

# Greenfield-Webapplikation mit Java

im Ein-Person-Selbstversuch

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# Today's goal

How to run and maintain a modern web java application with minimal resources

# About me

- By day: Community @ Elastic
- By night: sleep
- In between: Elasticsearch enthusiast, web framework evaluator, serverless observer, distributed work proponent, basketball fan
- Java since '07

# Why greenfield?

- Assessing current skills & technologies
- Acquiring new skills & technologies
- Communication/Feedback
- Business idea
- Test out competition
- Understand the full application lifecycle
- Just for fun

# Limitations

- Full-time job
- Family & Kids
- Covid-19
- No full stack developer

# Requirements

- Do the needful - *but not more*
- Operational simplicity - *No Kubernetes!*

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**Corey Quinn** @QuinnyPig · 1h

I'm somewhat unconvinced that presenting customers with 76 decisions to get a Kubernetes cluster up is a net positive. If it were true that "more options equals better" then @SAP would own the entire Cloud market.



**Richard Seroter** @rseroter · 9h

I don't know what got into me, but I decided to review ALL the available configuration options when provisioning the three major Kubernetes services in the cloud: GKE, AKS, and EKS.

tl;dr. GKE has 76 options, AKS has 33, and EKS has 33.

[seroter.com/2021/05/04/wha...](https://seroter.com/2021/05/04/wha...)

The screenshot shows a configuration form for a Kubernetes cluster. It includes the following elements:

- Specify default node locations (4)
- Current default: us-central1-c
- Control plane version**
- Choose a release channel for automatic management of your cluster's version and upgrade cadence. Choose a static version for more direct management of your cluster's version. [Learn more.](#)
- Static version (5)
- Release channel
- Release channel: Regular channel (default) (6)
- Version: 1.18.16-gke.2100 (default) (7)
- Buttons: CREATE, CANCEL, Equivalent REST or COMMAND LINE

13

2

42



**Torsten Bøgh Köster**

@tboeghk

Replying to @QuinnyPig

I reviewed EKS, GKE and DO in terms of Terraform lines: DO needed 10, GKE 150 and EKS a whopping 500 lines of Terraform code 🤔

#fewerisbetter

# Requirements

- Do the needful - *but not more*
- Operational simplicity - *No Kubernetes!*
- Easy rollouts - *git pushes*
- No login handling - *OAuth*
- Optimize for (single) developer productivity
- Small deployments, few dependencies!
- Ability to debug



# Idea

- Developer Advocate Conference & Talks Management

# Conferences @Elastic

- Labels for tagging/reporting
- Milestone for CFP closure
- No fixed date fields
- No final closing report (pictures, sponsors, competitors)
- No easy overview over submitted talks

## 2021-04 devday - Dresden, DE #2285

Edit New issue

Open xeraa opened this issue on 17 Nov 2020 · 4 comments

xeraa commented on 17 Nov 2020

Event is 2021-04-20  
CFP closes 2021-?-?  
Hear back by ?

CFP link: <https://www.devday.de/session/dev-day-2021/create-session/>  
Conference website: <https://www.devday.de>

**Copied from CFP page:**

Not much info yet; final details in 2021

**Related/Previous Events**

#2239 (2020)

xeraa added lang:de country:de focus:none region:EMEA-C 2021-04 labels on 17 Nov 2020

xeraa added this to the CFPs closing in February 2020 milestone on 17 Nov 2020

xeraa commented on 17 Nov 2020

I'll probably be on the program committee; not sure if I'll submit then 😊

spinscale commented on 14 Dec 2020

Submitted [Running a Serverless Lucene Reverse Geocoder](#):

Serverless und Java - passt das überhaupt zusammen? Cold starts, Memory Footprint - all das spricht nicht für Java. In diesem Vortrag wird ein Reverse Geocoder - die Zuordnung von Längen- und Breitengrad zu einer Stadt) mit Hilfe von Apache Lucene implementiert, so dass dieser Teil der serverless Anwendung und kein weiterer Endpunkt beim Aufruf abgerufen werden muss. Durch die Implementierung wird aufgezeigt, wie verschiedene Cloud Provider eine serverless Plattform interpretieren (AWS Lambda & Google Cloud Run), und welche Vor- und Nachteile dadurch für den Entwickler entstehen. Außerdem schauen wir uns an, wie man das Cold Start Problem mit GraalVM in den Griff bekommt.

spinscale self-assigned this on 14 Dec 2020

spinscale added the submitted label on 14 Dec 2020

spinscale commented on 14 Dec 2020

Submitted [Two steps forward, one step backward - backward compatibility in Elasticsearch as well](#) (in german)

Assignees

spinscale

Labels

2021-04 country:de focus:none lang:de region:EMEA-C submitted

Projects

None yet

Milestone

CFPs closing in February 2021

Linked pull requests

Successfully merging a pull request may close this issue.

None yet

Notifications

Customize

Unsubscribe

You're receiving notifications because you're watching this repository.

2 participants



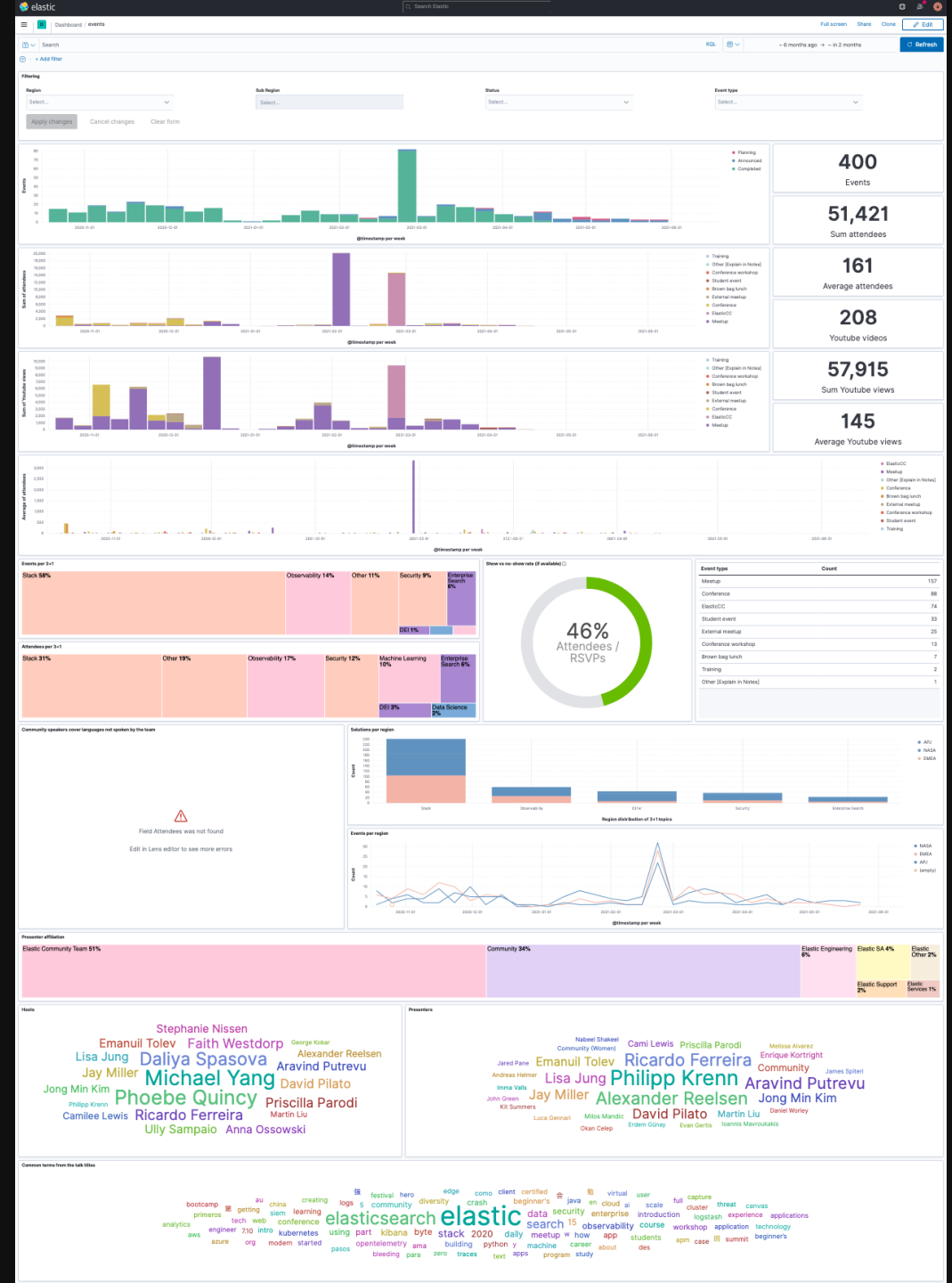
Lock conversation

Pin issue

Transfer issue

# Stats (+Airtable)

- Participants
- Youtube links





# Dashboard



Youtube Views (last 30 days)

4822



Total Youtube Views

62655

**Welcome to flipBit!**

Check out the documentation at the top and please provide feedback, we'd highly value that!



