



# What's Coming in Java EE 8?

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MAKE THE  
FUTURE  
JAVA

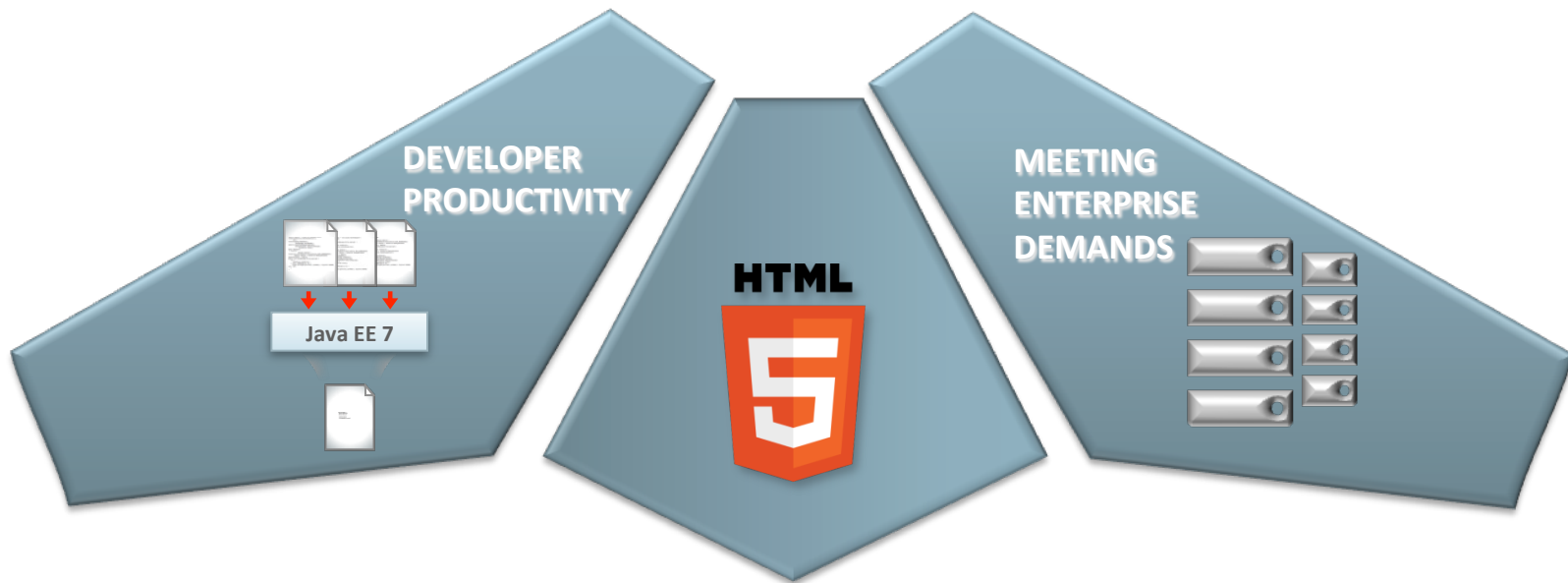


