



Open Liberty

Practical Microservices

An Introductory Workshop

Yee-Kang (YK) Chang
yeekangc@ca.ibm.com

Concepts


Open Liberty



Photo by [Scott Murdoch](#) from [Burst](#)

IBM



"Adam Beck Complex" by [OPG](#) is licensed under [CC BY 2.0](#)

IBM

What ‘Cloud’ promises

a virtual, dynamic environment which maximizes use, is infinitely scalable, always available and needs minimal upfront investment or commitment

Take your code – host it on someone else's machine and pay **only** for the resource you use for the time you use it

AND be able to do that very quickly and repeatedly in parallel



“Compute on demand” – it’s what we’ve always wanted



<https://www.flickr.com/photos/vuhung/>

Cloud – Public vs Private vs Hybrid

- Offer rapid access over a public network to computing resources
- With public cloud services, users don't need to purchase hardware, software, or supporting infrastructure, which is owned and managed by providers

Public
Cloud



- Operates solely for a single enterprise
- Can be managed by the owning enterprise or by a third party
- Can be hosted either internally or externally to that enterprise

Private
Cloud



- Uses a private cloud foundation
- Can use public cloud services
- Most companies with private clouds will evolve to manage workloads across data centers, private clouds, and public clouds - thereby creating hybrid clouds

Hybrid
Cloud





"Lego" by antpaniagua is licensed under CC BY-SA 2.0.

