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Java EE 8: A Community Update

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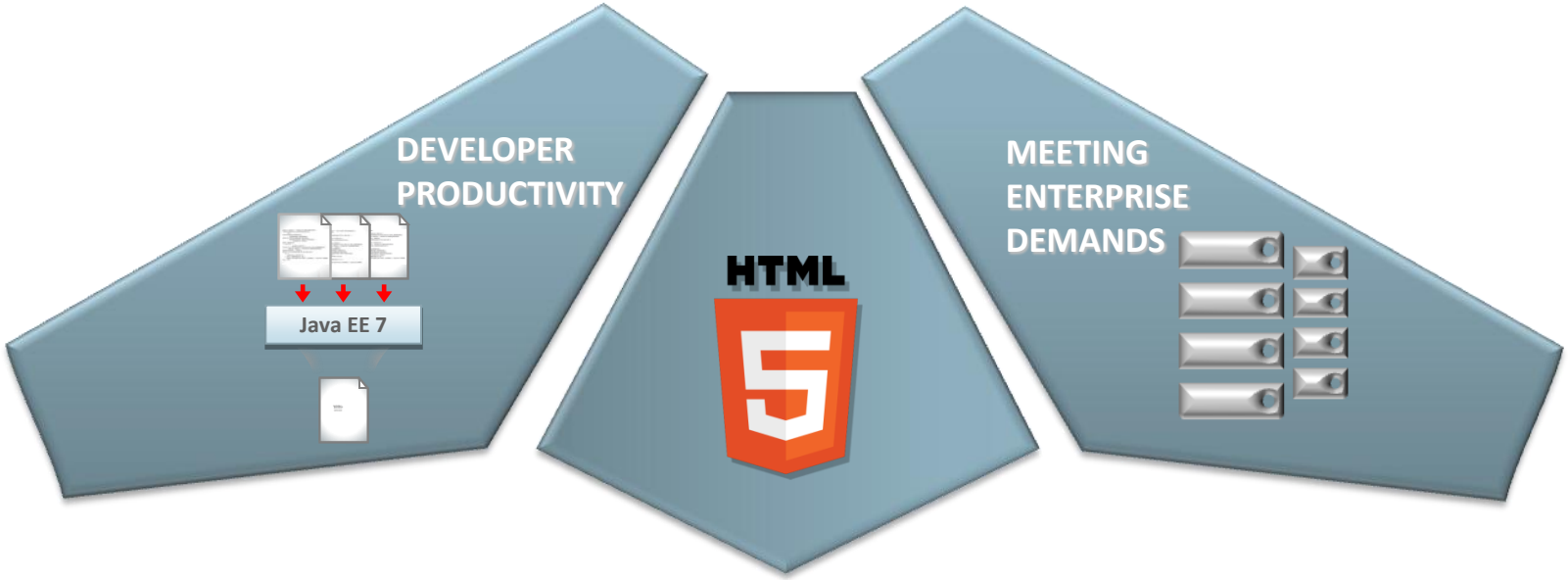
