Antonio Goncalves

What's new in Java EE 6?

« EJBs are dead... »

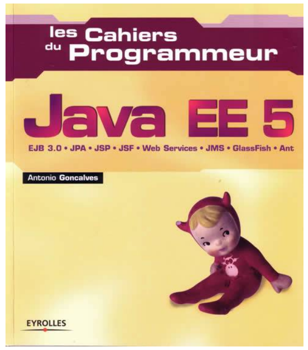
Rod Johnson

« ...Long live EJBs ! »

Antonio Goncalves

Antonio Goncalves

- Software Architect
- Former BEA Consultant
  - Experience with Application Servers
- Java EE 5 author (in French)
- Java EE 6 author (in English)
- JCP Expert Member
  - Java EE 6, EJB 3.1, JPA 2.0
- Co-creator, co-leader of the Paris JUG


les Cahiers du Programmeur
Java EE 5
EJB 3.0 • JPA • JSP • JSF • Web Services • JMS • GlassFish • Ant
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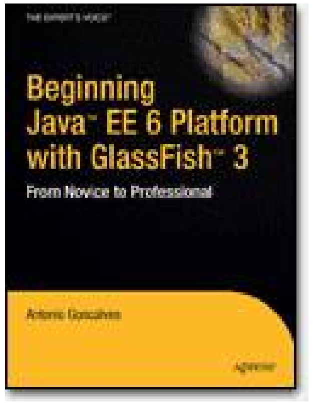
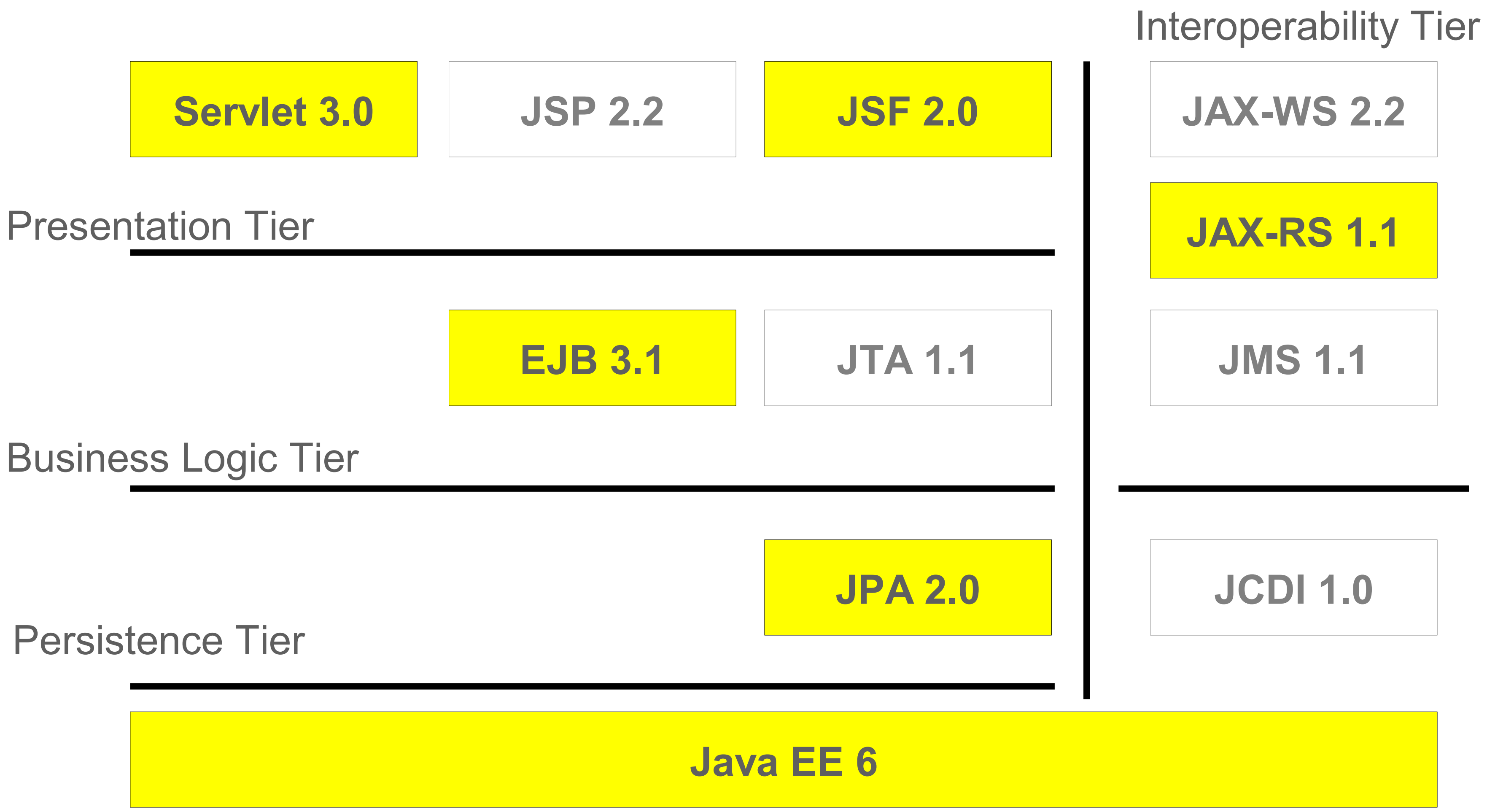

Beginning Java EE 6 Platform with GlassFish 3
From Novice to Professional
Antonio Goncalves
Apress

Agenda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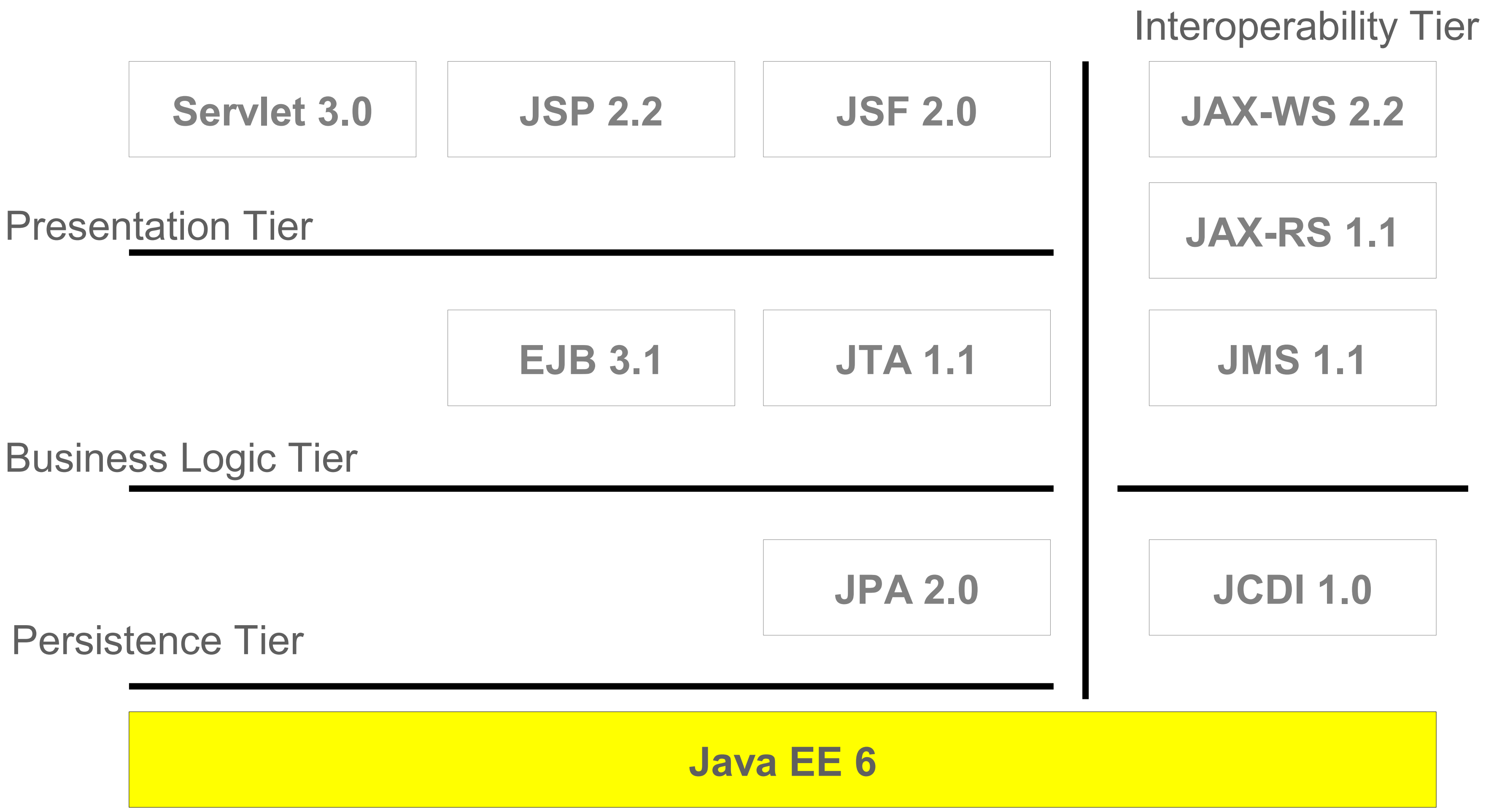
Java EE 6

