

Java Knights in Varna

Eclipse MicroProfile Past, Present & Future



14.11.2019

BULPROS



We, at BULPROS, empower businesses in their
Digital journey with innovative solutions, services
and products

Who am I?

Java Developer

I'm writing java code for the last 16 years

1

Software developer

For the last 30 years

2

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

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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.

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Agenda

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

What is Microprofile?

- Initially started as initiative in 2016 by



Red Hat

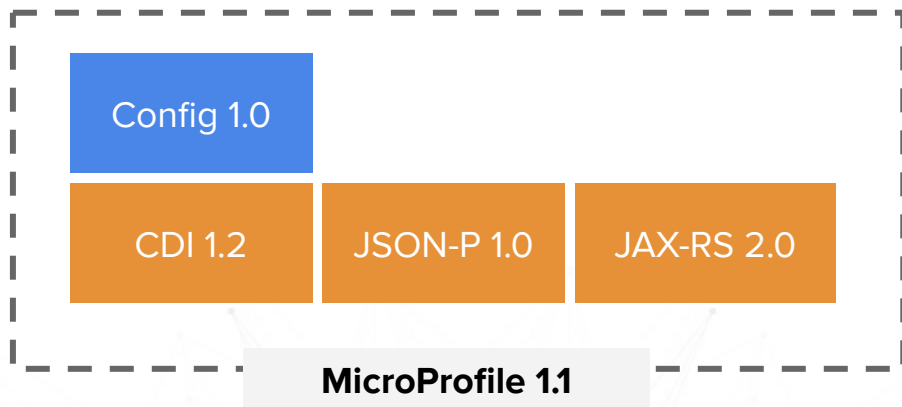




- Main goal was to try and leverage Java EE technologies to create vendor-neutral microservice framework



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;
    }
}
```

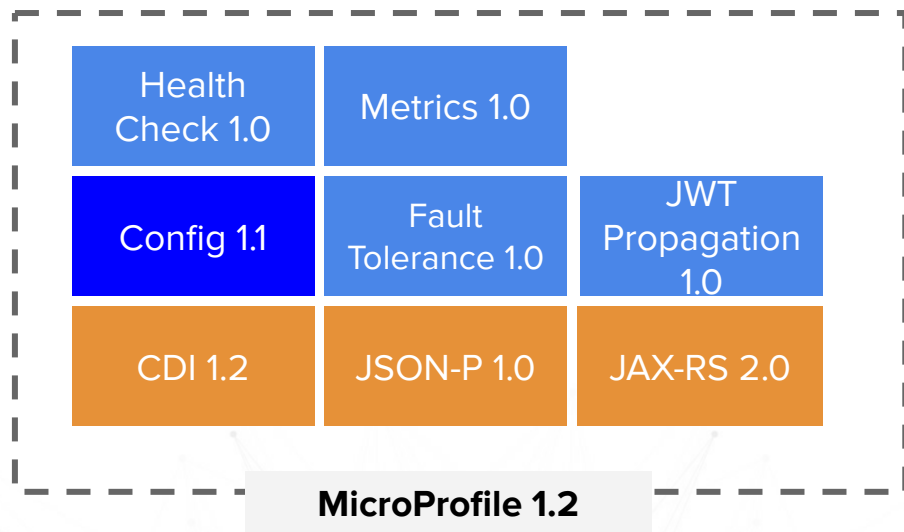
```
public class Config {




    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



-  = New
-  = Updated
-  = No change from last release

What is Metrics

- Specification that defines well known endpoints to monitor essential system parameters
- It provides access to **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 Kubernetes 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

```
@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.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKxwRJSMeKKF2QT4fwpMeJf36POk6yJV_adQssw5c
```

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

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

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

What is JWT Propagation

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

```
    @Inject
    private JsonWebToken jsonWebToken;
```