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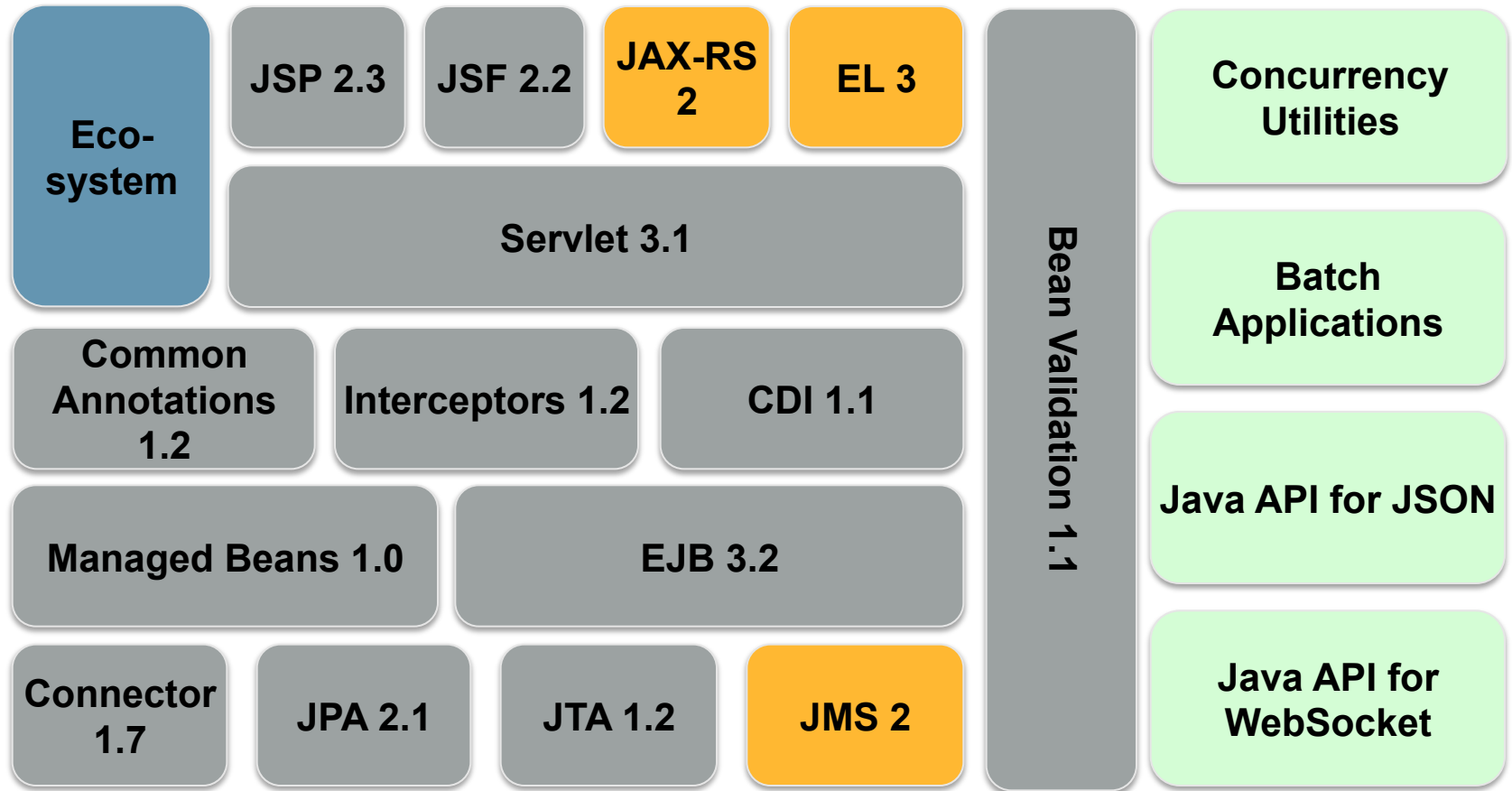
# Agenda

- How We Got Here
- Where We Are Going
- How Can You Get Involved?

