Using Java in the Oracle Frameworks

Lance Reedy
Java Architect

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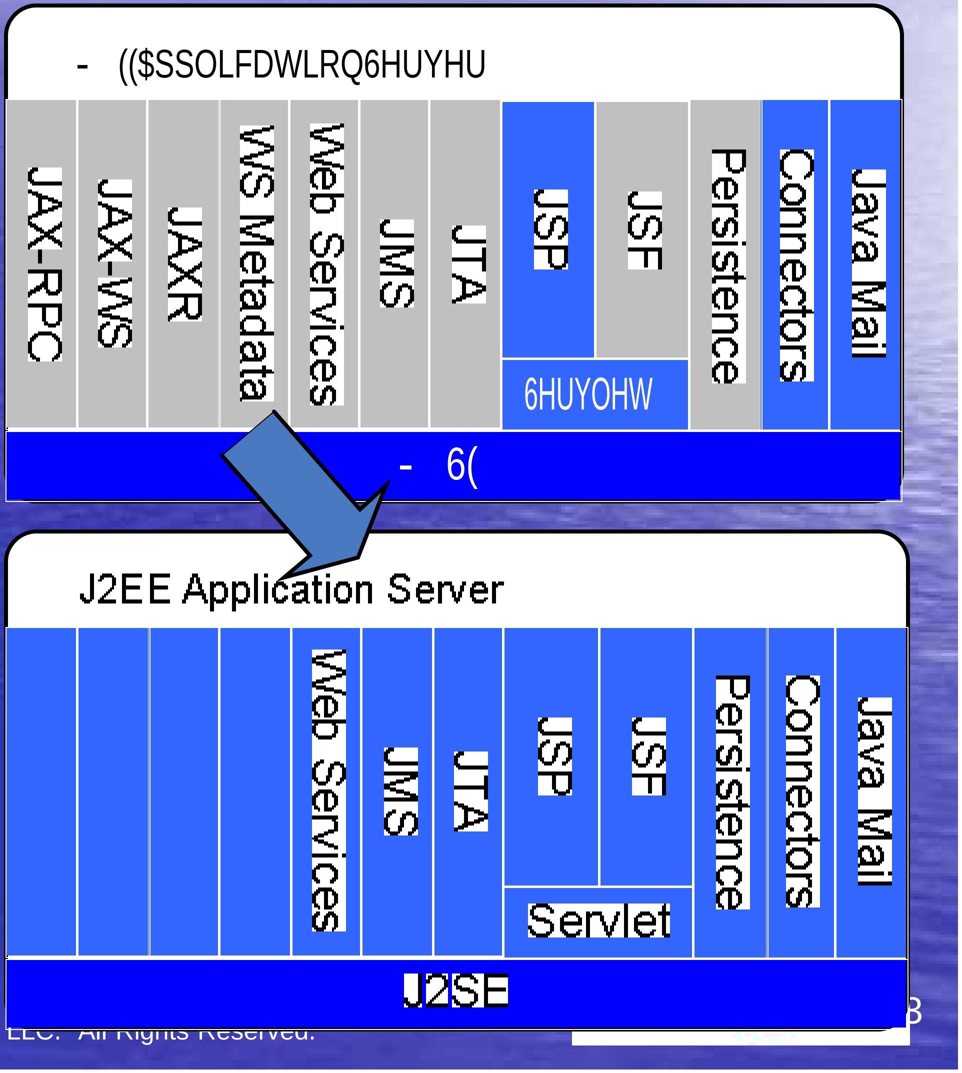
Agenda

- Explore the use of Java technologies in
  - OAF
  - ADF
  - OC4J
- Wrap-up



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JAX-RPC
JAX-WS
JAXR
WS Metadata
Web Services
JMS
JTA
JSP
JSF
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Persistence
Connectors
Java Mail

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J2EE Application Server

Web Services
JMS
JTA
JSP
JSF
Servlet
Persistence
Connectors
Java Mail

J2SE

Relevant History

- The move from native clients to web clients
  - With the rise of the web browser, the vast majority of "code" can reside on the server, and only the user interface can exist on the client
- The development of the Java 2 platform
  - A common language that can run on most flavors of UNIX as well as Win32
- The development of new device platforms able to run web browsers
  - Cell phone, PDA, bar code scanners, …

