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JavaEE.Next(): Java EE 7, 8, and Beyond

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JavaDAYS

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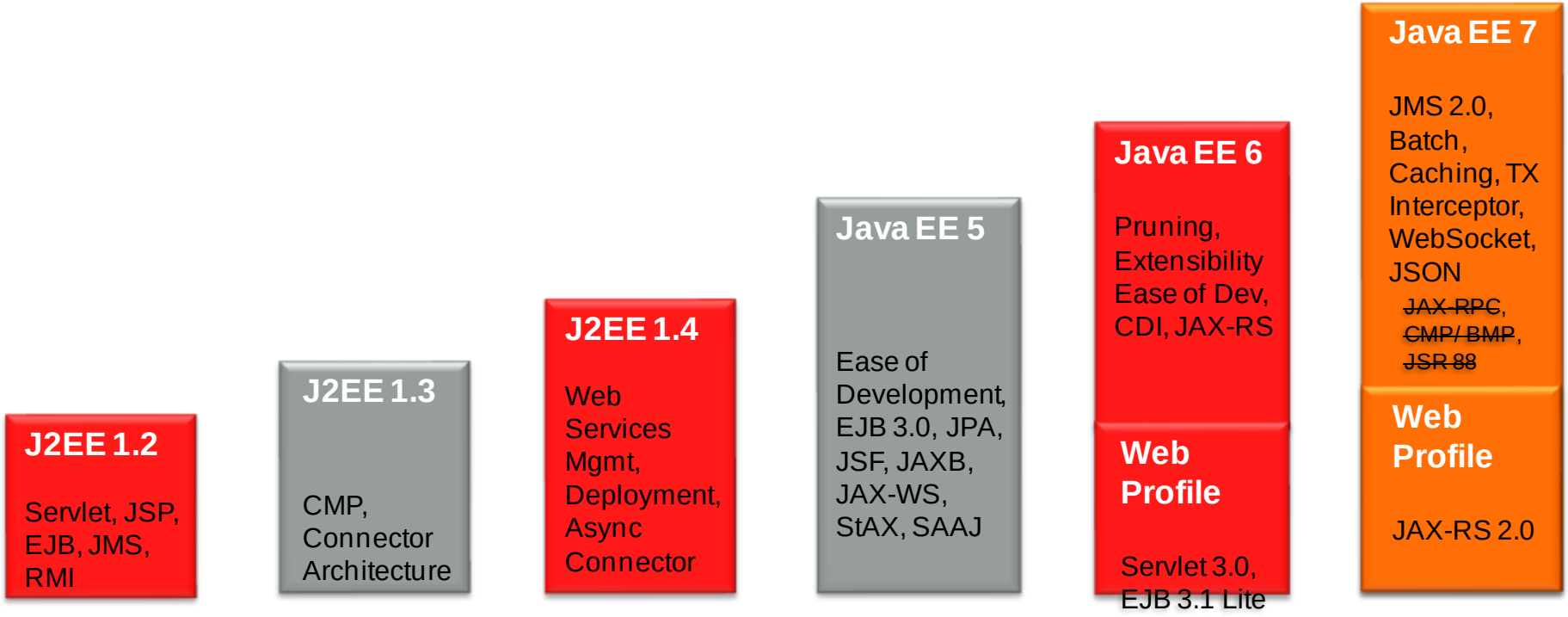
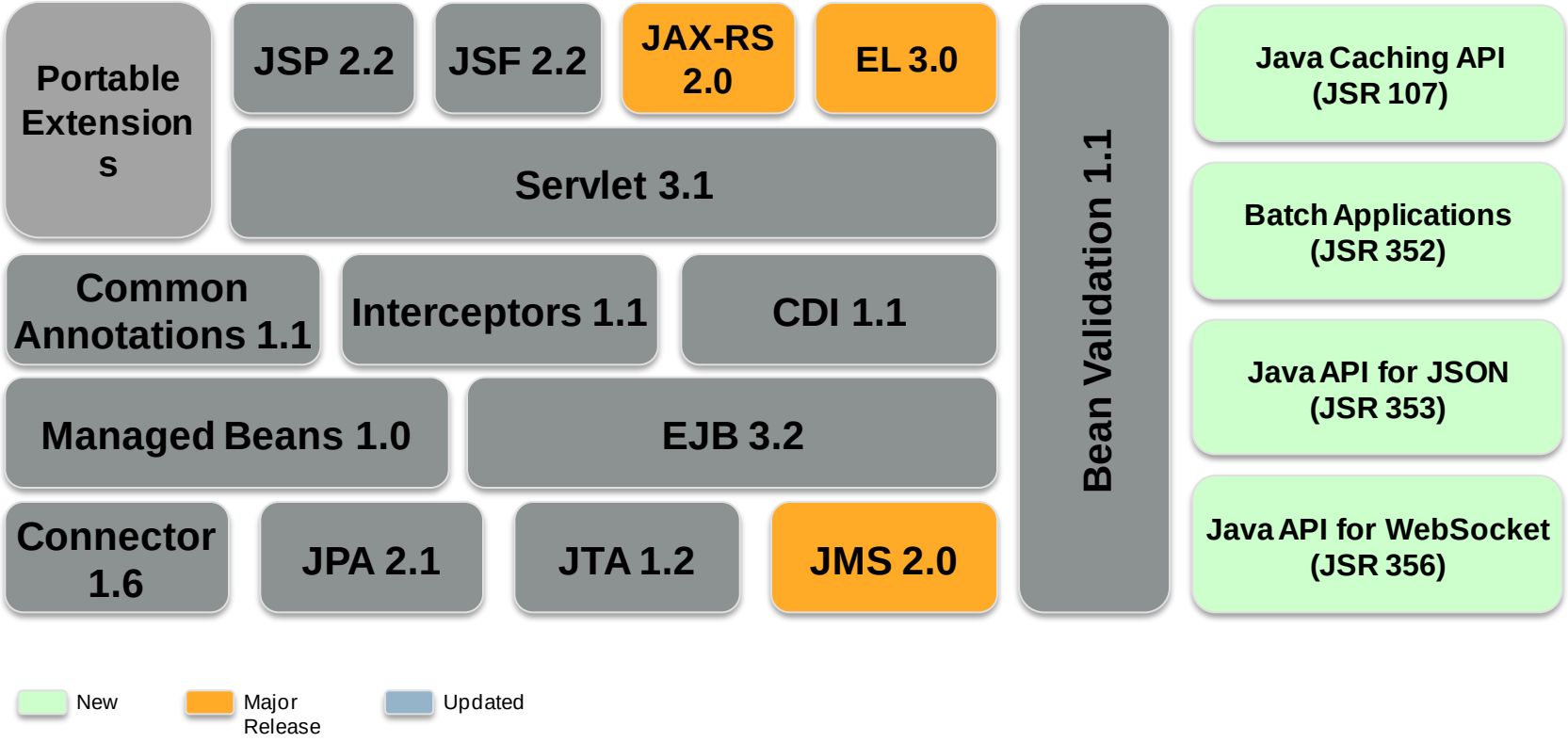
Program Agenda