# Events

Current 10 events

[Add Event](#)

## Java User Group Munich - Greenfield Webapplikationen mit Java

2021-05-10



0



region:EMEA

lang:de

country:online

## DevOpsDays Munich

2021-05-01



0



topic:search

lang:en

region:EMEA

country:de

## Search Meetup Munich

2021-04-23



0



topic:search

lang:en

country:online

region:EMEA

## Berlin Buzzwords 2020

2021-04-16



0



topic:search

lang:de

lang:en

country:online

size:100-500

region:EMEA

## Java User Group Munich

2021-04-04



0



topic:search

lang:en

region:EMEA

country:de

## Java Case Study Festival

2021-03-30



0



focus:jvm

lang:en

country:online

region:EMEA

## DevOpsDays Munich

2021-03-15



0



topic:search

lang:en

region:EMEA

country:de

# Java User Group Munich - Greenfield Webapplikationen mit Java Meetup

[Edit](#)[Delete](#)

2021-05-10

[lang:de](#)[region:EMEA](#)[country:online](#)

Greenfield Webapplikation mit Java - ein Einperson Selbstversuch

## Submissions

[Add](#)[Greenfield Webapplikation mit Java - ein Einperson Selbstversuch](#) by Alexander Reelsen

25 attendees



## Comments

Your comment

 [Save](#)



## Talks

Alphabetically ▾[Add Talk](#)**Awesome logging infrastructure using the Elastic stack**

2021-03-21

**Awesome logging infrastructure using the Elastic stack**

2021-05-07

**Continuous Integration visualisieren, verstehen und verbessern**

2021-05-03

**Elasticsearch - Beyond Full-text Search**

2021-05-07

**Elasticsearch - Beyond Full-text Search**

2021-03-21

**Elasticsearch - Securing a search engine while maintaining usability**

2021-03-21

**Elasticsearch - Securing a search engine while maintaining usability**

2021-05-07

**Finding relevancy: Improving your application search bar!**

2021-05-07

**Greenfield Webapplikation mit Java - ein Einperson Selbstversuch**

2021-05-10

**Inside the Elastic: Testing a Well Known Open Source Stack - (Alexander Reelsen, Germany)**

2021-05-07

**Inside the Elastic: Testing a Well Known Open Source Stack - (Alexander Reelsen, Germany)**

2021-03-21

**Introduction into Elasticsearch & Spring Data Elasticsearch**

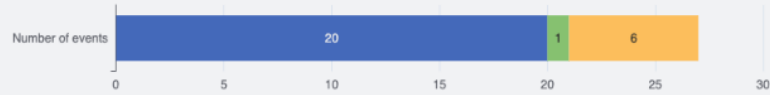
2021-03-21

# Reporting

From  To

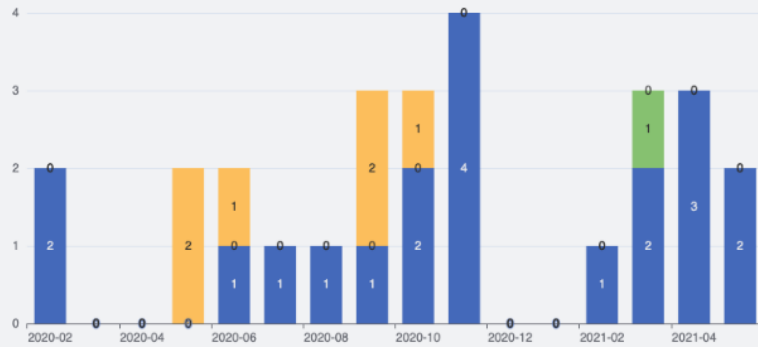
Events by type

accepted waiting rejected



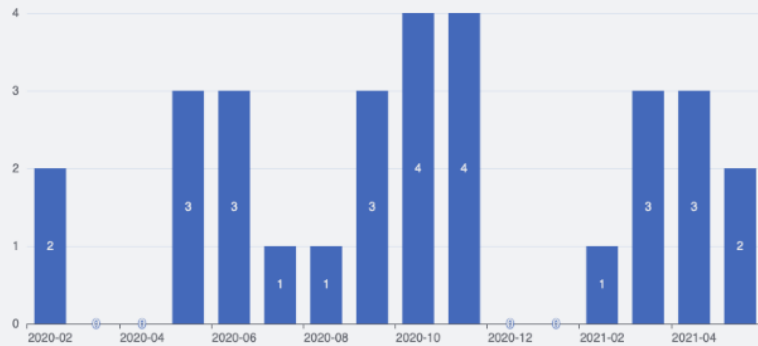
Events monthly by status

Accepted Waiting Rejected



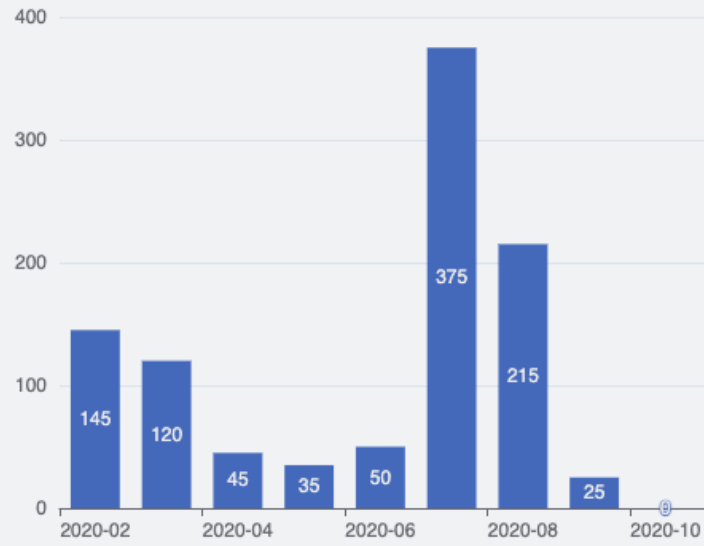
Event submissions by submitter

Alexander Roelsen

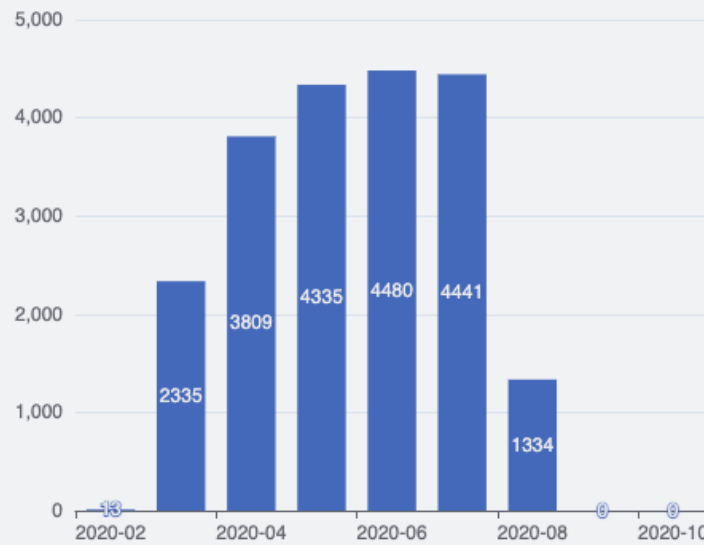




### Attendee counts



### Youtube views (incremental)



# Topics

- Database & Persistence
- Authentication & Security
- Web framework
- Frontend
- Development Environment & Testing
- Production Environment & Deployment

