





[web-store] Shopist checkouts have a high number of fai...

Status

TRIGGERED

Urgency

HIGH

Triggered

May 15, 4:38 am

Responder



Scott Gerring

Service



web-store

Tags

5 tags

NEXT STEPS

Acknowledge

✓ Resolve



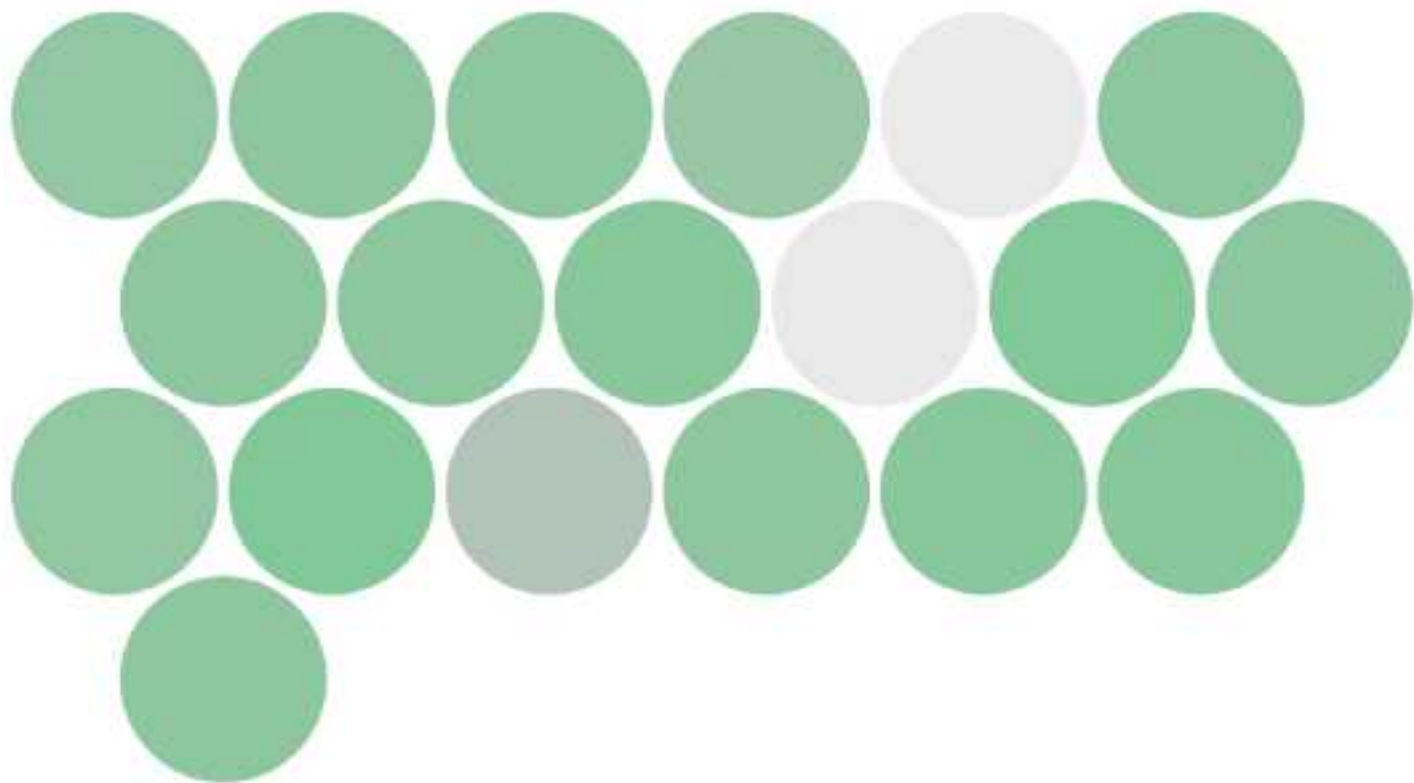
Declare Incident

Description

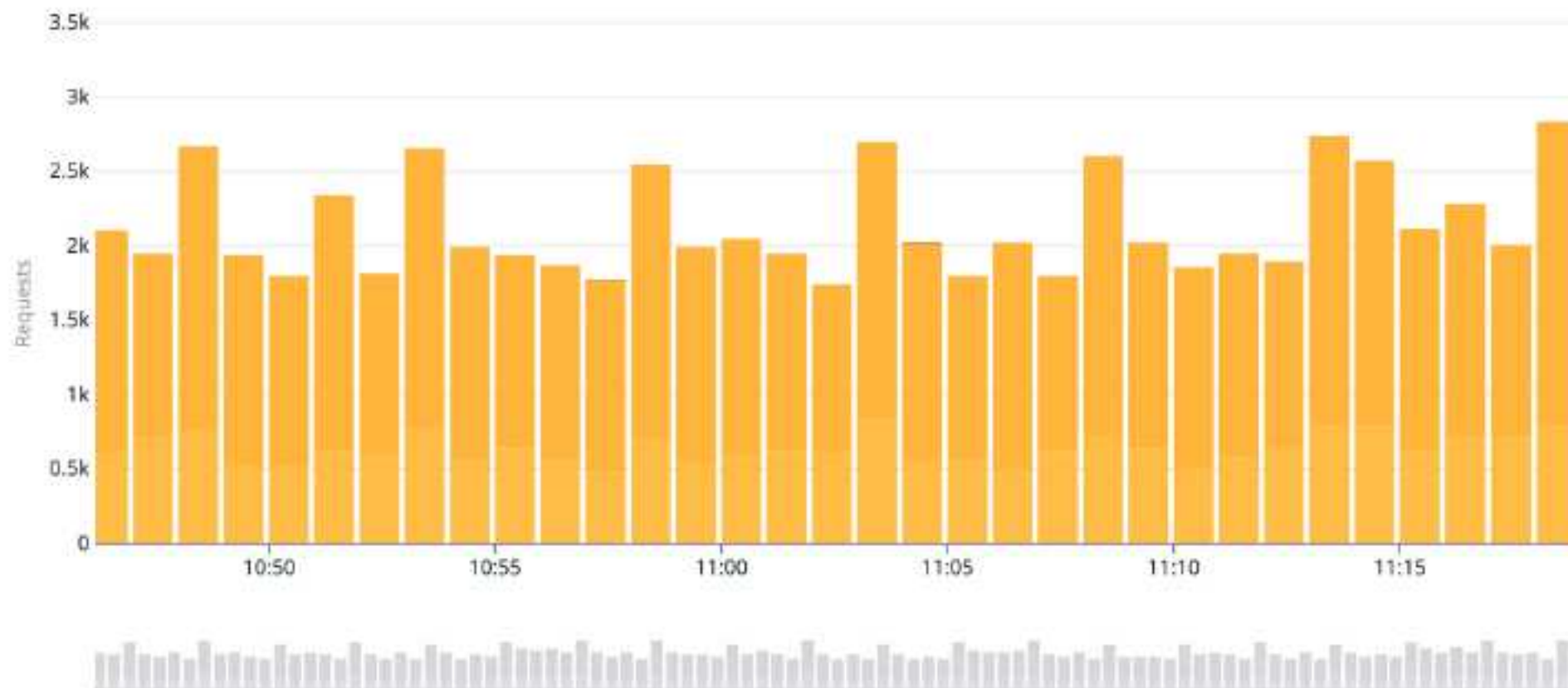
@slack-Datadog_Incidents-shopist-ops @oncall-gs-oncall @scott.gerring@datadoghq.com