- Overview
- A Taste of API Changes
- Your Feedback on Open Issues!

Java EE Past, Present, & Future



Java EE 7 – Candidate JSRs



JMS 2

- API modernization using dependency injection
- JCA adapter required
- Delivery delay, async send, delivery count, MDB alignment
- Fixes, clarifications

JMS 2

Old API

```
@Resource(lookup = "java:global/jms/demoConnectionFactory")
ConnectionFactory connectionFactory;
@Resource(lookup = "java:global/jms/demoQueue")
Queue demoQueue;

public void sendMessage(String payload) {
  try {
    Connection connection = connectionFactory.createConnection();
      try {
        Session session = connection.createSession(false, Session.AUTO_ACKNOWLEDGE);
        MessageProducer messageProducer = session.createProducer(demoQueue);
        TextMessage textMessage = session.createTextMessage(payload);
        messageProducer.send(textMessage);
      } finally {
        connection.close();
      }
  } catch (JMSException ex) {
    Logger.getLogger(getClass().getName()).log(Level.SEVERE, null, ex);
  }
}
```


JMS 2

Simplified API

```
@Inject
private JMSContext context;

@Resource(mappedName = "jms/inboundQueue")
private Queue inboundQueue;

public void sendMessage (String payload) {
  context.createProducer().send(inboundQueue, payload);
}
```

JMS 2/Java EE 7

JMS Resource Definition

```
@JMSConnectionFactoryDefinition(
  name="java:global/jms/demoConnectionFactory",
  className= "javax.jms.ConnectionFactory",
  description="ConnectionFactory to use in demonstration")

@JMSDestinationDefinition(
  name = "java:global/jms/demoQueue",
  description = "Queue to use in demonstration",
  className = "javax.jms.Queue",
  destinationName="demoQueue")
```