# Topics

- Database & Persistence (JDBI, Postgres, HikariCP)
- Authentication & Security (Pac4j)
- Web framework (Javalin)
- Frontend (htmx, hyperscript, Apache echarts, tailwindcss)
- Development Environment & Testing (direnv, testcontainers)
- Production Environment & Deployment

# Database & Persistence

Less magic, more SQL



# Persistence Layer

1. Elasticsearch using **templating** to prevent Object Mapping and not take the whole of Elasticsearch as dependency into
2. Postgres/H2 using **ebean**
3. Postgres/H2 using **JDBI**

# Persistence Layer: Connection Pool

```
PGSimpleDataSource ds = new PGSimpleDataSource();
ds.setUser(System.getenv("DB_USERNAME"));
ds.setPassword(System.getenv("DB_PASSWORD"));
ds.setUrl(System.getenv("DB_URL"));

HikariConfig hc = new HikariConfig();
hc.setDataSource(ds);
hc.setMinimumIdle(1);
hc.setMaximumPoolSize(6);

this.dataSource = new HikariDataSource(hc);
this.jdbi = Jdbi.create(dataSource);
this.jdbi.installPlugin(new PostgresPlugin());
this.jdbi.installPlugin(new SqlObjectPlugin());
```

# JDBI

| Jdbi provides convenient, idiomatic access to relational data in Java.

# JDBI

Jdbi provides convenient, idiomatic access to relational data in Java.

Unlike an ORM, we do not aim to provide a complete object relational mapping framework - instead of that hidden complexity, we provide building blocks that allow you to construct the mapping between relations and objects as appropriate for your application.



# User entity

```
public final class User {  
    private Long id;  
    ...  
    private List<Organization> organizations = new ArrayList<>(1);  
}
```

# JDBI - Dao interfaces

```
@RegisterBeanMapper(value = User.class, prefix = "u")
@RegisterBeanMapper(value = Organization.class, prefix = "o")
@UseRowReducer(UserOrganizationDocReducer.class)
@SqlQuery("""
    SELECT
        u.id u_id, u.username u_username, u.display_name u_display_name,
        u.picture_url u_picture_url, u.email u_email, u.created_at u_created_at,
        u.modified_at u_modified_at,
        o.id o_id, o.name o_name, o.created_at o_created_at, o.modified_at o_modified_at
    FROM users u
    JOIN user_organizations uo ON uo.user_id = u.id
    JOIN organization o ON uo.organization_id = o.id
    WHERE u.username = ?
    """)
User findByUsername(String username);
```

# JDBI - RowReducer

```
class UserOrganizationDocReducer implements LinkedHashMapRowReducer<Long, User> {  
    @Override  
    public void accumulate(Map<Long, User> map, RowView rv) {  
        User u = map.computeIfAbsent(rv.getColumn("u_id", Long.class), id -> rv.getRow(User.class));  
  
        if (rv.getColumn("o_id", Long.class) != null) {  
            u.getOrganizations().add(rv.getRow(Organization.class));  
        }  
    }  
}
```

# JDBI - Custom SQL

```
@SqlQuery("""
SELECT
    to_char(DATE_TRUNC('month',created_at), 'YYYY-MM') AS month,
    SUM(count) AS count
FROM analytics
WHERE organization_id = :organization.id AND created_at >= :from
    AND created_at <= :to AND type = :type
GROUP BY month;
""")
@KeyColumn("month")
@ValueColumn("count")
Map<String, Long> sumAndGroupByMonth(
    @BindBean("organization") Organization organization,
    @Bind("type") Analytics.AnalyticsType type,
    @Bind("from") OffsetDateTime from, @Bind("to") OffsetDateTime to);
```

# JDBI - enums

```
public final class Comment {  
  
    @EnumByName  
    public enum CommentType {  
        COMMENT,  
        REPORT  
    }  
}
```

# JDBI - security

- Multi-tenant system, implicit security issue
- How to prevent unauthorized access?
- Every DAO read operation requires an organization argument
- Organization cannot be injected from outside

# Flyway Database Migrations

```
// run the flyway migration before the app starts
Flyway flyway = Flyway.configure().dataSource(dataSource).load();
final MigrateResult result = flyway.migrate();
logger.info("flyway migration result, executed [{}] migrations on schema [{}] on database [{}]",
            result.migrationsExecuted, result.schemaName, result.database);
```

# Authentication & Security



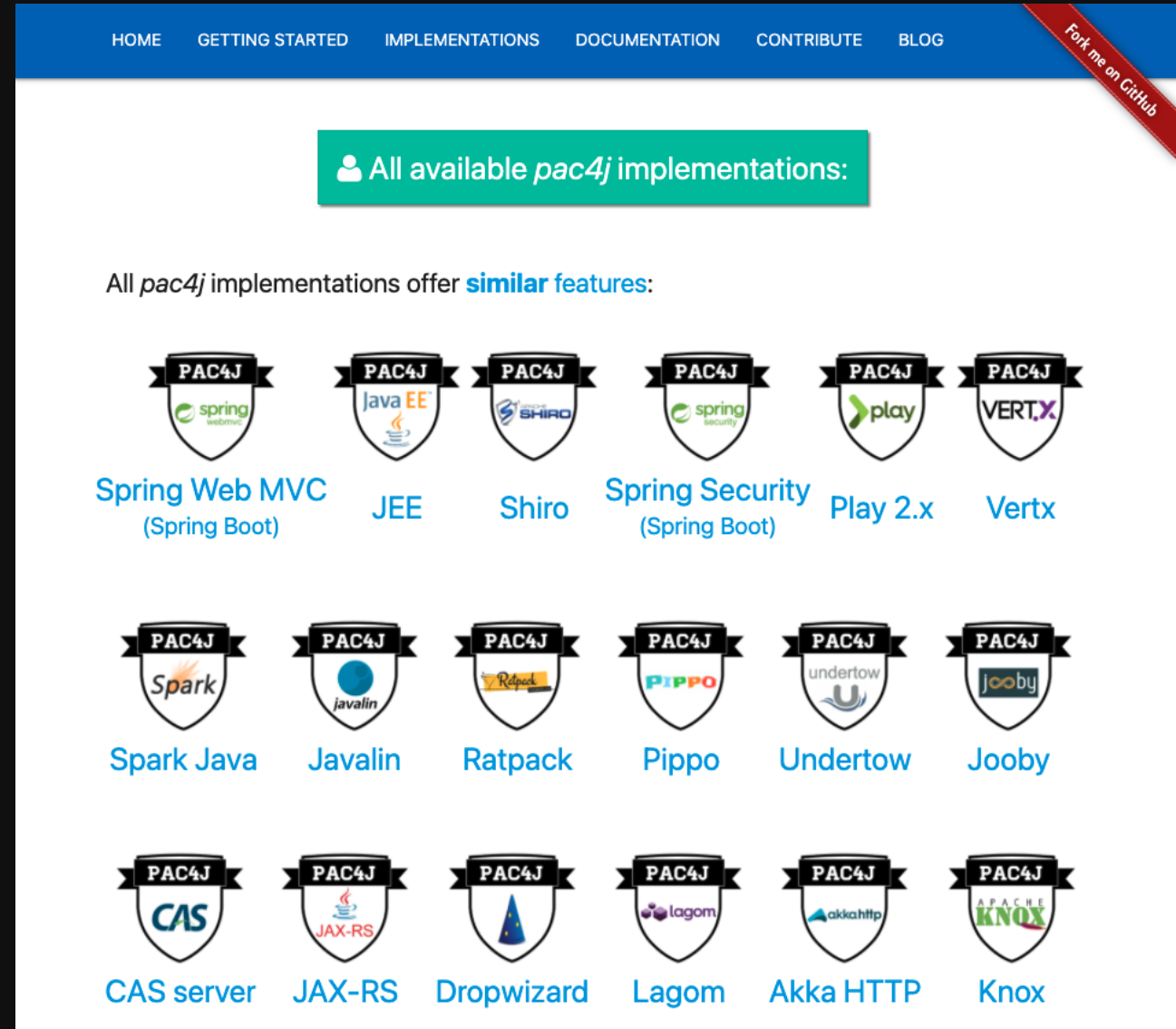


# Authentication

- Storing own passwords is not an option in a hobby project
- OAuth is the perfect fit to give away responsibilities
- Login via github, then storing in session
- Advantage: Unique usernames
- Solution: `pac4j`