Early Standards

- Server side languages included
  - CGI-BIN programming – first generation
  - Servlets – first generation of Java
  - JSP – second generation, complementary to Servlets
- HTML and JavaScript on the client

Java Editions

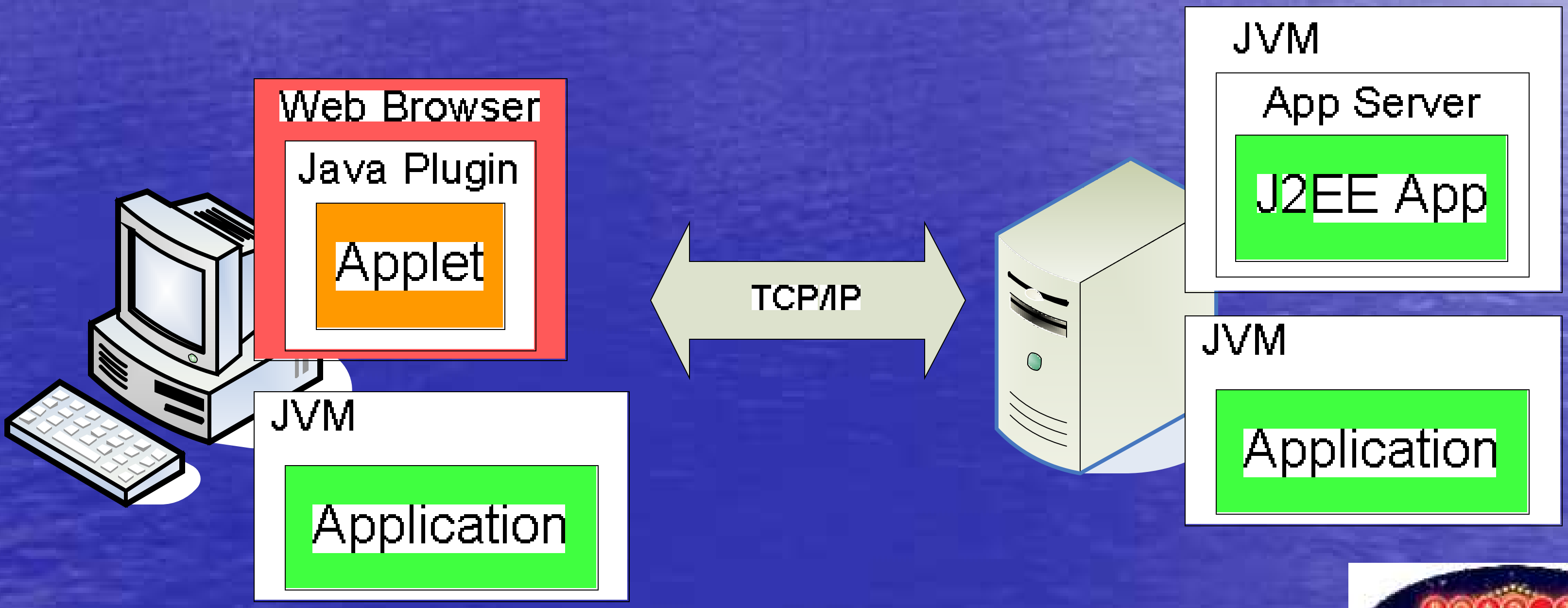
- Java 2 Standard Edition (J2SE)
  - What we typically think of as Java on a server
- Java Plug-in
  - The J2SE environment that is designed specifically to run *inside* a web browser
  - Not feature limited, but very ability limited
- Java 2 Enterprise Edition (J2EE)
  - Designed to be a cross platform application server
  - Sun provides the API specifications, and a reference implementation of them

Java Editions…cont'd

- JDK
  - Java developers Kit – specifically the core Java language (J2SE) developers kit
- J2EE SDK
  - The API libraries, compiler, and documentation needed to write a J2EE application
  - Includes the reference application server

Adding Java

- As a language Java has the flexibility of running on both sides of the client / server model
- Uses different programming models for each platform



JInitiator – New Client

- Is Oracle's licensed JVM
- Used on client platform to provide a consistent environment
- Executes within the client's web browser to run things like Forms based modules in E-Business Suite 11*i*

What is OAF

- Based on early web standards and technologies
- An attempt to introduce abstraction into application design
  - Separation of components into layers
  - Connections only between adjoining layers
- By separating the display from the business logic change becomes easier
- Mechanism for personalization, design pattern for extension

Abstraction

- The idea of breaking an algorithm into discrete layers, each of which is opaque
- Common in Object Oriented programming
- Simplifies code while complicating solutions?!