Java API for WebSocket

- Higher level API for WebSocket
- Both client and server-side (Java SE and Java EE)
- Both declarative and programmatic

Java API for WebSocket

Connection Life Cycle

```
@WebSocketEndpoint(path="/chat")
public class ChatServer {
  Set<Session> peers = ...

  @WebSocketOpen
  public void onOpen(Session peer) {
    peers.add(session);
  }

  @WebSocketClose
  public void onClose(Session session) {
    peers.remove(session);
  }
  ...
```

Java API for WebSocket

WebSocket Communication

```
  ...
  @WebSocketMessage
  public void message(String message, Session client)
      throws IOException {
    for (Session session : peers) {
      if (!session.equals(client)) {
        session.getRemote().sendObject(message);
      }
    }
  }
}
```

Java API for JSON Processing

- API to parse, generate, transform, query JSON
- Object Model and Streaming API -- similar to DOM and StAX
- Binding JSON to Java objects forthcoming

Java API for JSON Processing

Building a JSON Object

```
"phoneNumber": [
  {
    "type": "home",
    "number": ”408-123-4567”
  },
  {
    "type": ”work",
    "number": ”408-987-6543”
  }
]
```

```
JsonObject jsonObject =
    new JsonBuilder()
  .beginArray("phoneNumber")
    .beginObject()
      .add("type", "home")
      .add("number", "408-123-4567")
    .endObject()
    .beginObject()
      .add("type", ”work")
      .add("number", "408-987-6543")
    .endObject()
  .endArray()
.build();
```

JAX-RS 2

- Client API
- Message Filters & Entity Interceptors
- Asynchronous Processing – Server & Client
- Hypermedia Support
- Common Configuration

JAX-RS 2

Client API

```
// Get instance of Client
Client client = ClientFactory.newClient();

// Get customer name for the shipped products
String name = client.target("../orders/{orderId}/customer")
                    .pathParam("orderId", "10")
                    .queryParam("shipped", "true")
                    .request()
                    .get(String.class);
```

Java Temporary Caching API

- Java caching standard
- Long awaited…
- Caching annotations

Java Temporary Caching API

Basic API

```
CacheManager cacheManager =
    CacheManagerFactory.getCacheManager();
Cache<String, Object> cache =
    cacheManager.getCache("testCache");
...
cache.put(key1, value1);
...
Object value2 = cache.get(key2);
...
cache.remove(key3);
```

Java Temporary Caching API

Caching Annotations

```
public class CustomerDao {
  @CachePut(cacheName="customers")
  public void addCustomer(
      @CacheKeyParam int cid,
      @CacheValue Customer customer) {
    . . .
  }
}
```

JPA 2.1

- Schema generation
- Stored procedures
- Unsynchronized persistence contexts
- Entity converters
- Fixes and enhancements

JPA 2.1

Schema Generation

```
@Table(indexes= {@Index(columnList="NAME")
                 @Index(columnList="DEPT_ID")})
@Entity public class Employee {
  @Id private Integer id;
  private String name;
  ...
  @ManyToOne
  private Department dept;
  …
}
```

JPA 2.1

Stored Procedures

```
@Entity
@NamedStoredProcedureQuery(name="topGiftsStoredProcedure”,
    procedureName="Top10Gifts")
public class Product {


StoredProcedreQuery query = EntityManager.createNamedStoredProcedureQuery(
    "topGiftsStoredProcedure");
query.registerStoredProcedureParameter(1, String.class, ParameterMode.INOUT);
query.setParameter(1, "top10");
query.registerStoredProcedureParameter(2, Integer.class, ParameterMode.IN);
query.setParameter(2, 100);
. . .
query.execute();
String response = query.getOutputParameterValue(1);
```

JTA 1.2

- Declarative transactions outside EJB
- Transaction scope - @TransactionScoped

JTA 1.2

@Transactional Annotation

```
@Inherited
@InterceptorBinding
@Target({TYPE, METHOD}) @Retention(RUNTIME)
public @interface Transactional {
  TxType value() default TxType.REQUIRED;
  Class[] rollbackOn() default {};
  Class[] dontRollbackOn() default {};
}

@Transactional(rollbackOn={SQLException.class},
    dontRollbackOn={SQLWarning.class})
public class UserService {...}
```

JSF 2.2

- HTML5 Support
- @FlowScoped
- @ViewScoped for CDI
- Managed beans deprecated/CDI alignment
- File upload component
- View actions
- Multi-templating
- Security
- Fixes and enhancements

