Java Knights in Sofia

Eclipse MicroProfile

Past, Present & Future

28.11.2019

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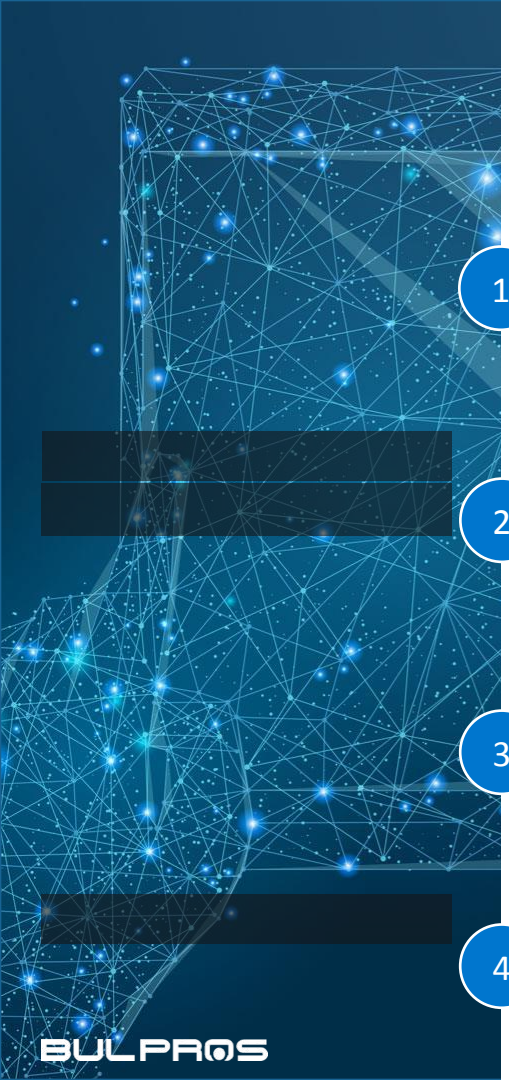


Who am I?

Java Developer

I'm writing java code for the last 16 years

Software developer

For the last 30 years

Java Enthusiast

- Java.beer in Plovdiv
- Part of Bulgarian Java User Group board
- I'm one of the organizers of jPrime conference
- I'm the organiser of the conference JProfessionals in Plovdiv

Member of JCP

I try to influence the direction where Java goes by participating in the elections of new JCP EC members every year for the last 10 years.

Agenda

- What is MicroProfile
- Short history of Microprofile with examples
- More information about MicroProfile

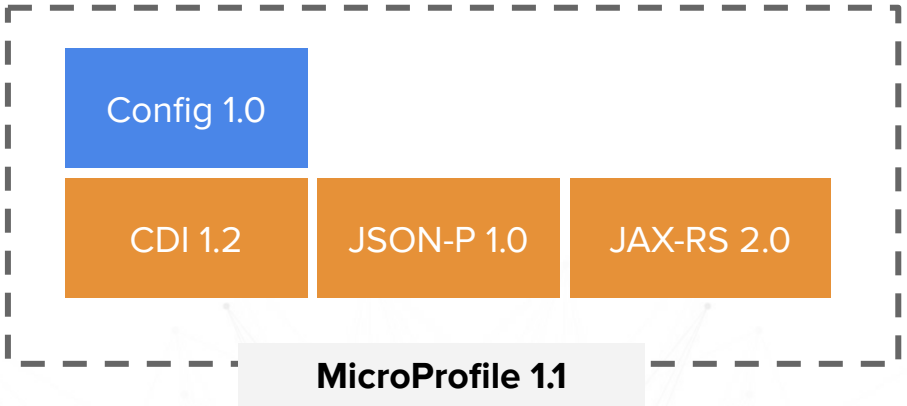
What is Microprofile?

- Initially started as initiative in 2016 by

- Main goal was to try and leverage Java EE technologies to create vendor-neutral microservice framework

Microprofile history

- Later in December 2016 Microprofile became an Eclipse project
- And in August 2017 new version of the specification was released



= New
= No change from last release

What is Config 1.0

- An API that is used to configure the application using externally provided parameters
- Actual implementations are provided by multiple vendors

```
@Singleton
@Path("/hello")
public class HelloResource {

   @Inject
   @ConfigProperty(name = "who", defaultValue = "world")
   private String who;

   @GET
   public String hello() {
      return "Hello " + who;
   }
}
```

