

Controlling your race with Micrometer and Spring Boot



Ko Turk

What do you learn today (goals)?

Define

Create

Save

And visualise

metrics!

You're part of a racing team



But what if we don't have this kind of information?

Sounds silly right?



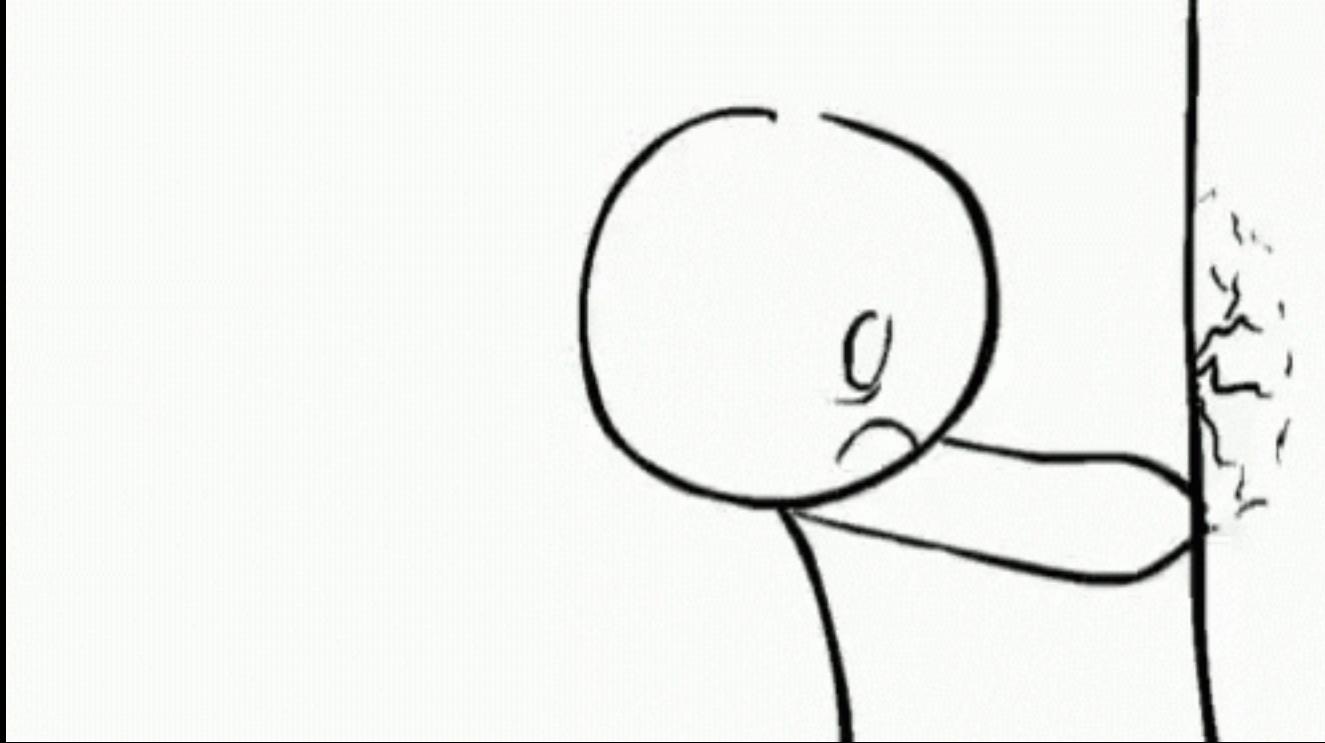
But why don't we (developers) think about proper monitoring?

(still driving but crashing)



Application Y

Backend



If that's happening.....

```
<dependency>
    <groupId>org.slf4j</groupId>
    <artifactId>log4j-over-slf4j</artifactId>
    <scope>provided</scope>
</dependency>
```

Of course you can log it but.....

```
} catch (Exception exception) {
    log.error("WTF is going wrong here:", exception);
    return new ResponseEntity<>(HttpStatus.BAD_REQUEST);
}
```

```
log.debug("You never going to read this, logging level is INFO", e);
```