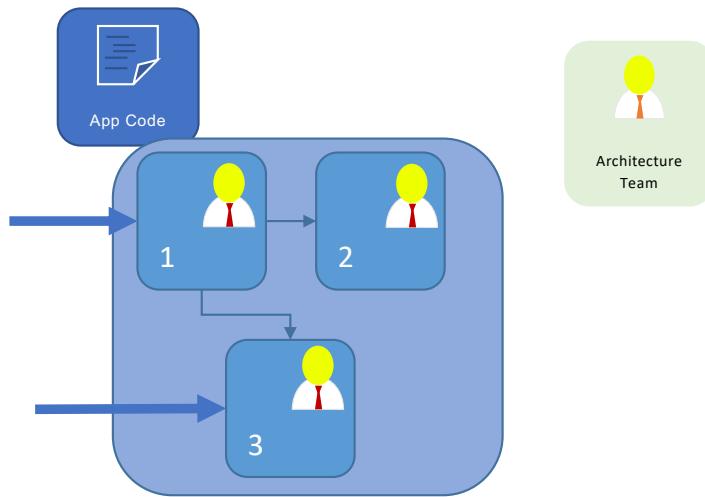
IBM

Application Design

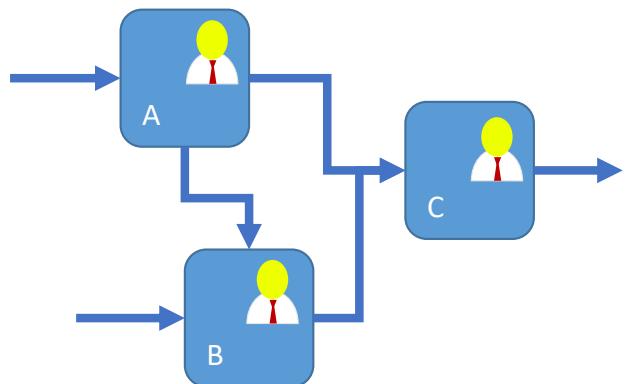
Open Liberty



Monolith



Microservices



Microservices

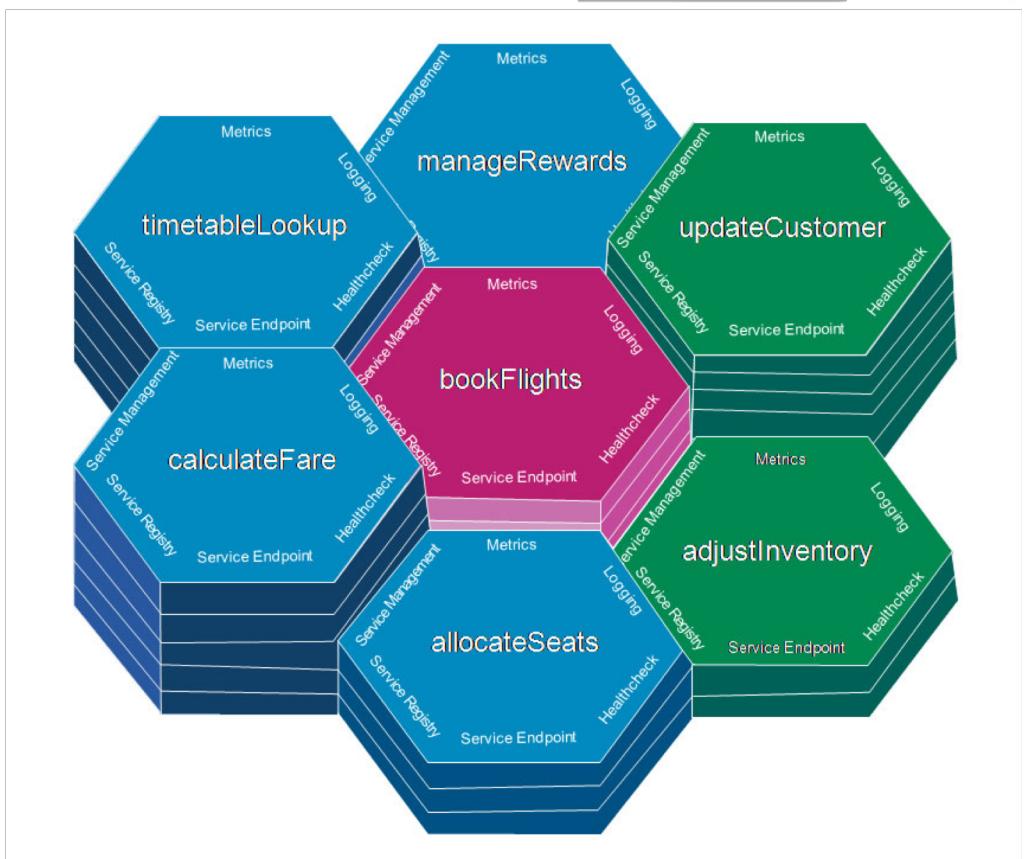


A microservice is an architectural style that structures