Java EE 6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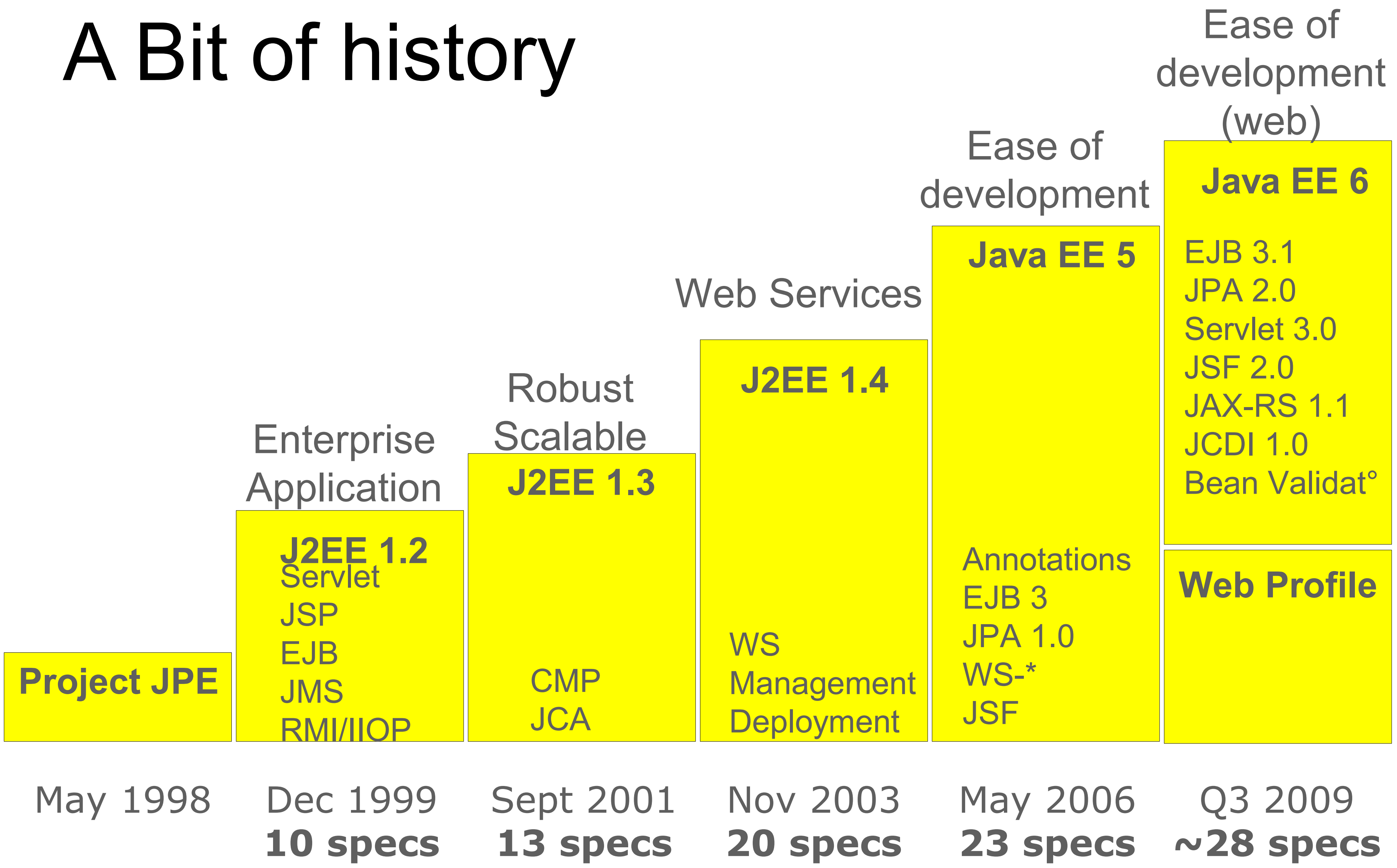
A Bit of history



Java EE 6 is Richer, Easier, Lighter

- Richer
  - New specifications
- Easier
  - POJO model
  - Less XML...
  - … even on the web tier
- Lighter
  - EJB Lite
  - Profiles and Pruning

Richer : ~28 specifications

Web Services

JAX-RPC	1.1
JAX-WS	2.2
JAXM	1.0
JAX-RS	**1.1**
JAXR	1.1
StAX	1.0
Web Services	1.2
Web Services Metadata	1.1