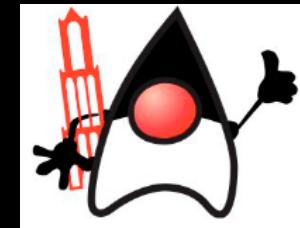
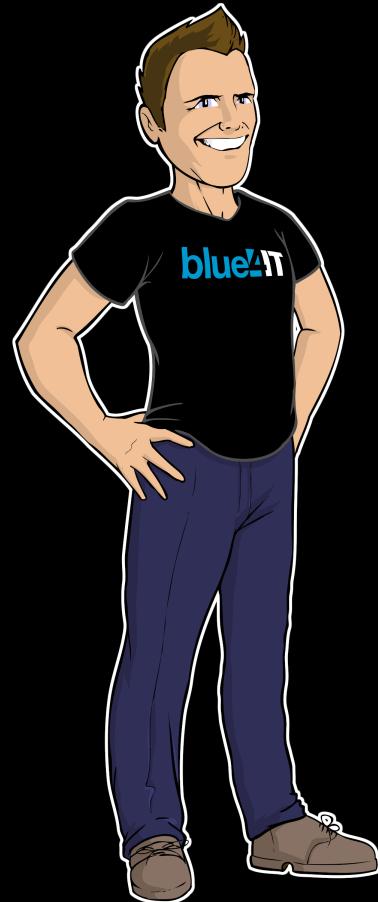
A log is an event that happened

A metric is a measurement of the health of a system.

That's where
Micrometer comes in

Introduction

MARRIED



@KOTURK77



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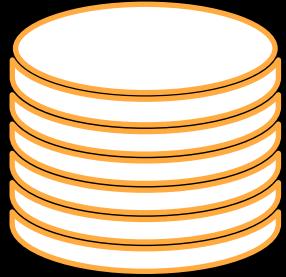
And visualise

metrics!

Let's define the teams strategy



What do we want to monitor?



How to be good in DevOps?



Edited by Betsy Beyer, Chris Jones,
Jennifer Petoff & Niall Richard Murphy



Site Reliability Engineering

HOW GOOGLE RUNS PRODUCTION SYSTEMS

Edited by Betsy Beyer, Chris Jones,
Jennifer Petoff & Niall Murphy

Site Reliability Engineering

Edited by Betsy Beyer, Chris Jones, Jennifer Petoff and Niall Richard Murphy

Members of the SRE team explain how their engagement with the entire software lifecycle has enabled Google to build, deploy, monitor, and maintain some of the largest software systems in the world.

READ ONLINE FOR FREE

BUY FROM GOOGLE BOOKS

<https://landing.google.com/sre/sre-book/toc/index.html>

Racing Factors —> Defining an indicator (SLI)

- pitstop request latency How long does it take to do a pitstop
How long does it take to return a response

Tactics —> Defining an objective (SLO)

- pitstop request latency Shouldn't take more than 8 seconds
Shouldn't be taking more than 0.1 seconds

Strategy —> Defining an agreement (SLA)

- 2 pitstops
99,9 % of all requests less then 8 seconds
 less than 0.1 seconds

What do you learn today (goals)?