# Pac4j

- [javalin-pac4j](#)
- Support for OAuth, SAML, CAS, OpenID Connect, SPNEGO
- OAuth: GitHub, LinkedIn, Dropbox, Facebook, Google, Twitter, Wordpress (Generic for custom endpoints)





















HOME GETTING STARTED IMPLEMENTATIONS DOCUMENTATION CONTRIBUTE BLOG

Fork me on GitHub

All available *pac4j* implementations:

All *pac4j* implementations offer **similar** features:

 Spring Web MVC (Spring Boot)	 JEE	 Shiro	 Spring Security (Spring Boot)	 Play 2.x	 Vertx
 Spark Java	 Javalin	 Ratpack	 Pippo	 Undertow	 Jooby
 CAS server	 JAX-RS	 Dropwizard	 Lagom	 Akka HTTP	 Knox

# Security - Organization check

```
User loggedInUser = ctx.sessionAttribute("user");
if (loggedInUser != null) {
    if (ctx.pathParamMap().containsKey("organization")) {
        final String pathOrganization = ctx.pathParam("organization");
        boolean isUserPartOfOrganization = loggedInUser.getOrganizations().stream()
            .anyMatch(o -> o.getName().equals(pathOrganization));
        if (isUserPartOfOrganization == false) {
            throw new NotFoundResponse("...");
        }
        final Organization organization = organizationDao.findByName(pathOrganization);
        ctx.sessionAttribute("organization", organization);
    }
}
```

- Can you spot the issue?

# Web framework



# HTTP Server & Framework

- Javalin
- Written in Kotlin
- On top of Jetty
- Sync/Async APIs

# Javalin

```
> Task :run
2021-04-16T16:45:00.745+0200 [main] [INFO] com.zaxxer.hikari.HikariDataSource - HikariPool-1 - Starting...
2021-04-16T16:45:00.877+0200 [main] [INFO] com.zaxxer.hikari.HikariDataSource - HikariPool-1 - Start completed.
2021-04-16T16:45:01.031+0200 [main] [INFO] org.flywaydb.core.internal.license.VersionPrinter - Flyway Community Edition 7.7.2 by Redgate
2021-04-16T16:45:01.065+0200 [main] [INFO] org.flywaydb.core.internal.database.base.DatabaseType - Database: jdbc:postgresql://localhost:5432/alr (PostgreSQL 13.2)
2021-04-16T16:45:01.102+0200 [main] [INFO] org.flywaydb.core.internal.command.DbValidate - Successfully validated 4 migrations (execution time 00:00.019s)
2021-04-16T16:45:01.110+0200 [main] [INFO] org.flywaydb.core.internal.command.DbMigrate - Current version of schema "public": 0004
2021-04-16T16:45:01.111+0200 [main] [INFO] org.flywaydb.core.internal.command.DbMigrate - Schema "public" is up to date. No migration necessary.
2021-04-16T16:45:01.119+0200 [main] [INFO] app.App - flyway migration result, executed [0] migrations on schema [] on database [alr]
2021-04-16T16:45:01.145+0200 [main] [INFO] org.eclipse.jetty.util.log - Logging initialized @612ms to org.eclipse.jetty.util.log.Slf4jLog
2021-04-16T16:45:01.189+0200 [main] [INFO] io.javalin.Javalin - Static file handler added:
  {urlPathPrefix: "/css", path: "build/resources/css", location: Location.EXTERNAL}
  Resolved path: 'build/resources/css'
2021-04-16T16:45:02.750+0200 [main] [INFO] io.javalin.Javalin - Starting Javalin ...
2021-04-16T16:45:02.848+0200 [main] [INFO] io.javalin.Javalin - Listening on http://localhost:7000/
2021-04-16T16:45:02.848+0200 [main] [INFO] io.javalin.Javalin - Javalin started in 100ms \o/
2021-04-16T16:45:02.849+0200 [flipbit-single-thread-executor] [INFO] service.YoutubeService - Triggered youtube analytics
2021-04-16T16:45:02.909+0200 [flipbit-single-thread-executor] [INFO] service.YoutubeService - Last update [2021-04-16T10:15:58.855305Z] is less than 24h ago, not retrieving youtube stats
<=====--> 88% EXECUTING [38s]
> :run
```

# Javalin App Setup

- Big `App` class, that could be modularized
- DB setup
- DAOs
- Routes & Controllers
- Background job initialization

# App Setup

```
OrganizationDao organizationDao = jdbi.onDemand(OrganizationDao.class);
UserDao userDao = jdbi.onDemand(UserDao.class);
EventDao eventDao = jdbi.onDemand(EventDao.class);
AnalyticsDao analyticsDao = jdbi.onDemand(AnalyticsDao.class);
ContentResourceDao contentResourceDao = jdbi.onDemand(ContentResourceDao.class);
TalkDao talkDao = jdbi.onDemand(TalkDao.class);
SubmissionDao submissionDao = jdbi.onDemand(SubmissionDao.class);
CommentDao commentDao = jdbi.onDemand(CommentDao.class);
EventTagsDao eventTagsDao = jdbi.onDemand(EventTagsDao.class);
InvitationDao invitationDao = jdbi.onDemand(InvitationDao.class);
```



# App Setup

```
ReportingController reportingController = new ReportingController(eventDao, analyticsDao, organizationDao);
SearchController searchController = new SearchController(eventDao, talkDao);
TalkController talkController = new TalkController(talkDao, eventDao, contentResourceDao, submissionDao);
SettingsController settingsController = new SettingsController(userDao, invitationDao);
Security security = new Security(organizationDao, userDao, invitationDao);
InviteeController inviteeController = new InviteeController(invitationDao);
```

# Javalin - Handler registration

```
app.before("/app/*", security.checkUserSessionHandler());

app.get("/app/{organization}/dashboard", reportingController.dashboard());
app.get("/app/{organization}/reporting", reportingController.reportingEcharts());
app.get("/app/{organization}/settings", settingsController.settings());
app.post("/app/{organization}/search", searchController.search());

post("/app/{organization}/event/{id}/submission/{talkId}/attendees", eventController.insertAttendeeAnalytics());
```

# Sample handler

```
public Handler deleteEvent() {  
    return ctx -> {  
        Organization organization = ctx.sessionAttribute("organization");  
        final Long id = ctx.pathParam("id", Long.class).get();  
        eventDao.delete(id, organization.getId());  
        ctx.redirect("/app/" + organization.getName() + "/event/");  
    };  
}
```

# Persistent sessions across restarts

```
this.app = Javalin.create(config -> {  
    ...  
    config.sessionHandler(this::sqlSessionHandler);  
});
```