Enterprise

EJB	3.1
JAF	1.1
JavaMail	1.4
JCA	1.6
JMS	1.1
JPA	2.0
JTA	1.1

Web

JSF	2.0
JSP	2.2
JSTL	1.2
Servlet	3.0
Expression Language	1.2

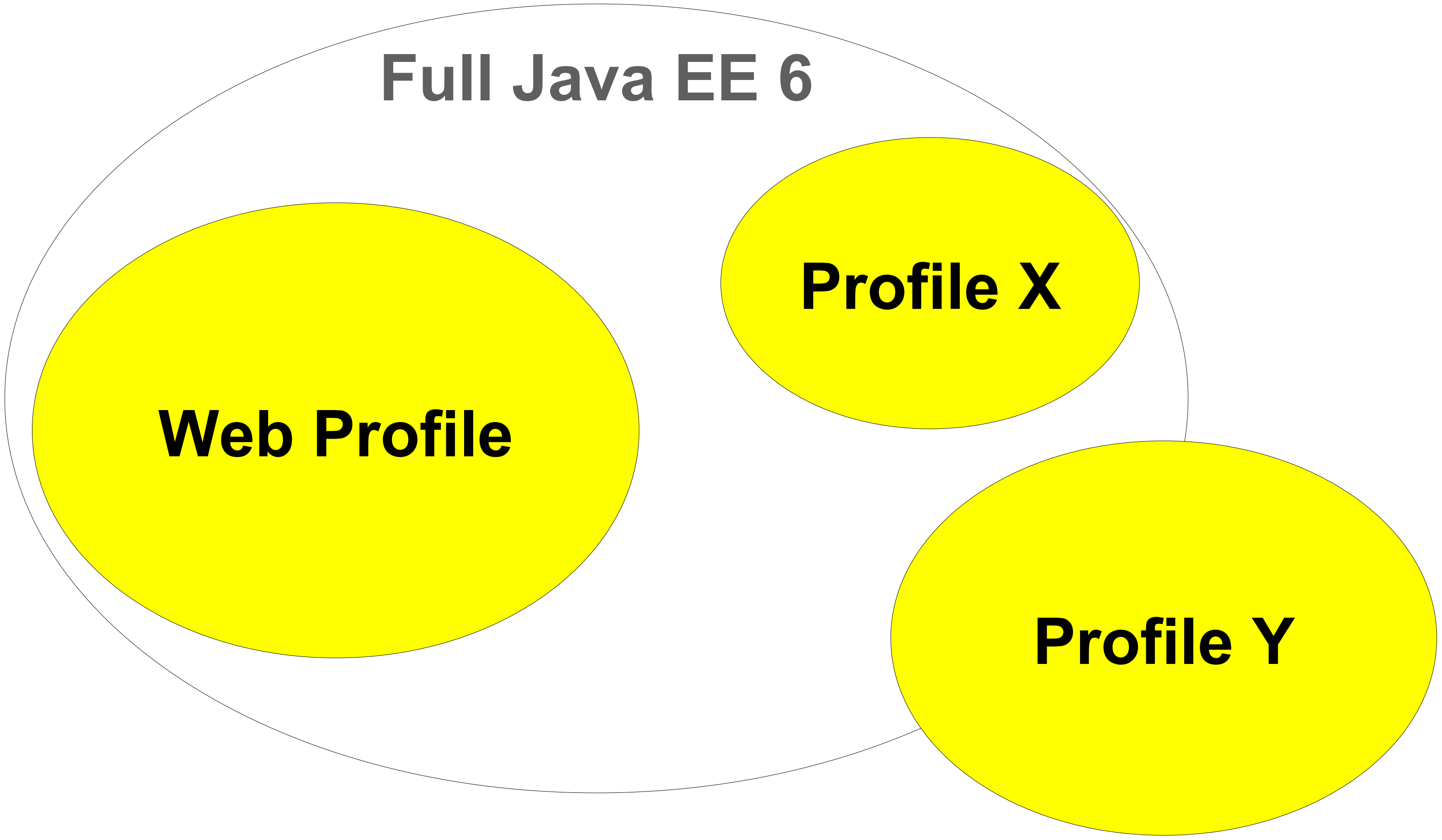
Management, Security and other

JCDI	**1.0**
JACC	1.1
Common Annotations	1.0
Java EE Application Deployment	1.2
Java EE Management	1.1
Java Authentication Service Provider Interface for Containers	1.0
Debugging Support for Other Languages	1.0
Bean Validation	**1.0**

+ Java SE 6

JAXB	2.2
JDBC	4.0
JNDI	1.5
RMI	
JMX	
JAAS	
JAXP...	

Lighter : Profiles



Lighter : Web Profile

- Subset of full platform
- Focuses on web development
- Separate specification
- Others will come
  - Minimal (Servlet/JSP)
  - Portal....

Servlet	3.0
JSP	2.2
EL	1.2
JSTL	1.2
EJB **Lite**	3.1
JTA	1.1
JPA	2.0
JSF	2.0

« ...you'll see gradual move toward the Web profile » - *Rod Johnson*

Lighter : EJB Light

- Subset of the EJB 3.1 API
- To be used in Web profile

Local Session Bean
Injection
CMT / BMT
Interceptors
Security

~~Message Driven Beans~~
~~EJB Web Service Endpoint~~
~~RMI/IIOP Interoperability~~
~~Remote interface~~
~~EJB 2.x~~
~~Timer service~~
~~CMP / BMP~~

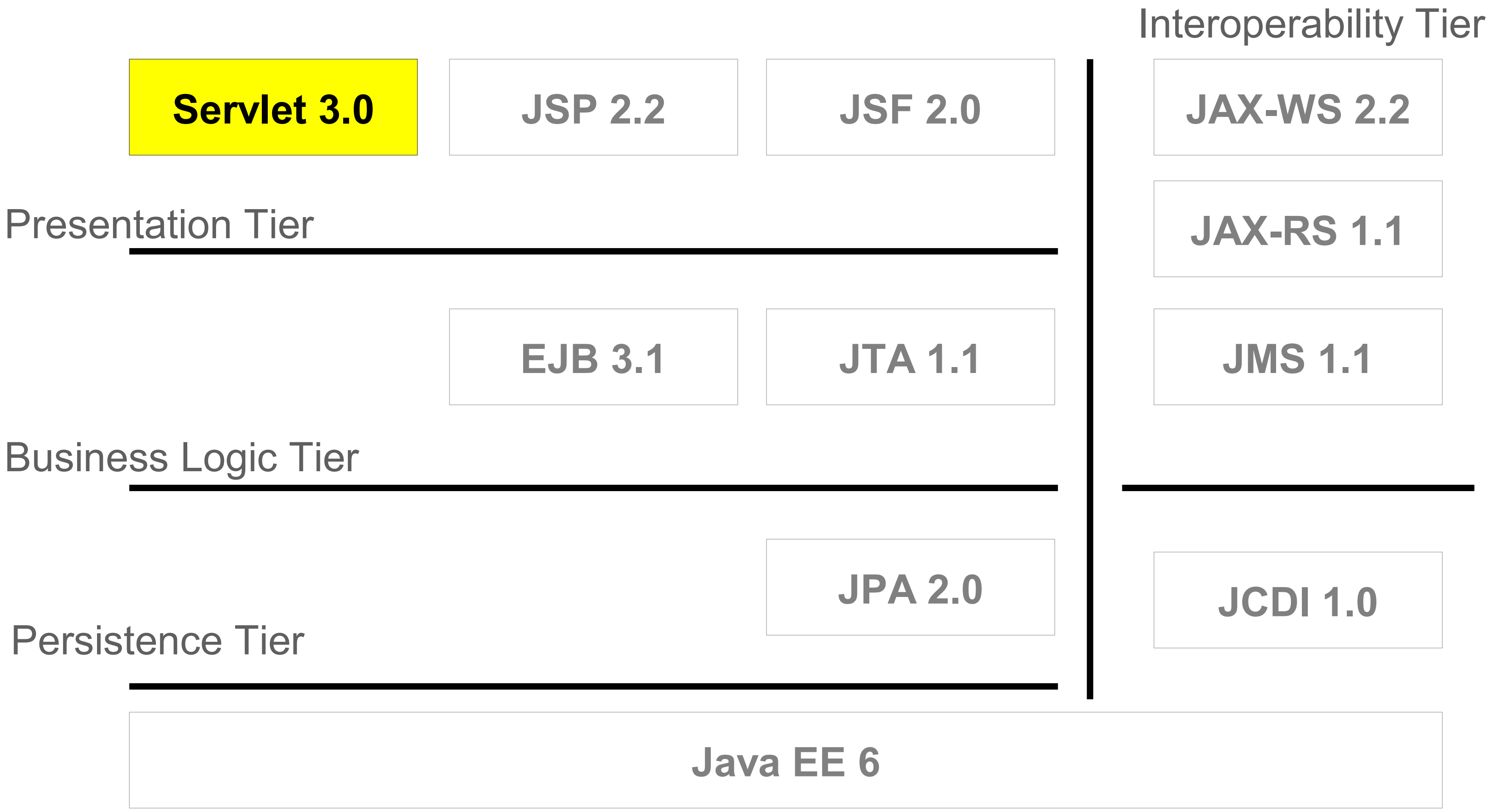
Lighter : Pruning (Soon less specs)

- Makes some specifications optional in next version
- Pruned in Java EE 6
  - Entity CMP 2.x
  - JAX-RPC
  - JAX-R
  - JSR 88 (Java EE Application Deployment)
- Stronger than @Deprecated
- Might disappear from Java EE 7
  - Evolve (or not) separately from Java EE
- Easier for future containers

Easier ?

Of course!

Servlet 3.0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Ease of development

- Annotations based programming model
  - @WebServlet
  - @ServletFilter
  - @WebServletContextListener
  - @InitParam
- Deployment descriptors optional (web.xml)
  - Modular

Ease of development

```
public class MyServlet extends HttpServlet {
    public void doGet (HttpServletRequest req,
                       HttpServletResponse res) {
                    ....
    }
}
```

Deployment descriptor (web.xml)

```
<web-app>
  <servlet>
          <servlet-name>MyServlet</servlet-name>
          <servlet-class>samples.MyServlet</servlet-class>
  </servlet>

  <servlet-mapping>
          <servlet-name>MyServlet</servlet-name>
          <url-pattern>/MyApp</url-pattern>
  </servlet-mapping>
  ...
</web-app>
```