Define

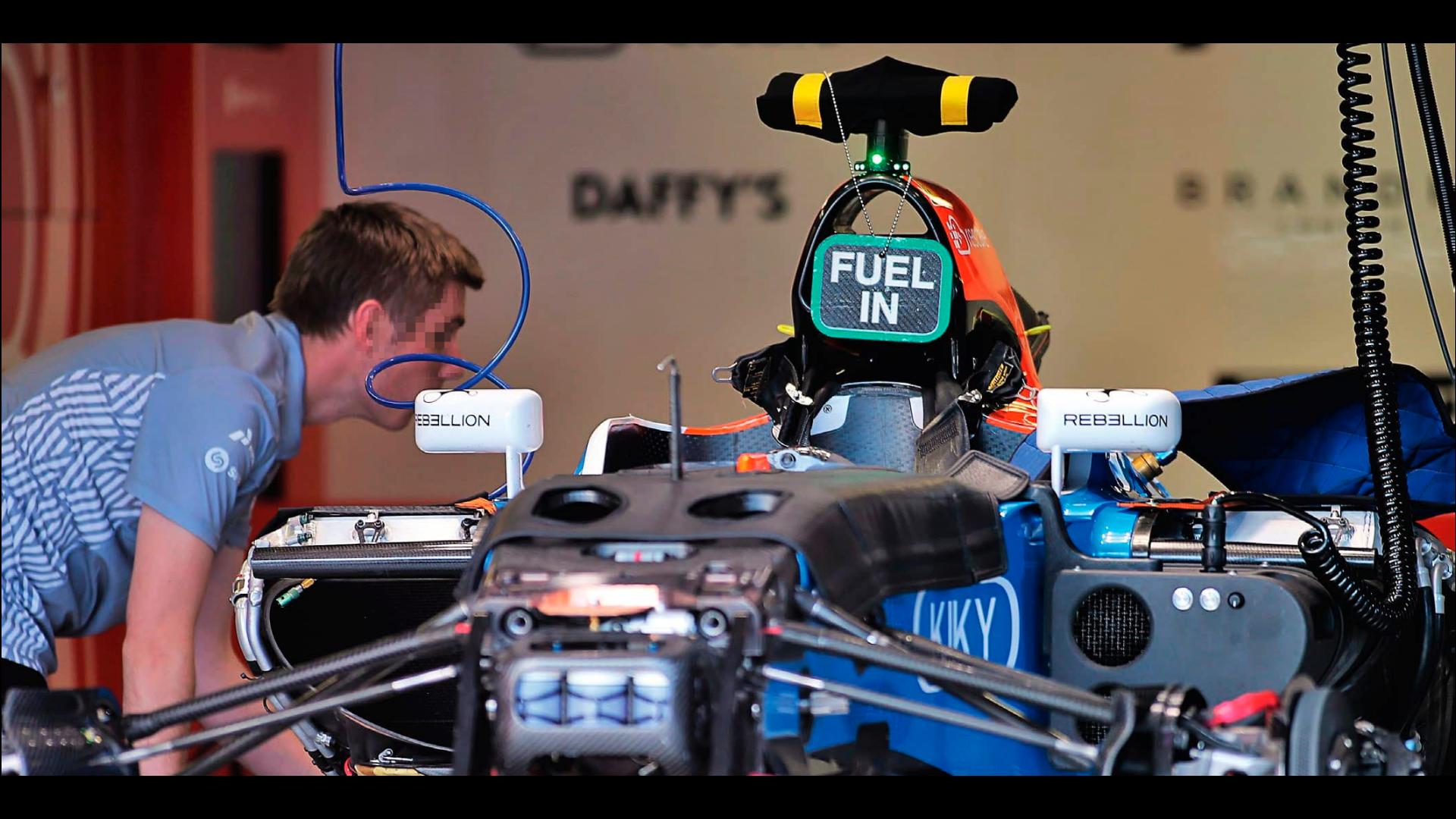


Create

Save

And visualise

metrics!



FUEL
IN

REBELLION

KIKY

Micrometer for the win!

But what is it?

SLF4J only for metrics

Micrometer is included in Spring Boot 2 actuator

```
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-starter-actuator</artifactId>
</dependency>
```

Extra dependency for Spring Boot 1.5.x

```
|<dependency>
|   <groupId>io.micrometer</groupId>
|   <artifactId>micrometer-spring-legacy</artifactId>
|</dependency>
```

And also for Micronaut

```
<dependency>
    <groupId>io.micronaut.configuration</groupId>
    <artifactId>micronaut-micrometer-core</artifactId>
    <version>${micronaut.version}</version>
</dependency>
```

```
<dependency>
    <groupId>io.micronaut</groupId>
    <artifactId>micronaut-management</artifactId>
    <version>${micronaut.management.version}</version>
</dependency>
```

Live coding



<https://i.ytimg.com/vi/eVpRNi5VEDo/maxresdefault.jpg>



Material Theme UI



Atom Material Themes & Plugins

Install to IntelliJ IDEA 2021.2.1

Some features of the plugin require a paid subscription. [Learn more](#)

Compatible with all IntelliJ-based IDEs

```
package com.chrisrm.idea.config;

import ...

public final class MTFileColorsPage implements ColorSettingsPage, DisplayPrioritySortable {
    @NotNull
    @Override
    public AttributesDescriptor[] getAttributeDescriptors() {
        return new AttributesDescriptor[0];
    }

    @NotNull
    @Override
    public ColorDescriptor[] getColorDescriptors() {
        val descriptors = [];

        final FileStatus[] allFileStatuses = FileStatusFactory.getInstance().getAllFileStatuses();
        for (val allFileStatus : allFileStatuses) {
            descriptors += new ColorDescriptor(allFileStatus.text, MTFileColors.getColorKey(allFileStatus), ColorDescriptor.Kind
                .FOREGROUND);
        }

        return ArrayUtil.toObjectArray(descriptors, ColorDescriptor.class);
    }

    @NotNull
    @Override
    public String getDisplayName() {
        MTFileColorsPage::getColorDescriptors()
    }
}
```

Project Structure:

- config
 - menuIcons
 - scope
 - ui
 - BeforeConfigNotifier
 - ConfigNotifier
 - CustomConfigNotifier
 - MTConfigTopHitProvider
 - MTConfigurable
 - MTConfigurableBase
 - MTCustomColorsProvider
 - MTCustomThemeConfigurable
 - MTFileColorsPage**
 - MTOptionContributor
 - icons
 - messages
 - panes
 - plugins
 - schemes
 - MTFileColors
 - MTThemesComponent
 - status
 - tabs
 - themes
 - tree
 - ui

Pre-configured Bindings

- Instrumentations of:
 - caches
 - class loader
 - garbage collection
 - processor utilisation
 - thread pools
 - and more

[Go to actuator metrics](#)

Timer

https://s1.cdn.autoevolution.com/images/news/gallery/red-bull-racing-beats-record-to-set-new-fastest-pit-stop-in-the-history-of-f1_2.jpg



Tags

<https://www.formula1.com/content/dam/fom-website/manual/Misc/PORGPMANUALADDS/GettyImages-1306846855.jpg.transform/9col/image.jpg>



Long Task Timer



<https://i.pinimg.com/originals/fb/5b/98/fb5b98edf68000f44e89d6428a3e2c65.jpg>

Counter



Gauge



<https://cdn.24.co.za/files/Cms/General/d/4338/1678467a9d9149b983f38424014fb2c0.jpg>