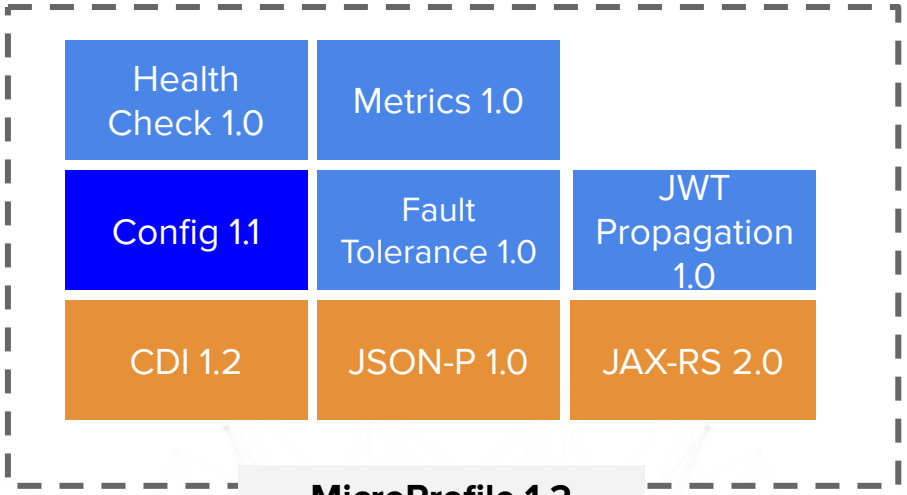
```
public class Config {

   public static void main(String[] args) {
      String who =
          ConfigProvider.getConfig().getOptionalValue("who", String.class).orElse("world");

      System.out.println("Hello " + who);
   }
}
```

Microprofile history

- In September 2017 Microprofile 1.2 was released



What is Metrics

- Specification that defines well known endpoints to monitor essential system parameters
- It provides access top **base**, **vendor** and **application** sets of parameters

```
@Singleton
@Path("/hello")
public class HelloResource {

  @Inject
  @ConfigProperty(name = "who", defaultValue = "world")
  private String who;

  @GET
  @Counted(name="hello counter", absolute = true, monotonic = true)
  public String hello() {
     return "Hello " + who;
  }
}
```

What is Health

- Health checks are used to probe the state of a computing node from another machine like Kubernetis service controller

```
@ApplicationScoped
@Health
public class HelloHealthCheck implements HealthCheck {

  @Inject
  MetricRegistry metricRegistry;

  @Override
  public HealthCheckResponse call() {
    long hello_count = metricRegistry.getCounters((n, m) -> n.endsWith("hello counter"))
                                     .values()
                                     .stream()
                                     .map(Counter::getCount)
                                     .reduce(0L, Long::sum);

    return HealthCheckResponse.builder()
                              .state(hello_count > 0)
                              .name("hello health")
                              .withData("total hello counter", hello_count)
                              .build();
  }
}
```

What is Fault Tolerance

- Timeout, Fall back, Circuit Breakers, Retry

```java
@Singleton
@Path("/hello")
public class HelloResource {

    private Random r = new Random(System.currentTimeMillis());

    @GET
    public String hello() {
        return "Fast hello world";
    }

    @GET
    @Path("/slow")
    @Timeout(500)
    @Fallback(fallbackMethod = "fallback")
    @Counted(name = "slow", monotonic = true)
    public String slowHello() {
        try { Thread.sleep(r.nextInt(1000)); } catch (InterruptedException ignored) { }
        return "Slow hello world";
    }

    @Counted(name = "fallback", monotonic = true)
    public String fallback() {
        return "fallback hello world";
    }
}
```

What is JWT Propagation

- This specification outlines a proposal for using OpenID Connect(OIDC) based JSON Web Tokens(JWT) for role based access control(RBAC) of microservice endpoints.

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzd
WIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gR
G9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKxwRJSM
eKKF2QT4fwpMeJf36POk6yJV_adQssw5c
```

```
{
  "alg": "HS256",
  "typ": "JWT"
}
```

```
{
  "sub": "1234567890",
  "name": "John Doe",
  "iat": 1516239022
}
```

```
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  secret
) base64 encoded
```

What is JWT Propagation

```java
@RequestScoped
@Path("/hello")
@Produces(MediaType.TEXT_PLAIN)
public class HelloResource {

  @Inject
  private JsonWebToken jsonWebToken;

  @GET
  @Counted(name="hello counter jwt", absolute = true, monotonic = true)
  @RolesAllowed({"authenticated"})
  public String jwtHello() {
     return "Hello " + jsonWebToken.getName();
  }

  @GET
  @Path("/nojwt")
  @Counted(name="hello counter no jwt", absolute = true, monotonic = true)
  @PermitAll
  public String noAuthentication() {
     return "Hello unauthenticated";
  }
}
```