an application as a collection of loosely coupled services

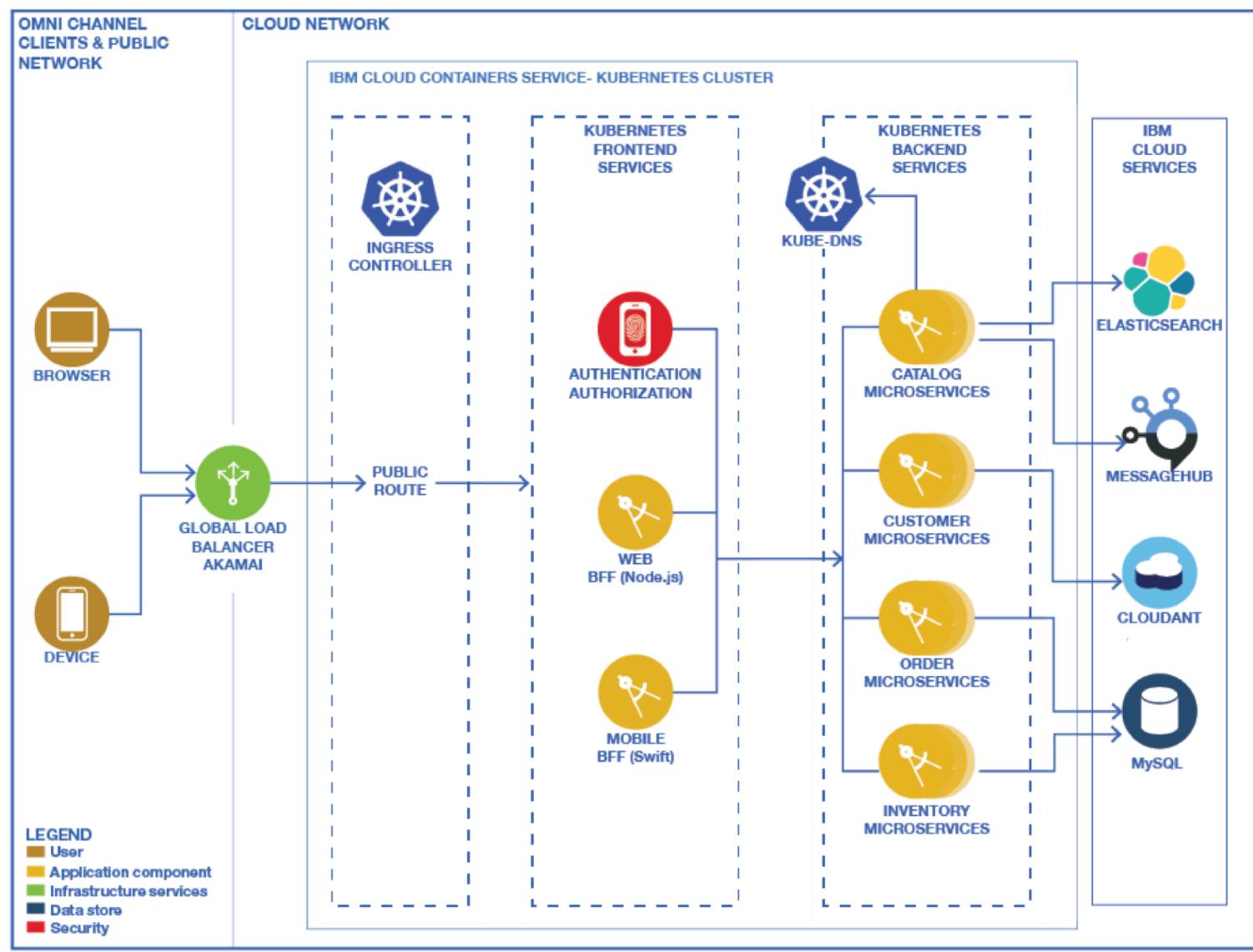
The benefit of having an application made up of microservices is that it improves modularity and make it easier to develop, test and more resilient to changes