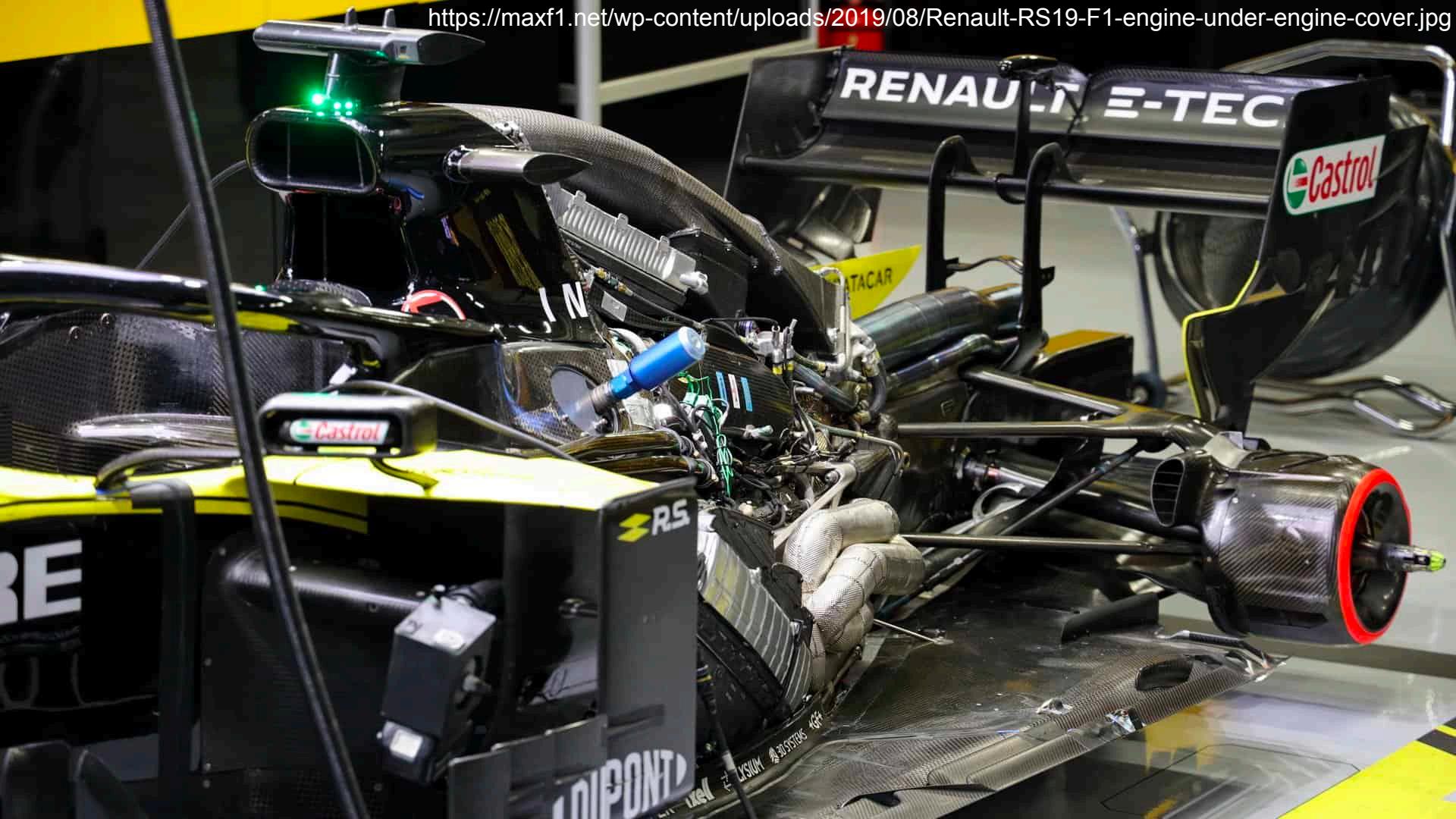
Exceptions



Kafka



Get data out of Actuator



About security

- Please implement spring security
- Otherwise you will expose your endpoint to others
- And don't forget to add it in your database config!

```
basic_auth:  
    username: "user"  
    password: "pass"
```

<https://www.baeldung.com/spring-security-basic-authentication>

<https://egkazioura.com/2020/05/07/spring-boot-and-micrometer-with-prometheus-part-6-securign-metrics/>

Sensitive data (!)

- Disable endpoints you don't need

```
management:  
  endpoints:  
    web:  
      exposure:  
        include: 'health'  
    jmx:  
      exposure:  
        exclude: '*'
```

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And visualise

metrics!

Where to store the metrics?

Which database should I use?

Databases

- Prometheus
- Graphite
- Atlas
- KairosDB

Persistent or not persistent?

If you want to expose to prometheus

```
<dependency>
    <groupId>io.micrometer</groupId>
    <artifactId>micrometer-registry-prometheus</artifactId>
</dependency>
```

Or Graphite

```
<dependency>
    <groupId>io.micrometer</groupId>
    <artifactId>micrometer-registry-graphite</artifactId>
</dependency>
```



```
# TYPE jvm_buffer_memory_used_bytes gauge
jvm_buffer_memory_used_bytes{id="direct",} 24576.0
jvm_buffer_memory_used_bytes{id="mapped",} 0.0
# HELP process_start_time_seconds Start time of the process since unix epoch.
# TYPE process_start_time_seconds gauge
process_start_time_seconds 1.581090649742E9
# HELP jvm_buffer_total_capacity_bytes An estimate of the total capacity of the buffers in this pool
# TYPE jvm_buffer_total_capacity_bytes gauge
jvm_buffer_total_capacity_bytes{id="direct",} 24576.0
jvm_buffer_total_capacity_bytes{id="mapped",} 0.0
# HELP gauge
# TYPE gauge gauge
gauge 7.0
# HELP logback_events_total Number of error level events that made it to the logs
# TYPE logback_events_total counter
logback_events_total{level="warn",} 0.0
logback_events_total{level="debug",} 0.0
logback_events_total{level="error",} 0.0
logback_events_total{level="trace",} 0.0
logback_events_total{level="info",} 8.0
# HELP counterBuilder_total
# TYPE counterBuilder_total counter
counterBuilder_total{continent="USA",} 0.0
# HELP jvm_memory_committed_bytes The amount of memory in bytes that is committed for the Java virtual machine to use
# TYPE jvm_memory_committed_bytes gauge
jvm_memory_committed_bytes{area="heap",id="PS Survivor Space",} 1.3631488E7
jvm_memory_committed_bytes{area="heap",id="PS Old Gen",} 1.76160768E8
jvm_memory_committed_bytes{area="heap",id="PS Eden Space",} 1.42606336E8
jvm_memory_committed_bytes{area="nonheap",id="Metaspace",} 3.9452672E7
jvm_memory_committed_bytes{area="nonheap",id="Code Cache",} 9568256.0
jvm_memory_committed_bytes{area="nonheap",id="Compressed Class Space",} 5636096.0
# HELP process_cpu_usage The "recent cpu usage" for the Java Virtual Machine process
# TYPE process_cpu_usage gauge
process_cpu_usage 0.0
# HELP system_cpu_count The number of processors available to the Java virtual machine
# TYPE system_cpu_count gauge
system_cpu_count 16.0
# HELP gaugeSimple
# TYPE gaugeSimple gauge
gaugeSimple 7.0
# HELP jvm_threads_peak_threads The peak live thread count since the Java virtual machine started or peak was reset
# TYPE jvm_threads_peak_threads gauge
jvm_threads_peak_threads 29.0
# HELP http_server_requests_seconds
# TYPE http_server_requests_seconds summary
http_server_requests_seconds_count{exception="None",method="GET",outcome="SUCCESS",status="200",uri="/actuator/metrics",} 1.0
http_server_requests_seconds_sum{exception="None",method="GET",outcome="SUCCESS",status="200",uri="/actuator/metrics",} 0.017340408
# HELP http_server_requests_seconds_max
# TYPE http_server_requests_seconds_max gauge
http_server_requests_seconds_max{exception="None",method="GET",outcome="SUCCESS",status="200",uri="/actuator/metrics",} 0.017340408
# HELP process_files_max_files The maximum file descriptor count
# TYPE process_files_max_files gauge
process_files_max_files 10240.0
# HELP gaugeBuilder
# TYPE gaugeBuilder gauge
gaugeBuilder 7.0
```