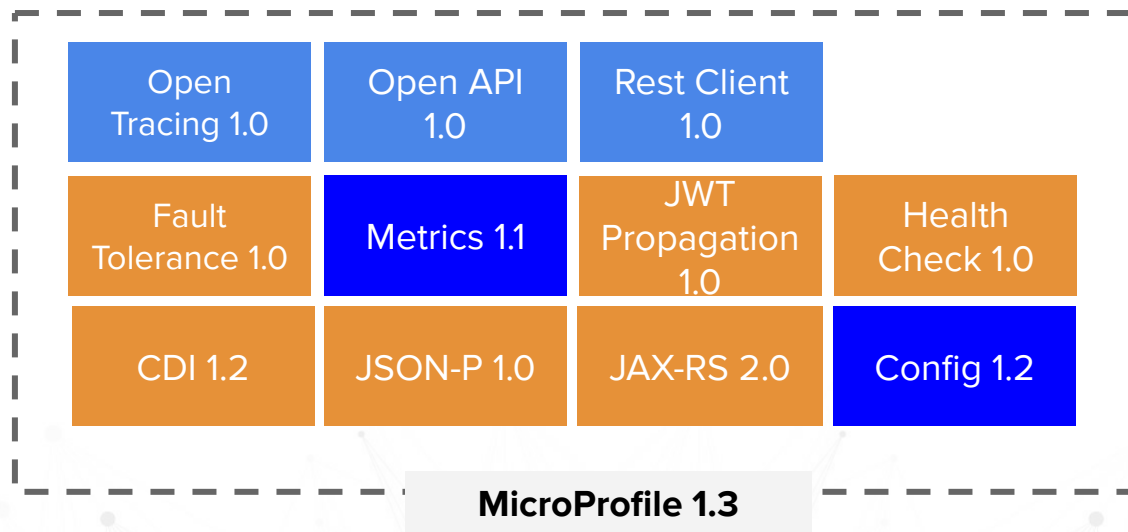
```
    @GET
    @Counted(name="hello counter jwt", absolute = true, monotonic = true)
    @RolesAllowed({"authenticated"})
    public String jwtHello() {
        return "Hello " + jsonWebToken.getName();
    }
}
```

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

```
@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



- = New
- = Updated
- = No change from last release

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 );
}
```

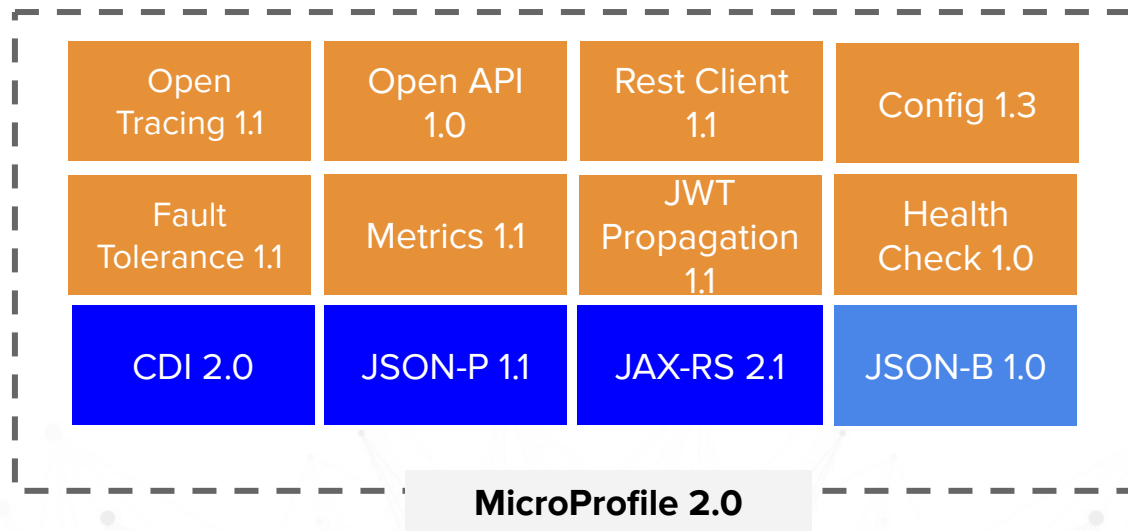
```
@Inject
@RestClient
private MovieReviewService movieReviewService;
```