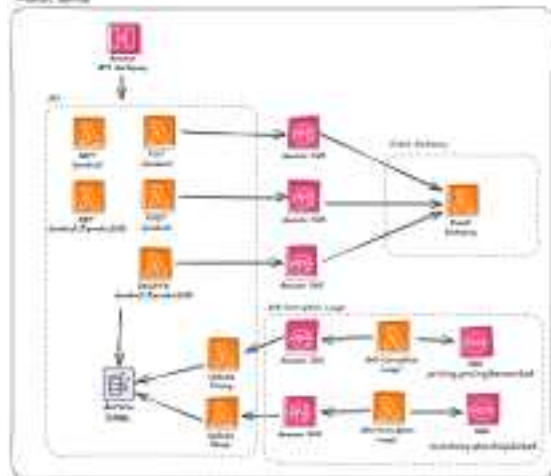
Your infrastructure 19



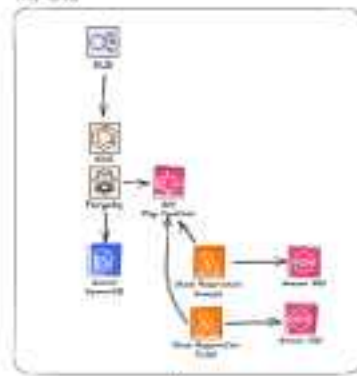
ELBs with Most Requests



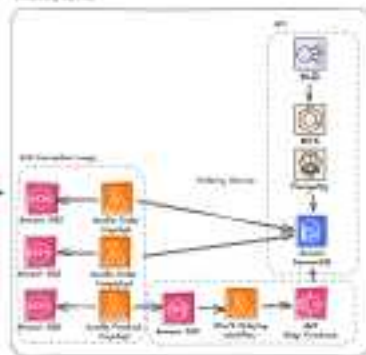
Product Service



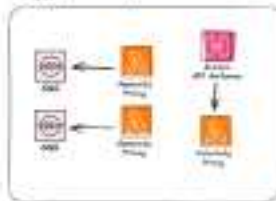
Order Service



Inventory Service



Pricing Service



Product Service

Order Service

Inventory Service

Pricing Service

57.1ms POST /checkout_v2 500 INTERNAL SERVER ERROR Jun 01 23:33:10.609 (12h ago)