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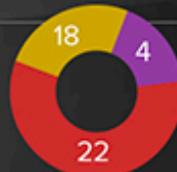
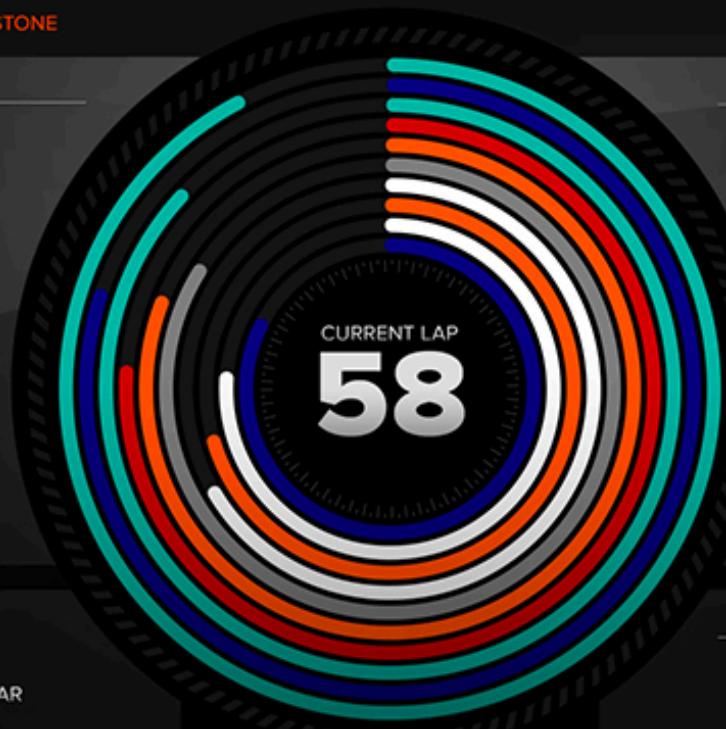
PURE PITWALL