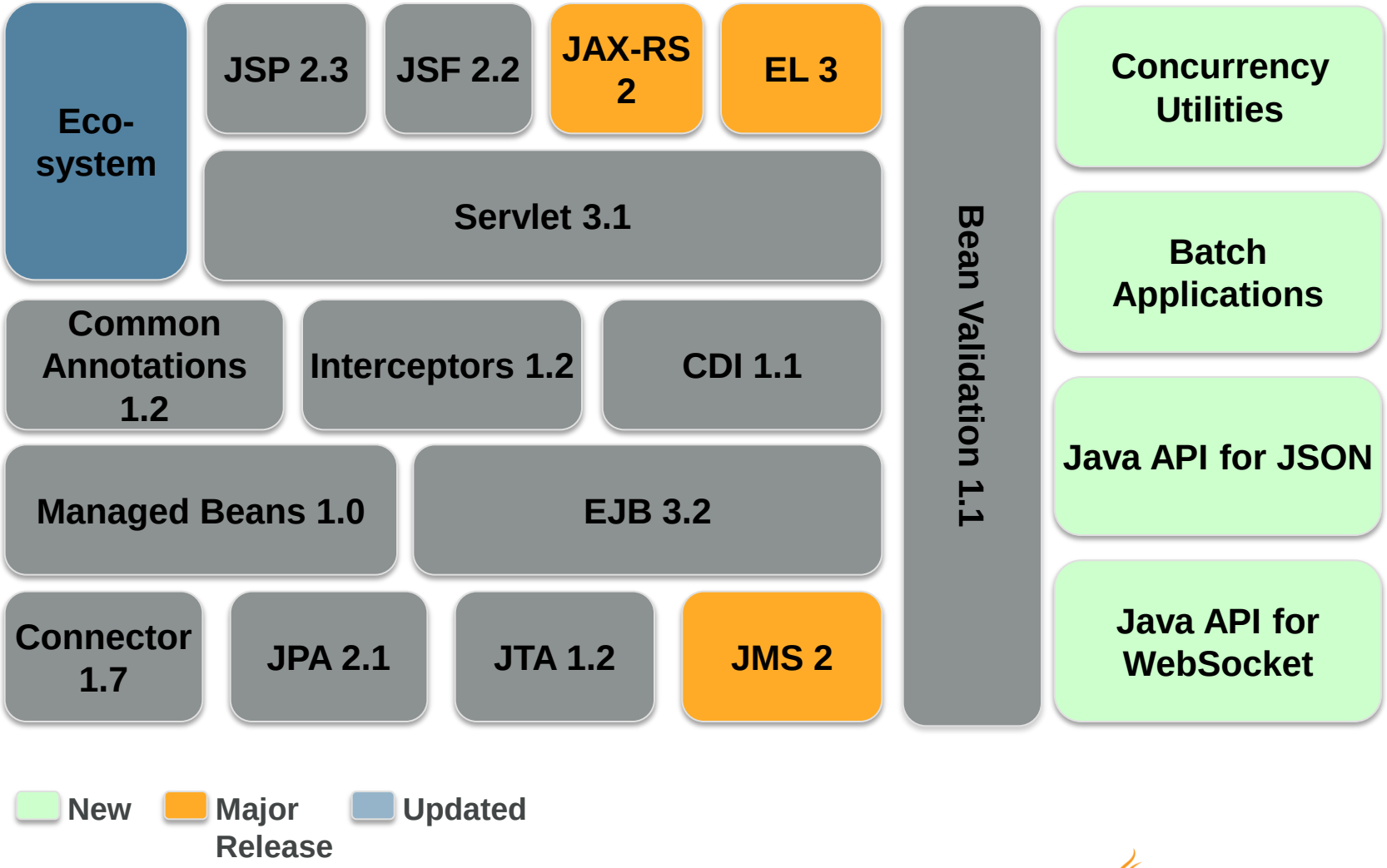
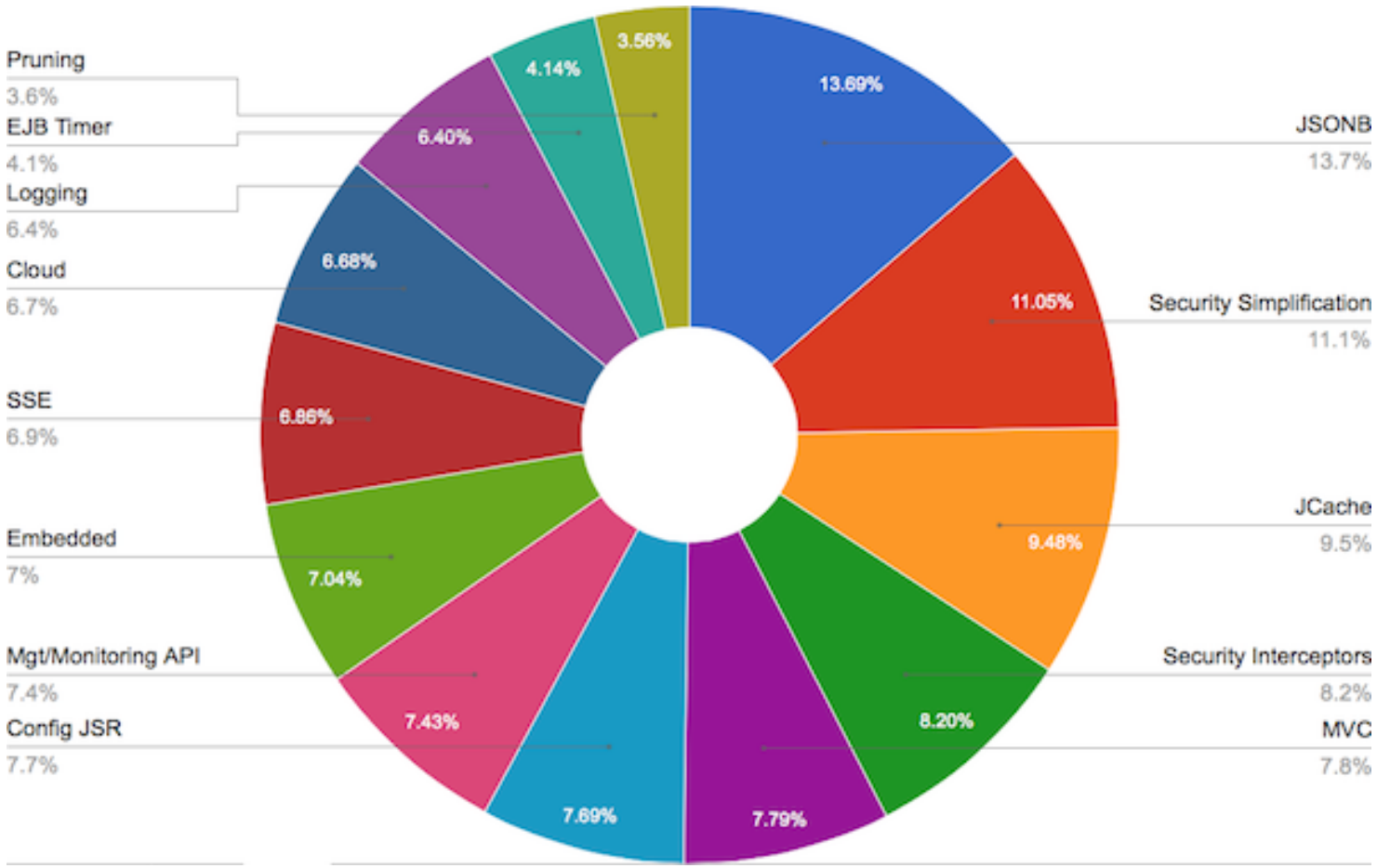
Java EE 7 Themes