```java
@ApplicationPath("/")
@LoginConfig(authMethod = "MP-JWT", realmName = "jwt-app")
@DeclareRoles("authenticated")
public class JWTApplication extends Application {}
```

Microprofile history

- In January 2018 Microprofile 1.3 was released
- And in June 2018 1.4 was released - no new API, only updates to some of the existing one

What’s new in 1.3

- Open Tracing

```
@Singleton
@Path("/hello")
public class HelloResource {

   @Inject
   @ConfigProperty(name = "who", defaultValue = "world")
   private String who;

  @GET
  @Produces(MediaType.TEXT_PLAIN)
   @Traced
   public String hello() {
            return "Hello " + who;
   }
}
```

- Open API

```
……..

<dependency>
   <groupId>org.microprofile-ext.openapi-ext</groupId>
   <artifactId>swagger-ui</artifactId>
   <version>1.0.2</version>
</dependency>

……..
```

```
@GET
@Counted(name="hello counter", absolute = true, monotonic = true)
@Produces(MediaType.TEXT_PLAIN)
@Operation(description = "returns \"Hello {who}\" where {who} is provided by
configuration or \"world\" if who is not provided")
public String hello() {
   return "Hello " + who;
}
```

What is REST Client

- The MicroProfile Rest Client provides a type-safe approach to invoke RESTful services over HTTP

```
@Path("/movies")
@RegisterRestClient
public interface MovieReviewService {

  @GET
  Set<Movie> getAllMovies();

  @GET
  @Path("/{movieId}/reviews")
  Set<Review> getAllReviews(@PathParam("movieId") String movieId);

  @GET
  @Path("/{movieId}/reviews/{reviewId}")
  Review getReview(@PathParam("movieId") String movieId, @PathParam("reviewId") String reviewId);

  @POST
  @Path("/{movieId}/reviews")
  String submitReview(@PathParam("movieId") String movieId, Review review);

  @PUT
  @Path("/{movieId}/reviews/{reviewId}")
  Review updateReview(@PathParam("movieId") String movieId, @PathParam("reviewId") String reviewId, Review review);
}
```

What is REST Client

Use plain API

```
private void consumeRestService() throws URISyntaxException {
   URI apiUri = new URI("http://localhost:9080/movieReviewService");
   MovieReviewService reviewSvc = RestClientBuilder.newBuilder()
                                        .baseUri(apiUri)
                                        .build(MovieReviewService.class);
   Review review = new Review(3 /* stars */, "This was a delightful comedy, but not terribly realistic.");
   reviewSvc.submitReview( movieId, review );
}
```

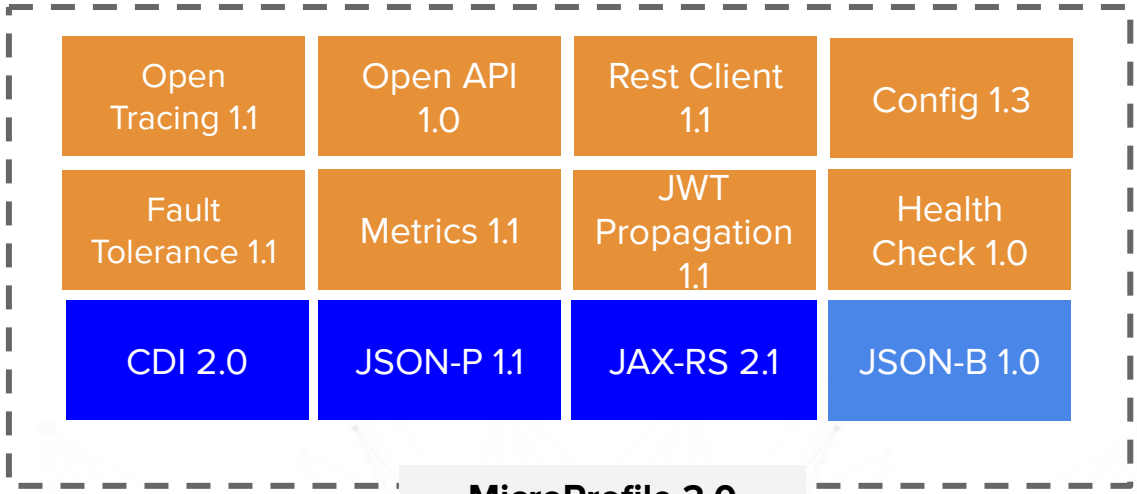
Use with CDI