Ease of development

```
@WebServlet(urlMappings={"/MyApp"})
public class MyServlet extends HttpServlet {

    public void doGet (HttpServletRequest req,
                       HttpServletResponse res){
                ....
    }
}
```

web.xml is optional

- Same for filters and listeners

Extensibility

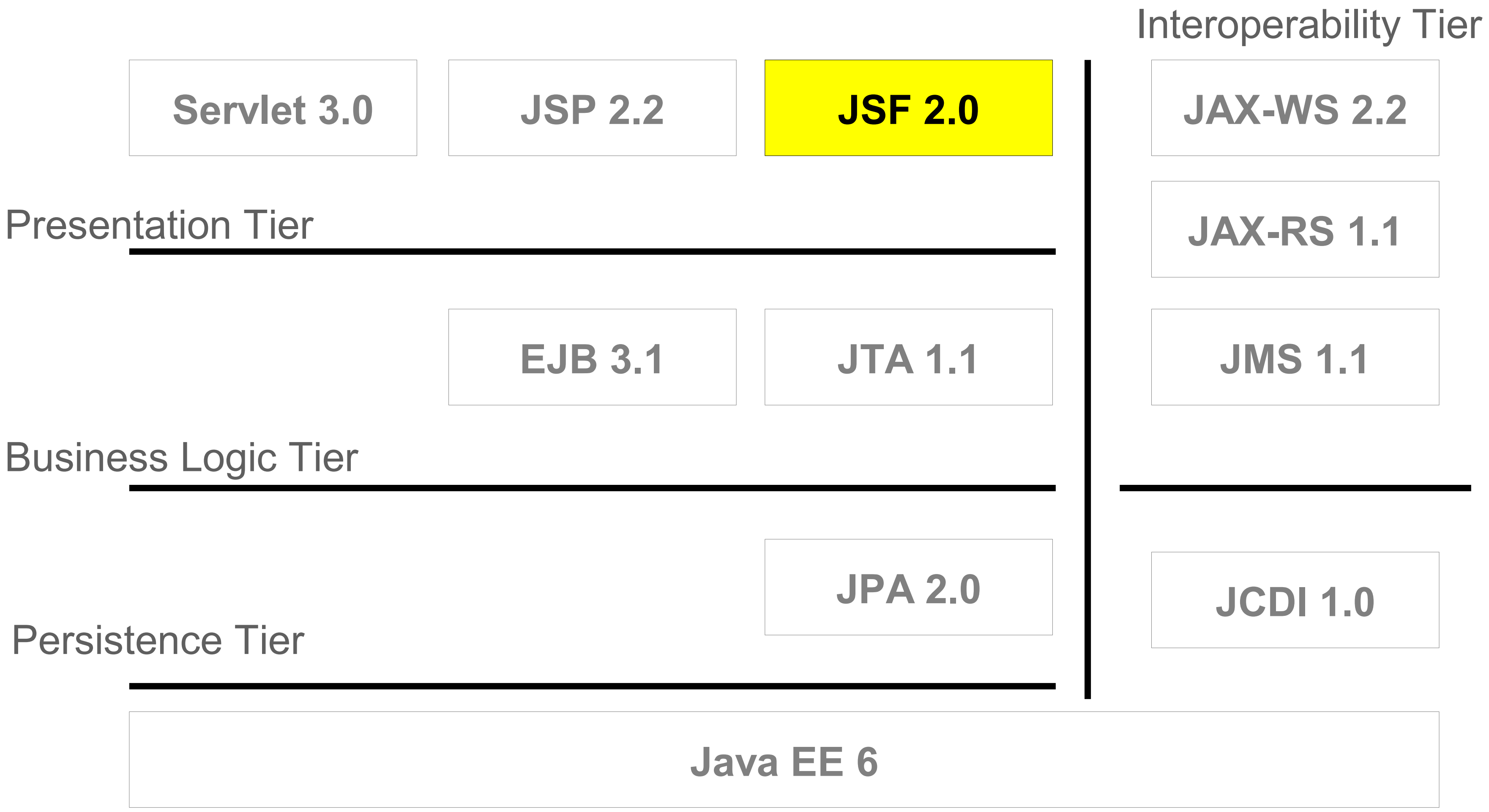
- Fragments or modular web.xml
  - Logical partitioning of a web application
- Annotations and web fragments are merged
- Overriden by main web.xml

```
<web-fragment>
  <servlet>
    <servlet-name>myservlet</servlet-name>
    <servlet-class>samples.MyServlet</servlet-class>
  </servlet>
  <listener>
    <listener-class>samples.MyListener</listener-class>
  </listener>
</web-fragment>
```

Asynchronous support

- Servlets have to wait for a response from :
  - Web service
  - JDBC connection
  - JMS message....
- Comet style of programming
- @WebServlet (asyncSupported = true)
- New APIs to ServletRequest / ServletResponse
  - Suspending, resuming, querying the status of the request

JSF 2.0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Ease of development

- Annotations
  - @ManagedBean
    - @ApplicationScoped, @SessionScoped...
    - @FacesConverter
    - @FacesValidator
- faces-config.xml optional
- Page declaration language (PDL)
  - Facelets (preferred)
  - JSP (still supported)
- Easier resources management
- Easier way of Component Development
- Ajax support

Managed bean

```
public class DatabaseUtil {

  private Cities cities;
  ...
}
```

faces-config.xml

```
<managed-bean>
  <managed-bean-name>dbUtil</managed-bean-name>
  <managed-bean-class>server.DatabaseUtil</managed-bean-class>
  <managed-bean-scope>request</managed-bean-scope>
  <managed-property>
    <property-name>cities</property-name>
    <value>#{cities}</value>
  </managed-property>
</managed-bean>
```

Managed bean

```
@ManagedBean(name="dbUtil")
@ApplicationScoped
public class DatabaseUtil {

    @ManagedProperty(value="#{cities}")
    private Cities cities;
}
```

faces-config.xml is optional

- Same for converters and validators

Composite component

- No Java code needed
- Use XHTML and JSF tags to create components
- Like Java programming you need :
  - «an interface»
  - «an implementation»

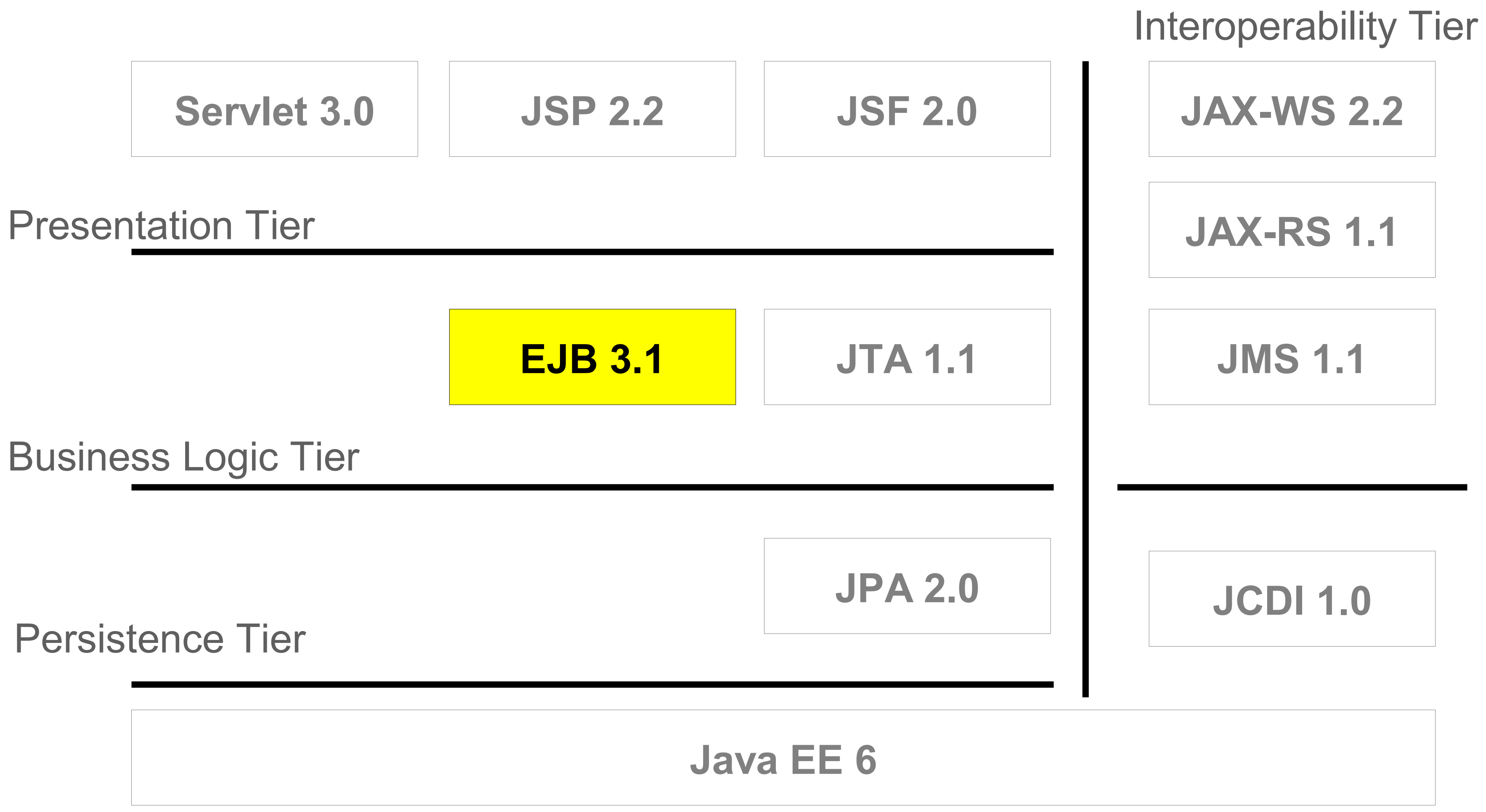
Composite component

```
<html>
<composite:interface>
  <composite:attribute name="item" required="true"/>
</composite:interface>

<composite:implementation>
  <tr>
    <td>Title :</td>
    <td>
      <h:inputText value="#{compositeComponent.attrs.item.title}"/>
    </td>
  </tr>
  <tr>
    <td>Description :</td>
    <td>
      <h:inputText value="#{compositeComponent.attrs.item.desc}" />
    </td>
  </tr>
</composite:implementation>

</html>
```

