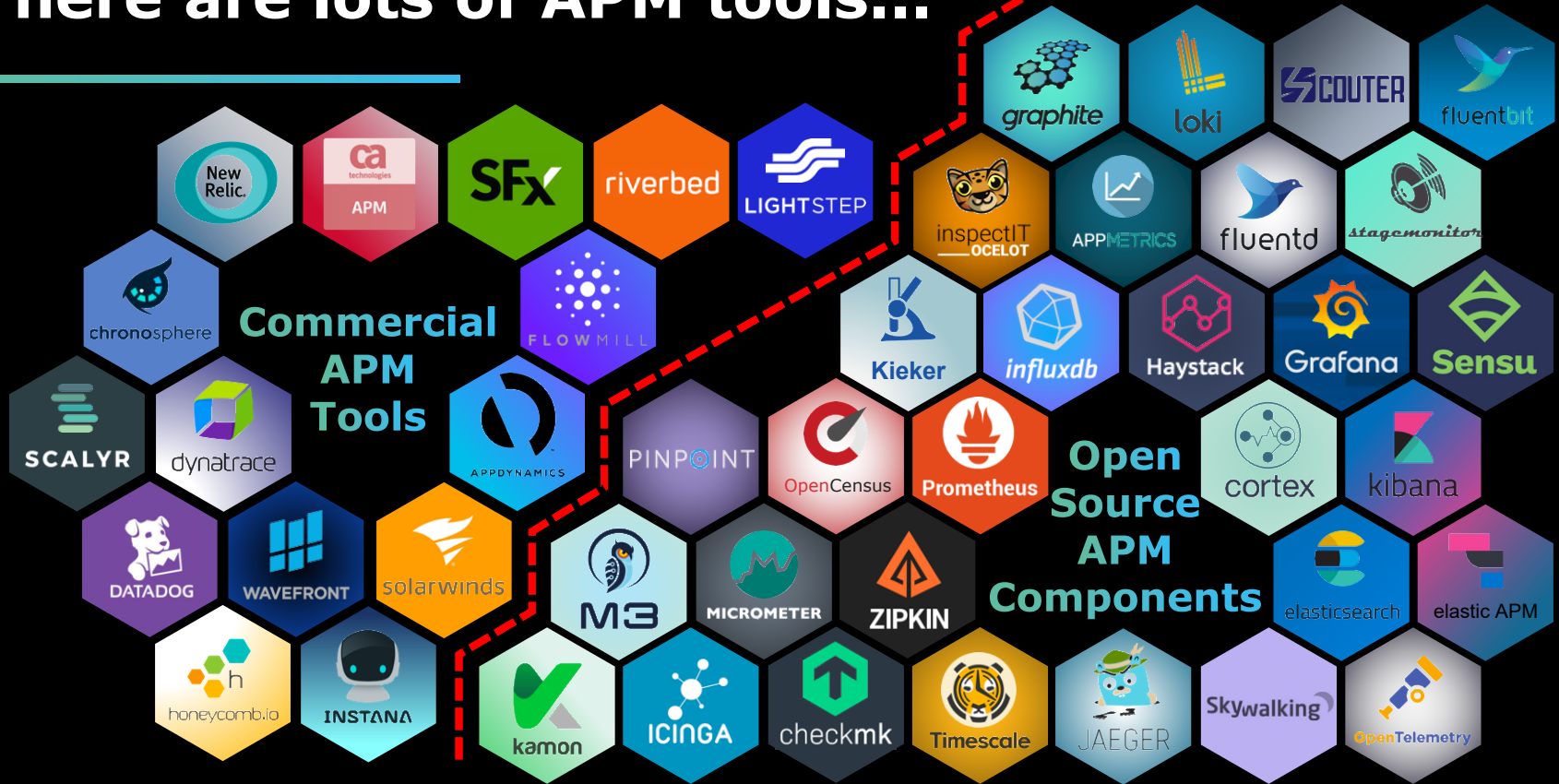
...and painpoints



There are lots of APM tools...



There are lots of APM tools...



There are lots of APM tools...



...to build a tailored APM solution







Baselining

EUM

Alerting

Tracing

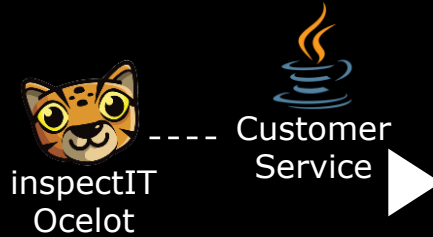
Metrics

Visualization

Service
Discovery

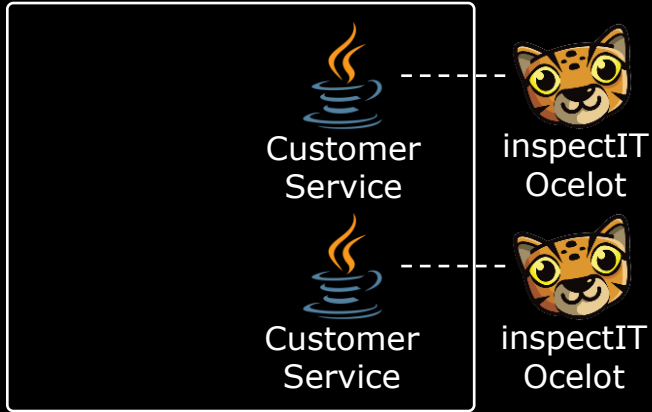
Alerting

Dynamic Instrumentation of Java Services



Instrumentation of Java Services

**Monitored
Application**



Runtime Attachment

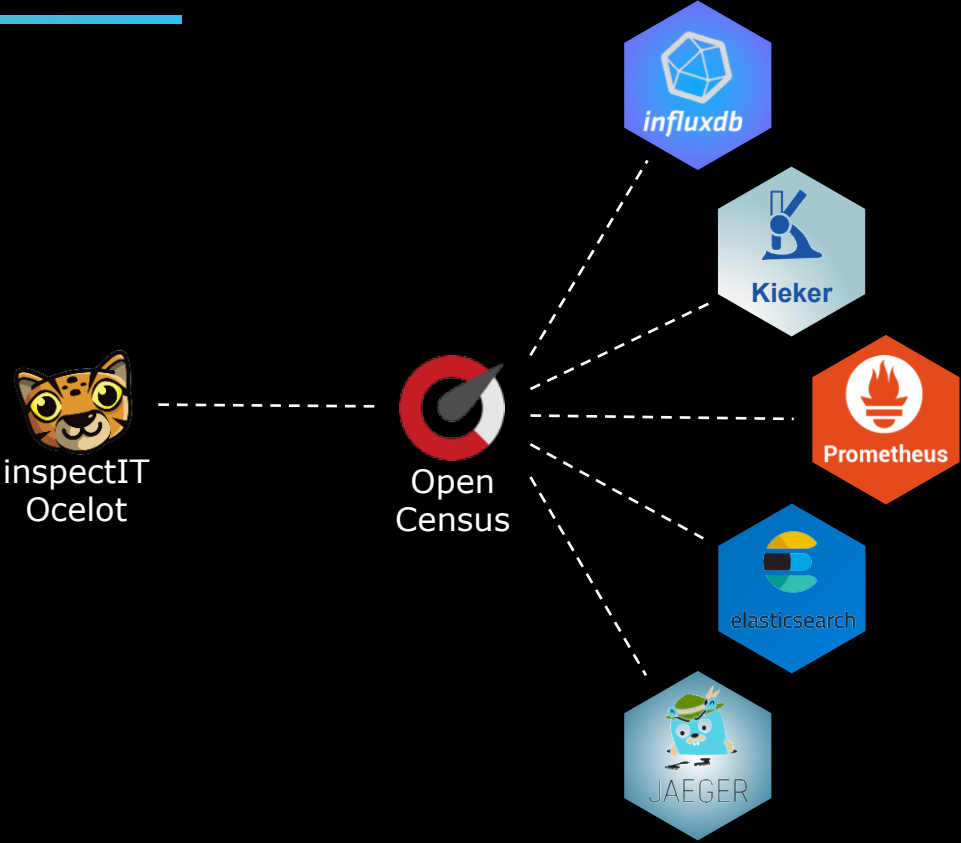


```
java -javaagent:"/path/to/inspectit-ocelot-agent-0.3.jar" -jar my-java-program.jar
```