Trace: Flame Graph Waterfall Span List Map

Filter spans by any attribute

Error 1

Color by Service

0 5 ms 10 ms 15 ms 20 ms 25 ms 30 ms 35 ms 40 ms 45 ms 50 ms 55 ms

! POST 500 57.1ms

["operation" =>

["operation" =>

["operation" => "getM

web-store

web-store-mon

web-store rack.request POST 500

57.1ms 100% total

Span: Overview Errors Infrastructure Metrics Logs Network Processes Profiles Dev Agent

web-store > POST 500

This issue is 16 days old (vqaR0-958893) - Last seen 10 hours ago (vcd13006gh-58f3d8)

View in En

Pretty Raw

ArgumentError: mday out of range

> lib/version_helper.rb:51:in `utc': mday out of range (ArgumentError)

> from lib/version_helper.rb:51:in `get_twice_daily_version'

> from controllers/application_controller.rb:115:in `add_version_tag'

Show 78 third-party frames

🔗 37 Open ✓ 1,986 Closed



Author ▾

Label ▾

Projects ▾

Milestones ▾

Reviews ▾

Assignee ▾

Sort ▾



Fix that pesky runtime issue ✓

💬 104

#1965 by Fred Developer was merged on Aug 23, 2024 • Approved 2 of 4 tasks

Back to Basics:

Crafting Quality Software in the Age Of Complexity

Scott Gerring, Datadog

The background of the slide is a solid blue color. On the left side, there is a 3D isometric pattern of dark blue cubes. Many of these cubes have a white ship's wheel icon on their top surfaces. The cubes are arranged in a staggered grid, creating a sense of depth.

Microservices

The Cloud



GenAI

```
/// A simple function to generate a random axis (0, 1, or 2)
/// We'd normally use a proper random number generator,
/// but for simplicity we'll just use a deterministic pattern
fn rand_axis() -> usize {
    static mut COUNTER: usize = 0;

    unsafe {
        COUNTER = (COUNTER + 1) % 3;
        COUNTER
    }
}
```

**“The earlier you catch
defects, the cheaper they are
to fix”**

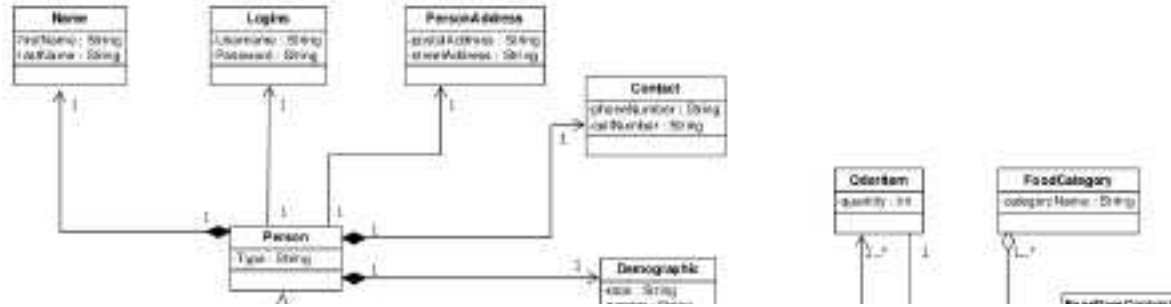
David Farley, on not shooting yourself in
the foot in production



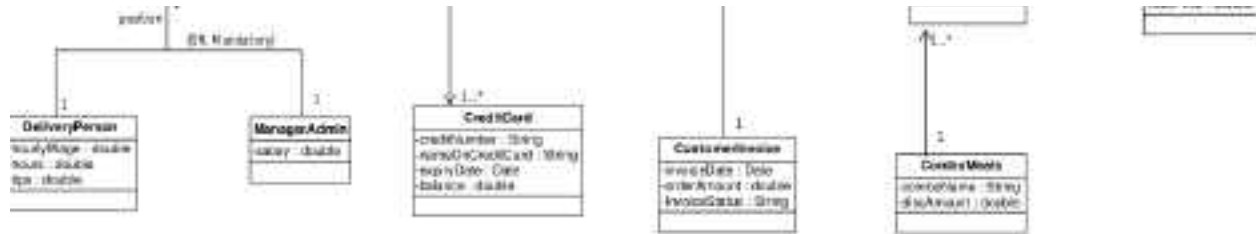
Quality ... you know what it is, yet you don't know what it is.