2016 FORMULA 1 BRITISH GRAND PRIX // SILVERSTONE

TRACK TEMP: 29°C AIR TEMP: 20°C

PIT STOP TIMES

ROS	FASTEAST
VET	+0.51
BUT	+0.74
SOT	+0.78
RIC	+0.90
HUL	+1.12
HAM	+1.19
MAS	+1.34
ALO	+1.95
RAI	+2.40



TYRE COMPOUNDS

SETS USED

- SUPER SOFT
- ULTRA SOFT
- SOFT

ROS 1:40.418

FASTEST LAPS: 10/67



TRACK RECORD: 1:39.768

SAFETY CAR LAPS

07	LAST YEAR
28	THIS SEASON

TOTAL OVERTAKES

WITH DRS	28	35
FOR LEAD	2	

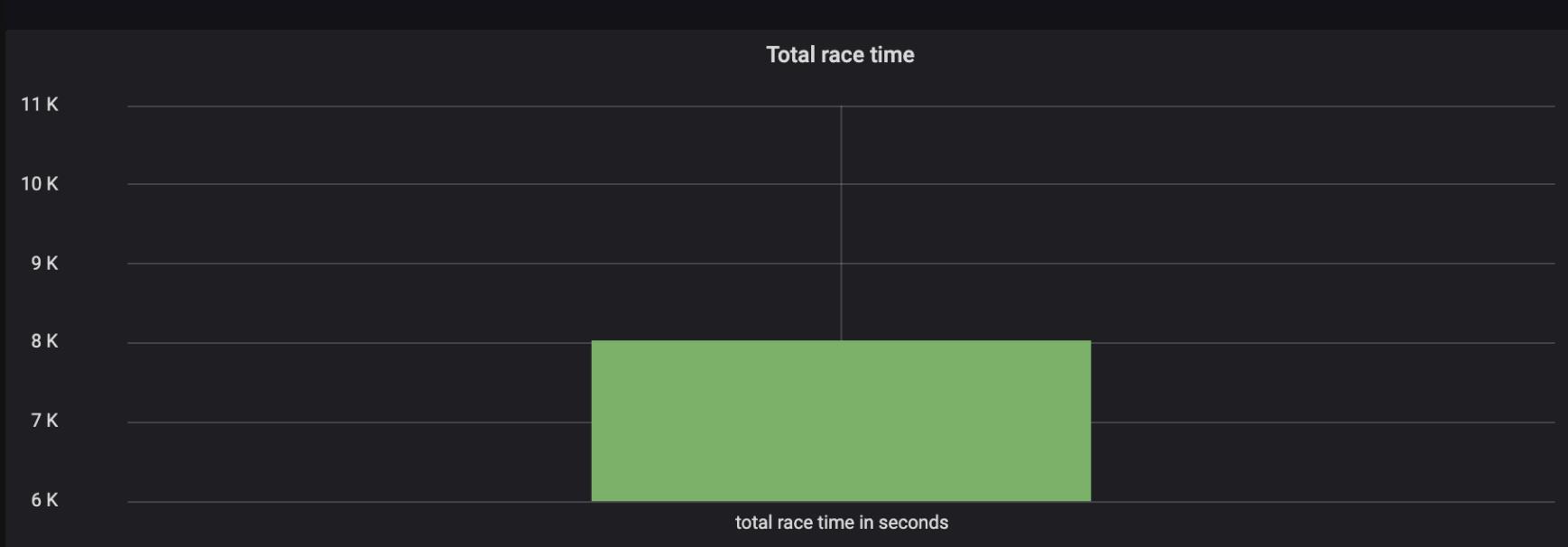
How to visualise the application metrics?
Which monitoring system to use?

Systems

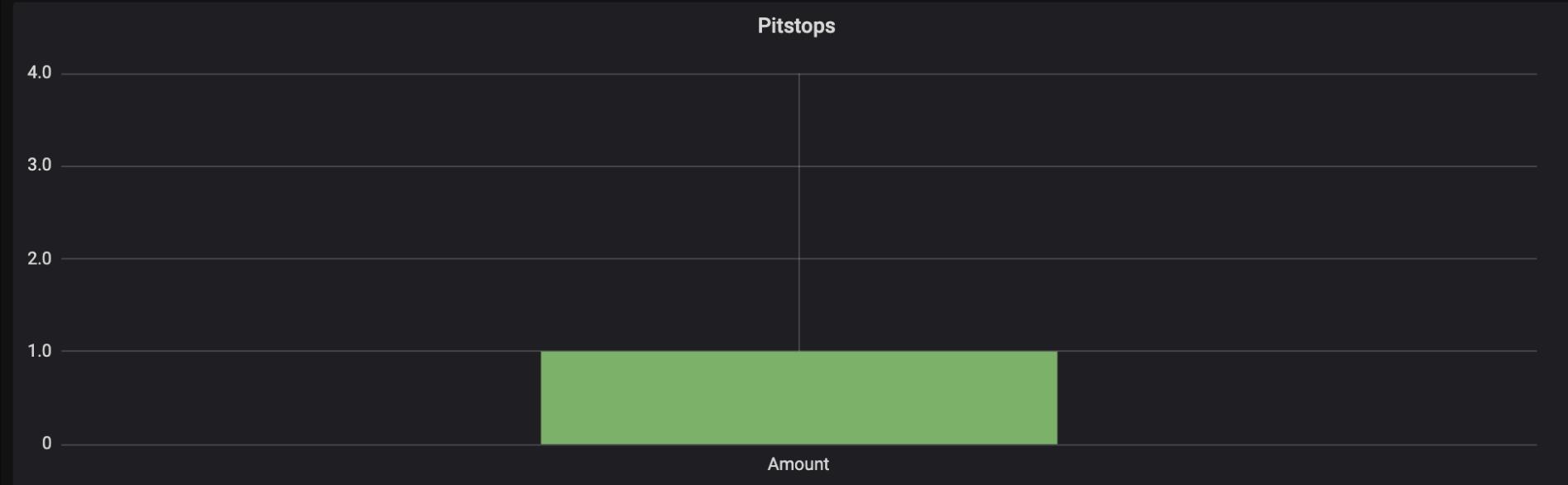
- Grafana
- Datadog
- Dynatrace
- Instant
- WaveFront
- and many more