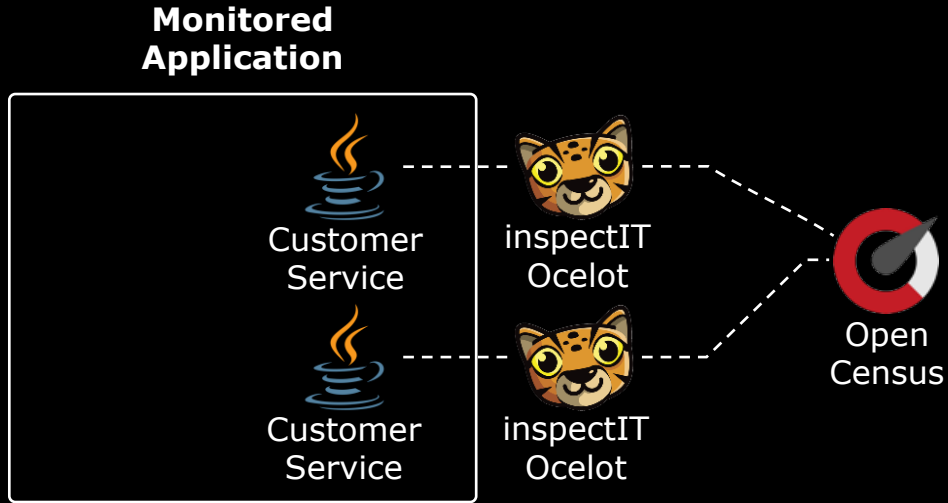


```
# Find the process ID of the JVM to which the agent should be attached to  
# ps aux | grep java  
# jps -lv # Requires an installed JDK  
# Attach the latest Ocelot agent to your JVM  
bash <(curl -s https://inspectit.github.io/inspectit-ocelot/attach.sh) <JVM_PID>  
  
# See awesome OpenCensus metrics  
wget -qO- localhost:8888
```