- **Robert Pirsig**





Thoughtful Design



A still life photograph of a single orange with several green leaves attached to its stem. The orange is positioned in the lower right quadrant, resting on a dark, textured surface. The leaves are spread out to the left and slightly behind the orange. The background is a solid, dark color, creating a high contrast with the bright orange and green. The lighting is soft, highlighting the texture of the orange's peel and the veins on the leaves.

Static Analysis

We've just started our new project, and based on "fun experiences" in previous ones, we want to get off on the right foot with code style and basic sanity checking.

Linting & Style Checks

Easy, Fast, Cheap



Common Tools

- **Java** - Spotbugs / Checkstyle, Error Prone
- **.net** - Roslyn Analyzers, StyleCop
- **Python** - pylint / flake8
- **Rust** - clippy / rustfmt

Demo!

Linting Recommendations

Do:

- Use **Error Prone** or **SpotBugs**
- Embrace **Spotless**
- Everything checked in CI and trivial to run locally

Don't:

- Go **too mad** with the code style; embrace what can be automated

“Jane in security keeps telling me to ‘fix the log4shells’. We’ve not touched the codebase in years, and I have no idea what she’s talking about anyway”.

Software Composition Analysis

We put an exploit in your
supply chain so you can
mine bitcoin while you
deliver business value



Filters

Labels 11

Milestones 0

New pull request

Clear current search query, filters, and sorts

20 Open 18 Closed

Author

Label





















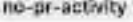









Projects

Milestones

Reviews

Assignee

Sort

- ☐  **Bump typescript from 5.6.3 to 5.7.3**    1
- #38 opened on Feb 1 by dependabot bot
- ☐  **Bump @iconify-json/mdi from 1.2.1 to 1.2.3**    1
- #37 opened on Feb 1 by dependabot bot
- ☐  **Bump astro-expressive-code from 0.37.1 to 0.40.1**    1
- #36 opened on Feb 1 by dependabot bot
- ☐  **Bump @astrojs/tailwind from 5.1.1 to 6.0.0**    1
- #35 opened on Feb 1 by dependabot bot
- ☐  **Bump prettier-plugin-tailwindcss from 0.6.8 to 0.6.11**    1
- #34 opened on Feb 1 by dependabot bot
- ☐  **Bump @astrojs/rss from 4.0.7 to 4.0.11**    1
- #33 opened on Feb 1 by dependabot bot
- ☐  **Bump @tailwindcss/typography from 0.5.15 to 0.5.16**    1
- #32 opened on Feb 1 by dependabot bot
- ☐  **Bump satori from 0.11.2 to 0.12.1**    1
- #31 opened on Feb 1 by dependabot bot

Dependabot alerts

[Give feedback](#)

Dependency files checked 2 minutes ago

🔍 is:open

☐ ⓘ **14 Open** ✓ 0 Closed

Package ▾

Ecosystem ▾

Manifest ▾

Severity ▾

Sort ▾

☐ ⓘ **Misuse of ServerConfig.PublicKeyCallback may cause authorization bypass in golang.org/x/crypto** **Critical**

#1 opened 2 minutes ago • Detected in golang.org/x/crypto (Go) • apps/pass-api/go.mod

☐ ⓘ **Borsh serialization of HashMap is non-canonical** **High**

#10 opened 2 minutes ago • Detected in hashbrown (Rust) • apps/pass-image-api/Cargo.lock

☐ ⓘ **golang.org/x/crypto Vulnerable to Denial of Service (DoS) via Slow or Incomplete Key Exchange** **High**

#3 opened 2 minutes ago • Detected in golang.org/x/crypto (Go) • apps/pass-api/go.mod

☐ ⓘ **ring has some AES functions that may panic when overflow checking is enabled in** **Moderate**

#14 opened 2 minutes ago • Detected in ring (Rust) • apps/pass-image-api/Cargo.lock

☐ ⓘ **Some AES functions may panic when overflow checking is enabled in ring** **Moderate**

#12 opened 2 minutes ago • Detected in ring (Rust) • apps/pass-image-api/Cargo.lock

☐ ⓘ **`idna` accepts Punycode labels that do not produce any non-ASCII when decoded** **Moderate**



**So many
tools!**

Software Composition Analysis Recommendations

- You're going to want to do this ...
- ... and **GitHub's** default tooling is a great low effort way to start

“I want to make sure that Joe the Intern is automatically prevented from passing unescaped user input to raw SQL queries ”

Getting Weird(er)

Semgrep, CodeQL,
and Static
Application Security
Testing



CodeQL – Query your codebase

Choose a workflow

Build, test, and deploy your code. Make code reviews, branch management, and issue triaging work the way you want. Select a workflow to get started.