Allows teams to work on individual services

Enables continuous delivery and deployment per microservice



Examples of Microservice APIs



IBM

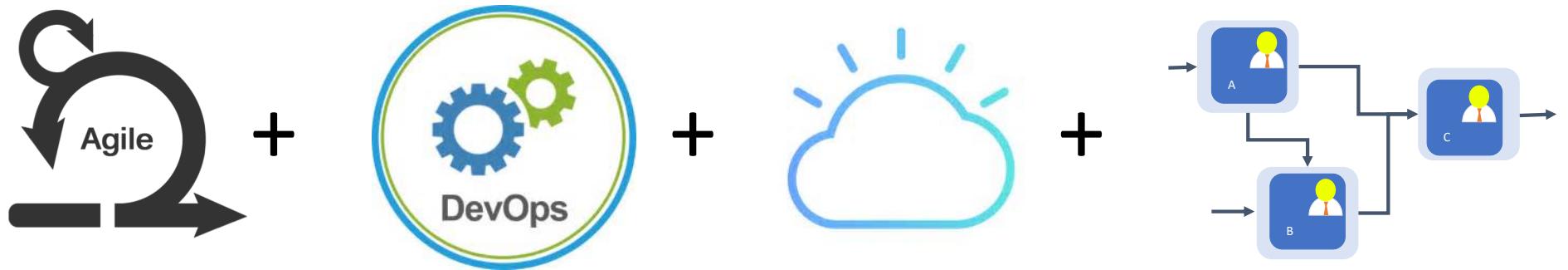


What is cloud-native development?





Agile & DevOps & Cloud & Microservices





What does it mean to provide microservice technologies (in Java)?





PROJECTS PRESENTATIONS FAQ BLOG CONTRIBUTORS JOIN THE DISCUSSION SEE THE CODE

Eclipse MicroProfile

Optimizing Enterprise Java for a microservices architecture





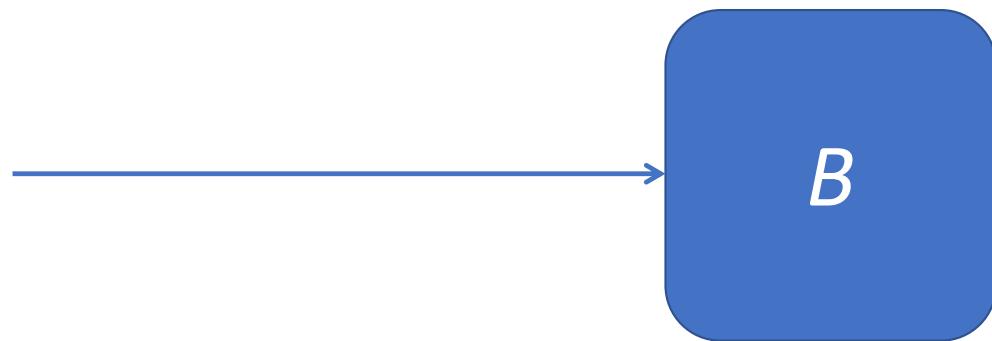
There's a good chance you'll use REST APIs.

Representational State Transfer (REST) is a software architectural style that defines a set of constraints to be used for creating web services ... RESTful web services allow the requesting systems to access and manipulate textual representations of web resources by using a uniform and predefined set of stateless operations ...

https://en.wikipedia.org/wiki/Representational_state_transfer

JAX-RS

Open Liberty



MicroProfile REST Client



CDI

Open Liberty



JSON-B & JSON-P

Open Liberty





Handling 100s of collaborating and frequently evolving services requires new APIs

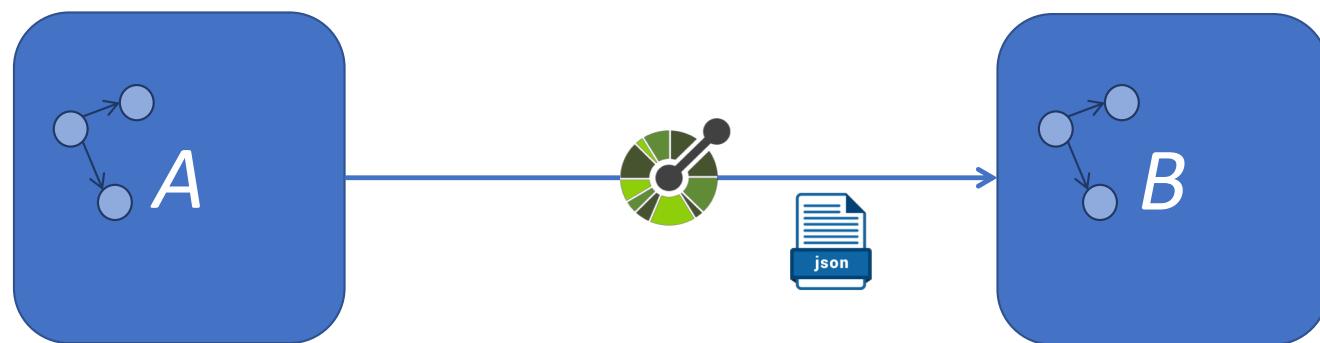


Where were we...?



