JAX-RS Done Right

How to use JAX-RS correctly (and how not)

Markus KARG (Head Crashing Informatics, JSR 339, JSR 370)

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The Cheeky™ comic character is used by courtesy of *inviticon*℠.

Bio (condensed)

Markus

Born 1973
ZX Spectrum (~1985)
State-Qualified Information Scientist (1997)
Java Addict (1997)
JAX-RS EG Member (JSR 339, 370)
JUG Switzerland – Zurich (April 24)
JUG Switzerland – St Gallen (now)

https://headcrashing.wordpress.com
markus@headcrashing.eu

How to write *ugly* JAX-RS code

```java
@Path("notebook")
public class BadNotebookResource {
	// Cannot replace for testing :-(
	NotebookApplication notebookApplication = new NotebookApplication();


	// Strings are pretty simple and straightforward to handle – but not type safe!
	@GET @Produces("text/plain")
	public List<String> getNotesAsStringList(@MatrixParam("from") String startDate, @MatrixParam("to") String endDate) {
		List<Note> notes = notesAsList(startDate, endDate);
		List<String> notesAsStrings = notes.stream().map(Note::toString).collect(Collectors.toList());
		// TODO Implement Note::toString!
		return notesAsStrings;
	}


	private List<Note> notesAsList(String startDate, String endDate) {
		return notebookApplication.getNotes(new TimeSpan(Instant.parse(startDate), Instant.parse(endDate))).asList();
	}


	// Hopefully JAXB support will not get deprecated sometimes... ;-)
	@GET @Produces("application/xml")
	public List<Note> getNotesAsXML(@MatrixParam("from") String startDate, @MatrixParam("to") String endDate) {
		List<Note> notes = notesAsList(startDate, endDate);
		// TODO Add @XmlRootElement to Note class
		return notes;
	}


	// Now we're rather screwed! :-(
	@GET @Produces("application/pdf")
	public PDF /* TBD */getNotesAsPDF(@MatrixParam("from") String startDate, @MatrixParam("to") String endDate) {
		List<Note> notes = notesAsList(startDate, endDate);
		PDF pdf = useFOP(notes); // TODO fix this!
		return pdf;
	}
}
```

Dude, **that's** really ugly!

Lesson #1: Choose Right API

Servlet API

- **You want to do *something* with HTTP.**
- Virtualizes web-servers
  - (Tomcat, Jetty, etc.)
- Layer 7 (HTTP)
- Request-oriented
- Slim and fast

JAX-RS

- **You want to write *RESTful applications*.**
- Virtualizes frameworks
  - (Jersey, RESTeasy, etc.)
- „Layer 8“ (Business)
- Domain-oriented
- Comes at a cost

Lesson #2: Use JAX-RS 2.0

JAX-RS 1.x

- **Nice idea.**
- Providers
- Auto-discovery
- JAXB
- Conditional Requests
- REST Level 2

http://martinfowler.com/articles/richardsonMaturityModel.html

JAX-RS 2.x

- **Now we're talking!**
- Features
- Configuration
- Filters, Interceptors
- Converter Providers
- Validation
- Basic Hypermedia
- Asynchronous Processing
- Client API
- REST Level 2.5