Skip this and [set up a workflow yourself](#) →

Categories

Deployment

Security

Continuous integration

Automation

Pages

code scanning

Found 78 workflows

CodeQL Analysis

By GitHub

Security analysis from GitHub for C, C++, C#, Go, Java, JavaScript, TypeScript, Python, Ruby, Kotlin and Swift developers.

Configure

Code scanning

Fortify Scan

By OpenText

Integrate Fortify's comprehensive static code analysis (SAST) for 33+ languages into your DevSecOps workflows.

Configure

Code scanning

Snyk Security

By Snyk

Detect vulnerabilities across your applications and infrastructure with the Snyk platform.

Configure

Code scanning

Codacy Security Scan

By Codacy

Free, out-of-the-box, security analysis provided by multiple open source static analysis tools.

Configure

Code scanning

APIsec Scan

By APIsec

APIsec provides the industry's only automated and continuous API testing platform that uncovers security vulnerabilities and logic flaws in APIs.

Configure

Code scanning

DevSkim

By Microsoft CST-E

DevSkim is a security linter that highlights common security issues in source code.

Configure

Code scanning

EthicalCheck

Mayhem for API

NeuraLegion


```
module LiteralToURLConfig implements DataFlow::ConfigSig {
  predicate isSource(DataFlow::
Node source) {
    source.asExpr() instanceof StringLiteral
  }

  predicate isSink(DataFlow::
Node sink) {
    /* check if this is used to construct a URL */
  }
}

module LiteralToURLFlow = DataFlow::Global
<LiteralToURLConfig>;

from DataFlow::
Node src, DataFlow::Node sink
where LiteralToURLFlow::flow(src, sink)
select src,
  "This string constructs a URL $@.", sink, "here"
```

Semgrep – query your codebase, but easier this time

```
rules:  
- id: pii-logger  
  pattern: logger.info($DATA);  
  message: "Logging is bad for some reason!"  
  severity: WARNING  
  languages: [java]
```

What - another demo?

SAST, CodeQL, and friends

Recommendations

- **SAST**
 - You're going to want to do this
 - Lean into what you already have available
- **Code Querying**
 - Is a fun past-time and lets you start to build a metal model of your code

“I want to formalise my model of the architecture of my service to keep it on the rails over time”

Architecture Testing

Automatically
enforcing your
mental model





 **ArchUnit**

Arch Rules like ...

- **Layering** - Things named **.*Resource** shouldn't import things from **javax.persistence**
- **Containment** - Classes named **.*DTO** should reside in packages named **".dto\$"**
- **Consistency** - Classes implementing **IThingDoer** should be named **.*ThingDoer**
- **Cycle Checks** - Slices in my application should be free of cycles


```
@Test
void sticker_domain_should_not_import_award_domain() {
    ArchRule rule = noClasses()
        .that()
            .resideInAPackage("..sticker..")
        .should()
            .dependOnClassesThat()
                .resideInAPackage("..award..")
            .because("domains should be isolated");

    rule.check(classes);
}
```

Demos never end

Architecture Testing: Recommendations

- Check it out!



Dynamic Analysis

Observability



Observability Is:

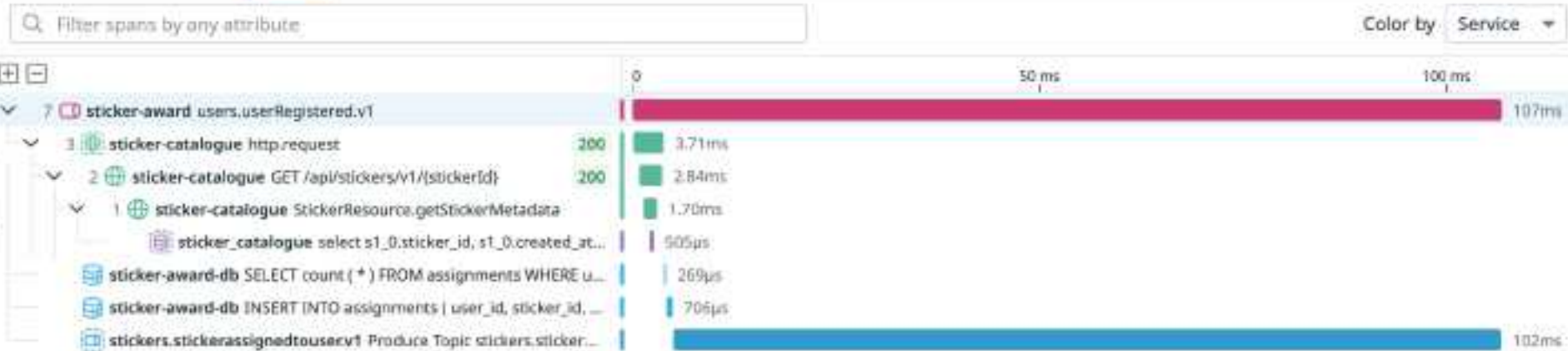
- **Logs**
- **Traces**
- **Metrics**



Tracing

🕒 107ms | Aug 26 14:23:48.277 (20h ago)

Trace: [Flame Graph](#) [Waterfall](#) [Span List](#) [Map](#)



🕒 107ms 100% total exec time 🔍

Span: [Overview](#) [Infrastructure](#) [Metrics](#) [Logs](#) [Network](#) [Processes](#) [SQL Queries](#) [Profiles](#)

SORT BY [Duration](#)

☐ Show only queries with errors

> sticker-award-db 706µs Aug 26, 2025 at 2:23:48.281 pm [View Query in APM](#)

```
INSERT INTO assignments ( user_id, sticker_id, assigned_at, removed_at, reason, created_at, updated_at ) VALUES ( ? ) RETURNING id
```


p1 1.61ms GET http://pass-summary-api:80... 500 INTERNAL SERVER ERROR Aug 25 07:56:38.552 (2d ago)

Trace: Flame Graph Waterfall Span List 6 Map

Filter spans by any attribute

☐ Errors 6

Color by Service



pass-summary-api netty.connect netty.connect

59.6µs 3.69% total exec time



Span: Overview Errors 6 Infrastructure Metrics Logs 0 Network Processes Profiles

Error Message

io.netty.channel.AbstractChannel\$AnnotatedConnectException: Connection refused: pass-api/172.28.83.30:8080

[View stack trace](#)

> Pinned Span Attributes No pinned tags found

Tracing - Getting Started

- Auto- vs. manual- instrumentation
- Explicit vs implicit collection

```
Default
sticker-catalogue java -javaagent:./dd-java-agent.jar -jar ./target/quarkus-app/quarkus-run.jar
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
[dd.trace 2025-08-27 14:49:47:700 +0200] [dd-task-scheduler] INFO datadog.trace.agent.core.StatusLogger - D
ATADOG TRACER CONFIGURATION {"version":"1.52.1-6b6db17410","os_name":"Mac OS X","os_version":"15.6","archi
tecture":"aarch64","lang":"jvm","lang_version":"23","jvm_vendor":"Oracle Corporation","jvm_version":"23+37-2
369","java_class_version":"67.0","http_nonProxyHosts":"local|*.local|169.254/16|*.169.254/16","http_proxyHo
st":"null","enabled":true,"service":"quarkus-run","agent_url":"http://localhost:8126","agent_error":false,"
debug":false,"trace_propagation_style_extract":["datadog","tracecontext","baggage"],"trace_propagation_styl
e_inject":["datadog","tracecontext","baggage"],"analytics_enabled":false,"priority_sampling_enabled":true,"
logs_correlation_enabled":true,"profiling_enabled":false,"remote_config_enabled":true,"debugger_enabled":fa
lse,"debugger_exception_enabled":false,"debugger_span_origin_enabled":false,"debugger_distributed_debugger_
enabled":false,"appsec_enabled":"ENABLED_INACTIVE","rasp_enabled":true,"telemetry_enabled":true,"telemetry_
dependency_collection_enabled":true,"telemetry_log_collection_enabled":true,"dd_version":"","health_checks_
enabled":true,"configuration_file":"no config file present","runtime_id":"e5fdec82-62bc-4f8a-998c-a396807fe
3f0","logging_settings":{"levelInBrackets":false,"dateTimeFormat":"' [dd.trace 'yyyy-MM-dd HH:mm:ss:SSS Z'] '
","logFile":"System.err","configurationFile":"simplelogger.properties","showShortLogName":false,"showDateTi
me":true,"showLogName":true,"jsonEnabled":false,"showThreadName":true,"defaultLogLevel":"INFO","warnLevelSt
ring":"WARN","embedException":false},"cws_enabled":false,"cws_tls_refresh":5000,"datadog_profiler_enabled":
false,"datadog_profiler_safe":true,"datadog_profiler_enabled_overridden":false,"data_streams_enabled":false
}
^C
--/ _ \ / / / / _ | _ \ / / / / / / _ \
-/ / / / / / _ \ | , _ \ , < / / / \ \
--\ _ \ \ _ \ / / | / / | / / | \ _ \ / _ \
2025-08-27 14:49:48,003 WARN [io.qua.config] (main) Unrecognized configuration key "quarkus.openapi.genera
tor.input-base-dir" was provided; it will be ignored; verify that the dependency extension for this configu
```