Java EE 7



Java EE 8 Community Survey



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 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

- Security
- Management and Monitoring
- JCache 1.1
- JSON-P 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);
```

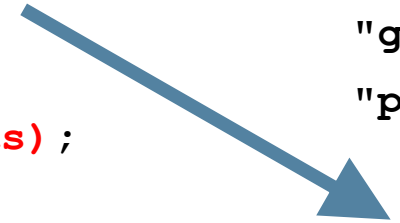
```
{
  "name":"Duke",
  "gender":"Male",
  "phones":{
    "home":"650-123-4567",
    "mobile":"650-234-5678"
  }
}
```

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)
- 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

```
[
  {
    "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());
```

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
  - 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

MVC Possibilities

```
@Path("/")
@Template("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) {
```

Java EE Management 2

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

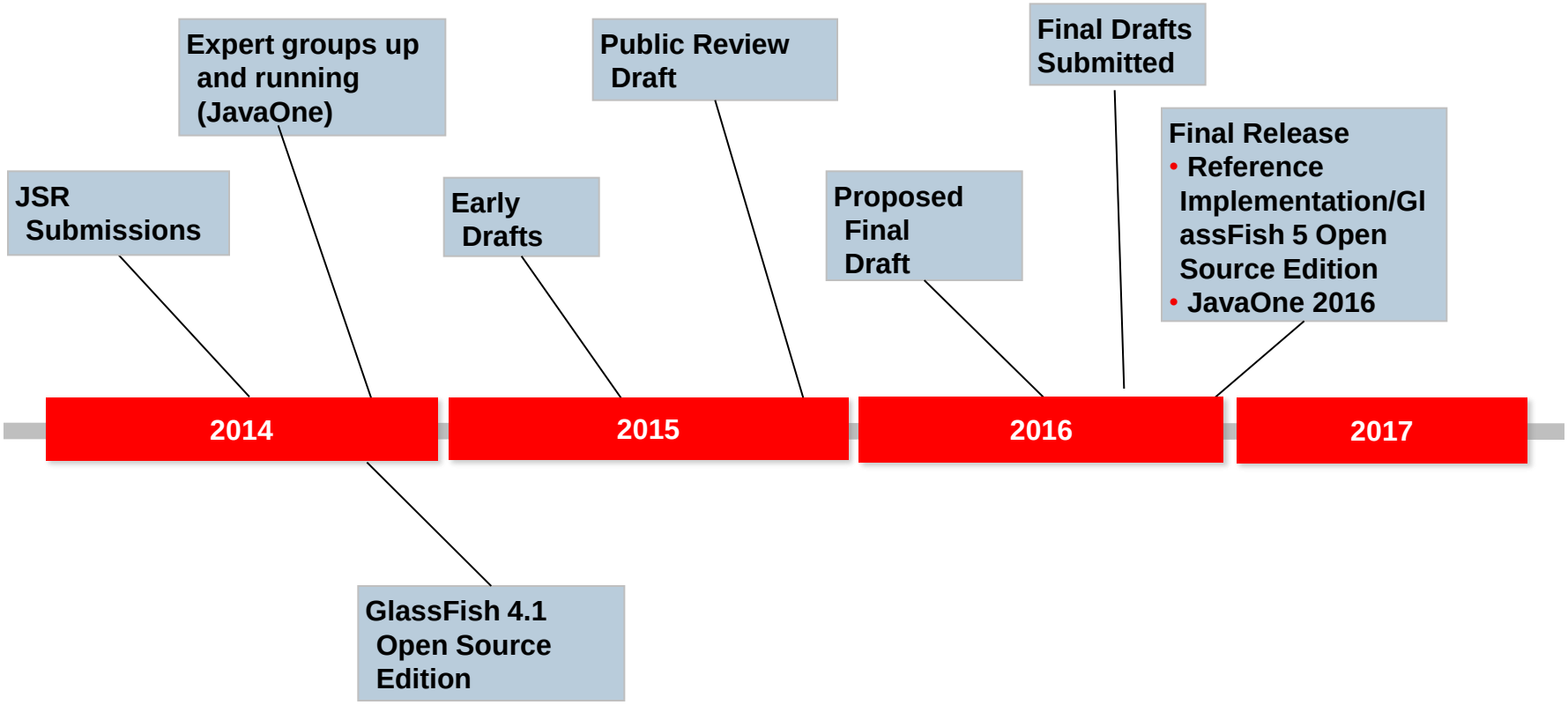
Adopting Java SE 8

- 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
  - Default methods

Others

- Reactive programming with JAX-RS client API
- Non-blocking I/O in JAX-RS
- More hypermedia support in JAX-RS
- Improving CDI integration with JAX-RS
- Improving CDI integration with WebSocket
- Ability to use @Schedule outside EJB
- 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							✓	
JUG Chennai/Hyderabad		✓					✓	

Learning More

- Java EE 7 Transparent Expert Groups
  - http://javaee-spec.java.net
- Java EE 7 Reference Implementation
  - http://glassfish.org
- The Aquarium
  - http://blogs.oracle.com/theaquarium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