Ajax support

- Previous versions had no native Ajax solution
- Ajax support has been specified
- JavaScript library (jsf.js)
  - Several specified JavaScript functions
  - request, response, execute, render...
- Easier integration in your pages

EJB 3.1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Easier & Richer

- Optional Local Interfaces
- Singleton
- Asynchronous calls
- Cron-based Timer Service
- Packaging in a war
- Portable JNDI name
- Embeddable Container
- EJB Lite

Optional Local Interface

- @Local, @Remote
- Interfaces are not always needed
  - Only for local interfaces
  - Remote interfaces are not optional !

```
@Stateless
public class HelloBean {

  public String sayHello() {
    return "Hello GeeCon";
  }
}
```

Singleton

- New component
  - Looks like a stateless / stateful
  - No/local/remote interface
- Follows the Singleton pattern
  - One single EJB per application per JVM
- Use to share state in the entire application
  - State not preserved after container shutdown
- Added concurrency management
  - @ConcurrencyManagement

Singleton

```
@Singleton
public class CachingBean {

  private Map cache;

  @PostConstruct void init() {
    cache = ...;
  }

  public Map getCache() {
    return cache;
  }

  public void addToCache(Object key, Object val) {
    cache.put(key, val);
  }
}
```

Asynchronous calls

- How to have asynchronous call in EJBs ?
- JMS is to send messages not to do asynchronous calls
- Threads are not allowed (don't integrate well)
- @Asynchronous
- Method returns `void` or `Future<T>`
  - `java.util.concurrent` package

Asynchronous calls

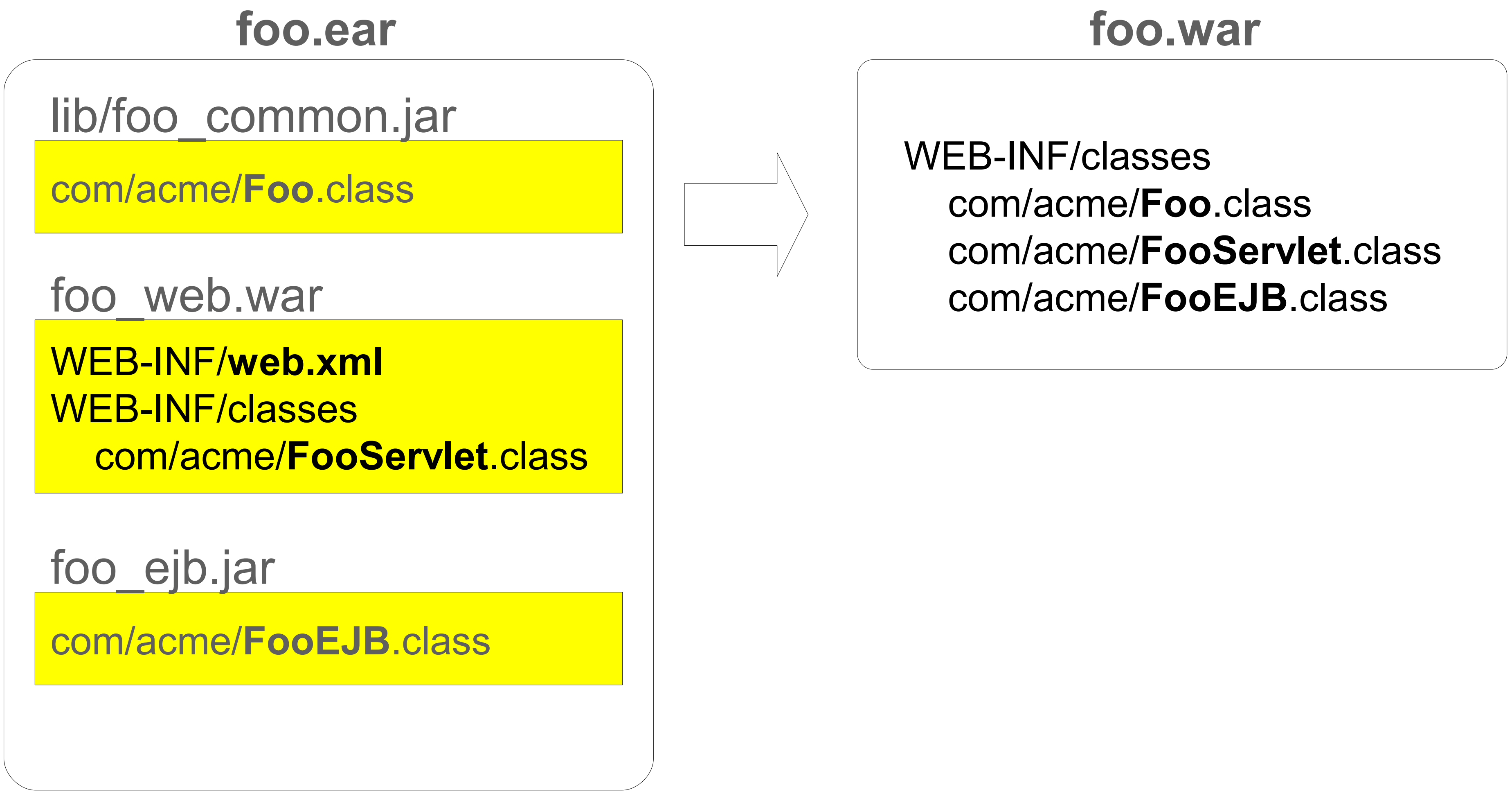
```
@Stateless
public class OrderBean {

  public void createOrder() {
    Order order = persistOrder();
    sendEmail(order) ;
  }

  public Order persistOrder() {...}

  @Asynchronous
  public void sendEmail(Order order) {...}
}
```

Packaging in a war



Portable JNDI Name

- Client inside a container (use DI)

```
@EJB Hello h;
```

- Client outside a container

```
Context ctx = new InitialContext();
Hello h = (Hello) ctx.lookup(???);
```

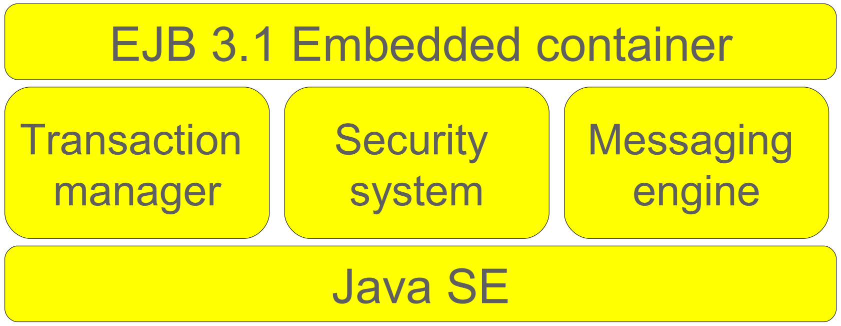
- Portable JNDI name is specified

```
java:global/env/foo/HelloEJB

java:global/(app)/(module)/(bean)#(intf)
```

Embeddable Container

- API allowing to :
  - Initialize a container
  - Get container context
  - ...