# Persistent sessions across restarts

```
private SessionHandler sqlSessionHandler() {
    SessionHandler sessionHandler = new SessionHandler();
    SessionCache sessionCache = new DefaultSessionCache(sessionHandler);

    DatabaseAdaptor databaseAdaptor = new DatabaseAdaptor();
    databaseAdaptor.setDatasource(this.dataSource);
    JDBCSessionDataStoreFactory jdbcSessionDataStoreFactory = new JDBCSessionDataStoreFactory();
    jdbcSessionDataStoreFactory.setDatabaseAdaptor(databaseAdaptor);

    sessionCache.setSessionDataStore(jdbcSessionDataStoreFactory.getSessionDataStore(sessionHandler));
    sessionHandler.setSessionCache(sessionCache);
    sessionHandler.setHttpOnly(true);

    return sessionHandler;
}
```

# Templating Language

- JTE
- *Fast*
- Autocomplete in the IDE
- Custom tags
- Template precompilation possible
- Further optimizations to reduce GC/memory and increase throughput

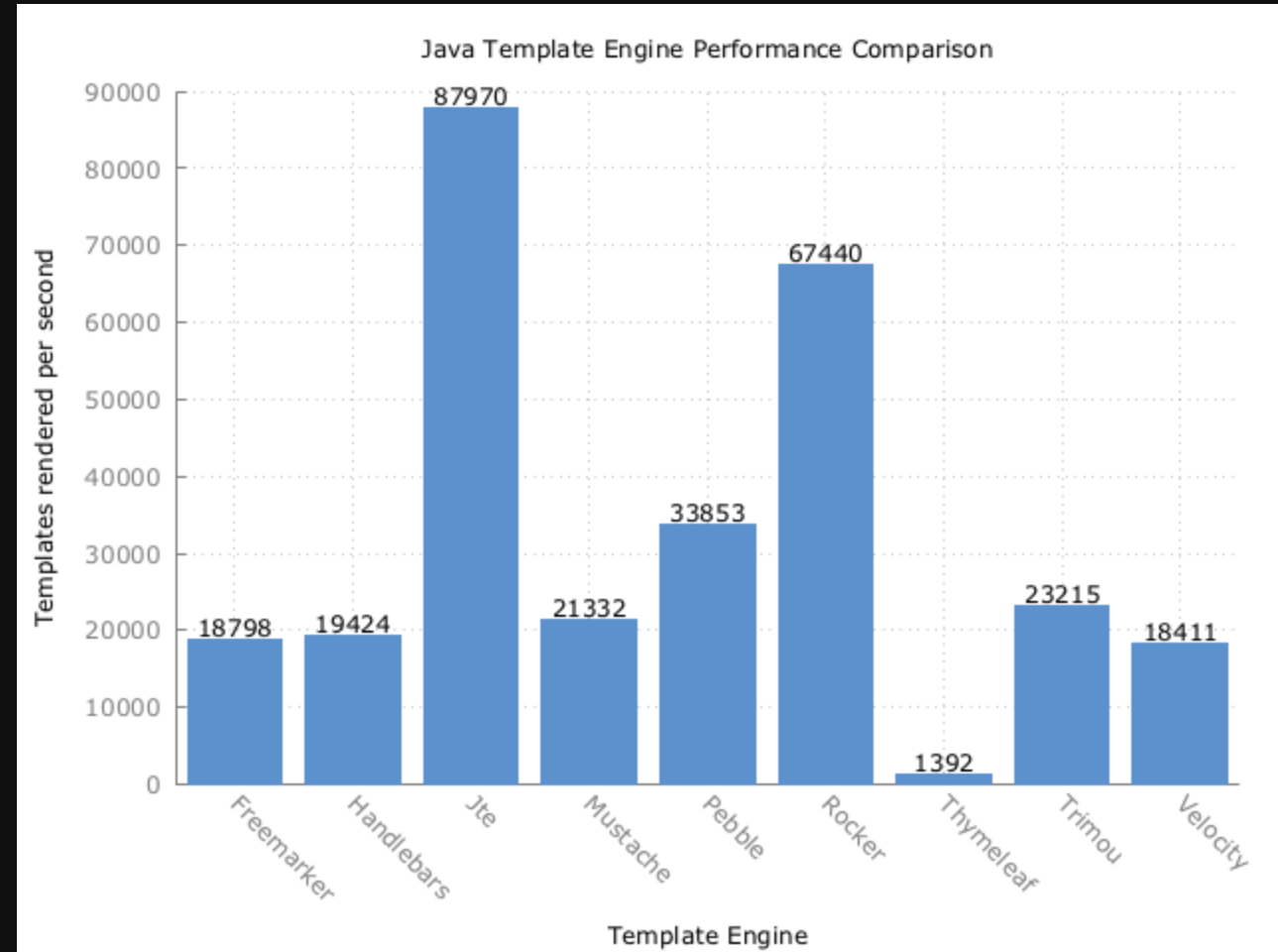
# JTE

```
@import static utils.TemplateUtils.capitalize

@param String organization
@param Talk talk
@param List<Event> events

<div class="col-span-1">
  <label for="type" class="block text-sm font-medium text-gray-700 font-mono">Type</label>
  <select id="type" name="type" class="mt-1 text-lg pl-2 pr-8 shadow-sm focus:bg-yellow-100 focus:border-none">
    @for(var type : ContentResource.ResourceType.values())
      <option value="{type.name()}">{capitalize(type.name())}</option>
    @endfor
  </select>
</div>
```

# JTE Benchmarks



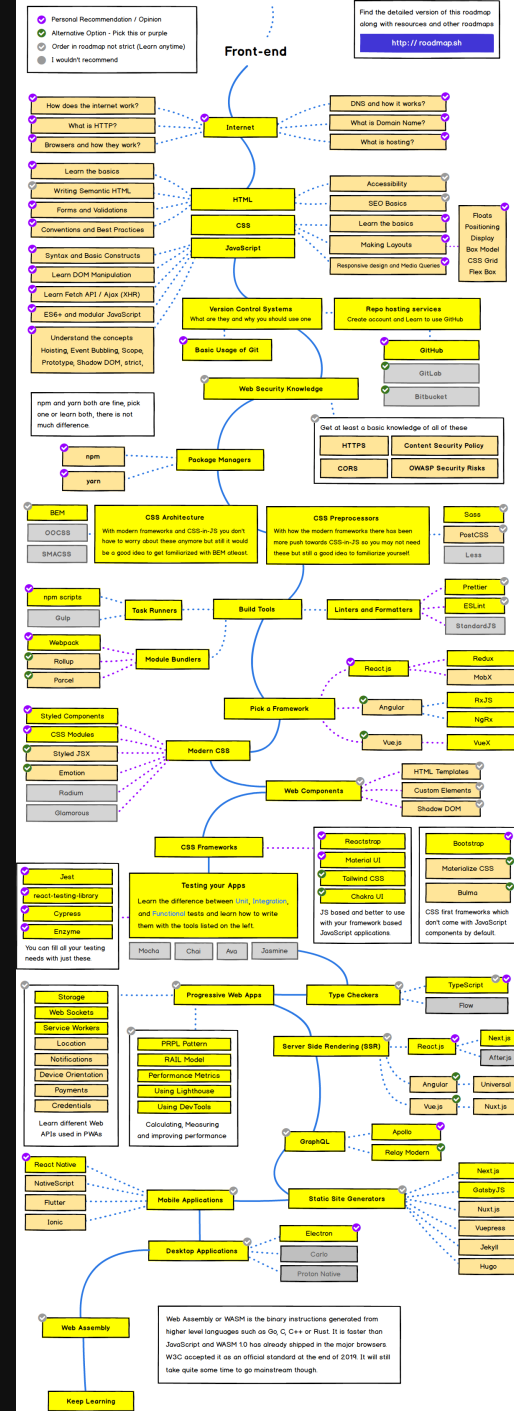


# JTE - Precompiled templates

```
// precompile JTE templates
tasks.precompileJte {
    sourceDirectory = Paths.get(project.projectDir.absolutePath, "src", "main", "jte")
    targetDirectory = Paths.get(project.projectDir.absolutePath, "jte-classes")
    compilePath = sourceSets.main.runtimeClasspath
    contentType = ContentType.Html
    compileArgs = [ '-source', '16' ]
}
```

# Frontend

See <https://roadmap.sh/frontend>



# Frontend



## Rapidly build modern websites without ever leaving your HTML.

A utility-first CSS framework packed with classes like **flex**, **pt-4**, **text-center** and **rotate-90** that can be composed to build any design, directly in your markup.