```
@Inject
@RestClient
private MovieReviewService movieReviewService;

private void consumeRestService() {
   Review review = new Review(3 /* stars */, "This was a delightful comedy, but not terribly realistic.");
   movieReviewService.submitReview( movieId, review );
}
```

Microprofile history

- In June 2018 also 2.0 was released - Upgrade to Java EE 8 versions of the core API's

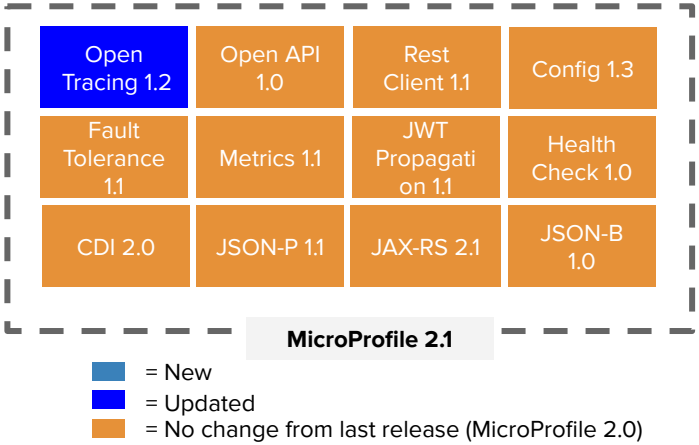


Microprofile history

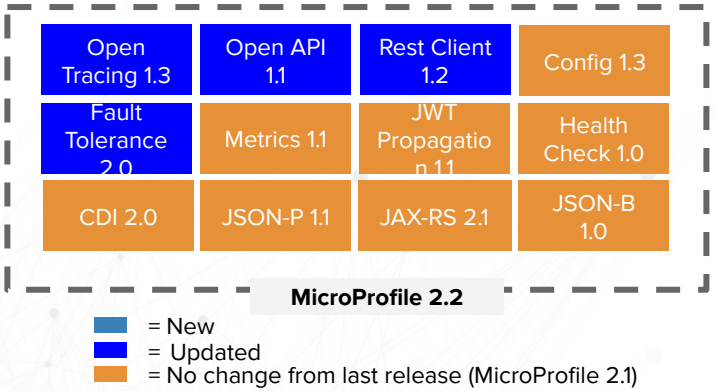
- Main changes in Microprofile 2.0
  - Align with Java EE 8 API's
  - Set minimum Java SE 8

Microprofile history

- In Oct 2018 2.1 was released

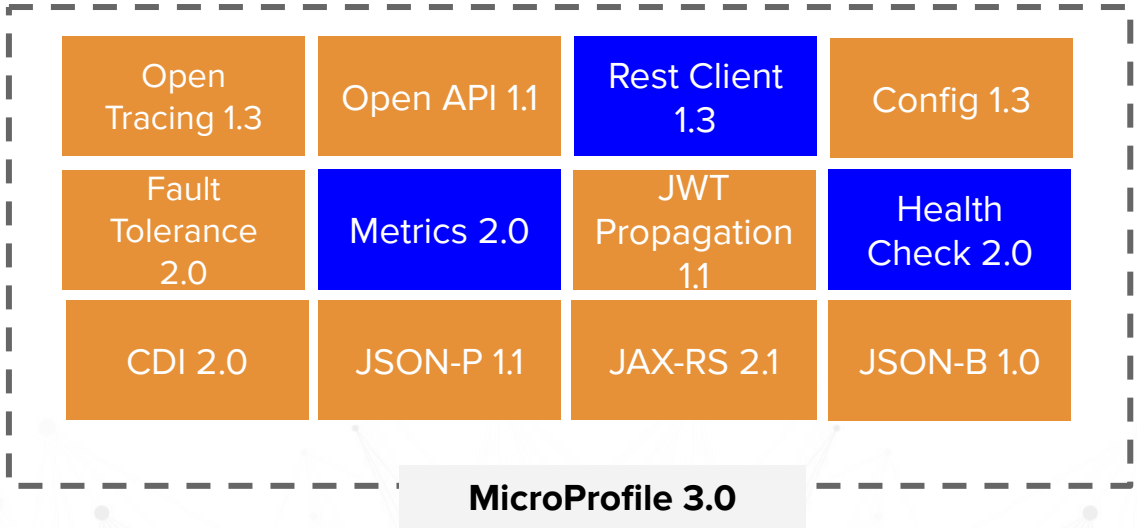


- In Feb 2019 2.2 was released



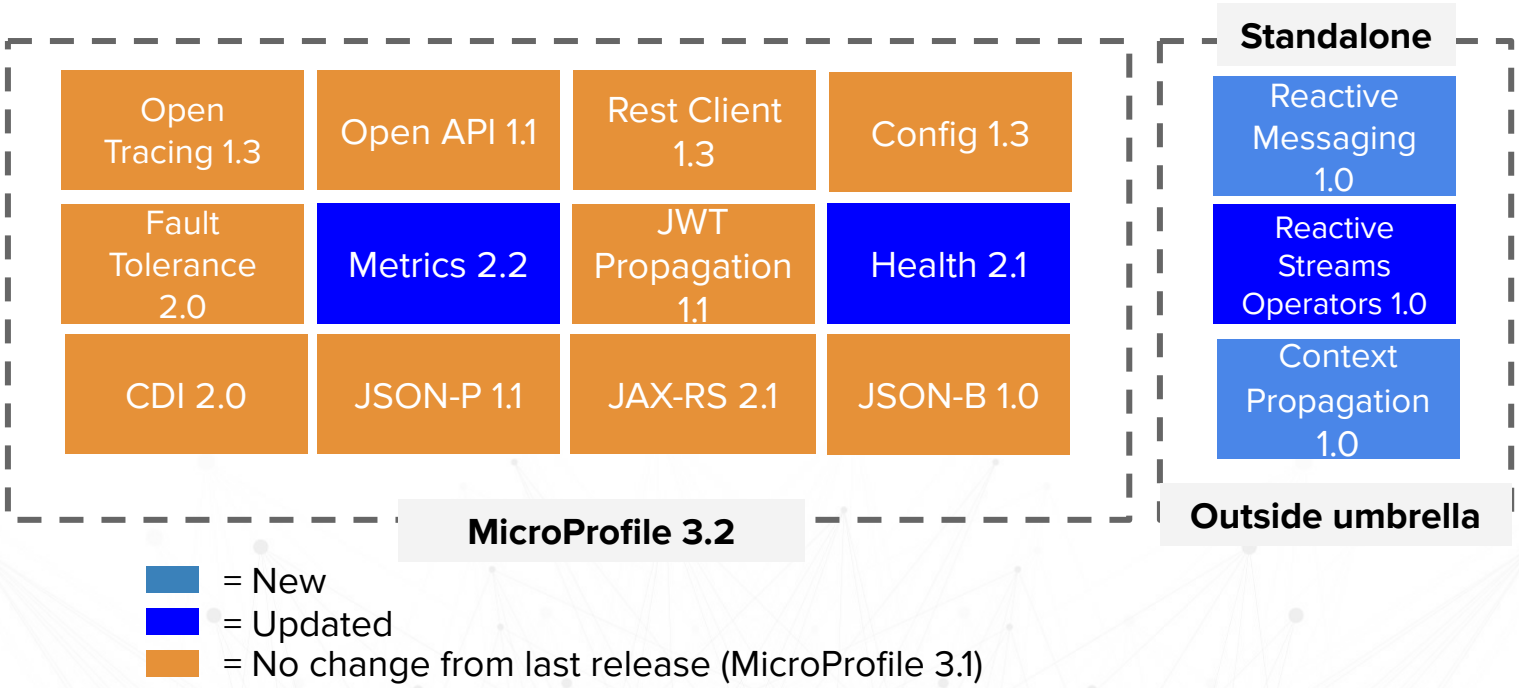
Microprofile history

- In June 2019 3.0 was released. Main reason is that some of the API's contain breaking changes



Microprofile history

- In November 2019 version 3.2 will be released



Microprofile Reactive Capabilities

MicroProfile Reactive Streams Operators

A set of operators to create new reactive streams, process the transiting data and consume them with ease

MicroProfile Reactive Messaging

Defines a development model for declaring CDI *beans* producing, consuming and processing messages. It relies on Reactive Streams Operators and CDI

MicroProfile Context Propagation

APIs for propagating contexts across units of work that are thread-agnostic

Current Microprofile implementations

Roadmap

- Long Running Actions
- GraphQL
- Reactive Relational Database Access
- Event Data
- Service Meshes

How you can contribute?

- Review individual specifications
- Propose changes in the SPEC or fix bugs
- Participate in the discussions
  - https://groups.google.com/forum/#!forum/microprofile

Microprofile Resources

- MicroProfile web site - https://microprofile.io
- MicroProfile Starter - https://start.microprofile.io/
- Wiki page - https://wiki.eclipse.org/MicroProfile
- GitHub repository - https://github.com/eclipse/microprofile

You can also check individual repositories of the MicroProfile specifications at GitHub

- https://github.com/eclipse

- Demo projects - https://github.com/doychin/java-knights
- BG JUG Hands-On-Lab - https://github.com/bgjug/microprofile-hol-1x
- Comparison between Spring & Microprofile - http://shorturl.at/cgiHW

Q & A