- Can run in any Java SE environment
  - Batch processing
  - Simplifies testing
  - Just a jar file in your classpath

Embeddable Container

```
public class PlaceBidClient {
  public static void main(String[] args) throws Exception {

    EJBContainer container =
                 EJBContainerFactory.createEJBContainer();

    Context context = container.getContext();

    Hello h = (Hello)
            context.lookup("java:global/app/foo/HelloEJB");

    h.sayHello;

    container.close();
  }
}
```

Timer Service

- Programmatic and Calendar based scheduling
  - « Last day of the month »
  - « Every five minutes on Monday and Friday »
- Cron-like syntax
  - second [0..59], minute[0..59], hour[0..23], year
  - DayOfMonth[1..31]
  - dayOfWeek[0..7] or [sun, mon, tue..]
  - Month[0..12] or [jan,feb..]

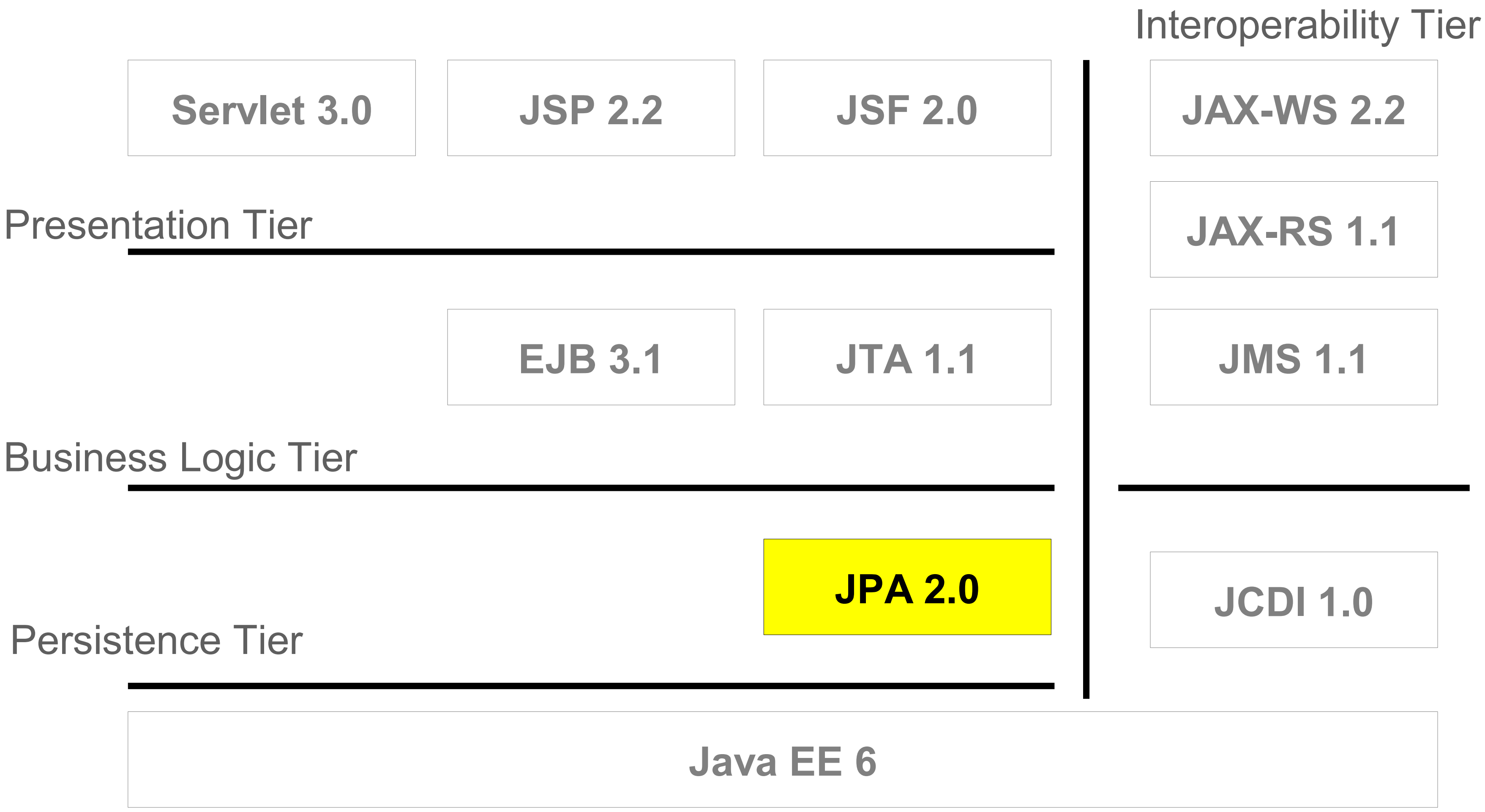
Timer Service

```
@Stateless
public class WakeUpBean {

  @Schedule(dayOfWeek="Mon-Fri", hour="9")
  void wakeUp() {
    ...
  }
}
```

- EJB Lite + Timer + Asynch calls + Embeddable Container = Batch processing

JPA 2.0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Java EE 6

JPA 2.0

- Java Persistent API
- Evolves separately from EJB now
  - JSR 317
- Can also be used in Java SE
- More mappings
  - JoinTable for OneToOne relationship
- Criteria API
- Standard properties in persistence.xml
- Simple Cache API

Collection of basic types

```
@Entity
Public class Item {

  @ElementCollection
  private Set<String> tags;
}
```

- Mapped in a separate table

Better Support of Map

```
@Entity
public class Department {
...
  @ElementCollection
  public Map<Integer, Employee> employees
  ...
}
```

- Basic types, Objects, Embeddables
- Mapped in a separate table

Locking Enhancement

```
public enum LockModeType {
  OPTIMISTIC,
  OPTIMISTIC_FORCE_INCREMENT,
  PESSIMISTIC,
  PESSIMISTIC_FORCE_INCREMENT,
  NONE
}
```

- JPA 1.0 only support optimist locking
- Now Pessimist locking
- Multiple places to specify lock
  - Lock, read and lock, read then lock

Criteria API

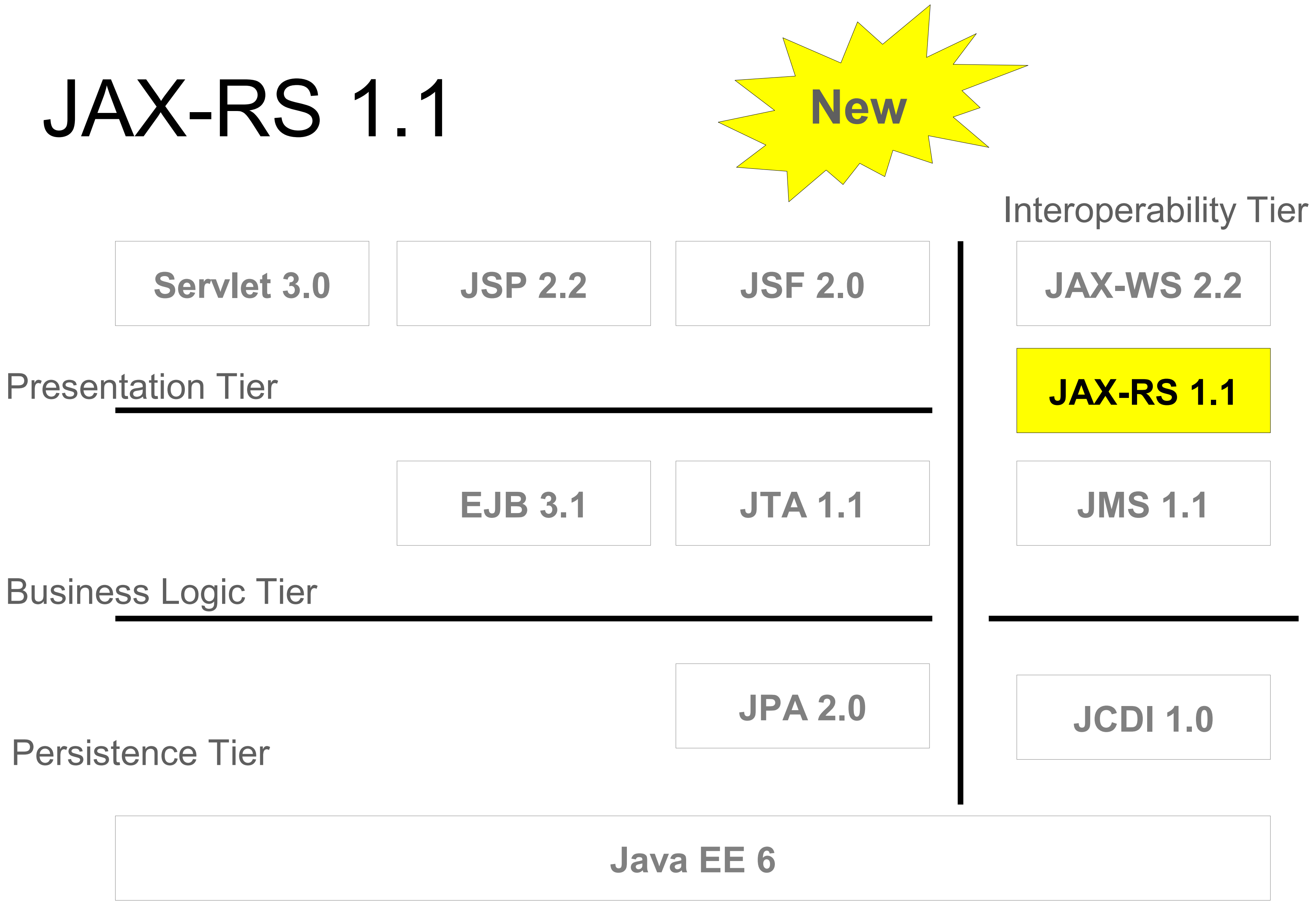
- Used to define dynamic queries
- Like JPQL, Criteria API is based on Entities
- Allow the construction of an object-based graph
- Strongly typed
- Uses a metamodel
    - Each entity X has a metamodel class X_