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

Use with CDI

Microprofile history

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



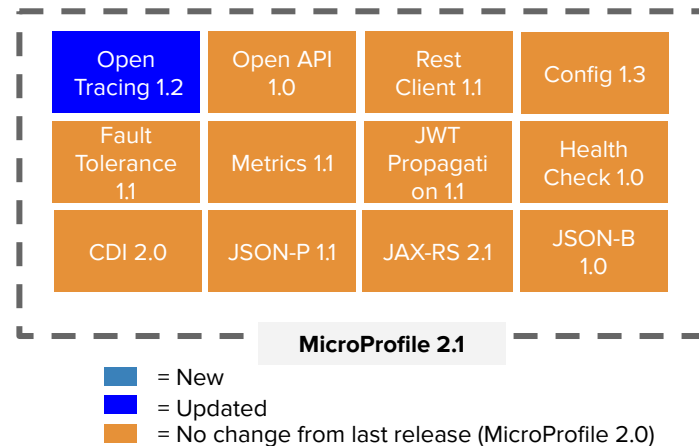
-  = New
-  = Updated
-  = No change from last release (MicroProfile 1.4)

Microprofile history

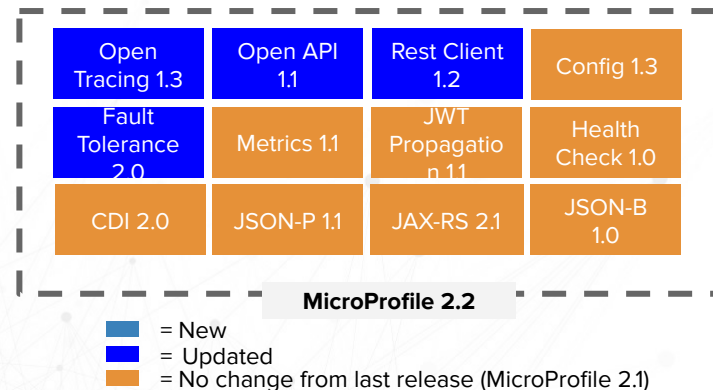
- Main changes in Microprofile 2.0
 - Align with Java EE 8 API's
 - Set minimum Java SE 8

