31.8.–3.9.2015
in Nürnberg

Herbstcampus

Wissenstransfer
par excellence

Bestandsaufnahme

Java Enterprise Edition 8

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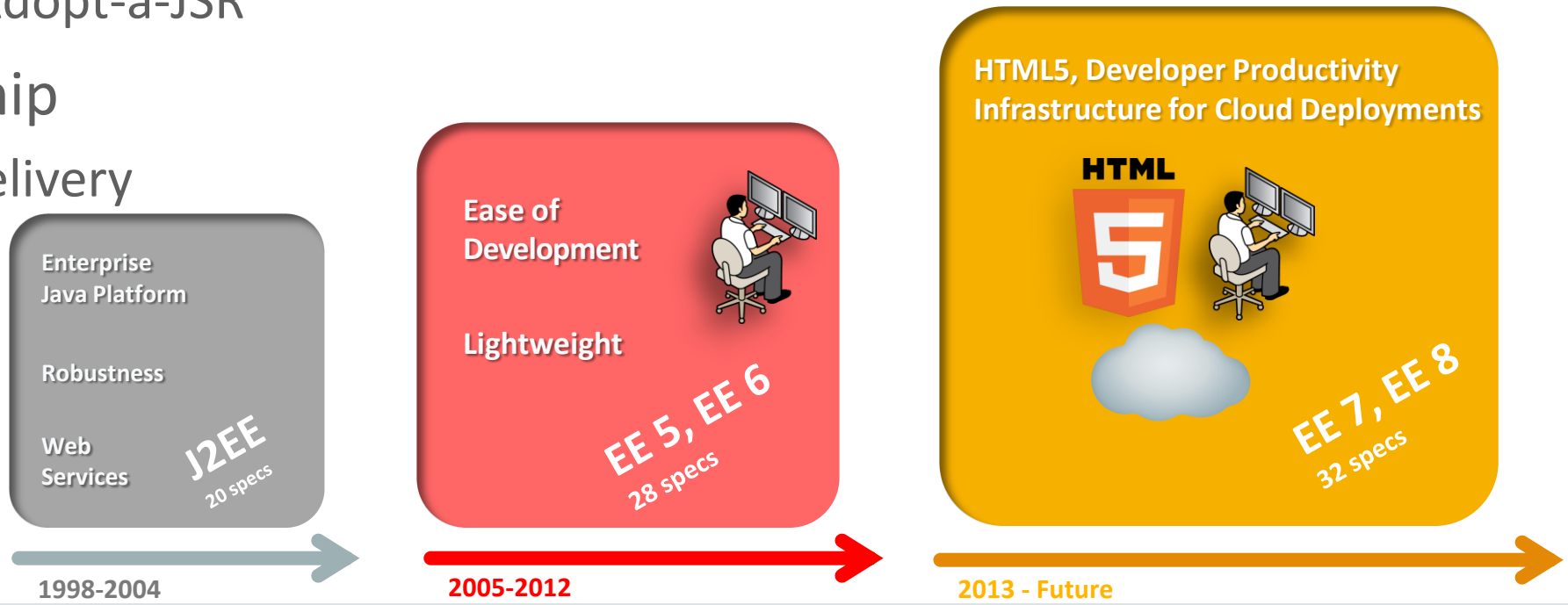
Agenda

1. Java EE Status
2. Java EE 8 Themes
3. Java EE 8 Roadmap

Java EE Evolution and Status

- Technology
  - Balance innovation, standardization, compatibility
- Community
  - Involvement: JCP, Adopt-a-JSR
- Oracle‘s stewardship
  - Investments and delivery



Java EE 7

- Full implementations
  - GlassFish 4.x
  - WildFly 8.x
  - TMAX JEUS 8
  - Hitachi Cosminexus 10.0
  - IBM WebSphere Liberty 8.5.5.6
- Partial commercial implementations
  - WebLogic 12.1.3

http://www.oracle.com/technetwork/java/javaee/overview/compatibility-jsp-136984.html