Get started

\$ npm install tailwindcss 

```
plugins {
  id "com.github.node-gradle.node" version "3.1.0"
}

node {
  // current LTS release
  version = "14.17.1"
  download = true
}

// build css and put it into resources directory
task build(type: NpmTask) {
  dependsOn npmInstall
  npmCommand = ['run', 'build']
  onlyIf {
    File destFile = file("$projectDir/build/src/flipbit.css")
    File sourceFile = file("$projectDir/src/flipbit.css")

    if (!destFile.exists()) {
      return true
    }

    return sourceFile.lastModified() > destFile.lastModified()
  }
}

task forceBuild(type: NpmTask) {
  dependsOn npmInstall
  npmCommand = ['run', 'build']
}
```

# Frontend: `package.json`

```
{
  "name": "css",
  "description": "tooling to create a custom tailwind build",
  "scripts": {
    "build": "./node_modules/.bin/tailwindcss --minify -i src/flipbit.css -o build/src/flipbit.css",
    "watch": "./node_modules/.bin/tailwindcss -w --minify -i src/flipbit.css -o build/src/flipbit.css"
  },
  "devDependencies": {
    "@tailwindcss/typography": "0.4.1",
    "@tailwindcss/forms": "0.3.3",
    "tailwindcss": "2.2.7"
  }
}
```

# Frontend:

# tailwind.config.js

```
module.exports = {
  mode: 'jit',
  purge: [
    '../src/main/jte/**/*.*jte',
    './src/**/*.*html',
    './src/**/*.*js',
  ],
  plugins: [
    require('@tailwindcss/typography'),
    require('@tailwindcss/forms')
  ]
}
```

# Frontend - fast builds

```
> ./gradlew :css:forceBuild
```

```
> Task :css:forceBuild
```

```
> css@ build /Users/alr/devel/spinscale/svelte-tailwind/css
```

```
> tailwindcss --minify -i src/flipbit.css -o build/src/flipbit.css
```

```
warn - You have enabled the JIT engine which is currently in preview.
```

```
warn - Previous features are not covered by semver, may introduce breaking changes, and can change at any time.
```

```
Done in 522ms.
```


```
Deprecated Gradle features were used in this build, making it incompatible with Gradle 8.0.
```

```
You can use '--warning-mode all' to show the individual deprecation warnings and determine if they come from your own scripts or plugins.
```

```
See https://docs.gradle.org/7.1.1/userguide/command\_line\_interface.html#sec:command\_line\_warnings
```

```
BUILD SUCCESSFUL in 2s
```

```
3 actionable tasks: 1 executed, 2 up-to-date
```

```
.../devel/spinscale/svelte-tailwind on main via  v16.0.2 took 3s
```

```
> █
```

# htmx - Ajax without JavaScript

htmx allows you to access AJAX, CSS Transitions, WebSockets and Server Sent Events directly in HTML, using attributes, so you can build modern user interfaces with the simplicity and power of hypertext

htmx is small (~10k min.gz'd), dependency-free, extendable & IE11 compatible



# htmx in HTML

```
<div class="hidden pt-3" id="resource-form">
  <form hx-post="/app/${organization}/talk/${talk.getId()}/resource" hx-push-url="true" hx-target="#main">
    ...
    <input ... />

    <button type="submit" class="flipbit-button">
      Save
    </button>
  </form>
</div>
```

# hyperscript

hyperscript is an easy and approachable language designed for modern front-end web development

# htmx + hyperscript = no javascript

```
<button _="on click toggle .hidden on #resource-form" class="flipbit-button">Add</button>
```

# htmx - hide/show on click

```
<button class="flipbit-button" _="on click hide me show #form-add-submissions">
```

# htmx - hide/show on hover

```
<div _="on mouseenter toggle .visible on #help until mouseleave">  
  Mouse Over Me!  
</div>  
<div id="help"> I'm a helpful message!</div>
```

# htmx - validate on change

```
<input type="date" name="start_at" id="start" class="..."  
  value="{ZonedDateTime.now().format(YEAR_MONTH_DAY_FORMATTER)}"  
  _="on change if #end.value == '' or #start.value > #end.value  
    then set { value: #start.value, min: #start.value } on #end" />
```

# htmx - multiple events

```
<div class="px-8 relative inline-block">
  <input class="..." id="searchbar" type="text" placeholder="🔍 Search..." name="flipbit-query"
    hx-post="/app/${organization}/search"
    hx-trigger="keyup changed delay:500ms"
    hx-target="#search-results"
    hx-indicator=".htmx-indicator"
    _="on keyup[key is '/' and target does not match <input, textarea/>] from <body/> call me.focus()
      on blur wait 200ms hide #search-results
      on focus show #search-results"/>
  <div id="search-results" class="absolute z-50 w-64 mt-1 pl-4 flipbit-search-results">
</div>
</div>
```

# Development Environment & Testing





# Local system setup via direnv

direnv - unclutter your .profile

```
.envrc
```

```
dotenv
```

# Local system setup via direnv

`.env`

```
GITHUB_KEY="<<KEY>>"
GITHUB_SECRET="<<SECRET>>"
GITHUB_CALLBACK_URL="http://localhost:7000/auth/login/github"
MODE=development
PORT="7000"
YOUTUBE_TOKEN="<<YT_TOKEN>>"

#DB_USERNAME="sa"
#DB_PASSWORD=""
#DB_URL="jdbc:h2:mem:flipbit_in_memory;MODE=PostgreSQL;DB_CLOSE_DELAY=-1;DATABASE_TO_UPPER=false"
DB_USERNAME="alr"
DB_PASSWORD=""
DB_URL="jdbc:postgresql://localhost:5432/alr"
```

# Development vs. production mode

```
public enum Mode {  
  
    PRODUCTION, DEVELOPMENT;  
  
    public static Mode current() {  
        final String mode = System.getenv("MODE").toUpperCase(Locale.ROOT);  
        return Mode.valueOf(mode);  
    }  
  
    public static boolean isProduction() { return current() == PRODUCTION; }  
  
    public static boolean isDevelopment() { return current() == DEVELOPMENT; }  
}
```

# Development vs. production mode

```
// this is the location in the dockerfile
// probably makes more sense to put this into an env var
if (Mode.isProduction()) {
    config.addStaticFiles("/css", "/flipbit-app/resources/css", Location.EXTERNAL);
} else {
    config.addStaticFiles("/css", "build/resources/css", Location.EXTERNAL);
}
```

# Development vs. production mode

```
final TemplateEngine templateEngine;
// no template compilation in prod, because of the read only docker image
// templates are created as part of the build
if (Mode.isProduction()) {
    templateEngine = TemplateEngine.createPrecompiled(Paths.get("/jte-classes"), ContentType.Html);
} else {
    final DirectoryCodeResolver resolver = new DirectoryCodeResolver(Paths.get("src", "main", "jte"));
    templateEngine = TemplateEngine.create(resolver, ContentType.Html);
    templateEngine.precompileAll();
}
JavalinJte.configure(templateEngine);
```

# Testing

```
testImplementation "org.assertj:assertj-core:3.19.0"  
testImplementation 'org.mockito:mockito-core:3.8.0'  
testImplementation 'org.junit-pioneer:junit-pioneer:1.3.8'  
  
testImplementation "org.testcontainers:junit-jupiter:1.15.2"  
testImplementation "org.testcontainers:postgresql:1.15.2"  
  
testImplementation 'nl.jqno.equalsverifier:equalsverifier:3.5.5'  
  
testImplementation 'org.junit.jupiter:junit-jupiter-api:5.7.1'  
testRuntimeOnly 'org.junit.jupiter:junit-jupiter-engine:5.7.1'
```