Let's deep dive into Grafana

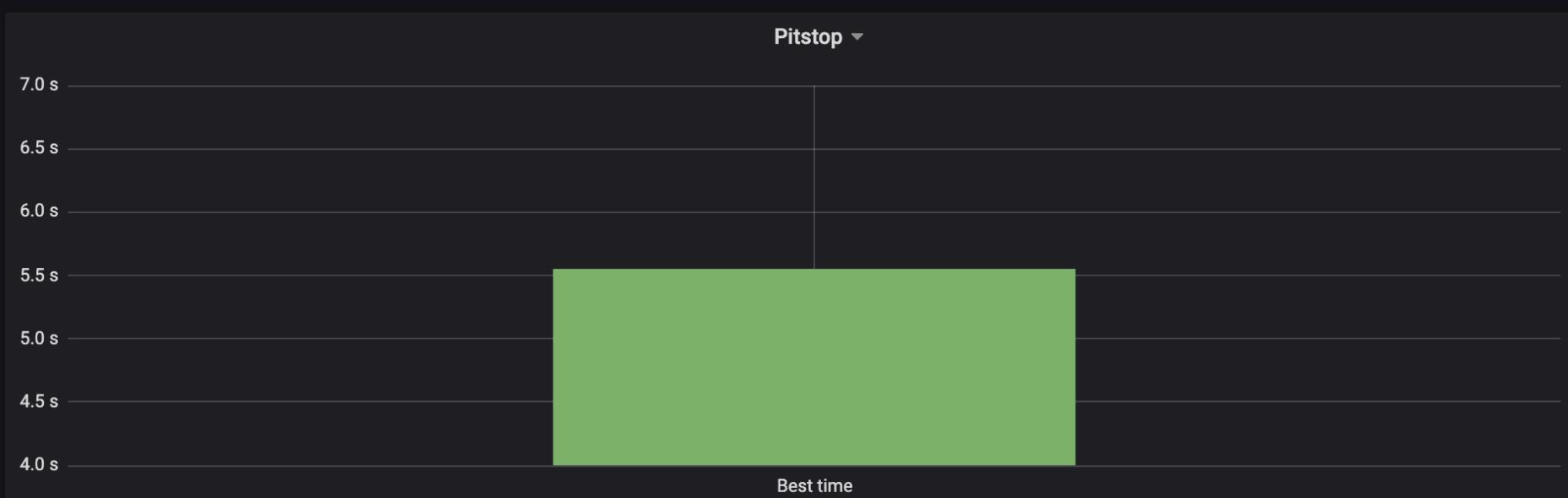
Long Task Timer (duration)



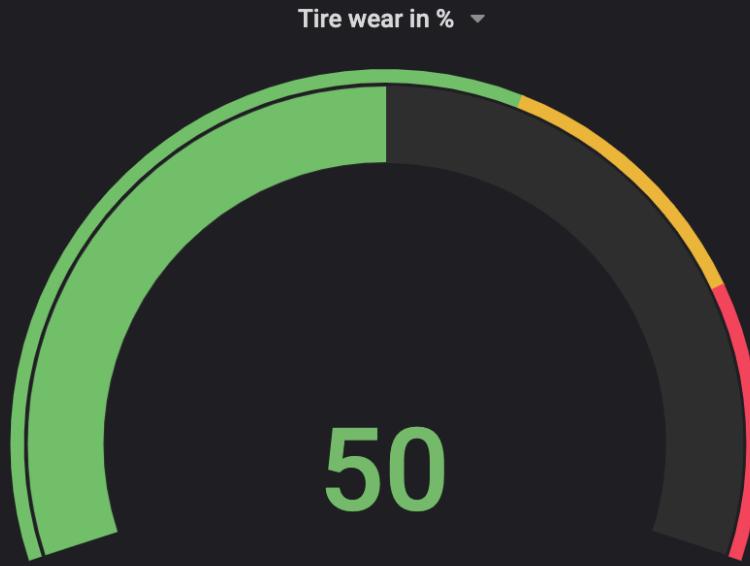
Timer (count)



Timer (max)



Gauge



Bindings

Cars in race (thread count)

20



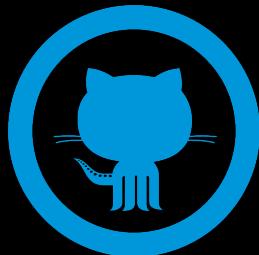
Race-Demo -

>Last 6 hours ▾





Thank you for listening



All examples you can find at:

<https://github.com/koturk/micrometer/javazone>



@KoTurk77