Auto Instrumentation

```
import io.opentelemetry.api.GlobalOpenTelemetry;
import io.opentelemetry.api.trace.Span;
import io.opentelemetry.api.trace.Tracer;
import io.opentelemetry.extension.annotations.SpanAttribute;
import io.opentelemetry.extension.annotations.WithSpan;

public class AwardService {

    private static final Tracer tracer;

    @WithSpan
    public void grantAward(@SpanAttribute("user.id") String userId) {
        Span.current()
            .setAttribute("award.type", "certification")
            .addEvent("award_grant_started");

        // ...
    }
}
```

Manual Instrumentation

Collection

- **Agent** - implicitly pushes from **outside** app
- **OTel SDK** - explicitly pushes from **within** app

Tracing - Pragmatic Advice

- Instrument using OpenTelemetry APIs
- Collect using provider instrumentation



Observability Is:

- Logs
- Traces
- Metrics
- Continuous Profiling?!1

Manual Profiling

- Manual runs & analysis under test
- Custom builds (gprof)
- Binary rewriting (valgrind)
- Dynamic Instrumentation / eBPF (dtrace)
- Some statistical sampling (prof, JFR)





Continuous Profiling

- Statistical sampling, load overhead
- Always on in prod
- Correlated with traces (and request metadata!)

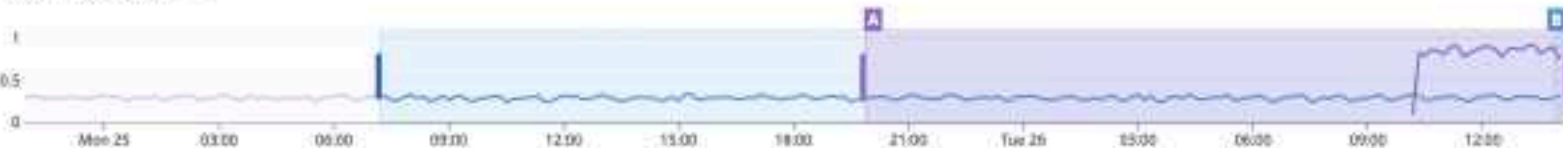
UTC+02:00
18h Aug 25, 7:50 pm - Aug 26, 2:09 pm

service:product-recommendation env:prod version:e2277f66

UTC+02:00
1d Aug 25, 7:12 am - Aug 26, 2:09 pm

service:product-recommendation version:54c921f6

Metric: CPU - Cores



Insights

Deadlocked Threads

Command Line Options Check

View 9 More Insights

Hide Controls

Facets from Query A

Search facets

Showing 80 of 81 + Add

core

Env

prod 11.1K

Service

product-recommen... 11.1K

Version

aed6c793

e2277f66 11.1K

Host

Runtime

Compare stack traces: CPU Time .74% per Endpoints for GET /heavy_computation .89% Visualize as: Flame Graph Table