Interoperability

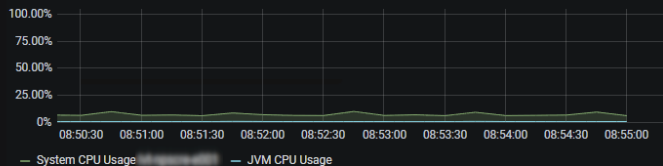


Interoperability

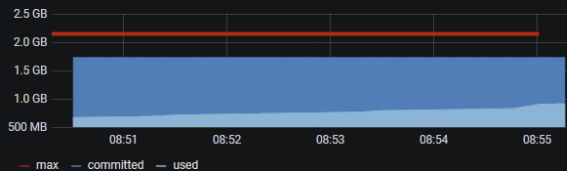


Metric Collection & Visualization

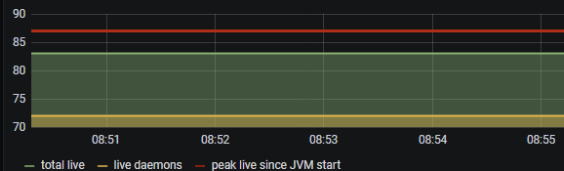
CPU Usage



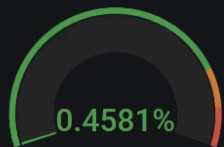
Memory - Heap



Live Threads



Current CPU Usage



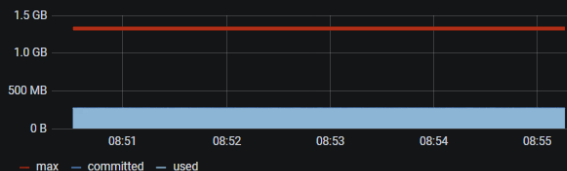
Loaded Classes

23633

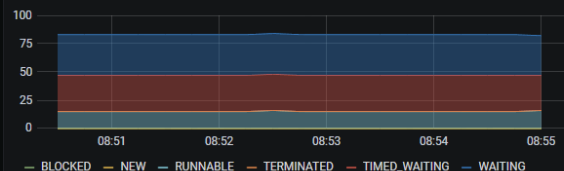
Unloaded Classes

11

Memory - Non-Heap



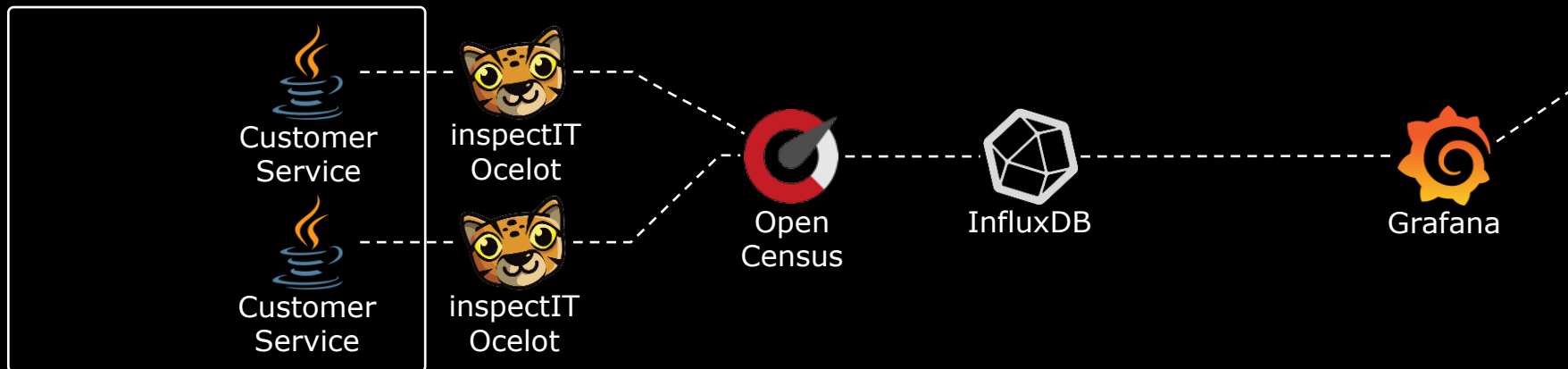
Threads by States



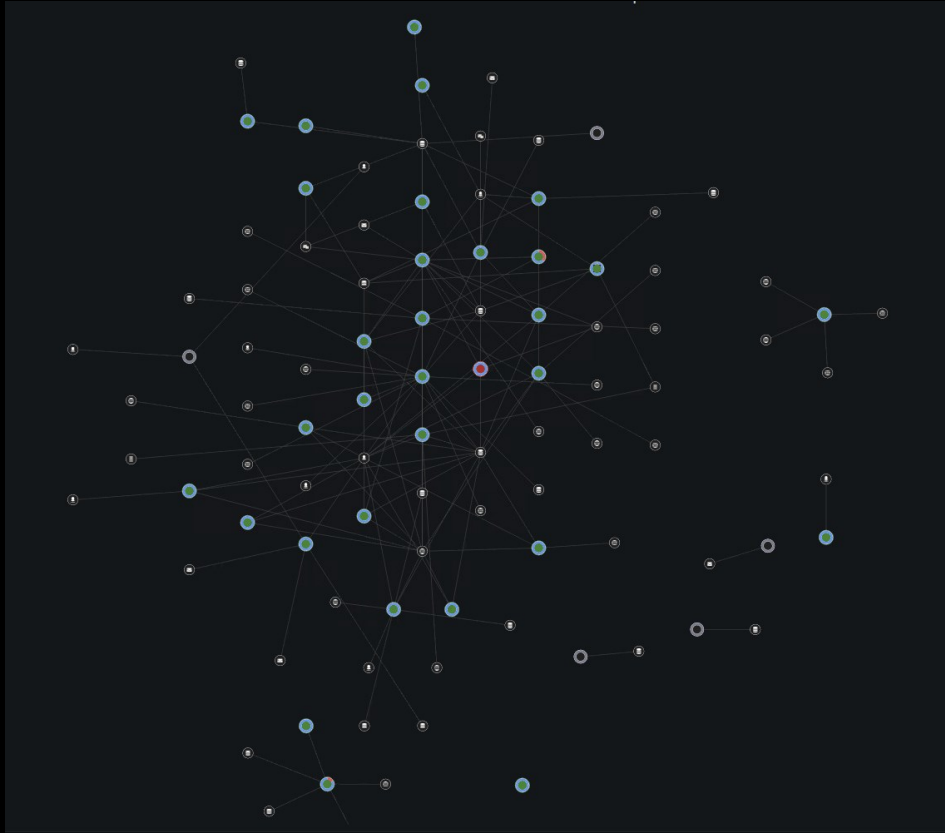