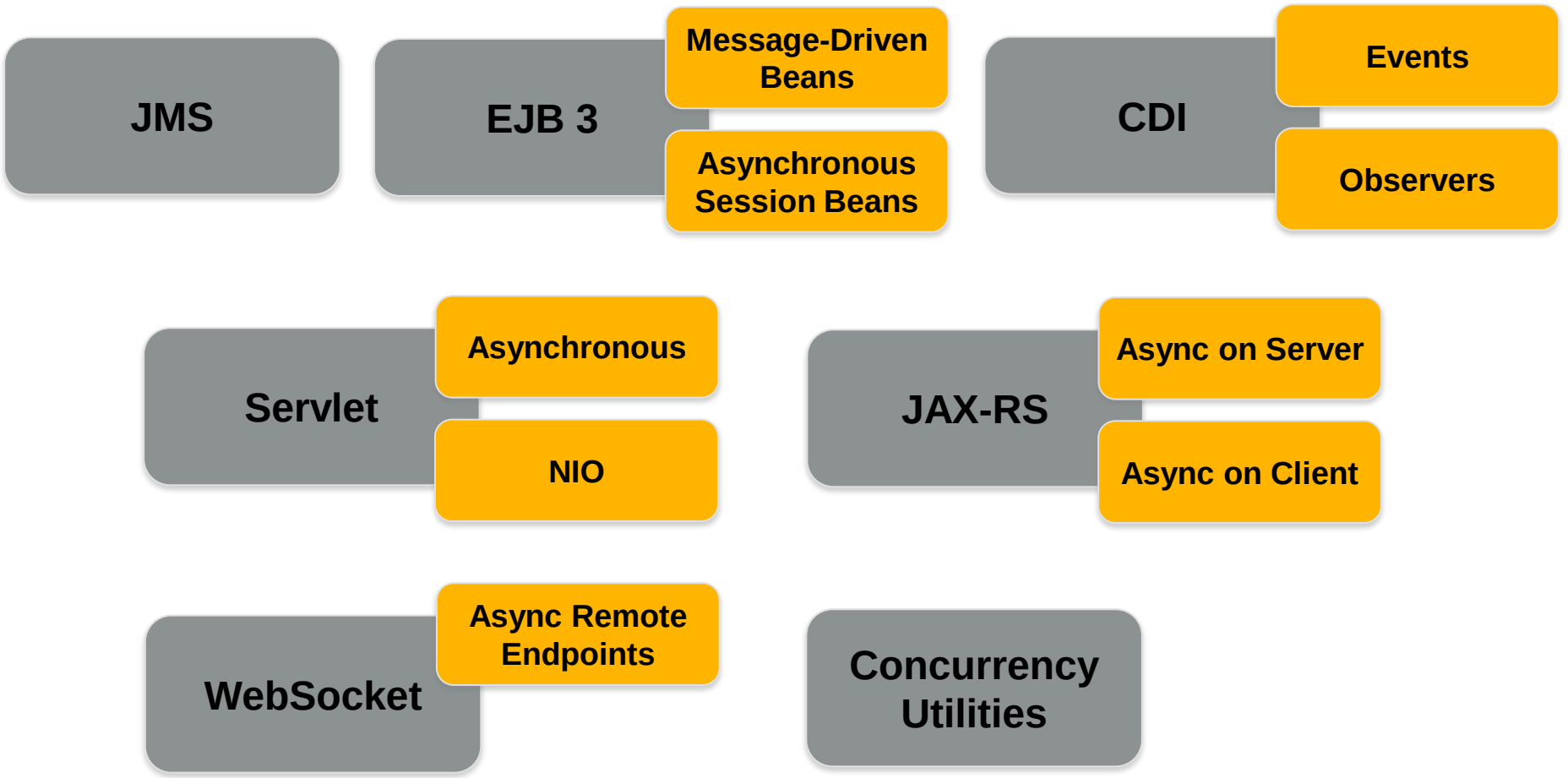
Industry Trends

HTTP/2

Microservices

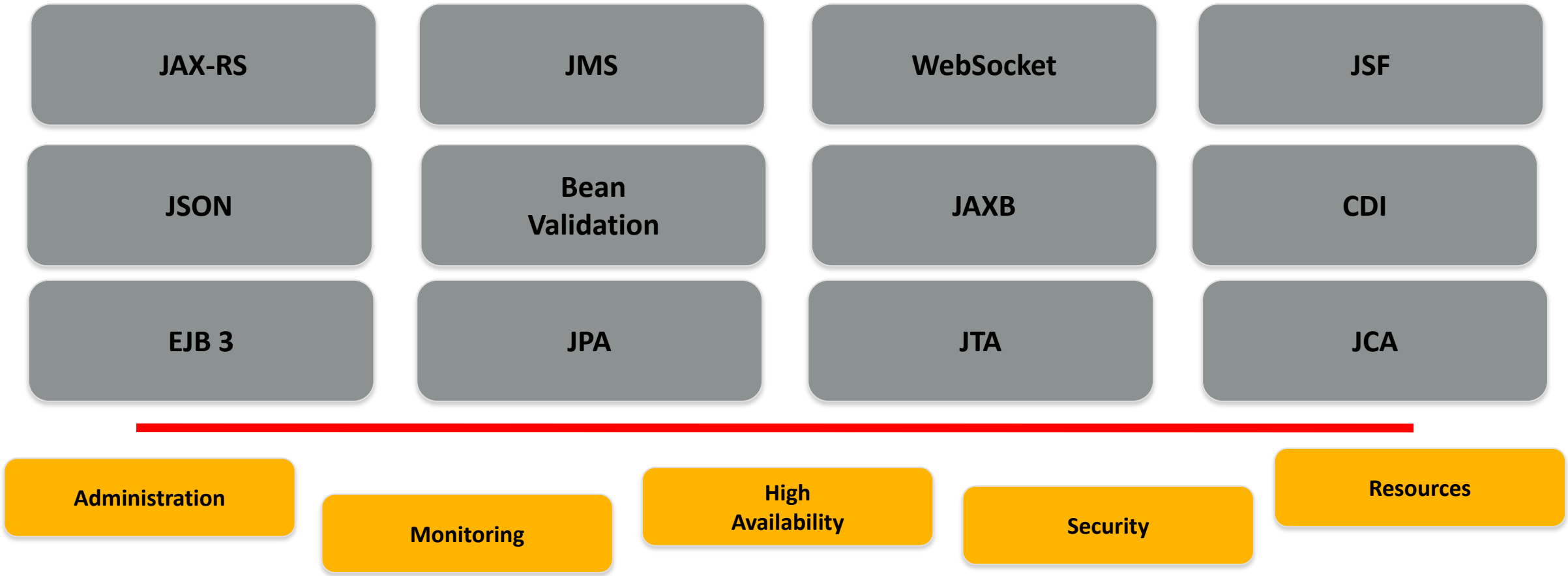
Reactive Programming

Java EE and Reactive Programming



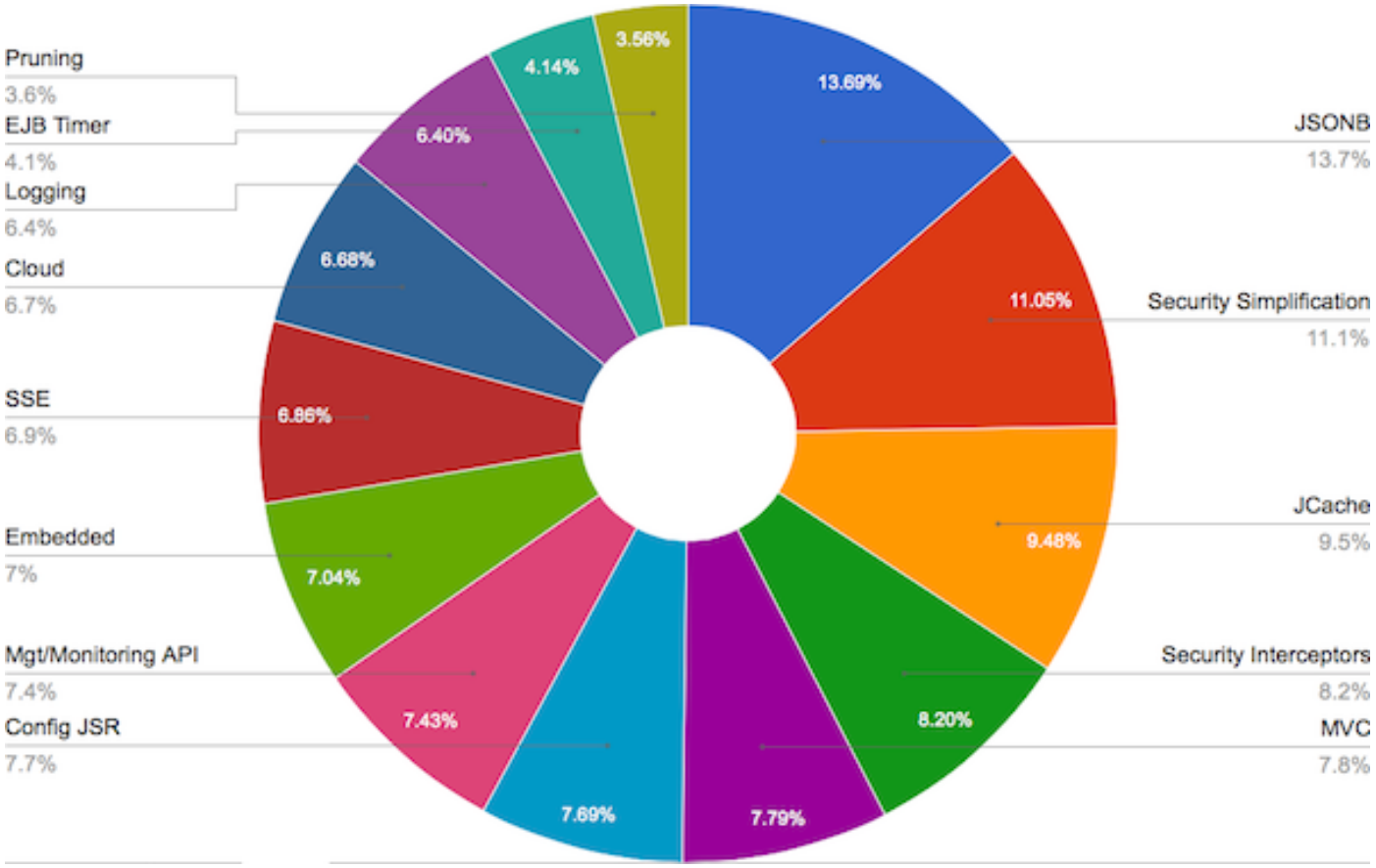
Java EE and Microservices

Building blocks for pragmatic microserveces



Java EE 8 Community Survey

4500+ respondents



https://blogs.oracle.com/ldemichiel/entry/results_from_the_java_ee

https://java.net/downloads/javaee-spec/JavaEE8_Community_Survey_Results.pdf

Java EE 8 Themes

- HTML5 / Web Tier Enhancements
- Ease of Development / CDI alignment
- Infrastructure for running in the Cloud