MicroProfile OpenAPI

Open Liberty

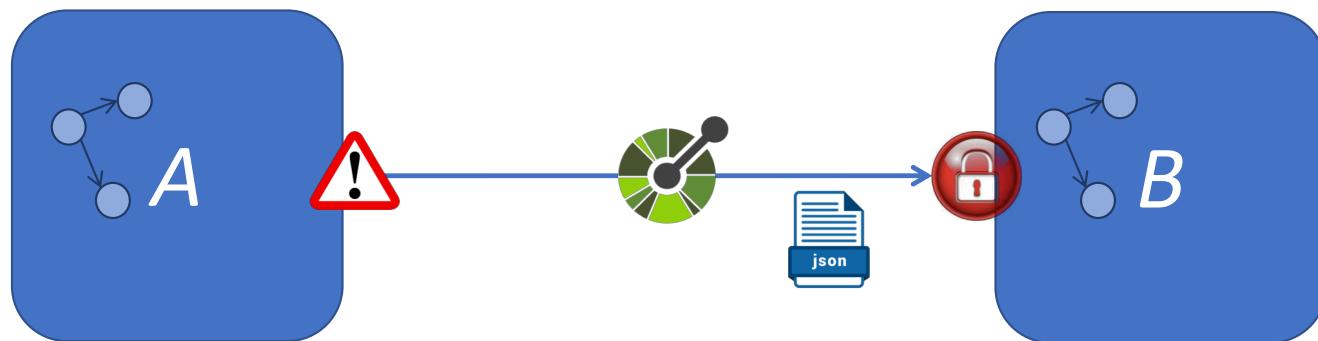


MicroProfile JWT

Open Liberty

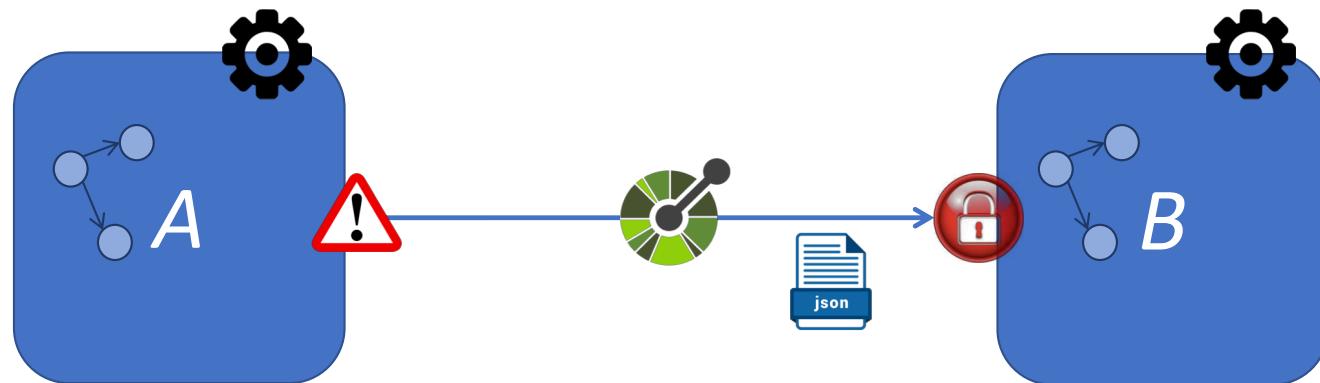


MicroProfile Fault Tolerance



MicroProfile Config

Open Liberty

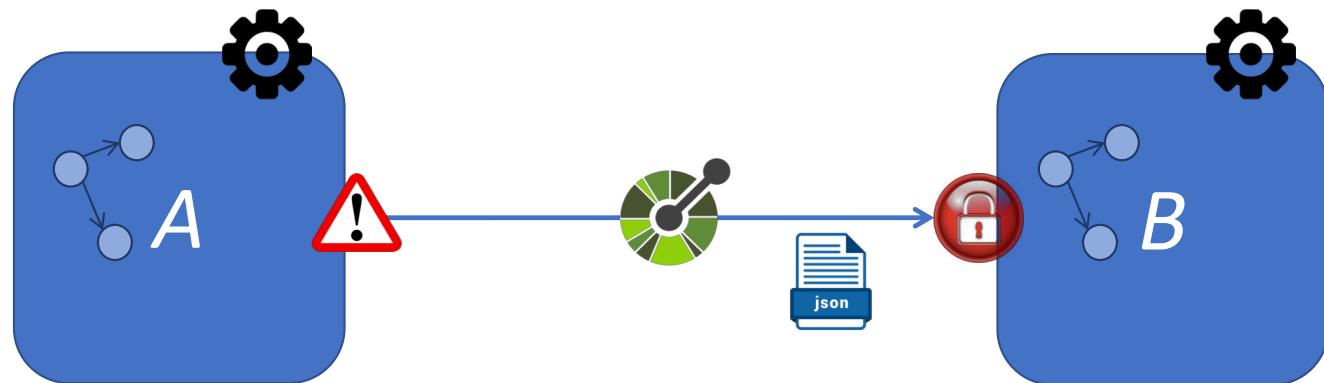




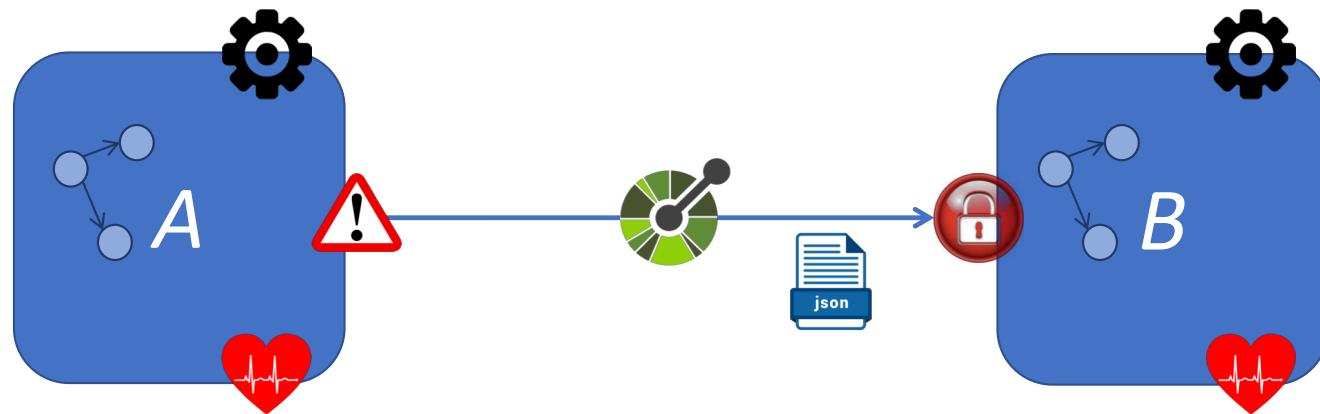
Handling 100s of collaborating services
requires a strong operations focus



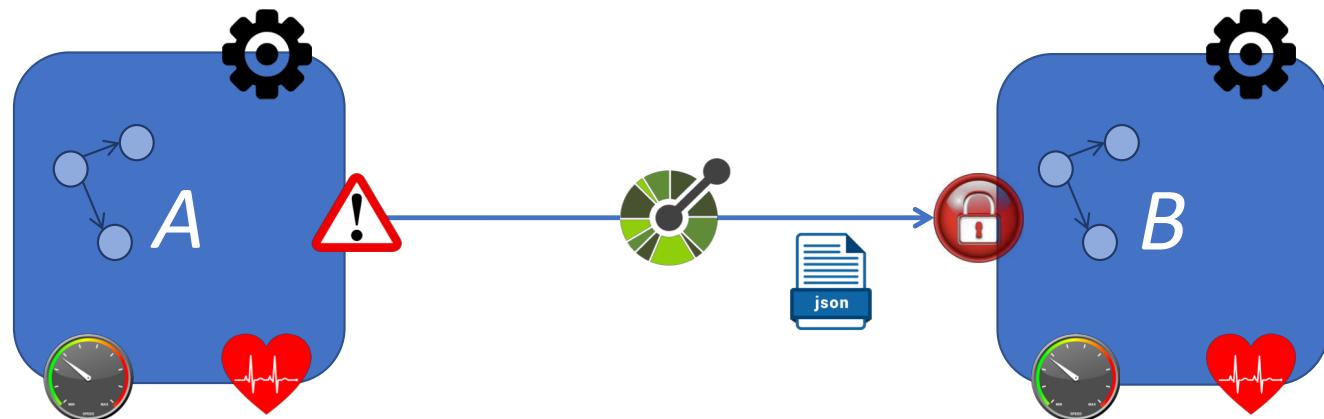
Where were we...?