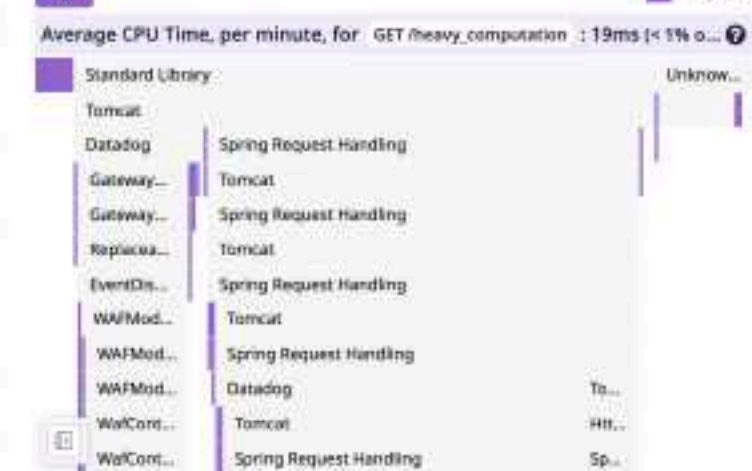
Filter flame graph

Group by Method

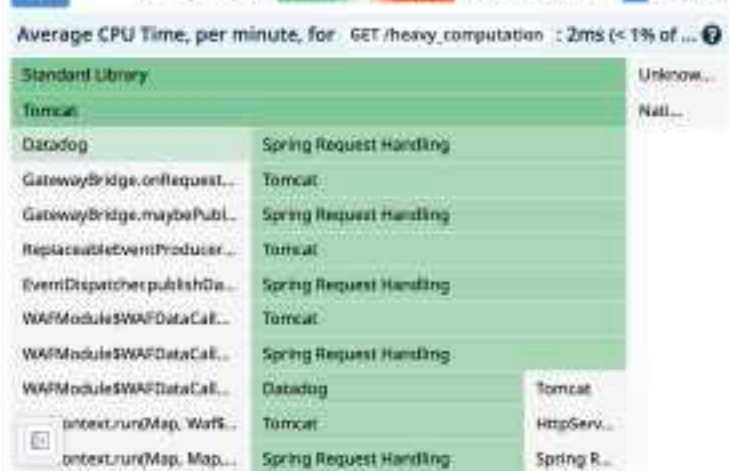
View Only My Code

Options

Average CPU Time, per minute, for GET /heavy_computation : 19ms (< 1% of ...)



B Average CPU Time, per minute, for GET /heavy_computation : 2ms (< 1% of ...)



Continuous Profiling - Pragmatic Advice

- Keep an eye on it! It'll be table stakes soon enough.

“ Great! I can avoid terrible things creeping into my Java. But, I have another codebase for the frontend. And its written in ... another language. Without types. Help?”

Incremental Typing

Less Easy, Pretty Great

Javascript

```
function(a){var b=["resolve",...  
function(){return e.done arguments  
(done, resolve).fail(c.reject);if (e  
[a][2].disable, b[2][2].disable, a  
referred to, function(a,b,c){return  
(done, resolve).fail(g.reject):—f; return  
e, done, resolve, n.readyWait>0}}; resolve  
dispatchEvent("readystatechange",K), e.detail  
addEventListener("DOMContentLoaded",  
setTimeout(f,50))}J(), n.ready  
document.getElementById("div"), e.style.cssText="padding:  
10px; margin: 10px; border: 1px solid #ccc; width: 100px; height: 100px; text-align: center; line-height: 100px; font-size: 12px; font-weight: bold; color: #000080; background-color: #f0f0f0; border-radius: 5px; box-shadow: 2px 2px 0px #000080;";  
data(a,b,c)}else c="void"  
if(k&&j[k]&&(e||j[k].data  
void 0:=d&&(g[n.camelCase  
(camelCase)):b in d?b={b}:—  
"embed ":!0,"object " :  
removeData:function(a,b){return  
camelCase(d.slice(5)),P  
removeData(this
```

Typescript?

```
function addPrices(a, b) {  
    return a + b;  
}
```

```
const total = addPrices(10, "5");  
console.log(total); // "105" 🤖
```



```
function addPrices(a: number, b: number): number {  
    return a + b;  
}
```

```
const total = addPrices(10, "5");  
// ✖ Error:  
// Argument of type 'string' is not  
// assignable to parameter of type 'number'
```

```
// @ts-check
/**
 *
 * @param {number} a
 * @param {number} b
 * @returns {number}
 */
function add(a, b) {
    return a + b;
}
```

Ok, so I did mention
Scala ...

```
interface Payment {}  
class CreditCard implements Payment {}  
class Paypal implements Payment {}  
class DebitCard implements Payment {}  
  
void process(Payment p) {  
    if (p instanceof CreditCard) /* process credit */ ;  
    else if (p instanceof Paypal) /* process paypal */ ;  
    else throw new IllegalArgumentException(); // Runtime party!  
}
```

```
sealed trait Payment
case class CreditCard() extends Payment
case class Paypal() extends Payment
case class DebitCard() extends Payment

def process(p: Payment): Unit = p match
  case CreditCard() => /* process credit */
  case Paypal()      => /* process PayPal */

/* If we don't add a case for DebitCard,
   this will not compile ! */
```

```
opaque type Meter = Int
opaque type Second = Int

object Meter:
  def apply(m: Int): Meter = m

object Second:
  def apply(s: Int): Second = s

def speed(distance: Meter, time: Second): Double =
  // ✗ won't compile
  // Dear programmer, what is your _intent_ ?
  distance.toDouble / time
```

Incremental Typing Recommendations

- Favour **TypeScript** over **JavaScript** 🐛
- Consider whether **Scala** or **Kotlin** add any value for your domain (they may well not!)

Crafting Quality Software

- Quality has to be tended to over time
- Good design is good ...
- ... automated guard-rails are essential!
- Static|Dynamic analysis is here to help
- Encode structural checks for what matters

That's it!



<https://scottgerring.com>