- Java SE 8 alignment
  - Utilizing Java SE 8 new features

HTML5 Support and Web Tier Enhancements

- HTTP/2 support
- Action-based MVC
- Server-sent events
  - Part of HTML5
  - By extending JAX-RS (already supported by Jersey)
- JSON Binding
  - Similar to JAXB (already supported by MOXy, included in Jersey)
- JSON Processing enhancements
  - Track new standards JSON-Pointer and JSON-Patch

HTTP/2

Address the Limitations of HTTP

- HTTP/2 IETF standard finalized in May (RFC 7540)
- Reduce latency
  - Address the Head-of-Line blocking problem
- Support parallelism
  - Without requiring multiple connections
- Retain semantics of HTTP 1.1
- Define interaction with HTTP 1.x

HTTP/2

- Request/Response multiplexing over single connection
  - Fully bidirectional
  - Multiple streams
- Stream prioritization
- Server push
- Binary framing
- Header compression (RFC 7541)
- Upgrade from HTTP 1.1

Servlet 4.0

HTTP/2 Features in Servlet API

- Request/response multiplexing
  - Servlet request as HTTP/2 message
- Stream prioritization
  - Add stream priority to HttpServletRequest: new class Priority
- Server push
- Upgrade from HTTP 1.1
- Binary framing
  - Hidden from API