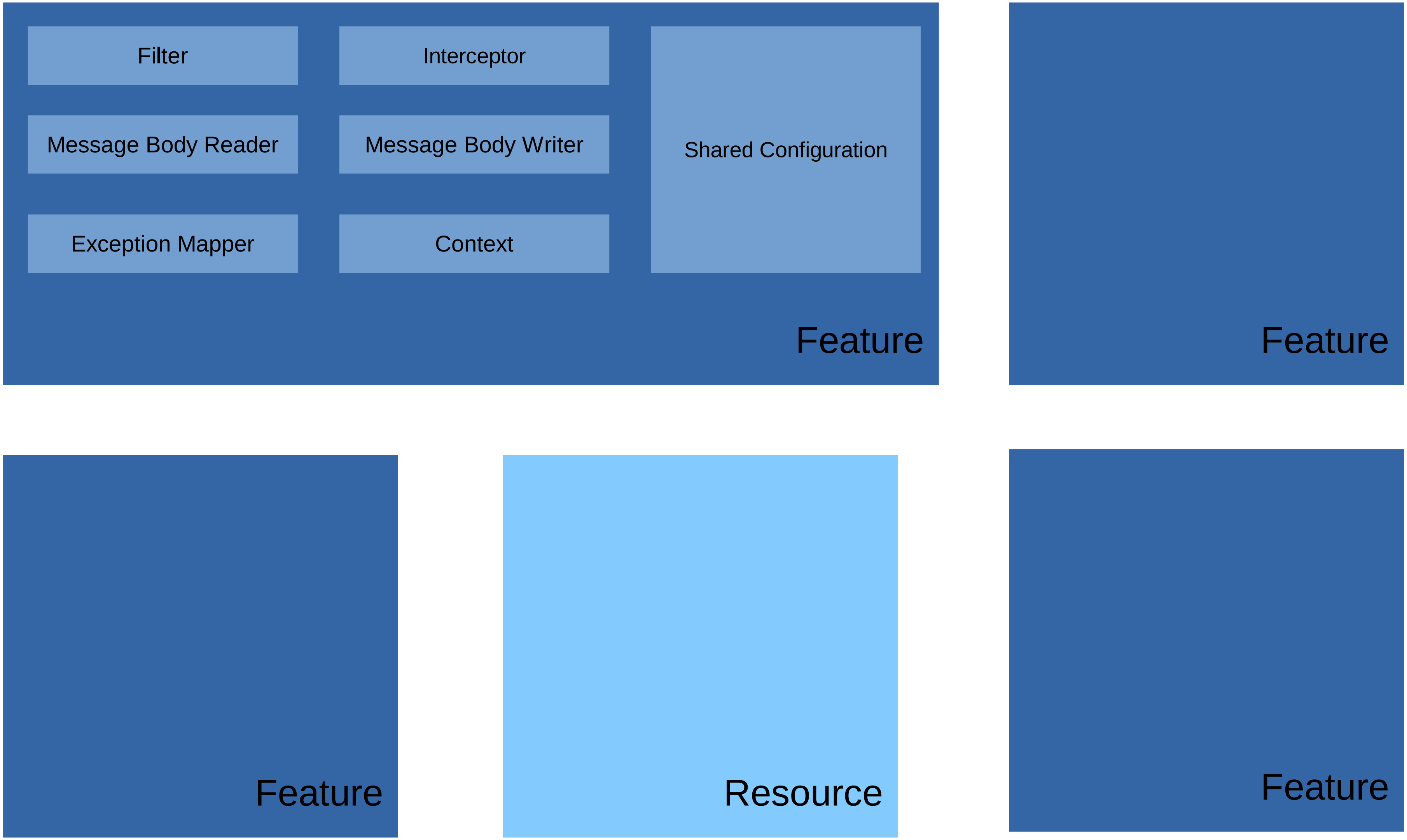
Lesson #3: Clean Business Object

- Apply CoC (Convention over Configuration)
  - Use annotations sparingly. You might actually not need them at all!
- Don't mix technology into business logic
  - Resource – „Business Service“
  - Entity – „Business Item“
  - Header – „Business State“
  - Exception – „Business Problem“
- Don't reference providers
- Let framework do the rest
  - Parsing and Rendering of State Representation (HTTP Entity)
  - Encoding / Decoding of additional information (HTTP Headers)
  - Result Code and Exceptions
  - Transfer Encoding, Compression, Caching
  - Dealing with URIs, Parameters, etc.

Lesson #4: Separate Aspects

- Apply SoC (Separation of Concerns)
  - Disintegrate monolithic application
  - Compose standalone components
- Think in features
  - „PDF Support“, „JSON Support“
  - „Compression Support“
  - „OData Support“
- **Know Your API**
  - Filters, Providers, Configuration, ...

Disintegrated Application



Filter

Interceptor

Message Body Reader

Message Body Writer

Shared Configuration

Exception Mapper

Context

Feature

Feature

Feature

Resource

Feature

How *nice* JAX-RS code looks like

```
@Path("notebook")
public class GoodNotebookResource {
    @Inject
    NotebookApplication notebookApplication;

    @GET
    public Notes getNotes(@BeanParam TimeSpan timeSpan) {
        return this.notebookApplication.getNotes(timeSpan);
    }
}
```

Ain't *that* cool?

The Magic behind JAX-RS

- Auto-detects features and global providers
- Auto-selects stuitable provider alternatives
- Manages component lifecycle
- Features configure providers
- Features are dynamic, optional and configurable
- Integrates with CDI, Bean Validation API, and EJB

Ingredients

- Providers
  - Message Body Readers and Writers
  - Parameter Converters
  - Context Resolvers
  - Exception Mappers
- Filters and Interceptors
  - The JAX-RS Swiss Army Knife
  - Can completely re-route, modify or even suppress requests and commits!
- Features
  - Dynamic Features are asked to register for each method AT DEPLOYMENT; can also bind globally
- Configuration
  - Shared among all components, application scoped
- Request and Response Properties
  - Forward information tags from one component to the next

Conclusion

- Application := ∑*Features*
- Marketplace with replaceable off-the-shelf *Features*
  - PDF Support
  - Encryption
  - Compression
  - Data Type Conversion (`Instant`, `Image`, `URL`, ...)
- Less `*.java`, more `pom.xml`

Got It?

The Bonus Slide: JAX-RS 2.1 Status

- *Oracle has better things to do than doing open source.*
  - *Oracle was rather inactive for many months.*
- *Reactivated Expert Group recently with* ***massively*** *reduced charter:*
  - *RX (Support for reactive programming using `CompletableFuture<T>`)*
  - *NIO (Improving scalability by decoupling thread cound from client count)*
  - *SSE (Pushing events to clients)*
  - *Alignment with MVC specification (JAX-RS based MVC controllers)*
  - *Support for JSON-B*