HTML User Interface

- Tags and properties used can become too complex and interdependent to manage easily
- Dependent upon the browser's interpretation of the HTML language

```
<body>
<p>Example table</p>
<table cellspacing=1…
<caption>Table
1</caption>
<tr>
<td>Homer</td>
<td>cell2</td>
</tr>
</table>
</body>
```

JSP

- A way to create HTML with programmatic content.
- Embeds Java doe (scriptlets) into HTML

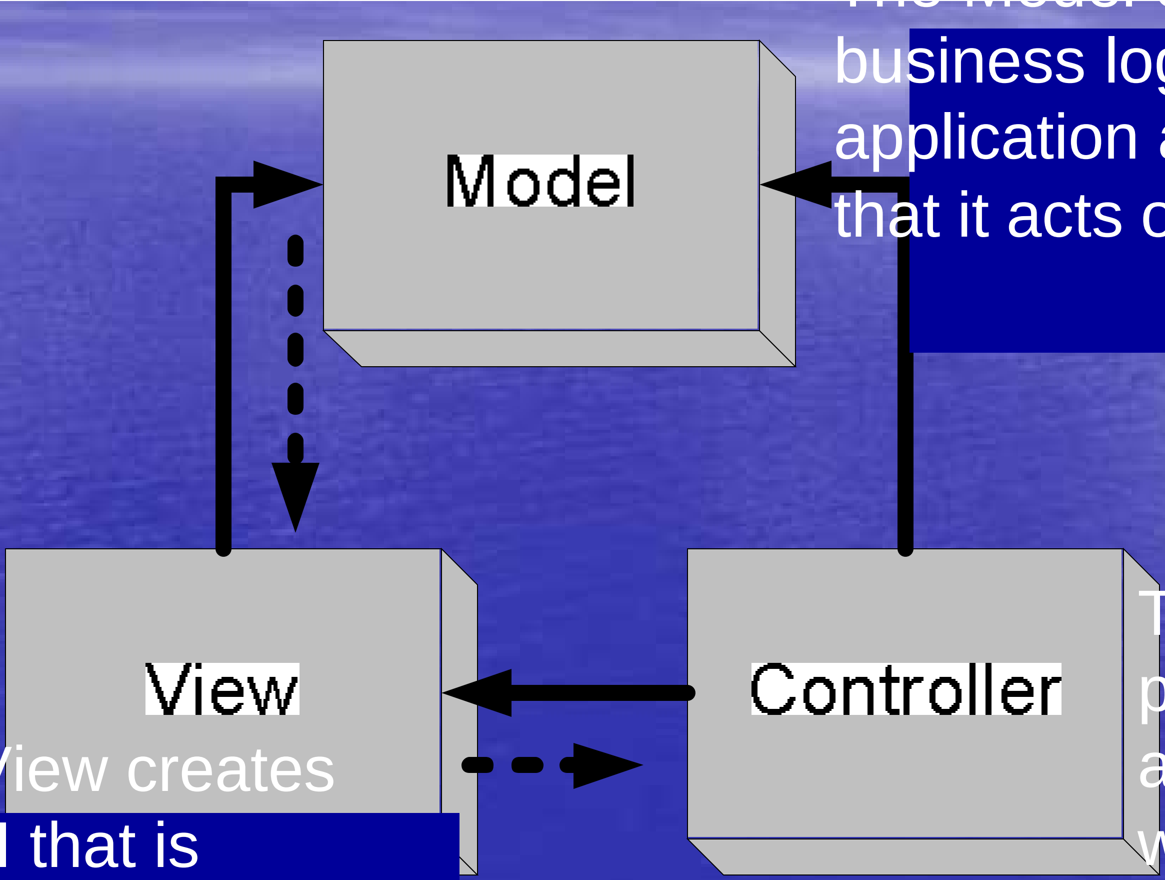
```
 <body><p>
     A table drawn via a JSP page.
   </p><p>
 <table cellspacing=1 …
<caption>Table 1</caption>
<tr>
<td>
<%= visitor.getName()%>
</td>
<td>cell2</td></tr>
</table>
</body>
```

Servlet

- Java code that produces HTML as it’s output
- Distributed as compiled Class files

```
public class _test1… {
 public void _jspService(… {
    response.setContentType…
    __ojsp_s_out.write( “<body>…”);
    __ojsp_s_out.write( visitor.getname() );
```