JAX-RS 2.1

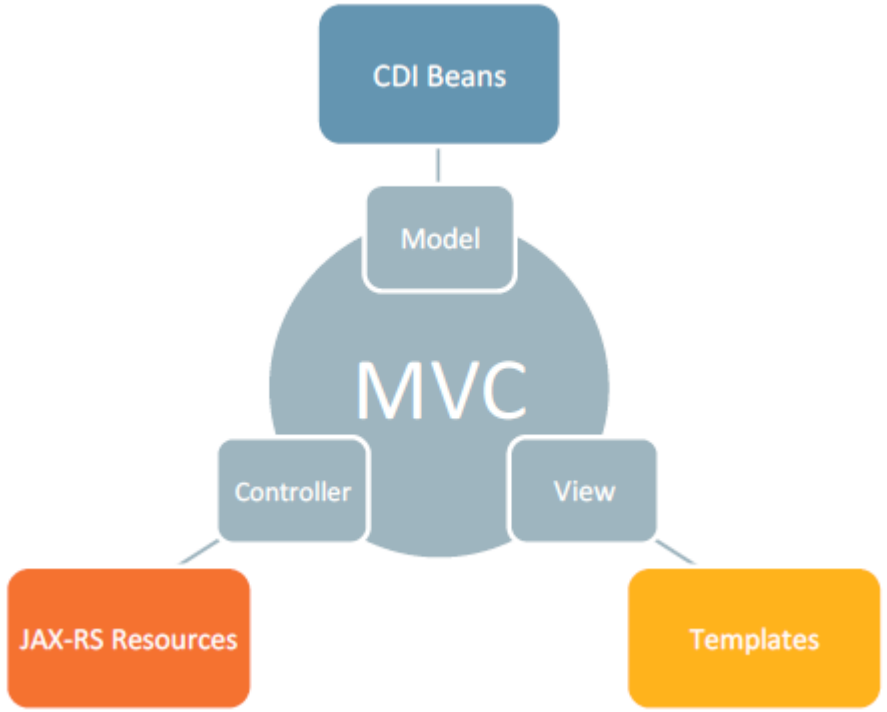
Covers many of the new Java EE 8 API

- Support for Server Sent Events
- JSON-B integration
- MVC support through JAX-RS ressources as controllers
- Non-blocking I/O in porviders
- Better CDI integration
- Hypermedia API improvements
- Reactive programming API
- Most of the above already implemented in Jersey (JAX-RS 2.0 RI)

MVC 1.0

JSR 371

- Action-based Model-View-Controller architecture
  - vs. component-based like JSF, Wicket, Tapestry
- Glues together key Java EE technologies:
  - Model
    - CDI, Bean Validation, JPA
  - View
    - Facelets, JSP
  - Controller
    - JAX-RS Ressources
- https://ozark.java.net (RI)



MVC 1.0

Example

```
@Path("hello")
public class HelloController
{
        @Inject private User user;

        @GET
        @Controller
        public String hello(@QueryParam("name") String name) {
        user.setName(name);
        return "hello.jsp";
        }
 }
```

Server-Sent Events (SSE)

- Part of HTML 5
  - Standard JavaScript API on the browser
- Server-to-client streaming
  - “Stock tickers”, monitoring applications
- Just plain long-lived HTTP
  - Between the extremes of vanilla request/response and WebSocket
  - Content-type ‘text/event-stream’
- Support via JAX-RS.next()
  - Already supported in Jersey JAX-RS reference implementation

SSE on the Server-Side

```
@Path("tickers")
public class StockTicker {
  @Resource ManagedExecutorService executor;

  @GET @Produces("text/event-stream")
  public EventOutput getQuotes() {
    EventOutput output = new EventOutput();

    executor.execute(() -> {
      ...
      output.send(new StockQuote(...));
      ...
    });

    return output;
  }
}
```

SSE on the Client-Side

```
WebTarget target = client.target("http://example.com/tickers");

EventSource eventSource = new EventSource(target) {
  @Override
  public void onEvent(InboundEvent inboundEvent) {
    StockQuote quote = inboundEvent.readData(StockQuote.class);
    ...
  }
};

eventSource.open();
```

JSON-P 1.1

- Updates to new API in Java EE 7
- Adapt to new JSON standards
  - JSON-Pointer (IETF RFC 6901)
  - JSON-Patch (IETF RFC 6902)
- Editing operations for JsonObject and JsonArray
- Helper classes and methods to better utilize SE 8’s stream operations

JSON-Pointer

Similar to XPATH in XML

```
JsonArray contacts = ...;
JsonPointer pointer =
    Json.createPointer(
        "/0/phones/mobile");
JsonValue value =
    pointer.getValue(contacts);
```

```
[
  {
    "name":"Duke",
    "gender":"Male",
    "phones":{
      "home":"650-123-4567",
      "mobile":
          "650-234-5678"}},
  {
    "name":"Jane",
    "gender":"Female",
    "phones":{
       "mobile":
           "707-555-9999"}}
]
```