# EqualsVerifier

```
@Test
public void testEqualsVerifierUser() {
    EqualsVerifier.simple().forClass(User.class).verify();
}
```

# Supporting Tools

- Forbidden APIs
- Errorprone
- spotless



# Errorprone

```
> ./gradlew clean check
Starting a Gradle Daemon, 5 stopped Daemons could not be reused, use --status for details

> Task :compileTestJava
/Users/alr/devel/spinscale/svelte-tailwind/src/test/java/model/EqualsVerifierTests.java:10: warning: [UnusedVariable] The local variable 'foo' is never read.
    final String foo = String.format("foo bar");
                   ^
    (see https://errorprone.info/bugpattern/UnusedVariable)
    Did you mean to remove this line or 'String.format("foo bar");'?
error: warnings found and -Werror specified
1 error
1 warning

> Task :compileTestJava FAILED

FAILURE: Build failed with an exception.
```

# Forbidden APIS

```
.../devel/spinscale/svelte-tailwind on ʘ main [!] via ☕ v16
❯ ./gradlew check

> Task :forbiddenApisTest FAILED
Forbidden method invocation: java.lang.String#format(java.lang.String,java.lang.Object[]) [Uses default locale]
  in model.EqualsVerifierTests (EqualsVerifierTests.java:12)
Scanned 23 class file(s) for forbidden API invocations (in 0.15s), 1 error(s).

FAILURE: Build failed with an exception.

* What went wrong:
Execution failed for task ':forbiddenApisTest'.
> de.thetaphi.forbiddenapis.ForbiddenApiException: Check for forbidden API calls failed, see log.
```

# Production environment



# Packaging

- gradle `application` plugin
- Creates shell scripts for services automatically via `installDist` task
- `bin/flipbit-app`
- Package size: less than 13MB

```
flipbit-app
├── bin
│   ├── flipbit-app
│   └── flipbit-app.bat
└── lib
    ├── annotations-13.0.jar
    ├── antlr4-runtime-4.9.jar
    ├── autolink-0.10.0.jar
    ├── caffeine-2.8.0.jar
    ├── checker-qual-3.5.0.jar
    ├── commonmark-0.17.1.jar
    ├── commonmark-ext-autolink-0.17.1.jar
    ├── commonmark-ext-gfm-strikethrough-0.17.1.jar
    ├── commonmark-ext-gfm-tables-0.17.1.jar
    ├── commonmark-ext-task-list-items-0.17.1.jar
    ├── commons-codec-1.15.jar
    ├── encoder-1.2.3.jar
    ├── flipbit-app-0.1.0-SNAPSHOT.jar
    ├── flyway-core-7.7.2.jar
    ├── geantyref-1.3.7.jar
    ├── h2-1.4.200.jar
    ├── HikariCP-4.0.3.jar
    ├── jackson-annotations-2.11.2.jar
    ├── jackson-core-2.11.2.jar
    ├── jackson-databind-2.11.2.jar
    ├── javalin-3.13.5.jar
    ├── javalin-pac4j-3.0.0.jar
    ├── javax.servlet-api-3.1.0.jar
    ├── jdbi3-core-3.18.1.jar
    ├── jdbi3-postgres-3.18.1.jar
    ├── jdbi3-sqlobject-3.18.1.jar
    ├── jetty-client-9.4.39.v20210325.jar
    ├── jetty-http-9.4.39.v20210325.jar
    ├── jetty-io-9.4.39.v20210325.jar
    ├── jetty-security-9.4.39.v20210325.jar
    ├── jetty-server-9.4.39.v20210325.jar
    ├── jetty-servlet-9.4.39.v20210325.jar
    ├── jetty-util-9.4.39.v20210325.jar
    ├── jetty-util-ajax-9.4.39.v20210325.jar
    ├── jetty-webapp-9.4.39.v20210325.jar
    ├── jetty-xml-9.4.39.v20210325.jar
    ├── jte-1.9.0.jar
    ├── jte-runtime-1.9.0.jar
    ├── kotlin-stdlib-1.3.71.jar
    ├── kotlin-stdlib-common-1.3.71.jar
    ├── kotlin-stdlib-jdk7-1.3.71.jar
    ├── kotlin-stdlib-jdk8-1.3.71.jar
    ├── pac4j-core-4.4.0.jar
    ├── pac4j-oauth-4.4.0.jar
    ├── postgresql-42.2.19.jar
    ├── scribejava-apis-7.1.1.jar
    ├── scribejava-core-7.1.1.jar
    ├── slf4j-api-1.8.0-beta4.jar
    ├── slf4j-simple-1.8.0-beta4.jar
    ├── websocket-api-9.4.39.v20210325.jar
    ├── websocket-client-9.4.39.v20210325.jar
    ├── websocket-common-9.4.39.v20210325.jar
    ├── websocket-server-9.4.39.v20210325.jar
    └── websocket-servlet-9.4.39.v20210325.jar
```

devel/spinscale/svelte-tailwind / main x

# Packaging: ZGC

```
def jvmOptions = ["-Xmx512m", "-XX:+UseZGC"]

startScripts {
    defaultJvmOpts = jvmOptions
}

run {
    dependsOn('copyCssFile')
    jvmArgs += jvmOptions
}
```

# Packaging: Dockerfile

```
FROM gradle:7.0-jdk16 as build
COPY --chown=gradle:gradle . /home/gradle/src
WORKDIR /home/gradle/src
RUN gradle clean check precompileJte installDist --no-daemon
#####
FROM openjdk:16-slim-buster
RUN addgroup --system flipbit && adduser --system flipbit --ingroup flipbit
USER flipbit:flipbit

WORKDIR /flipbit-app
COPY --from=build /home/gradle/src/build/ /flipbit-app
COPY --from=build /home/gradle/src/jte-classes/ /jte-classes

EXPOSE 7000
ENTRYPOINT [ "/flipbit-app/install/flipbit-app/bin/flipbit-app" ]
```

# Packaging: APM agent

```
def agentVersion = "1.25.0"
task downloadAgent(type: Download) {
    mkdir ".gradle/agent/"
    src "https://repo1.maven.org/maven2/co/elastic/apm/elastic-apm-agent/${agentVersion}/elastic-apm-agent-${agentVersion}.jar"
    dest new File(".gradle/agent", "elastic-apm-agent-${agentVersion}.jar")
    onlyIfModified true
    overwrite false
}

task copyAgent(type: Copy) {
    dependsOn 'downloadAgent'
    from(".gradle/agent/elastic-apm-agent-${agentVersion}.jar") {
        rename "(.*)-${agentVersion}.jar", '$1.jar'
    }
    into "build/install/flipbit-app/agent/"
}
copyAgent.mustRunAfter installDist
```

```
ENV FLIPBIT_APP_OPTS="-javaagent:/flipbit-app/install/flipbit-app/agent/elastic-apm-agent.jar"
ENTRYPOINT [ "/flipbit-app/install/flipbit-app/bin/flipbit-app" ]
```

# Deployment

- `git push spinscale main`
- Digital Ocean App Platform (Github hook building & deploying the Docker image)
- Postgresql
- Costs: 27\$ per month (different kind of gym costs 😊)
- One click scale up



# Deployment alternatives

- Own VM: Price 💰 | Maintenance 👎 | Setup (TLS) 👎 | Custom rollout 👎
- Heroku: 💰💰💰
- Qovery 💰💰 👍
- Digital Ocean App Platform 💰💰 👍
- Others: fly.io, render, AWS Beanstalk
- Java makes options more expensive