MicroProfile Health

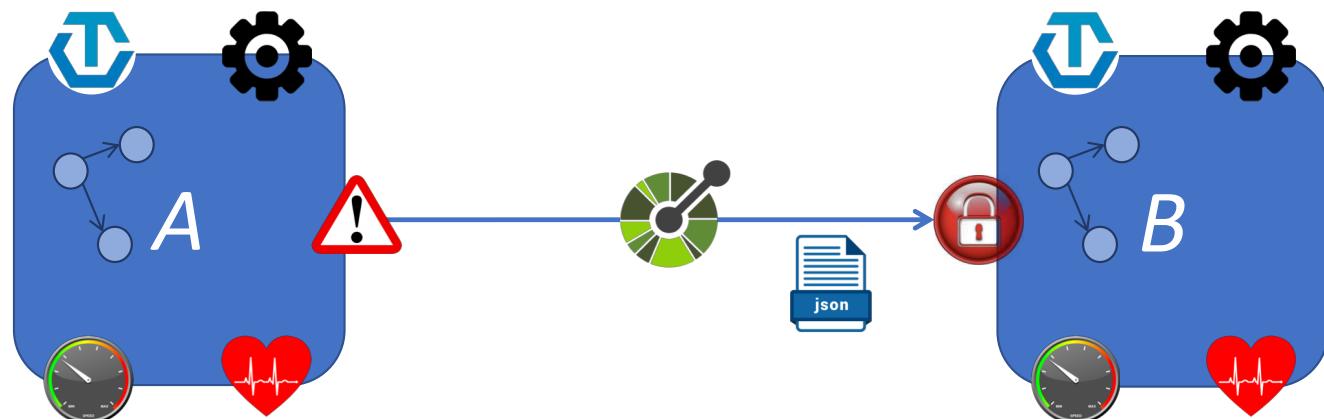


MicroProfile Metrics



MicroProfile OpenTracing

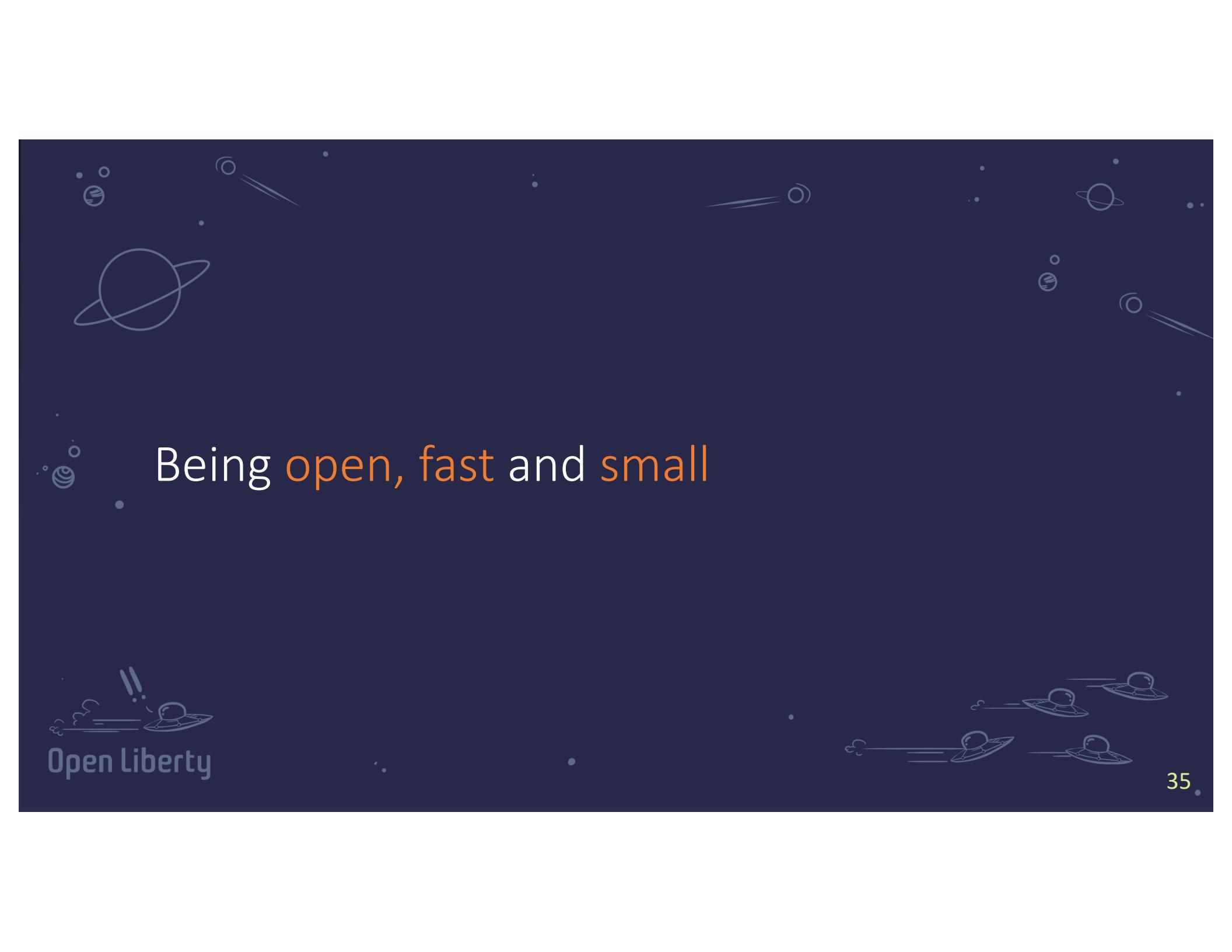
Open Liberty



Eclipse MicroProfile

- ✓ Open specifications
- ✓ Wide vendor support
- ✓ REST services
- ✓ OpenAPI support
- ✓ Security
- ✓ Fault Tolerance
- ✓ Configuration
- ✓ Metrics
- ✓ Health
- ✓ Open Tracing





Being open, fast and small





Open Liberty

An IBM Open Source Project

Jump on board and work at lightspeed

Build cloud-native apps and microservices while running only what you need. Open Liberty is the most flexible server runtime available to Java™ developers in this solar system. Here's why.