Criteria API

```
@Entity
public class Customer {
  @Id Integer custId;
  String name;
  Address shippingAddress;
  ...
}
```

```
CriteriaQuery q = qb.create();
Root<Customer> customer = q.from(Customer.class);
q.select(customer.get(Customer_.shippingAddress)).
where(q.equal(customer.get(Customer_.name),"Peter"));
```

JAX-RS 1.1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JAX-RS 1.1

- RESTful Services
- POJO and Annotations Based
- Data and functionality are considered resources
- Map HTTP

HTTP	Action	HTTP	Action
GET	Get a resource	PUT	Create or update
POST	Create a resource	Delete	Deletes a resource

- JAX-RS 1.0 has been released

Hello World

```
@Path("/helloworld")
public class HelloWorldResource {

  @GET
  @Produces("text/plain")
  public String sayHello() {
    return "Hello World";
  }
}
```

- http://example.com/helloworld

Hello World

Request

```
GET /helloworld HTTP/1.1
Host: example.com
Accept: text/plain
```

Response

```
HTTP/1.1 200 OK
Date: Wed, 12 Nov 2008 16:41:58 GMT
Server: Apache/1.3.6
Content-Type: text/plain; charset=UTF-8
Hello World
```

MIME Types

```
@Path("/helloworld")
public class HelloWorldResource {

  @GET @Produces("image/jpeg")
  public byte[] paintHello() {
  ...
  @POST @Consumes("text/xml")
  public void updateHello(String xml) {
  ...
}
```

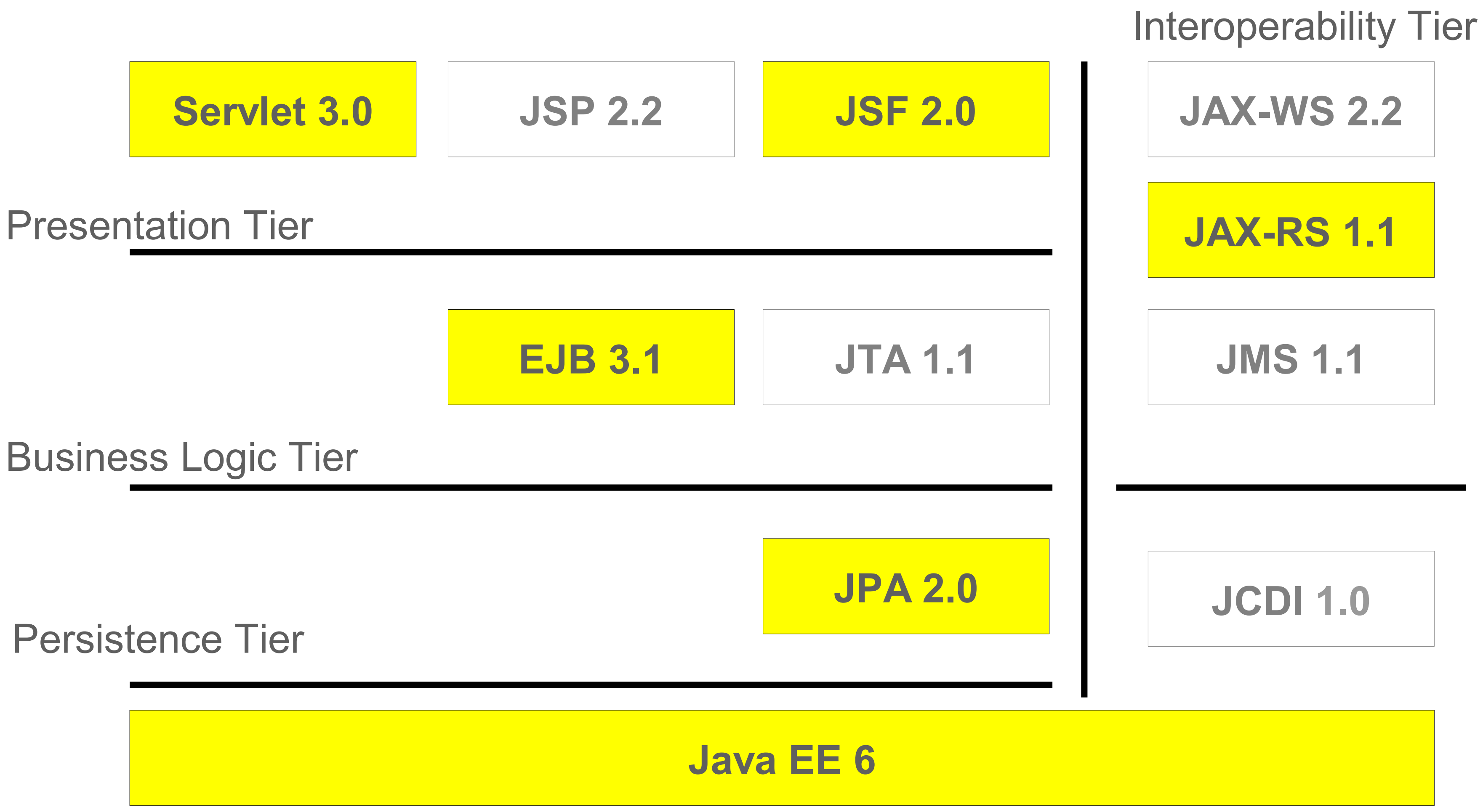
Parameters

```
@Path("/users/{userId}")
public class UserResource {

  @GET
  @Produces("text/xml")
  public String getUser(@PathParam("userId")
                        String userName) {
     ...
  }
}
```