# Java EE 7 Themes



# Java EE 7



 New  Major Release  Updated

# Java EE 7 Platforms

FUJITSU

NEC

HITACHI

SAP NetWeaver

JO<sub>n</sub>AS

APACHE  
GERONIMO

resin®

Java EE 6

ORACLE®  
WebLogic

JBoss™

IBM  
WebSphere®

TomEE



GlassFish

WildFly

TmaxSoft

Java EE 7

# GlassFish 4.1 and WebLogic 12.1.3

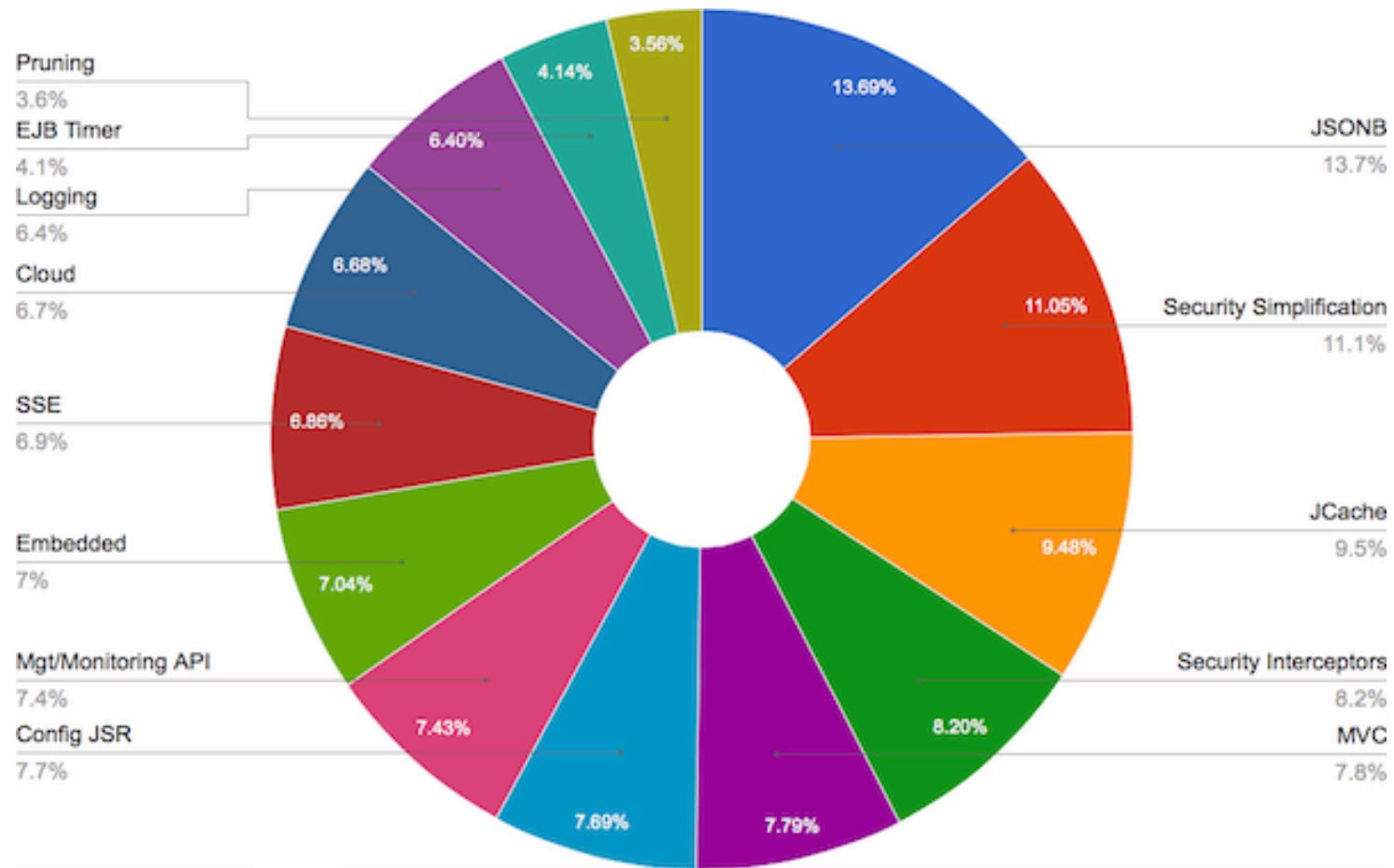
- Glassfish 4.1

- Addressing security, must-fix and important bugs
- Over 800+ bugs fixed!
- JDK 8 Support
- Updates to projects: Jersey, Mojarra, WebSocket 1.1, Tyrus, Grizzly, CDI 1.2, Weld 2.2
- NetBeans includes GlassFish 4.1

- WebLogic 12.1.3

- WebSocket, JSON-P, JAX-RS 2, JPA 2.1
- JDK 8 support
- Server-Sent Events (SSE)
- WebSocket fallback
- Improved Maven support
- Official Docker images

# Java EE 8 Community Survey



[https://blogs.oracle.com/ldemichiel/entry/results\\_from\\_the\\_java\\_ee](https://blogs.oracle.com/ldemichiel/entry/results_from_the_java_ee)

[https://java.net/downloads/javaee-spec/JavaEE8\\_Community\\_Survey\\_Results.pdf](https://java.net/downloads/javaee-spec/JavaEE8_Community_Survey_Results.pdf)



# Java EE 8 Possibilities

- Web Standards/HTML5 Alignment
  - HTTP2, SSE, JSON-B, JSON-P, action-oriented web framework, hypermedia
- Cloud
  - Simple security providers, multitenancy, REST management/monitoring
- CDI Alignment
  - CDI 2, EJB services outside EJB, security interceptors, EJB pruning
- Enterprise
  - JCache, Configuration, JMS
- Java SE 8 alignment

# Current Status

## Already There

- Java EE 8 (JSR 366)
- CDI 2 (JSR 365)
- JSON-B (JSR 367)
- JMS 2.1 (JSR 368)
- Servlet 4 (JSR 369)
- JAX-RS 2.1 (JSR 370)
- MVC (JSR 371)
- JSF 2.3 (JSR 372)

## Coming Soon

- Java EE Security (JSR 373)
- Java EE Management (JSR 375)
- JSON-P 1.1 (JSR 374)
- JCache 1.1

## Farther Out

- Concurrency Utilities
- WebSocket
- JPA
- And more...