Metric Collection & Visualization


LDAP Server

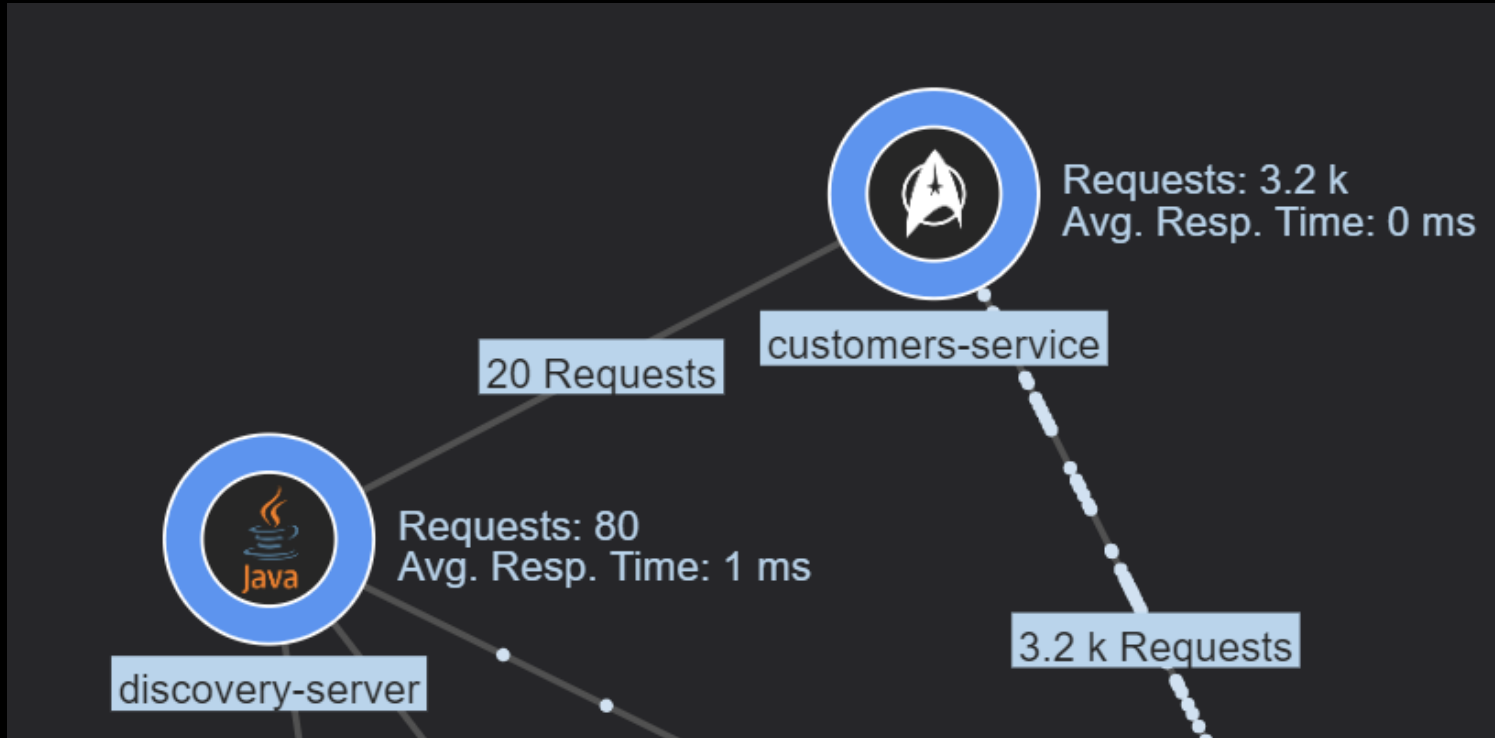
**Monitored
Application**



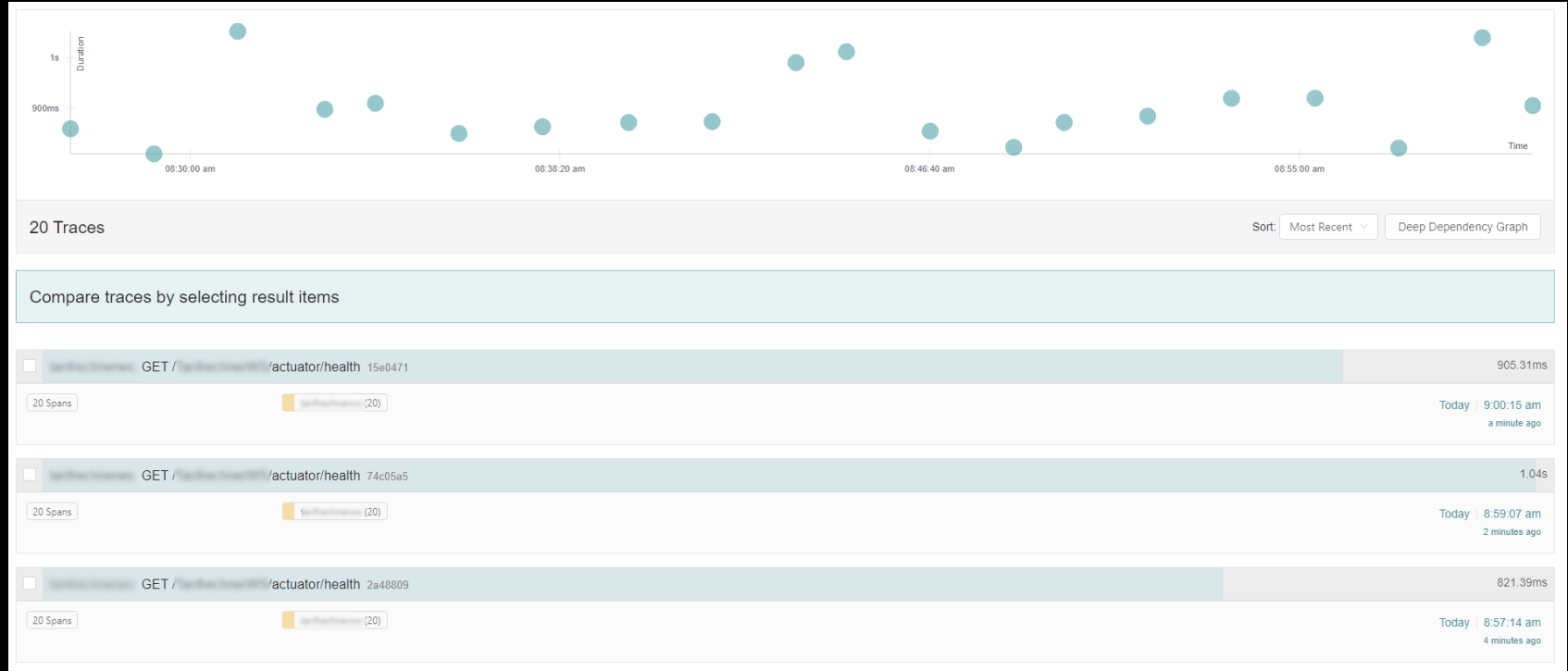
Dependency Discovery



Dependency Discovery



Distributed Tracing



Extend Jaeger



Jaeger UI

localhost:3000/trace/50fd1a1b5268e69596513bba36edd31d?uiFind=pets

Jaeger UI Lookup by Trace ID... Search Compare Dependencies

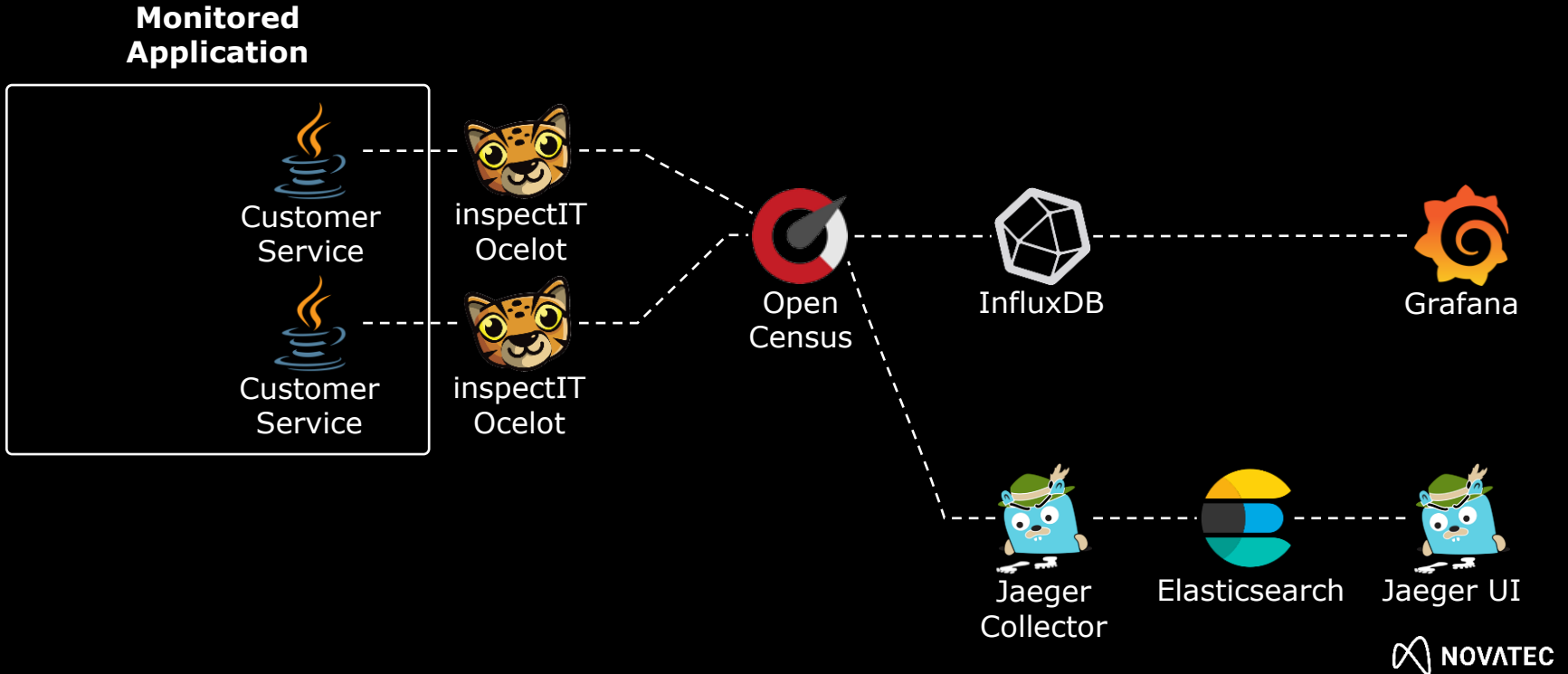
api-gateway: GET /api/gateway/owners/3 50fd1a1

Trace Start September 3 2019, 08:13:06.172 Duration 22.61ms Services 3 Depth 6 Total Spans 9