JSF 2.2

Pass-Through HTML 5 Components

```
<html>
   ...
   <input type="color" jsf:value="#{colorBean.color2}" />
   <input type="date" jsf:value="#{calendarBean.date1}" />
   ...
</html>
```

JSF 2.2

Faces Flow

```
@Named
@FlowScoped(id="flow-a")
public class Flow_a_Bean implements Serializable {
    public String getName() {
        return "Flow_a_Bean";
    }
    public String getReturnValue() {
        return "/return1";
    }
    @Produces
    Flow getFlow(FlowBuilder builder) {
         builder.startNode("router1");
         builder.flowReturn("success").fromOutcome("/complete");
         builder.flowReturn("errorOccurred").fromOutcome("error");
         builder.switchNode("router1").
             navigationCase().condition("#{facesFlowScope.customerId == null}").
             fromOutcome("create-customer").
             defaultOutcome("view-customer");
         builder.viewNode("create-customer");
         builder.viewNode("maintain-customer-record");
         builder.methodCall("upgrade-customer").
           method("#{maintainCustomerBean.upgradeCustomer}").defaultOutcome("view-customer");
         builder.initializer("#{maintainCustomerBean.initializeFlow}");
         builder.finailzer("#{maintainCustomerBean.cleanUpFlow}");
         return builder.getFlow();
    }
}
```

JSF 2.2

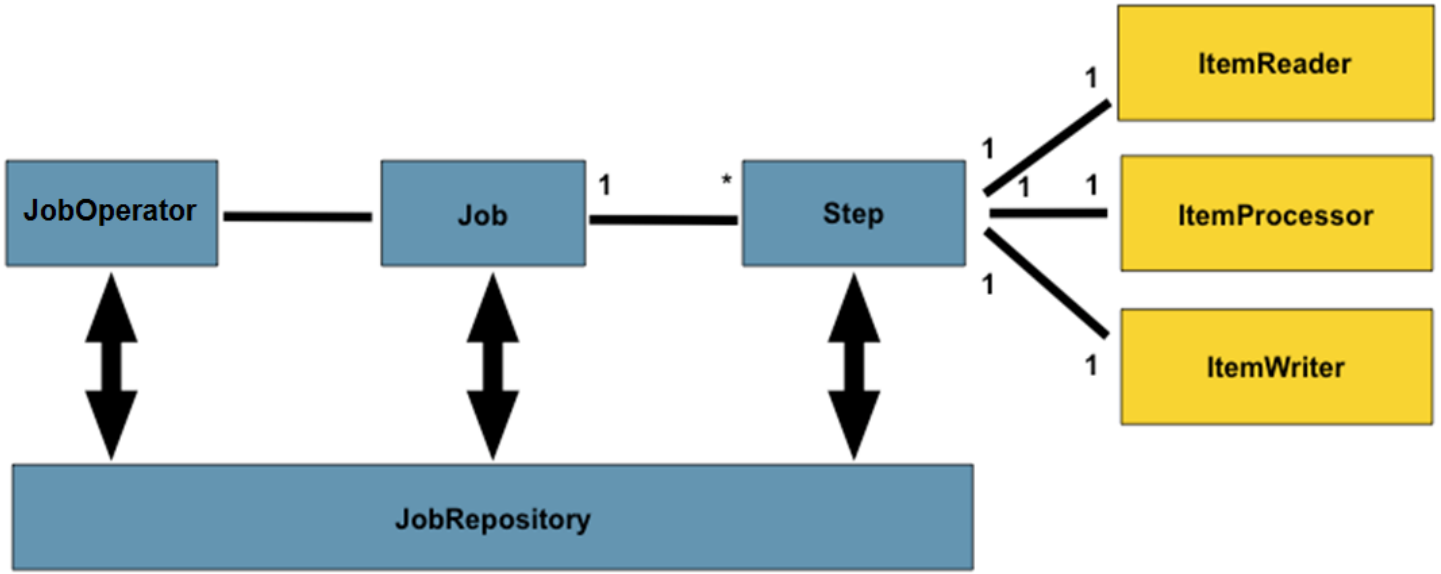
File Upload Component

```
<h:inputFile id="file" value="#{fileUploadBean.uploadedFile}">
  <f:validator validatorId="FileValidator" />
</h:inputFile>

@Named @RequestScoped
public class FileUploadBean {
  private Part uploadedFile; // getter/setter
  public String getFileText() {
    String text = "";
    if (null != uploadedFile) { try {
      InputStream is = uploadedFile.getInputStream();
      text = new Scanner( is ).useDelimiter("\\A").next();
    } catch (IOException ex) {} }
    return text;
  }
}
```