# Servlet 4

- Principal goal to support HTTP 2
  - Request/response multiplexing over single connection
  - Multiple streams
  - Stream Prioritization
  - Server Push
  - Binary Framing
  - Header Compression



- Hopefully most of it can be done without major API changes

# JSON-B

## Java API for JSON Binding

- API to marshal/unmarshal POJOs to/from JSON
  - Very similar to JAXB in the XML world
- Default mapping of classes to JSON
  - Annotations to customize the default mappings
  - `@JsonProperty`, `@JsonTransient`, `@JsonValue`
- Draw from best of breed ideas in existing JSON binding solutions
  - MOXy, Jackson, GSON, Genson, Xstream, ...
  - Allow switching providers
- Provide JAX-RS a standard way to support “application/json” for POJOs
  - JAX-RS currently supports JSON-P

# JSON-B Possibilities

```
@Entity public class Person {  
    @Id String name;  
    String gender;  
    @ElementCollection  
    Map<String, String> phones;  
    ...  
}  
  
Person duke = new Person();  
duke.setName("Duke");  
duke.setGender("Male");  
phones = new HashMap<>();  
phones.put("home", "650-123-4567");  
phones.put("mobile",  
    "650-234-5678");  
duke.setPhones(phones);
```

```
{  
    "name": "Duke",  
    "gender": "Male",  
    "phones": {  
        "home": "650-123-4567",  
        "mobile": "650-234-5678"  
    }  
}
```

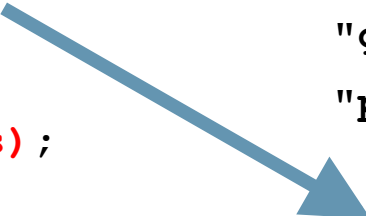
# JSON-P 1.1

- 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 Possibilities

```
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"}}  
]
```