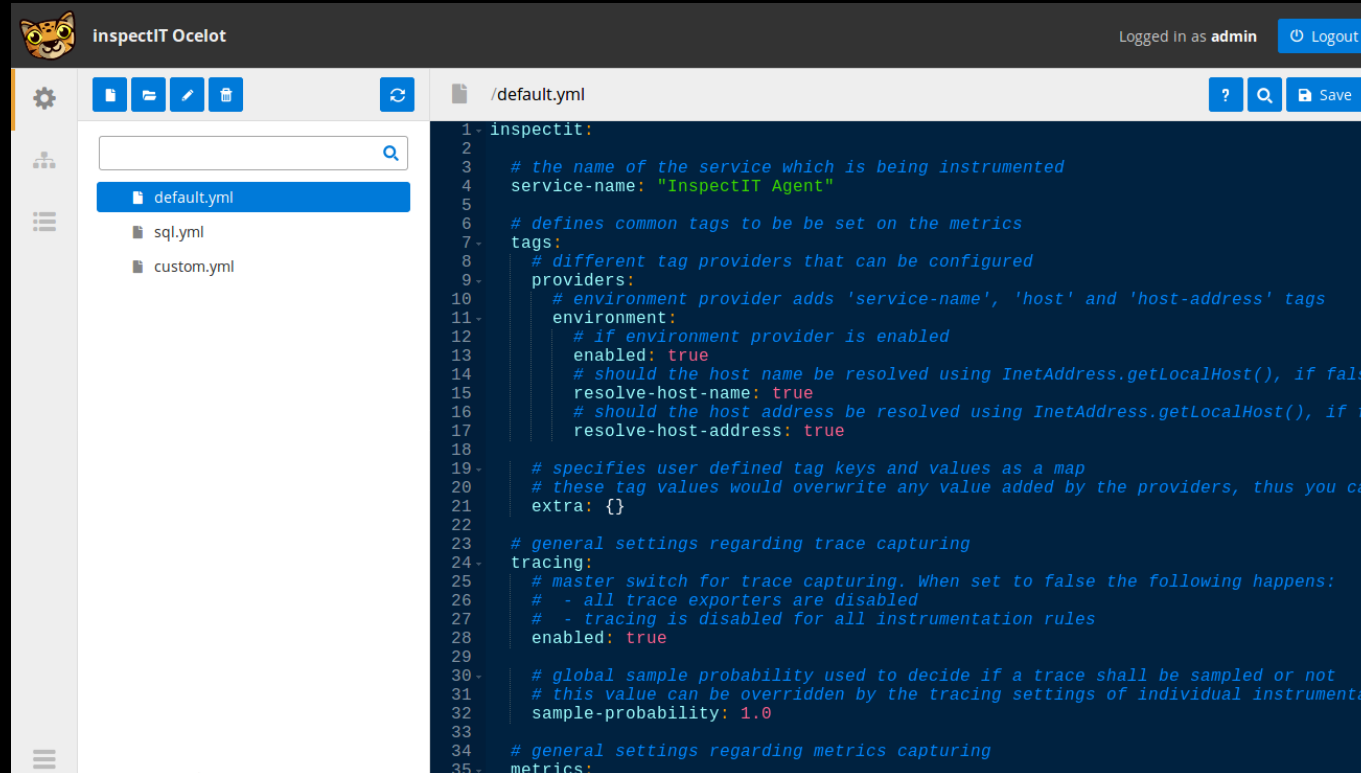
Trace Detail

Name	Count	Total	Avg	Min	Max	Total Exc
GET /owners/3	4	44.26ms	11.06ms	2.92ms	20.82ms	16.51ms
api-gateway	3	41.33ms	13.78ms	4.17ms	20.82ms	13.70ms
customers-service	1	2.92ms	2.92ms	2.92ms	2.92ms	2.81ms
HikariProxyPreparedStatement.executeQuery	2	0.33ms	0.16ms	0.11ms	0.22ms	0.33ms
customers-service	1	0.11ms	0.11ms	0.11ms	0.11ms	0.11ms
visits-service	1	0.22ms	0.22ms	0.11ms	0.22ms	0.22ms
GET /pets/visits	2	7.82ms	3.91ms	3.63ms	4.19ms	3.97ms
GET /api/gateway/owners/3	1	22.61ms	22.61ms	22.61ms	22.61ms	1.79ms

Distributed Tracing



Configuration Server & UI



The screenshot displays the inspectIT Ocelot web interface. The top navigation bar includes the Ocelot logo, the text "inspectIT Ocelot", and a "Logout" button for the user "admin". The main interface is divided into a left sidebar and a main content area. The sidebar contains a search bar and a file explorer showing a directory structure with files "default.yml", "sql.yml", and "custom.yml". The main content area displays the configuration for "/default.yml" in a code editor. The configuration is a YAML file with the following content:

```
1 inspectit:
2
3   # the name of the service which is being instrumented
4   service-name: "InspectIT Agent"
5
6   # defines common tags to be set on the metrics
7   tags:
8     # different tag providers that can be configured
9     providers:
10      # environment provider adds 'service-name', 'host' and 'host-address' tags
11      environment:
12        # if environment provider is enabled
13        enabled: true
14        # should the host name be resolved using InetAddress.getLocalHost(), if false
15        resolve-host-name: true
16        # should the host address be resolved using InetAddress.getLocalHost(), if false
17        resolve-host-address: true
18
19      # specifies user defined tag keys and values as a map
20      # these tag values would overwrite any value added by the providers, thus you can
21      extra: {}
22
23  # general settings regarding trace capturing
24  tracing:
25    # master switch for trace capturing. When set to false the following happens:
26    # - all trace exporters are disabled
27    # - tracing is disabled for all instrumentation rules
28    enabled: true
29
30    # global sample probability used to decide if a trace shall be sampled or not
31    # this value can be overridden by the tracing settings of individual instrumentation
32    sample-probability: 1.0
33
34  # general settings regarding metrics capturing
35  metrics:
```

Config Server

The screenshot displays the InspectIT Ocelot Config Server interface. The main window shows a list of Agent Mappings with columns for Name and Attributes. A modal dialog titled "Edit Service Group A" is open, allowing for the configuration of a service group. The dialog includes a "New Name" field set to "Service Group A", a "new Source" input field with a "+" button, and a list of source files: "/sql.yml" and "/custom.yml" (both checked), and "default.yml" (unchecked). At the bottom, there is a "groupName" field with the value "A" and a "+" button. The "Update" button is highlighted in blue.

