

# LogStage: Zero-cost Structural Logging for Scala

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## What's wrong with logging frameworks?

- ▶ Do we need structured logs? Yes, obviously,
- ▶ Logging frameworks are convenient for a programmer *xor* for a machine, not for both,
- ▶ Logging frameworks love to break SOLID,
- ▶ Magic rituals required!

## scala-logging API example

```
1 class Example
2   extends LazyLogging { // Let's break SOLID!
3     //...
4
5     // Renders as "Received message from JohnDoe"
6     // Structure lost
7     logger.trace(s"Received message from $user")
8   }
```

## fluentd logging API example

```
1  object Example {  
2    // We love rituals! Is it SOLID, hmm?..  
3    val LOG = FluentLoggerFactory  
4      .getLogger("fluentd.test")  
5  
6    // ...  
7  
8    val data =  
9      new HashMap[String, String]()  
10     data.put("from", "userA")  
11     data.put("to", "userB")  
12     LOG.log("follow", data)  
13  }
```

## The code...

```
1 | val user = "JohnDoe"  
2 | logger.debug(s"Received a message from $user")
```

... is structured

```
1 Expr(Apply(Select(  
2   Apply(  
3     Select(Select(Ident("scala"), scala.StringContext),  
4       TermName("apply"))  
5     , List(Literal(Constant("Received a message from "))  
6       , Literal(Constant(""))  
7     )  
8   ),  
9   TermName("s")  
10  )  
11 , List(Ident(TermName("user"))))  
12 ))
```

## The code is always structured

- ▶ We have argument names, types and order defined in code,
- ▶ As well we have some static information about the context – file, line, etc,
- ▶ We have static part of our message – interpolation context or *message template*,
- ▶ We may process our string interpolations with a macro, recover structure and pass it to a logger.

```
def trace(message: String): Unit = macro doTrace  
  
def doTrace(c: blackbox.Context)(message: c.Expr[String]): c.Expr[Unit] = {  
  ???  
}
```

# LOGSTAGE

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First-class logging framework for Scala



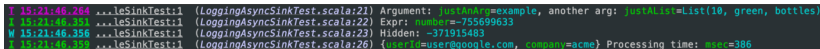
## Quick overview

- ▶ Almost no dependencies,
- ▶ Compile-time structure and context extraction,
- ▶ Console and file sinks out of the box, log rotation supported,
- ▶ Asynchronous sink out of the box (single worker thread at the moment),
- ▶ String and JSON rendering out of the box,
- ▶ Automatic structure identifiers for JSON policy,
- ▶ Modular – you may implement your own sink, router, etc,
- ▶ DI-ready, no singletons or classpath scanners,
- ▶ **Method**-level granularity,
- ▶ User-provided logging contexts,
- ▶ Slf4J backend – LogStage is a drop-in replacement for Logback, route your legacy logs,
- ▶ Location hyperlinks for IntelliJ console.

## An example

```
1 class ExampleService(log: IzLogger) {  
2   val justAnArg = "example"  
3   val justAList = List[Any](10, "green", "bottles")  
4   val msec = Random.nextInt(1000)  
5   log.trace(s"Argument: $justAnArg, another arg: $justAList")  
6   log.info(s"Expr: ${Random.nextInt() -> "number"}")  
7   log.warn(s"Hidden: ${Random.nextInt() -> "number" -> null}")  
8   val ctxLog = log("userId" -> "user@google.com"  
9     , "company" -> "acme")  
10  ctxLog.info(s"Processing time: $msec")  
11 }
```

Followed by a cute screenshot of course:



```
T 15:21:46.264 ...leSinkTest:1 (LoggingAsyncSinkTest.scala:21) Argument: justAnArg=example, another arg: justAList=List(10, green, bottles)  
I 15:21:46.291 ...leSinkTest:1 (LoggingAsyncSinkTest.scala:22) Expr: number=-755699633  
W 15:21:46.356 ...leSinkTest:1 (LoggingAsyncSinkTest.scala:23) Hidden: -371915483  
I 15:21:46.399 ...leSinkTest:1 (LoggingAsyncSinkTest.scala:26) {userId=user@google.com, company=acme} Processing time: msec=386
```

## Something nice for our robots

```
{
  "just_a_list": [10, "green", "bottles"],
  "just_an_arg": "example",
  "@event": {
    "class": "f48ebb70",
    "logger": "...logstage.api.routing.ExampleService.start",
    "file": "LoggingAsyncSinkTest.scala", "line": 20,
    "thread": { "id": 1, "name": "ScalaTest-run-running-LoggingJson4sTest" },
    "level": "trace",
    "timestamp": 1532384023837,
    "datetime": "2018-07-23T22:13:43.837Z[UTC]"
  },
  "@template":
    "Argument: ${just_an_arg}, another arg: ${just_a_list}",
  "@message":
    "Argument: justAnArg=example, another arg: justAList=List(10, green, bottles)"
}
```

# Status and things to do

LogStage is:

- ▶ ready to use,
- ▶ in real production for 4 months.

Our plans:

- ▶ Declarative router config,
- ▶ Start using log events to collect metrics (keep in mind, we have derived structure identifiers),
- ▶ Cleanups and refactorings.

# Thank you for your attention

<https://izumi.7mind.io/>

We're looking for clients, contributors, adopters and colleagues ;)

About the author:

- ▶ coding for 18 years, 10 years of hands-on commercial engineering experience,
- ▶ has been leading a cluster orchestration team in Yandex, “the Russian Google”,
- ▶ implemented “*Interstellar Spaceship*” – an orchestration solution to manage 50K+ physical machines across 6 datacenters,
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