JSON-Patch

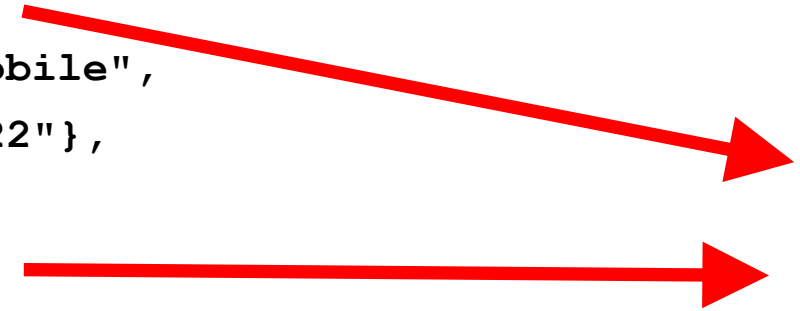
Similar to HTTP PATCH

- Modifying parts of a JSON document
- Patch itself a JSON document
  - add, replace, remove, move, copy, test operations
  - Must have "op" field and "path" field, may have “value” field
- JsonObject and JsonArray are immutable
  - Utilize Builder pattern for editing API?

```
[
  {"op": "replace", "path":"/0/phones/mobile",
      "value":"650-111-2222"},
  {"op": "remove", "path":"/1"}
]
```

JSON-Patch Possibilities

```
[
  {
    "op":"replace",
    "path":"/0/phones/mobile",
    "value":"650-111-2222"},
  {
    "op":"remove",
    "path":"/1"}
]
```



```
[
  {
    "name":"Duke",
    "gender":"Male",
    "phones":{
      "home":"650-123-4567",
      "mobile":
          "650-234-5678"}},
  {
    "name":"Jane",
    "gender":"Female",
    "phones":{
       "mobile":
           "707-555-9999"}}
]
```

JSON Query using Lambda Operations

```
JsonArray contacts = ...;
List<String> femaleNames =
    contacts.getValuesAs(JsonObject.class).stream()
        .filter(x->"Female".equals(x.getString("gender")))
        .map(x->(x.getString("name"))
        .collect(Collectors.toList());
```

JSON Query Collecting Results in JsonArray

```
JsonArray contacts = ...;
JsonArray femaleNames =
    contacts.getValuesAs(JsonObject.class).stream()
        .filter(x->"Female".equals(x.getString("gender")))
        .map(x->(x.getString("name"))
        .collect(JsonCollectors.toJsonArray());
```

- Using specialized collectors we can retrieve JSON-P API objects like JsonArray that can be directly manipulated further

Ease of Development and CDI alignment

- EJB services outside EJB
- Simplified messaging through CDI-based “MDBs”
- CDI improvements
  - Events: async, ordering, range (war, ear, server, cluster)
  - WebSocket scopes
- Pruning of EJB 2.x client view and IIOP interoperability

EJB Services outside EJB

```
@ApplicationScoped
public class MyScheduledBean {
   ...
   @Schedule(...)
   public void myScheduledTask() { ... }
}

@ApplicationScoped
@Stereotype
@Retention(RUNTIME)
@Target(TYPE)
@Schedule(...)
public @interface MonthlyTask {}
```

Simplified messaging with CDI beans

JMS 2.1

- New API to receive messages asynchronously
- Alternative to message driven beans
- Simpler JMS annotations
  - Usable by any CDI bean
  - No need for MessageListener implementation

```
@RequestScoped
public class MyListenerComponent {

  @JMSListener(destinationLookup="myQueue")
  @Transactional
  public void myCallback(Message message) {
    ...
    ...
  }
}
```

- Planning https://java.net/projects/jms-spec/pages/JMS21Planning

CDI 2.0

- Specification modularization
  - CDI full with Java EE support, CDI full, CDI light (no support for contexts and AOP)
- Observer ordering – priority annotation
- Asynchronous events
- Java SE bootstrap
- Improvements for interceptors and decorators
  - Repeatable annotations for qualifiers and interceptor bindings
- Extension SPI simplification
- EJB annotation usage in CDI beans

CDI 2.0

Asynchronous events – alternative implementations for sender and receiver?

```
@Inject @CargoInspected Event<Cargo> cargoInspected;
...
public void inspectCargo(TrackingId trackingId) {
   ...
   cargoInspected.fireAsync(cargo);
}


public void onCargoInspected(
     @Observes(async=true) @CargoInspected Cargo cargo) {
```