[Download \(76 MB\)](#)

[View more downloads](#)



Simple to get started



Launch a sample app

Open Liberty is fast and composable, but don't take our word for it - try it out!

```
git clone https://github.com/OpenLiberty/sample-getting-started.git
```

```
cd sample-getting-started
```

```
mvn clean package liberty:run-server
```

Open browser to: <http://localhost:9080>

openliberty.io

Developer-oriented Docs



Screenshot of the Open Liberty Guides website (<https://openliberty.io/guides/>) showing two sections of developer guides:

Open Liberty Basics - Let's get started

4 guides

4 essentials

- Deploying and packaging applications (25 minutes)
- Building a web application with Gradle (15 minutes)
- Building a web application with Maven (15 minutes)
- Using Docker containers to develop microservices (20 minutes)

MicroProfile - Developing microservices with ease

14 guides

4 essentials

New to MicroProfile? [Get an introduction here.](#)

- Creating a RESTful web service (30 minutes)
- Injecting dependencies into microservices (15 minutes)
- Consuming RESTful services with template interfaces (20 minutes)
- Separating configuration from code in microservices (25 minutes) INTERACTIVE

Simple Config



```
<server>
  <featureManager>
    <feature>microProfile-2.0</feature>
  </featureManager>

  <webApplication location="myweb.war" contextRoot="/" />

</server>
```

server.xml

```
-Xmx1g
-Dsystem.prop=value
```

jvm.options

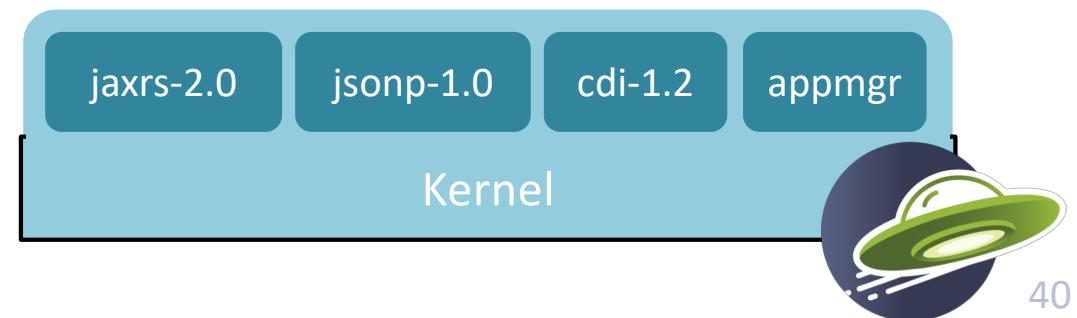
```
WLP_OUTPUT_DIR=/usr/wlp-out/
```

server.env

Fit-for-purpose server

- Get only what you choose
- Transitive dependencies automatically included
- Minimal footprint
- Quick start/shutdown

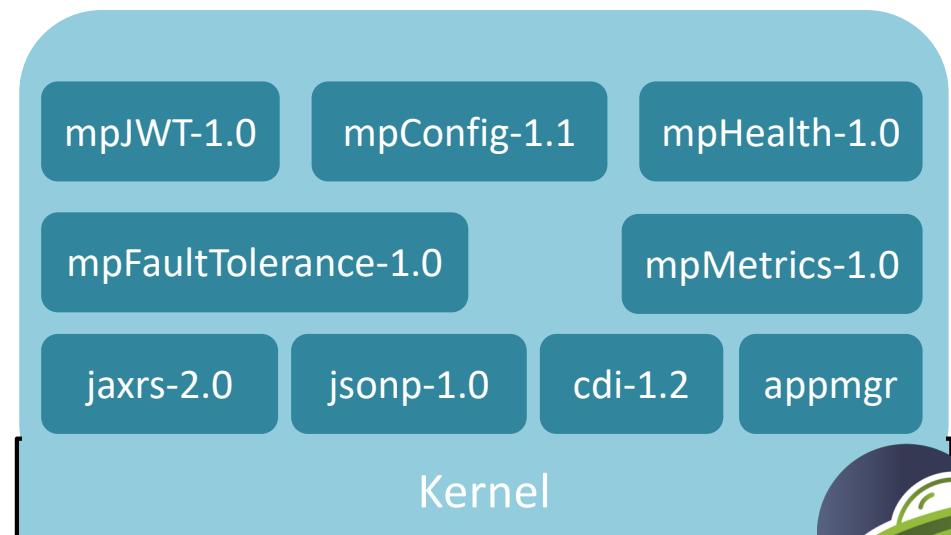
```
<feature>microProfile-1.0</feature>
```



Fit-for-purpose server

- Server picks up changes dynamically (no restart)
- Great for rapid development
- Integration with Maven and Gradle build tools

```
<feature>microProfile-1.2</feature>
```





Open Liberty

Let's get practical ...