- http://example.com/users/Smith123

Summary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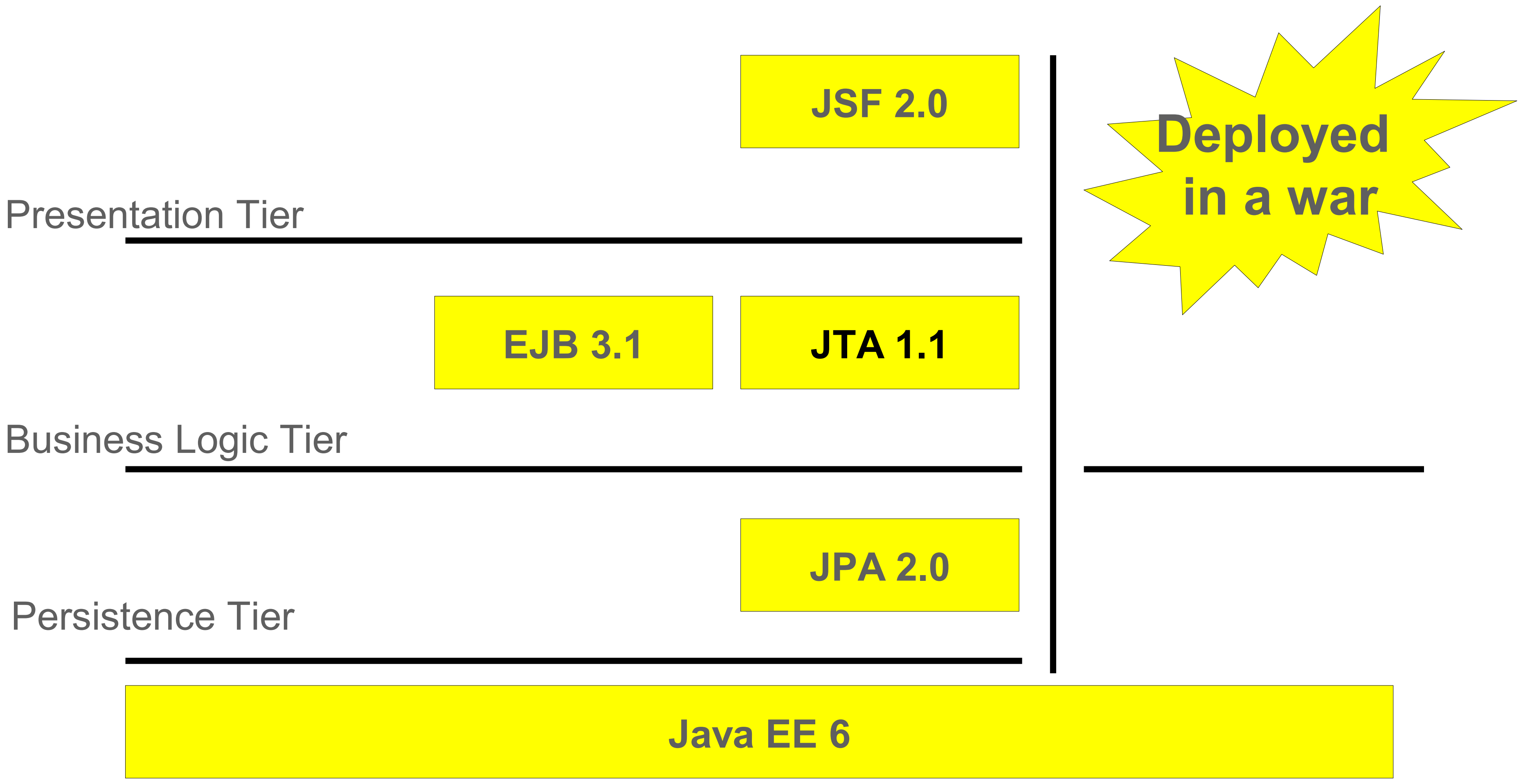
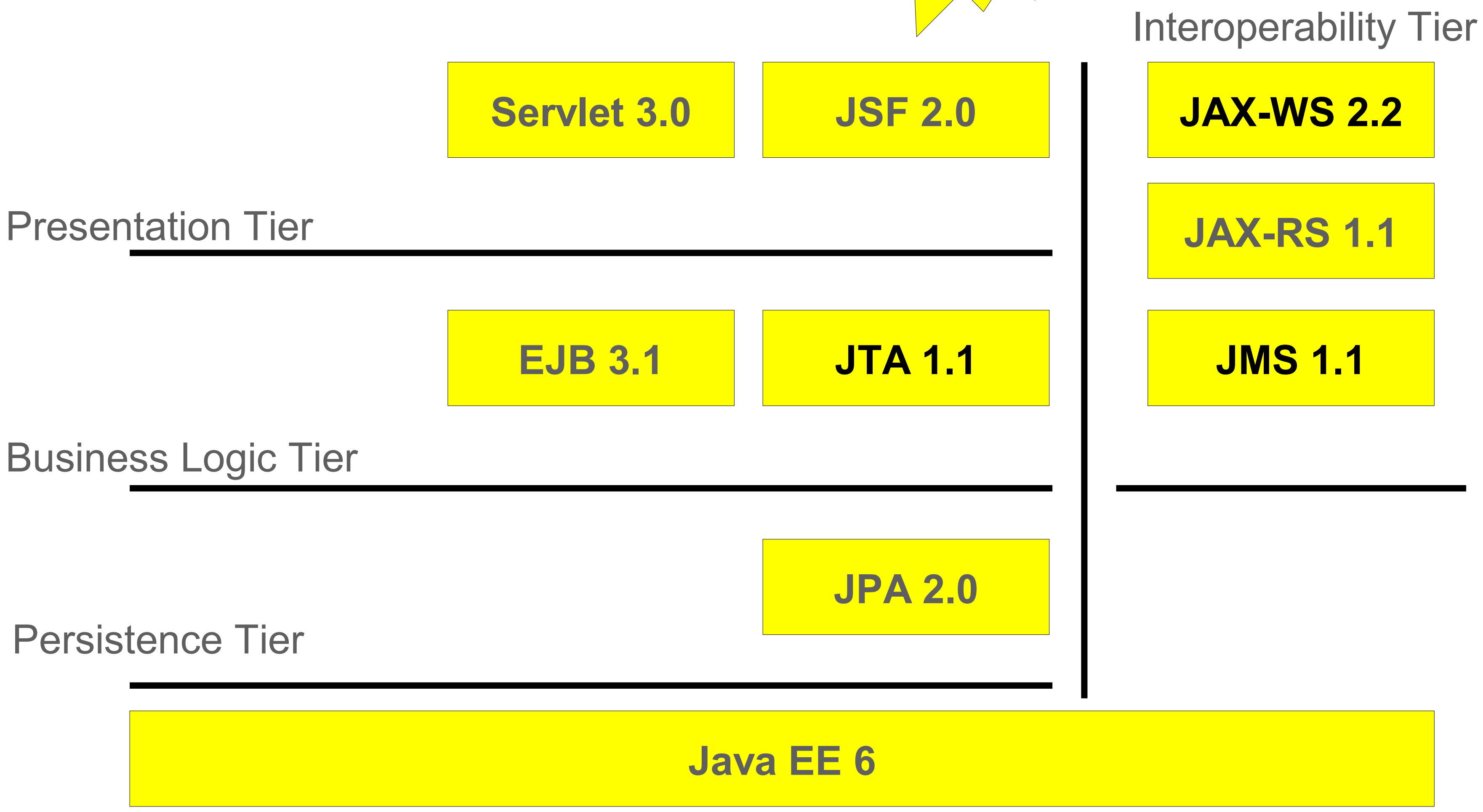
From simple web application



...to richer ones



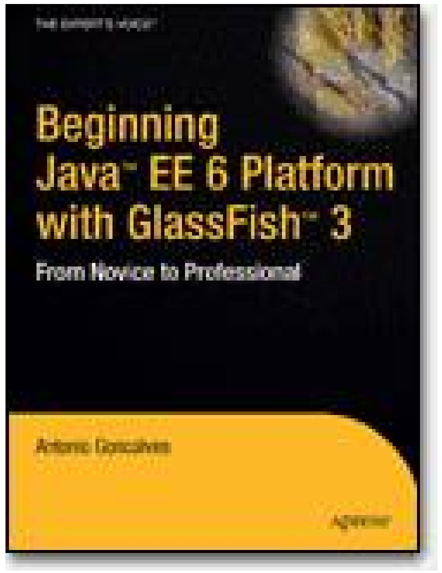
Reference Implementations

- All these specs have reference implementations
  - GlassFish V3 : EJB 3.1 and Servlet 3.0
  - EclipseLink : Java Persistence API (JPA 2.0)
  - Jersey : RESTful Web Services (JAX-RS 1.0)
  - Metro : Web Services (JAX-WS 2.2)
  - JBoss Seam : JCDI 1.0
  - Mojarra : JSF 2.0
- And they are production ready

Open Source

Summary

- Java EE 6 is
  - Simpler (POJO, annotation, less XML, Pruning)
  - Richer (more specifications)
  - Lighter (profiles, pruning, EJB lite)
  - Standard (no vendor locking)
  - Robust (10th anniversary)
  - Book out in June 2009
    - **Java EE 6 out in September 2009**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« Forget the past, look to the future, Java EE 6 is the place to go... » - Antonio Goncalves

Q&A