Infrastructure Modernization

For Cloud and on-premise

- Java EE Management 2.0
  - REST-based APIs for Management and Deployment
- Java EE Security 1.0: enhance portability, flexibility, ease-of-use
  - Password aliasing
  - Security interceptor annotations
  - User management and simple security providers
  - Role mapping
  - Authentication
  - REST authentication (Oauth/OpenID)

Java EE Management 2.0

- Update of JSR 77 (J2EE Management)
  - J2EE management is based on EJB2 remoting and CORBA
- Define RESTful API to augment and/or replace current Management EJB APIs
  - Currently used OBJECT_NAME to become URL
  - Define CRUD operations for individual managed object
  - Server-sent events used for event support
- Define RESTful API for application deployment
  - Focus on simple cases first

Java EE Security 1.0

Password aliasing

- Standardized syntax for password aliases
  - Avoids storing passwords in clear text in code, deployment descriptors and files

```
@DataSourceDefinition(
        name="java:app/MyDataSource",
        className="com.example.MyDataSource",
        ...
        user="duke",
        password="${ALIAS=dukePassword}")
```

- Standardized secure credentials archive for bundling alias and password with the application
  - Used by platform as credential store for resolving alias

CDI Interceptor for Authorization

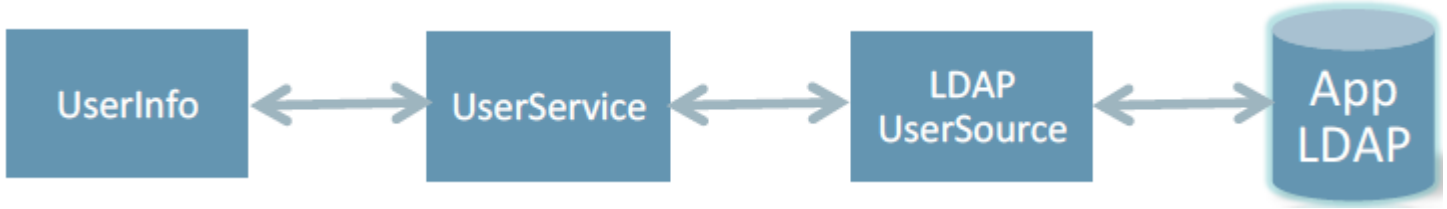
EL eanbled annotations

```
@IsAuthorized("hasRoles('Manager') && schedule.officeHrs")
void transferFunds();

@IsAuthorized("hasRoles('Manager') && hasAttribute('directReports', employee.id)")
double getSalary(long employeeId);

@IsAuthorized(ruleSourceName="java:app/payrollAuthRules", rule="report")
void displayReport();
```

Java EE Security 1.0

User Management

- Allow application to manage its own user and groups
  - Without need to access server configuration
- Users stored in application-specified repository (e.g., LDAP)
  - Simple security providers
- User service manipulates users from user source



Java EE Security 1.0

Simple security providers

```
@EmbedddedSecurityProvider({
    @Credentials(username="reza", password="secret", roles="dad"),
    @Credentials(username="nicole", password="secret", roles="mom"),
    @Credentials(username="zehra", password="secret", roles="daughter"),
    @Credentials(username="xavier", password="secret", roles="son")})

@DatabaseSecurityProvider(
    lookup="java:global/MyDB",
    userQuery="SELECT password FROM principals WHERE username=?",
    rolesQuery="SELECT role FROM roles where username=?", ...)

@LdapSecurityProvider(url="...", dnPrefix="...", dnSuffix="...", ...)
```

Adopting Java SE 8

- Most of Java SE 8 can already be used with Java EE
  - GlassFish, WildFly and WebLogic support JDK 8
- Some APIs could adopt features
  - Repeatable Annotations
  - Date-Time API/JDBC 4.2
  - CompletableFuture
  - Lambda expressions, streams
  - Default methods