InspectIT Ocelot

Logged in as admin Logout

Agent Mappings Search

Service Group A

Default Mapping

Attributes

new Source +

/sql.yml

/custom.yml

default.yml

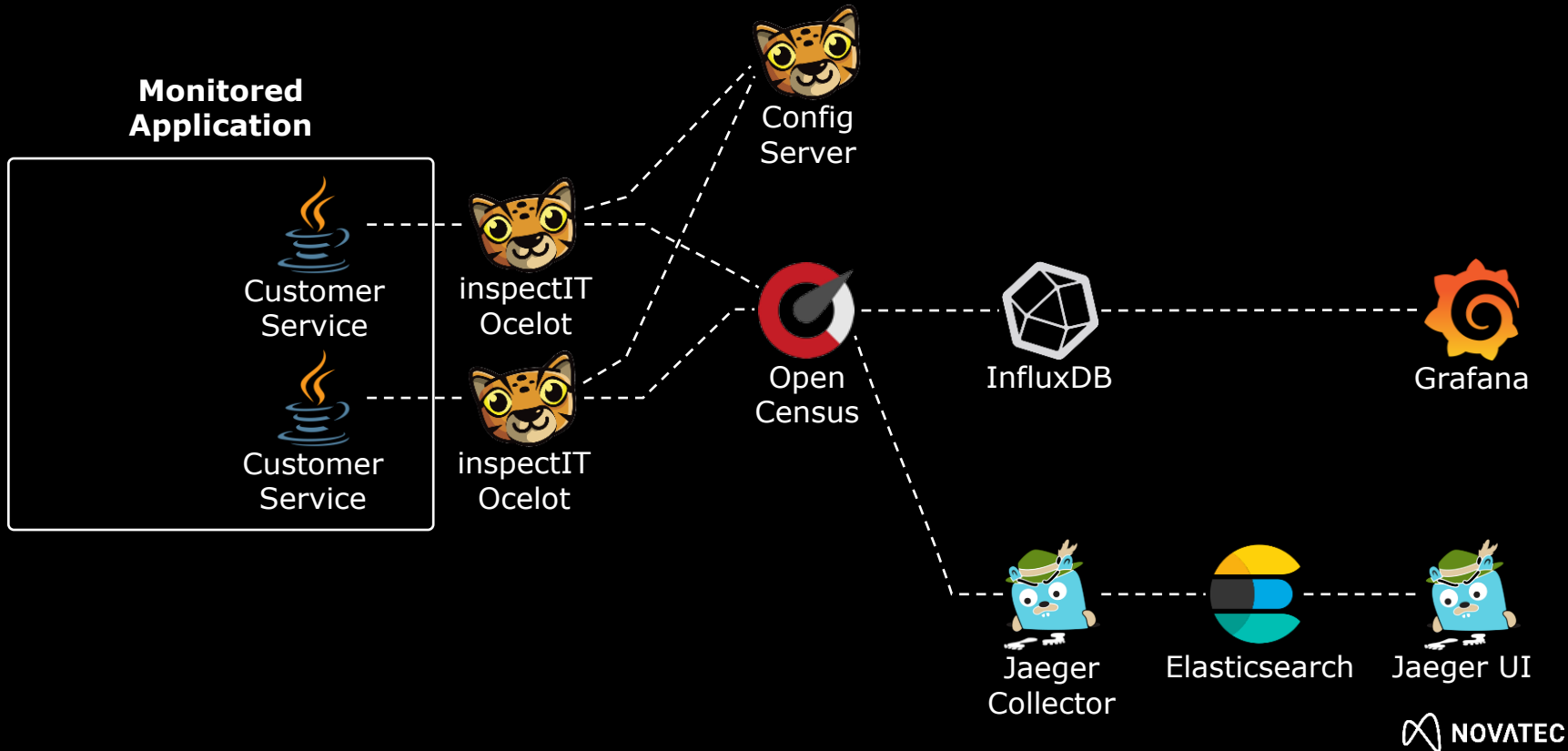
sql.yml

custom.yml

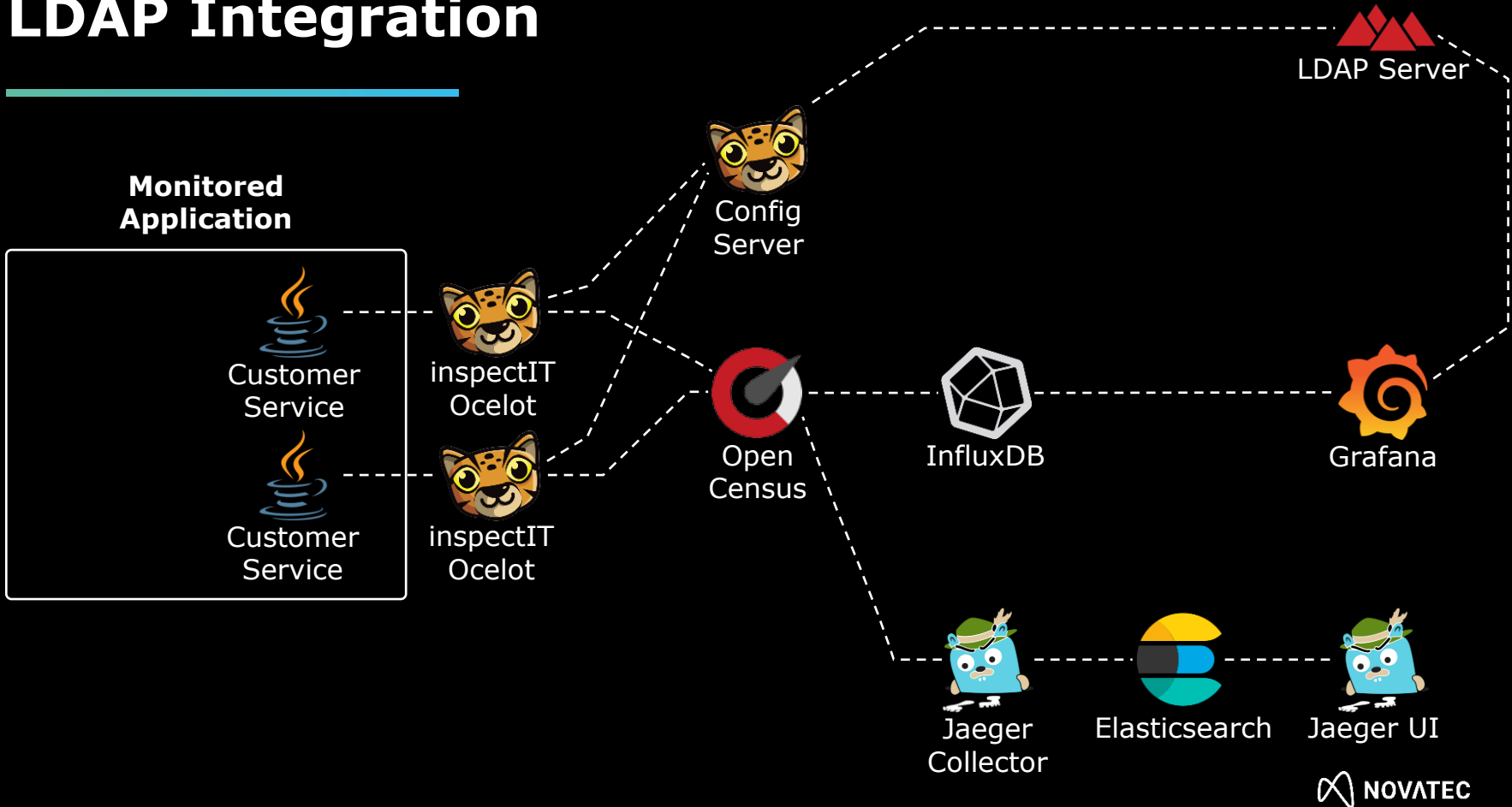
groupName : A +

Update Cancel

Config Server



LDAP Integration

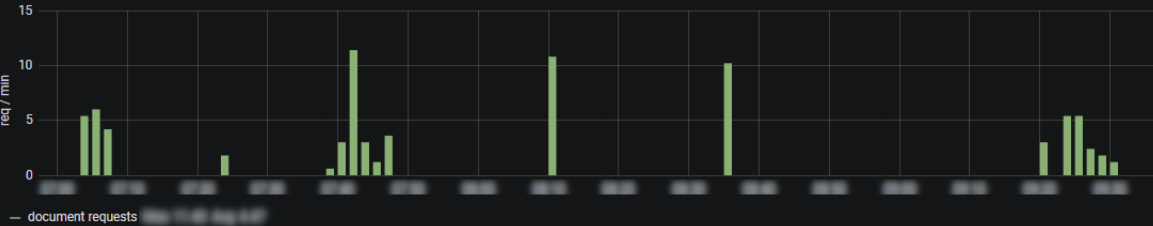


Enduser Monitoring

Enduser Response Time Trend



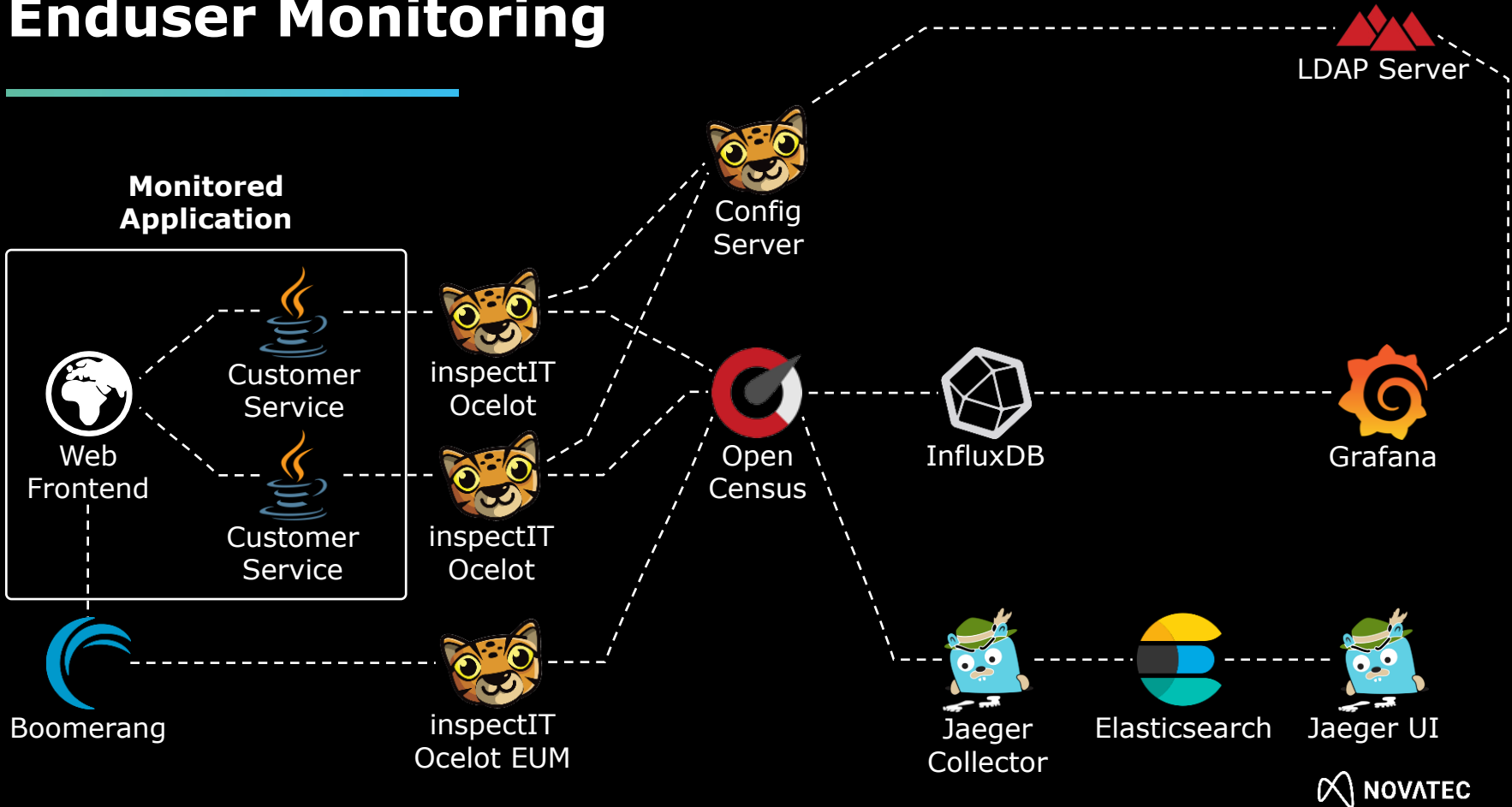
Request Rate



Top Requests

Page	Number of Requests	Load Time
/jsp/...	63	...
/jsp/screen65.jsp	46	...
/jsp/screen62.jsp	13	...
/jsp/...	3	...
/jsp/screen63.jsp	3	...
/jsp/navigation.jsp	3	...
/jsp/screen60.jsp	2	...
/jsp/screen61.jsp	1	...

Enduser Monitoring



Alerting & Reporting

Alerting Rules Notification Channels

selfmonitoring_... > config_server_... Enabled: Save

- selfmonitoring_...
- config_server_...

Rule Details

Status: ● Enabled
Creation Date: 2020-09-03 15:09:40
Last Modification: 2020-09-03 15:10:09