Batch Applications for the Java Platform

- API for robust batch processing targeted to Java EE



Batch Applications for the Java Platform

Step Example

```
<step id="sendStatements">
  <chunk reader="AccountReader"
     processor="AccountProcessor"
     writer="EmailWriter"
     chunk-size="10" />
</step>
```

```
@ReadItem
public Account readAccount() {
  // read account using JPA
}
```

```
@ProcessItem
public Account processAccount(Account account) {
  // calculate balance
}
```

```
@WriteItems
public void sendEmail(List<Account> accounts) {
  // use JavaMail to send email
}
```

Bean Validation 1.1

- Method constraints
- Bean Validation artifacts injectable
- Fixes, clarifications and enhancements

Bean Validation 1.1

Method Level Constraints

```
public void placeOrder(
     @NotNull String productName,
     @NotNull @Max("10") Integer quantity,
     @Customer String customer) {
   . . .
}

@Future
public Date getAppointment() {
   . . .
}
```

Others

- **Servlet 3.1:** Non-blocking I/O, upgrade to WebSocket, security…
- **CDI 1.1:** Ordering of interceptors, Servlet events, @Veto…
- **EL 3.0:** Lambda expressions, Collection, operators, standalone API…
- **EJB 3.2:** Truncating CMP/BMP…

Java EE 8

- Cloud, PaaS, multitenancy/SaaS
- Modularity
- HTML5
- More CDI/EJB alignment?
- NoSQL?

Addition of New JSRs

	Add to Java EE Full Platform?			Add to Web Profile?		
	Yes	No	Not Sure	Yes	No	Not Sure
WebSocket 1.0	☐	☐	☐	☐	☐	☐
JSON-P 1.0	☐	☐	☐	☐	☐	☐
Batch 1.0	☐	☐	☐	☐	☐	☐
JCache 1.0	☐	☐	☐	☐	☐	☐

How important is CDI?

- Essential?
- Very Important?
- Important?
- So – so?
- Not Important?

Enable CDI more broadly?

- Currently, CDI must be enabled on a per-jar basis with beans.xml
- Should we enable CDI by default in Java EE?

Yes	No	Not Sure
☐	☐	☐

CDI @Inject Use

- Should new Java EE technologies invent their own annotations for injection, or just use CDI?

```
@JobListener @Named("MyJobListener")
public class MyJobListenerImpl {
  @BatchContext JobContext jctxt;
}
```

```
@JobListener @Named("MyJobListener")
public class MyJobListenerImpl {
  @Inject @BatchContext JobContext jctxt;
}
```

Expansion of CDI Stereotypes

```
@Secure
@RolesAllowed("Administrator")
@Stereotype
@Target({TYPE, METHOD}) @Retention(RUNTIME)
public @interface Admin {
}

@Stateless
@Stereotype @Target({TYPE}) @Retention(RUNTIME)
@Admin
public @interface AdminBean {
}

@AdminBean
public class AdminService {
   ...
}
```

Stereotypes

- Should we expand the use of Stereotypes?

Yes	No	Not Sure
☐	☐	☐

Use of CDI Interceptors

- CDI interceptors and Java EE interceptors are currently supported on
  - CDI managed beans, @ManagedBean beans, Session Beans, MDBs
- Should we support interceptors on:
  - All Java EE components (e.g., JAX-RS Resource classes, Servlets, …)?
  - Other Java EE managed classes?
- *Is there any place that CDI injection is supported that should not support interceptors?*

Use of CDI Observers

- CDI observer methods are currently supported on
  - CDI managed beans, Session beans, @ManagedBean beans
- Should we support observer methods on:
  - All JavaEE components (e.g., JAX-RS Resource classes, Servlets, …)?
  - Other Java EE managed classes?
- Should we support observer methods wherever CDI injection is supported?

Use of EJB Timers

- EJB Timers are currently supported on
  - Stateless Session Beans, Singleton Session Beans, MDBs
- Should we support timers on:
  - CDI managed beans?
  - Other Java EE components (MDBs, Servlets, JAX-RS Resource classes, . . .) ?
  - Other Java EE managed classes?
- Should we support timers wherever observer methods are supported ?

Try it Out!

download.java.net/glassfish/4.0/promoted/

Resources

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

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