Quick Labs

The screenshot shows the Open Liberty Quick Labs interface. On the left is a sidebar with navigation links such as Contents, What you'll learn, Getting started, Try what you'll build, Writing the RESTful client interface, Injecting injector, Building, Testing, Contributed, Related, Tags, MicroProfile, and Java EE. The main area displays two guide cards:

- Consuming RESTful services with template interfaces**: A card with a yellow header. It says "Learn how to use MicroProfile Rest Client to invoke RESTful microservices over HTTP in a type-safe way." It includes a "20 minutes" duration indicator.
- Creating a RESTful web service**: A card with a green header. It says "Learn how to create a REST service with JAX-RS, JSON-P, and Open Liberty." It includes a "30 minutes" duration indicator.

Below the cards, there's a section titled "What you'll learn" which describes the goal of building and testing a simple REST service using JAX-RS and JSON-P. It provides a URL example: `http://localhost:9888/LibertyProject/System/properties`. It also shows a JSON object representation of system properties:

```
{  
  "os.name": "Mac",  
  "java.version": "1.8"  
}
```

A note at the bottom states: "When you create a new REST application the design of the API is important. The JAX-RS APIs could be used to create JSON-RPC or XML-RPC APIs, but wouldn't be a RESTful service. A good RESTful service is designed..."

- Go to

<https://openliberty.io/guides>

- <https://github.com/OpenLiberty/tutorial-microprofile> for pre-requisites

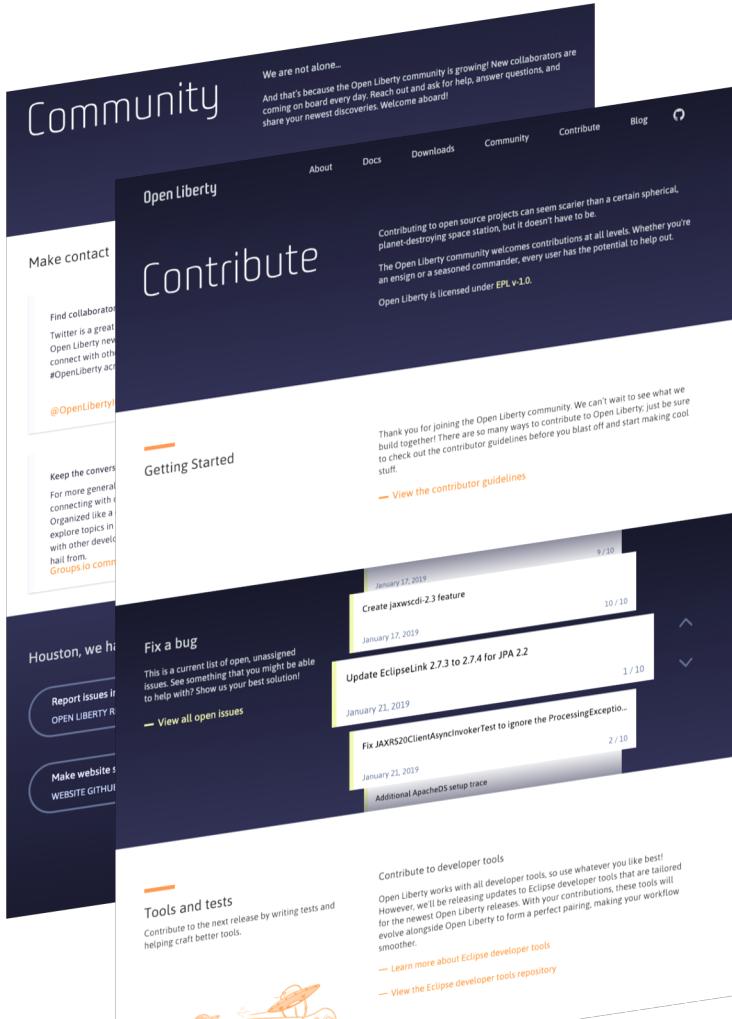
- Pick a guide:

- *Creating a RESTful web service*
- *Consuming RESTful services with template interfaces*

- Follow the instructions

- Have fun and shout if you need help

Get Involved!



- Open Liberty -
<https://openliberty.io/>

<https://github.com/OpenLiberty>

<https://stackoverflow.com/questions/tagged/open-liberty>

<https://groups.io/g/openliberty>

<https://twitter.com/OpenLibertyIO>

- Future talks?

- Cloud, Containers, Kubernetes
- Software Developer 101
- Space Sentry ...



Quick Labs

- Go to
<https://openliberty.io/guides>
 - <https://github.com/OpenLiberty/tutorial-microprofile> for prerequisites
- Pick a guide:
 - *Creating a RESTful web service*
 - *Consuming RESTful services with template interfaces*
- Follow the instructions
 - Have fun and shout if you need help

Get Involved!



Open Liberty -
<https://openliberty.io/>

- ⌚ <https://github.com/OpenLiberty>
- 📢 <https://stackoverflow.com/questions/tagged/open-liberty>
- ✉️ <https://groups.io/g/openliberty>
- 🐦 <https://twitter.com/OpenLibertyIO>



Open Liberty

Thank You!