Java EE 8 JSR Status

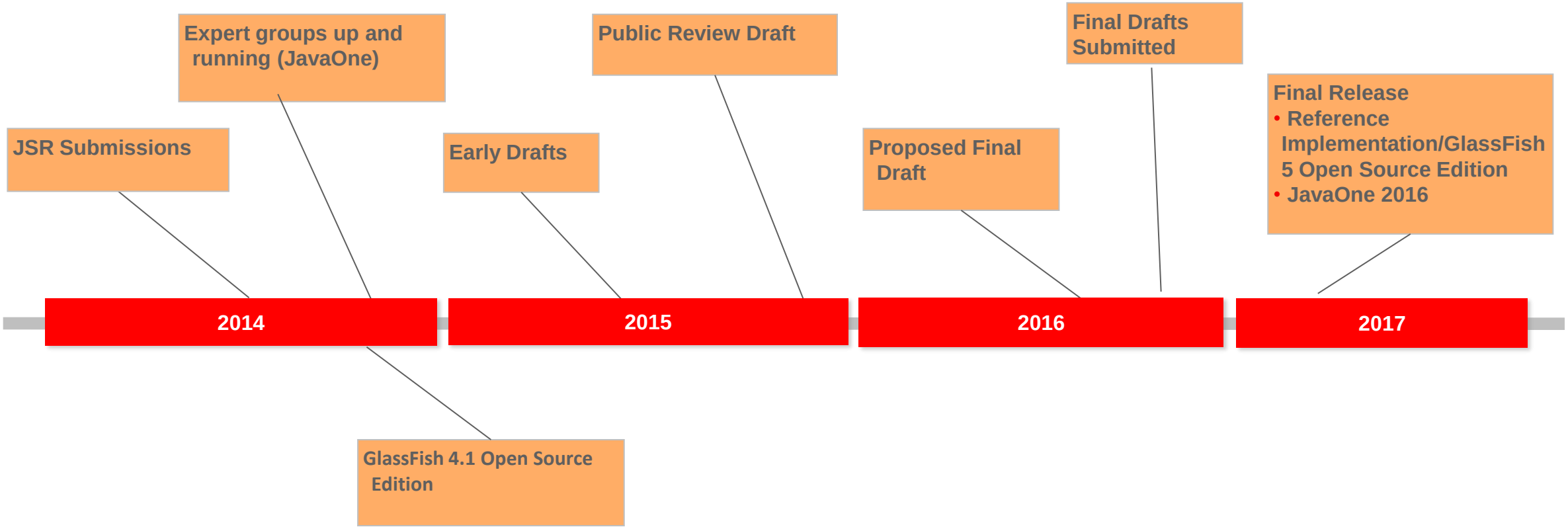
Submitted

- Java EE 8 Platform
- CDI 2.0
- JSON Binding 1.0
- JAX-RS 2.1
- MVC 1.0
- Java Servlet 4.0
- JSF 2.3
- JMS 2.1
- JSON-P 1.1
- Java EE Security 1.0
- Java EE Management 2.0

More To Come

- JCache
- Concurrency Utilities
- WebSockets
- JPA
- And more to follow…

Java EE 8 Roadmap



Continue to participate

Java EE 7

14 adopted JSRs

19 Java User Groups

Thank You!

Java EE 8

New JSRs

New Opportunities

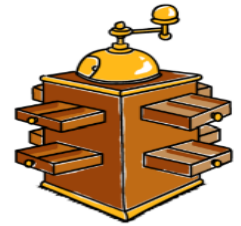
Get Involved!

Participate with us!

http://glassfish.org/contribute

Adopt-a-JSR for Java EE 8

- Grassroots participation to shape Java EE
- Launched in Java EE 7 time-frame, key community element for Java EE 8
  - 30 Java user groups participating!



https://java.net/projects/adoptajsr

Java EE 8 JSRs Already Adopted!

User Group	Java EE 8.0	CDI 2.0	JSON-B 1.0	JMS 2.1	Servlet 4.0	JAX-RS 2.1	MVC 1.0	JSF 2.3
London Java Community	✓	✓	✓	✓		✓	✓	
Morocco JUG		✓	✓		✓	✓	✓	
Egypt JUG	✓		✓	✓			✓	✓
Hellenic Java User Group	✓						✓	
Santa Catarina Java User Group		✓			✓	✓	✓	
Japan Java User Group							✓	

Links

- Java EE Tutorials
  - http://docs.oracle.com/javaee/7/tutorial/doc/home.htm
- Java EE Transparent Expert Groups
  - http://javaee-spec.java.net
- Adopt a JSR
  - https://java.net/projects/adoptajsr
- The Aquarium Blog
  - http://blogs.oracle.com/theaquarium
- Java EE 8 reference implementation
  - http://glassfish.org

Vielen Dank!

Peter Doschkinow
ORACLE Deutschland B.V. & Co. KG