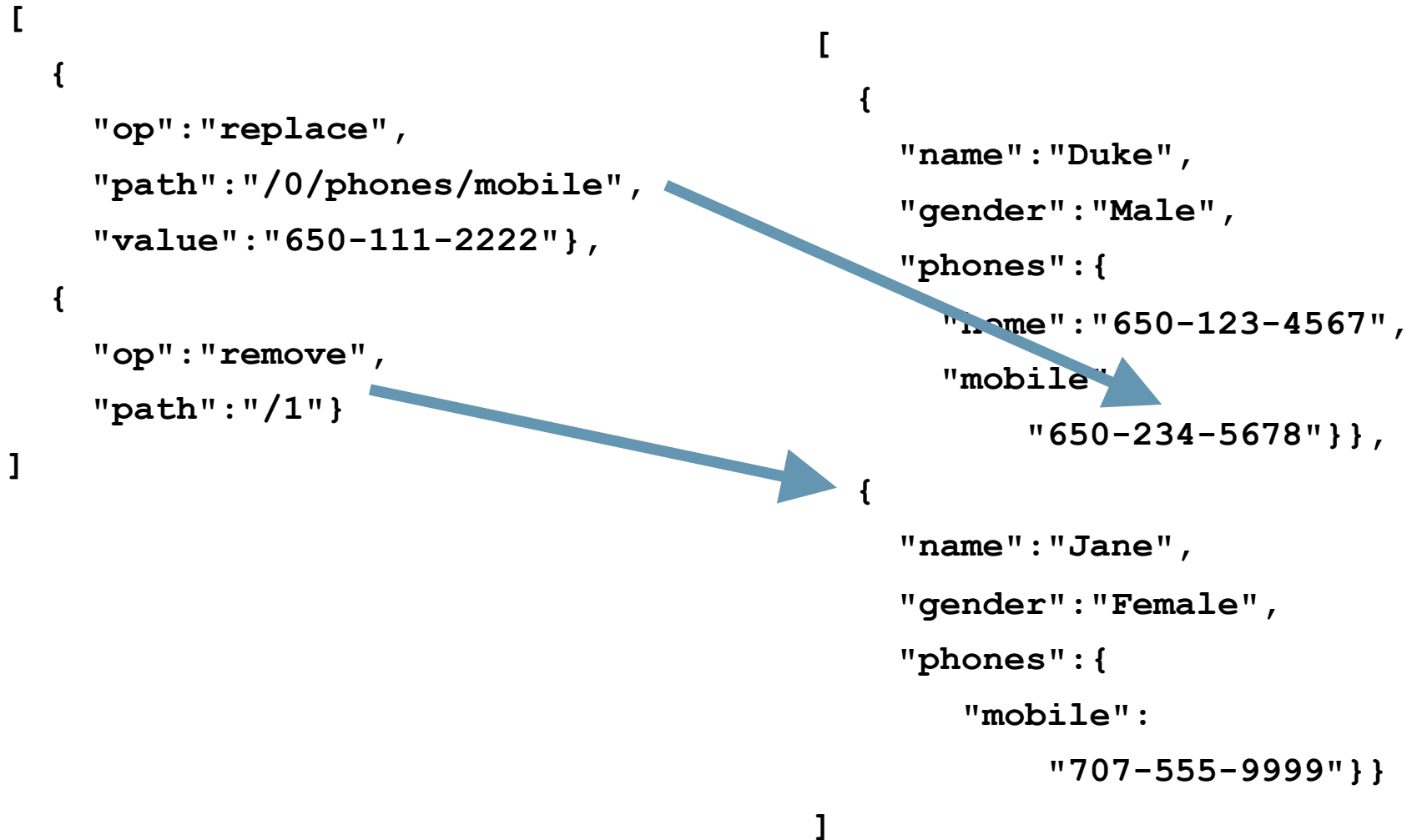
# JSON-Patch

- 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



# 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());
```

# Server-Sent Events (SSE)

- Lesser known 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();
```

# MVC

- Standard action-based web framework for Java EE
  - First class peer to JSF, JSF to continue on it's evolution path
- Model
  - CDI, Bean Validation, JPA
- View
  - Facelets, JSP
- Controller
  - Majority of work here
  - Based on JAX-RS

# MVC Possibilities

```
@Path("/")
@View("my-index.xhtml")
public class Bookstore {
    ...
    @GET
    public List<Item> getItems() {
        ...
        return items;
    }
}
```



# Java EE Security

- Simplify security for Java EE and improve portability
- Simple security providers
- Simple pluggability and mappings
- Enabling existing security annotations (`@RolesAllowed`) for all beans
- EL enabled security annotations via interceptors
- Password aliasing
- OAuth/OpenID

# 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="...", ...)
```

# EL Enabled Security Annotations

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

```
@IsAuthorized(  
    "hasRoles('Manager') && hasAttribute('directReports', employeeId)")  
public double getSalary(long employeeId);
```

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

# Simple Security Pluggability

**@SecurityProvider**

```
public class MySecurityProvider {
```

```
    @Inject UserService userService;
```

**@OnAuthentication**

```
// The parameters should suit the credentials mechanism being
// used.
```

```
public Principal getPrincipal(
    String username, String password) {
    // Construct the principal using the user service.
}
```

**@OnAuthorization**

```
public String[] getRoles (Principal principal) {
    // Construct an array of roles using the principal and user
    // service.
}
}
```

# Password Aliasing

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

# JMS 2.1

- Essentially continuation of JMS 2
- Declarative message listeners
  - Alternative to MDB
  - More powerful features
  - Available to all beans
- Improving JMS provider portability
- Minor features and corrections
  - Redelivery delay, redelivery limits, dead message queues

# Declarative JMS Listeners