# Summary



# But why no...?

- *Kotlin/Node/Ruby?* Didn't want to learn a new language, getting results fast
- *Spring Boot?* Not increasing my productivity at all...
- *SPA with a JSON API?* Making some things easier, and others harder. Requires to learn Svelte/Vue, TypeScript, node ecosystem
- *Quarkus/Micronaut* Not comfortable enough yet, but a good candidate for the future
- *Serverless* Google Cloud Run is a good candidate, app must be stateless

# The missing parts

| So much... all the time

- Development & Testing
- Build
- Metrics
- Ops
- Security
- UI

# Missing: Development & Testing

- Build high level classes around low level DAOs
- Don't run flyway for all unit tests, don't recreate h2 db for every test class
- Unique incrementing ids per organization
- Easy local development: offline support (no oauth)
- HtmlUnit/E2E Testing
- H2/Postgres gap

# Missing: Build

- GraalVM all the things - reduces monitoring
- Reproducible builds

# Missing: Metrics

- Business metrics/health endpoints
- Analytics (not needed with web logs?)
- Monitoring/APM

# Missing: Logs

- Logs is an issue on PaaS
- No stored logs in a storage bucket on DigitalOcean
- Storing logs can cost the same than running your app...
- Remote logging provider? Test when endpoint is not reachable



# Missing: Ops

- Terraform setup for DO
- Rate Limiting (Javalin built-in?)
- Terraform based monitoring (for example [Checkly](#))
- APM: Every agent supports Spring Boot and then nothing...



# Add Javalin plugin #1822

Edit Open with ▾

🔗 Merged eyalkoren merged 36 commits into elastic:master from spinscale:add-javalin-support on 13 Jul

💬 Conversation 62 📄 Commits 36 📄 Checks 0 📄 Files changed 15 +604 -2



spinscale commented on 21 May · edited ▾ Member 😊 ⋮

## What does this PR do?

This adds a javalin plugin which creates spans for handlers. This is what it looks like in the UI



Javalin is based on handlers. A handler can be a before or after handler or what to be executed for a certain HTTP endpoint or a combination of those. A handler is basically a functional interface, so that one can also add lambdas for a handler. Those had to be wrapped into a handler to create spans out of them, which is done with another instrumentation.

TODO: There are two left-over todos in the code. First I would like to get rid of the reflection, second the naming of span types and subtypes. I don't know if there are any standards for this I need to adhere to.

## Checklist

- This is an enhancement of existing features, or a new feature in existing plugins
  - I have updated [CHANGELOG.asciidoc](#)
  - I have added tests that prove my fix is effective or that my feature works
  - Added an API method or config option? Document in which version this will be introduced
  - I have made corresponding changes to the documentation

### Reviewers

- SylvainJuge ✓
- eyalkoren ✓

### Assignees

- eyalkoren

### Labels

agent-java

### Projects

APM-Agents

Done ▾

### Milestone

No milestone

### Linked issues

Successfully merging this pull request may close these issues.

None yet

### Notifications

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### 5 participants





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[Issues](#) 21

[Pull requests](#) 3

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# Expose HandlerType in Context #1264

Edit

Open with

Merged

tipsy merged 1 commit into [tipsy:master](#) from [spinscale:javalin-expose-handlertype-in-context](#) on 1 Jun

Conversation 2

Commits 1

Checks 9

Files changed 2

+33 -0



**spinscale** commented on 1 Jun

Contributor



Closes [#1263](#)

Reviewers

No reviews

Assignees

No one assigned



Expose HandlerType in Context

✓ 6a076e8

# Missing: Security

- Add all the fancy security headers, CORS
  - `X-XXS-Protection`, `X-Frame-Options`, `Content-Security-Policy`, `X-Content-Type-Options`. See also [OWASP Secure Header Project](#)
- Add seccomp policy to never fork processes
- Become smarter about landlock as a java security manager replacement



Search or jump to...

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[Code](#)

[Issues](#) 21

[Pull requests](#) 3

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# Add header configuration helper to simplify header setting #1293

Edit

Open with

Merged tipsy merged 5 commits into [tipsy:master](#) from [spinscale:add-headers-plugin](#) on 25 Jun

Conversation 20

Commits 5

Checks 9

Files changed 5

+296 -0



spinscale commented on 25 Jun

Contributor



This introduces a `Headers` class with a few pre-defined header names to have a DSL to easily configure headers. This has been created with the OWASP security headers in mind, but can be used for anything.

Closes [#1246](#)

Reviewers



tipsy



Assignees

No one assigned

Labels

None yet

Add header configuration helper to simpliy header setting ...

✓ beb5666

# Missing: UI

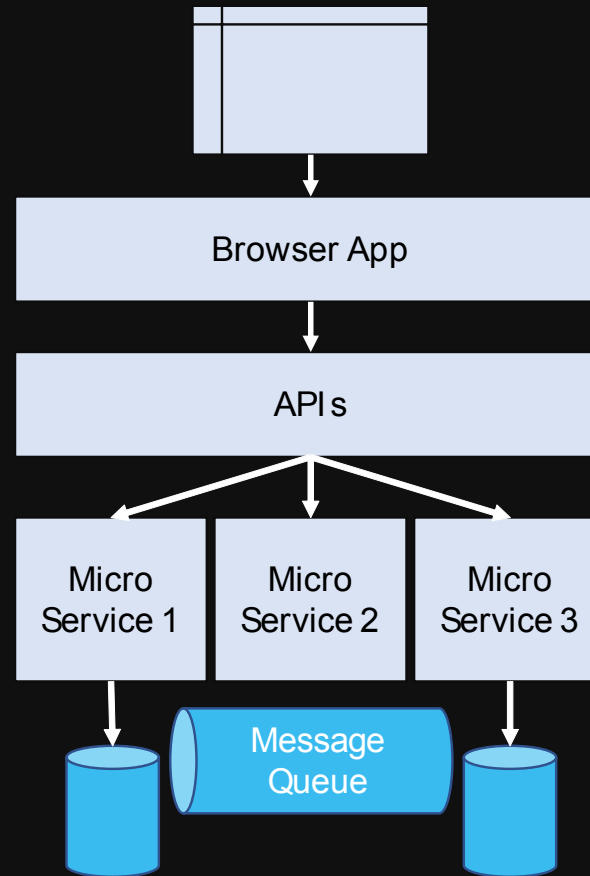
- Rework UI to make it acceptable
- CSS only chart libraries like [chartscss.org](https://chartscss.org)

# Summary

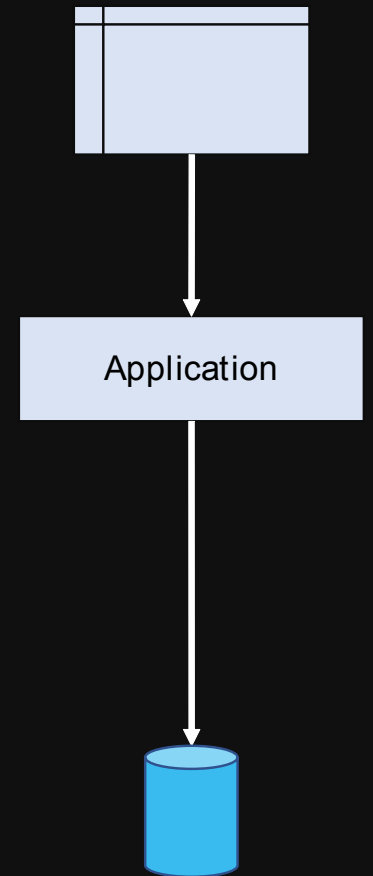
- Don't underestimate the work, but **Keep it fun!**
- There is no failure!
- Combining different libraries means a lot of learning
- **htmx/hyperscript is a frontend revelation for backend developers**
- **PaaS > K8s**

Radical simplicity

### Standard System



### Radical Simplicity





**Thanks for listening**

**Q & A**

Alexander Reelsen

alr@spinscale.de | @spinscale

# Discussion

- What technologies would you use?
- Where did I go wrong?

**Thanks for listening**

**Q & A**

Alexander Reelsen

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