Microprofile history

- In Oct 2018 2.1 was released

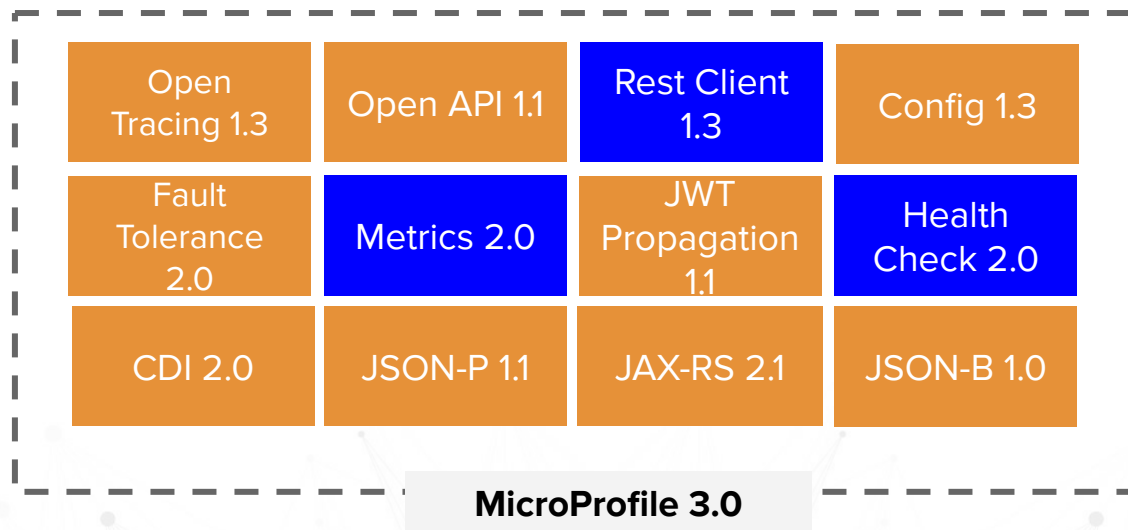


- In Feb 2019 2.2 was released



Microprofile history

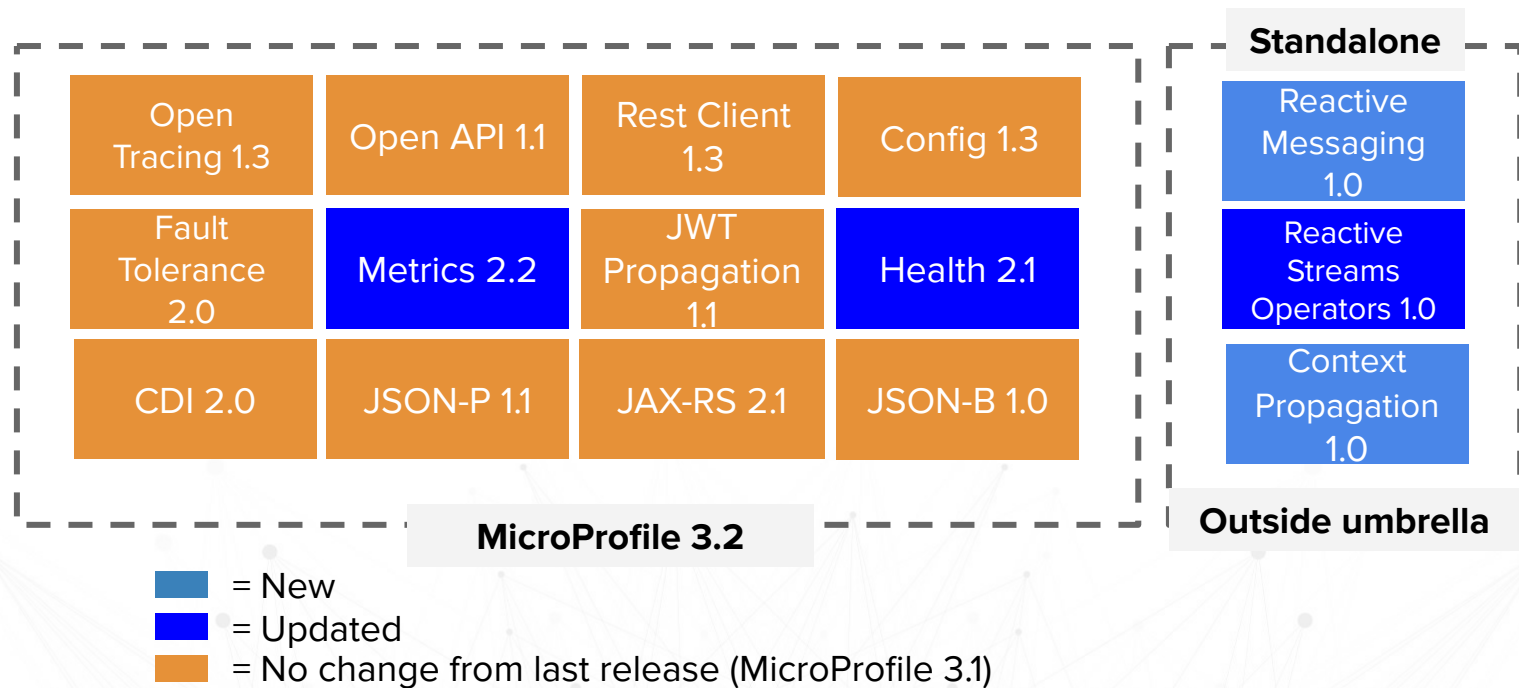
- In June 2019 3.0 was released. Main reason is that some of the API's contain breaking changes



- = New
- = Updated
- = No change from last release (MicroProfile 2.2)

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



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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>

Q & A