```
@ApplicationScoped
@MaxConcurrency(10)
public class HandlingEventRegistrationAttemptConsumer {
    @JmsListener(
        destinationLookup="jms/HandlingEventRegistrationAttemptQueue",
        selector="source = 'mobile'",
        batchSize=10, retry=5, retryDelay=7000,
        orderBy=TIMESTAMP)
    @Transactional
    public void onEventRegistrationAttempt(
        HandlingEventRegistrationAttempt... attempts) {
        ...
    }
}
```

# CDI 2

- Java SE Bootstrap
- XML configuration
- Asynchronous events
- @Startup for CDI beans
- Portable Extension SPI simplification
- Small features and enhancements



# Asynchronous CDI Events?

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

---

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

# @Schedule Outside EJB

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

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

# Java EE Management

- Revamp of dated JSR 77 (J2EE Management)
- REST/SSE instead of EJB 2.x remoting
- Not just management/monitoring but deployment as well

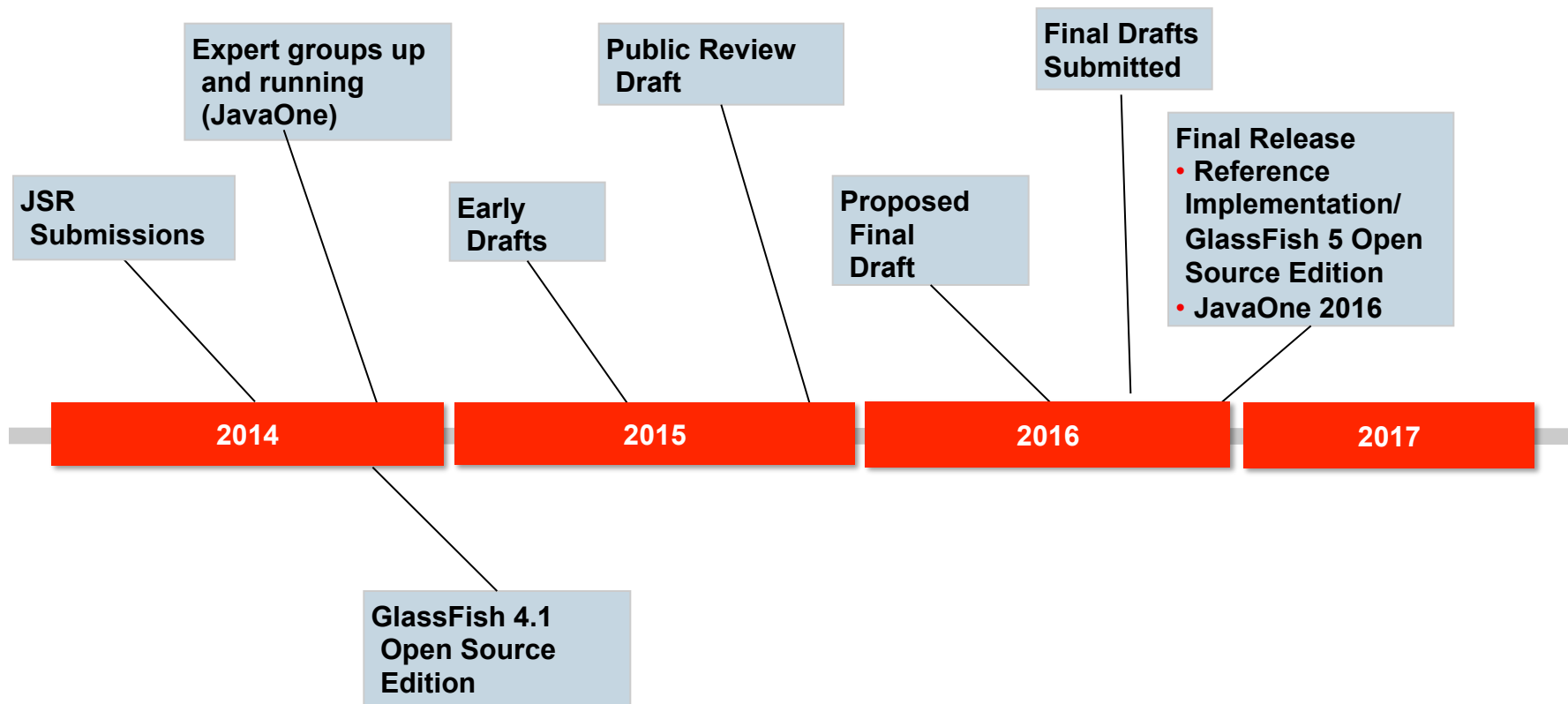
# Adopting Java SE 8

- 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
  - Completable Future
  - Lambda expressions, streams
  - Default methods

# Others

- Reactive programming with JAX-RS client API
- More hypermedia support in JAX-RS
- Non-blocking I/O in JAX-RS
- Improving CDI integration with JAX-RS
- Improving CDI integration with WebSocket
- Prune EJB 2 interfaces
- Prune CORBA interoperability

# Java EE/GlassFish Roadmap



# 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
  - 19 Java user groups adopted a Java EE 7 JSR!



<http://glassfish.org/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							✓	



# Learning More

- Java EE Transparent Expert Groups
  - <http://javaee-spec.java.net>
- Java EE Reference Implementation
  - <http://glassfish.org>
- The Aquarium
  - <http://blogs.oracle.com/theaquarium>