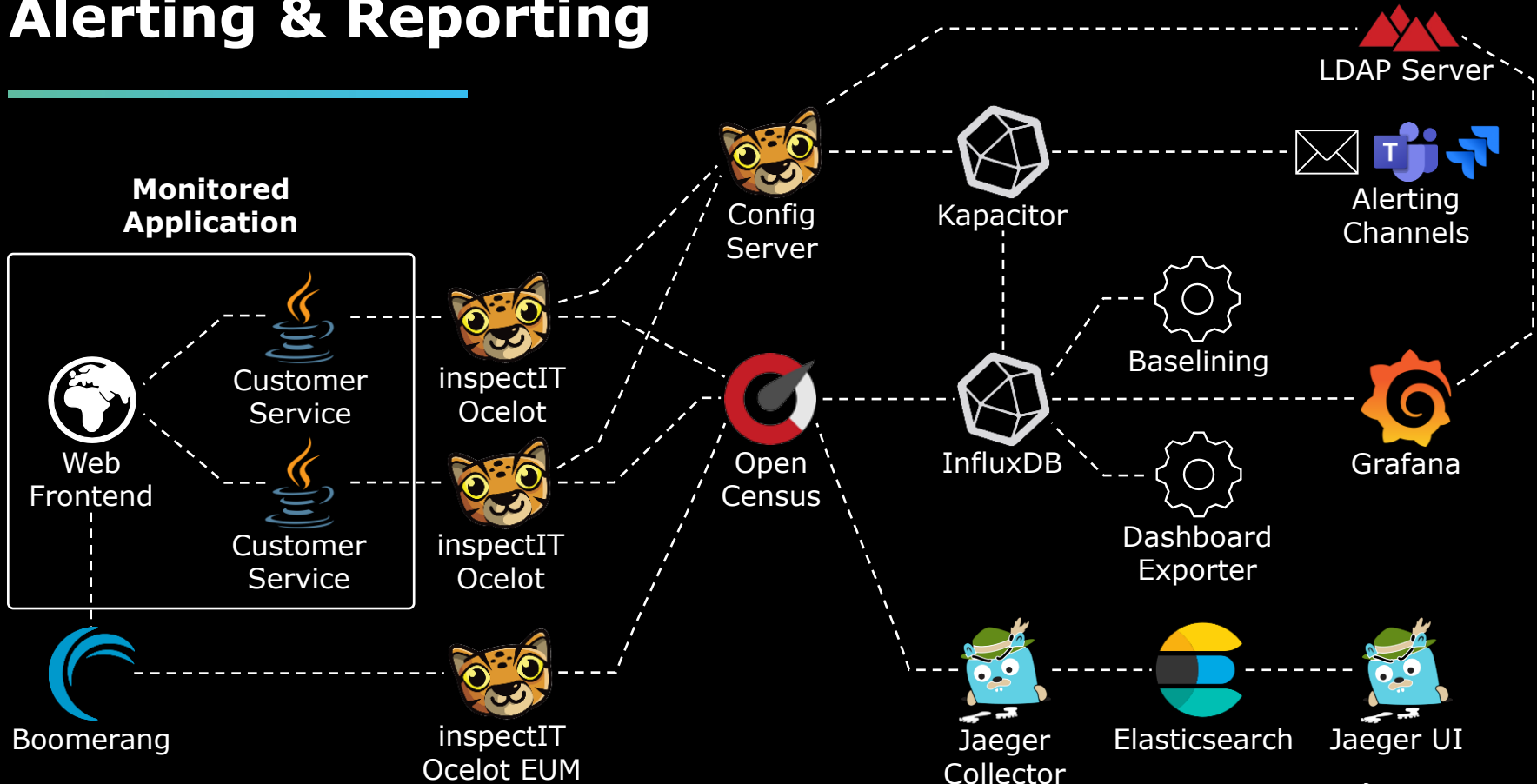
Description

no description

Variables

Notification Channel <i>selection</i>	<input type="text" value="selfmonitoring"/>
The destination channel where notifications should be sent to when an alert is triggered by this rule.	
agent_connect_interval <i>duration</i>	<input type="text" value="30s"/>
Das connect-Intervall, wie oft sich Agenten mit dem Config-Server verbinden. Dies ist notwendig, um aus der Anzahl Requests die Anzahl Agenten zu schließen.	
crit_count <i>int</i>	<input type="text" value="10"/>
Wenn die Anzahl Agenten unter diesen Wert fällt, wird ein Alert verschickt.	
custom_message <i>string</i>	<input type="text" value="Task Name: {{.TaskName}}
Group: {{.Group}}
Level: {{.Level}}
ID: {{.ID}}"/>
Die Nachricht, welche im email body steht "{{.TaskName}}" Name des Tasks, "{{.Group}}" Tags, welche für die GroupBy Statements verwendet wurden (hier: "service"), "{{.Level}}" Aktueller Alert Level, "{{.ID}}" Alert ID (hier: TaskName:Group) Zugriff auf einzelne Tags: {{ index .Tags "service"}}	
notification_time <i>string</i>	<input type="text" value="always"/>
Definiert die Zeiträume, in welchen der Alert überprüft wird und Benachrichtigungen verschickt werden. Hierbei kann einer der folgenden Werte eingegeben werden: "office" für Mo-Fr(6:30-20:00); "vdi" für Mo-So(5:00-24:00); "mainframe" für Mo-Fr(6:30-22:00); "always" für 24x7	
service_regex <i>string</i>	<input type="text" value="inspectit-configurationserver-.*"/>
Regulärer Ausdruck für den "service" tag aller Config-Server, die überwacht werden sollen	
time_window <i>duration</i>	<input type="text" value="10m"/>
Das Zeitfenster, über welches die mittlere Anzahl an Agenten-Verbindungen berechnet wird	

Alerting & Reporting



When will you go open-source?

- Successful replacement of APM Leader



When will you go open-source?

- Successful replacement of APM Leader



When will you go open-source?

- Successful replacement of APM Leader
- Further customization is necessary



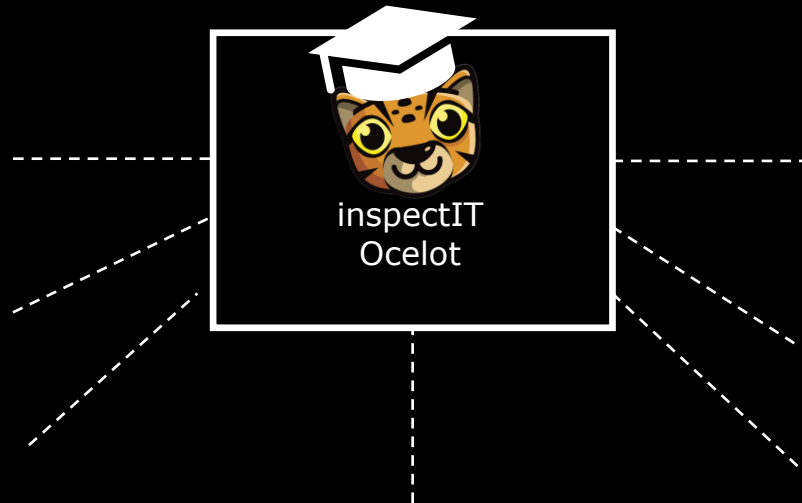
When will you go open-source?

- Successful replacement of APM Leader
- Further customization is necessary
- Enterprise-ready OpenAPM solution



When will you go open-source?

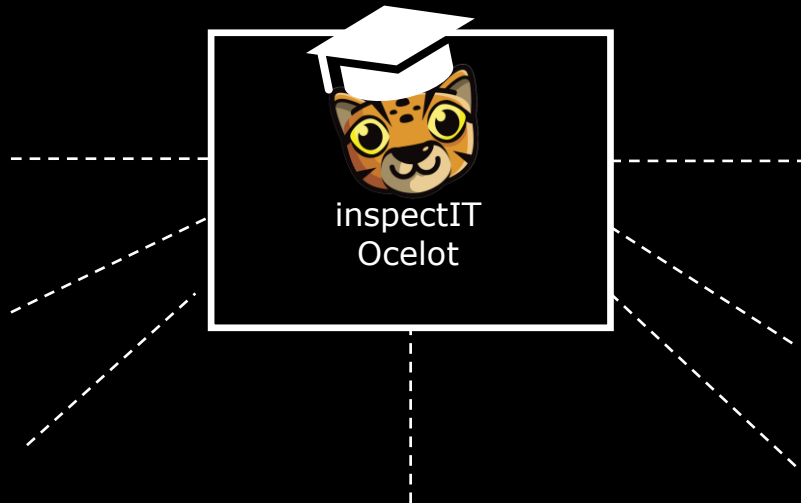
- Successful replacement of APM Leader
- Further customization is necessary
- Enterprise-ready OpenAPM solution
- High flexibility through high-degree of interoperability



When will you go open-source?

- Successful replacement of APM Leader
- Further customization is necessary
- Enterprise-ready OpenAPM solution
- High flexibility through high-degree of interoperability


We are happy to support academics; please reach out to us





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inspectIT
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