MVC Design Pattern



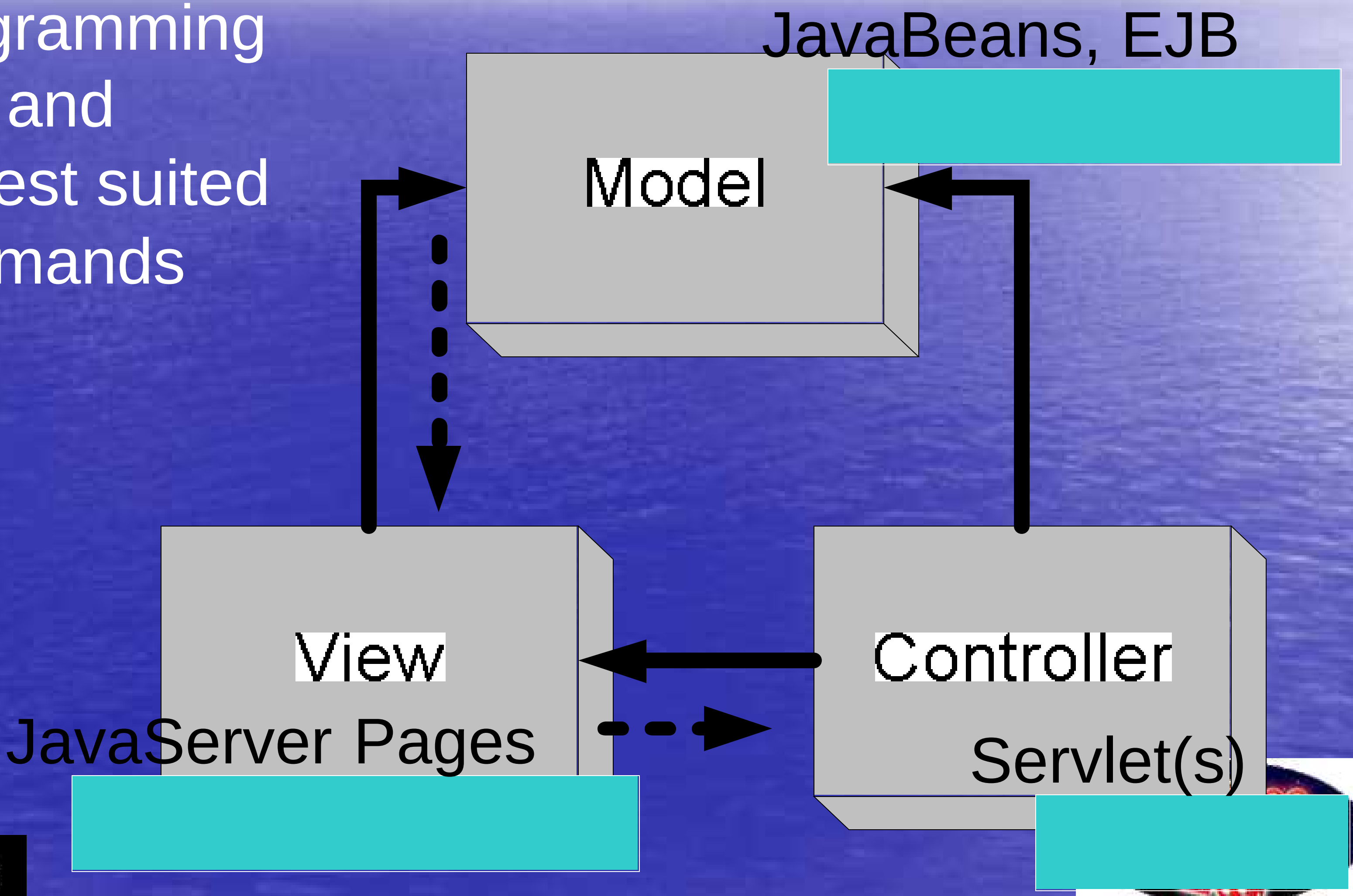
The Model contains the business logic for the application and the data that it acts on.

he View creates
he UI that is
resented to the
nd user.

The Controller provides application workflow and coordinates what the user sees.

MVC Technologies

- Each component uses programming concepts and models best suited for it's demands



MVC Declarative Programming

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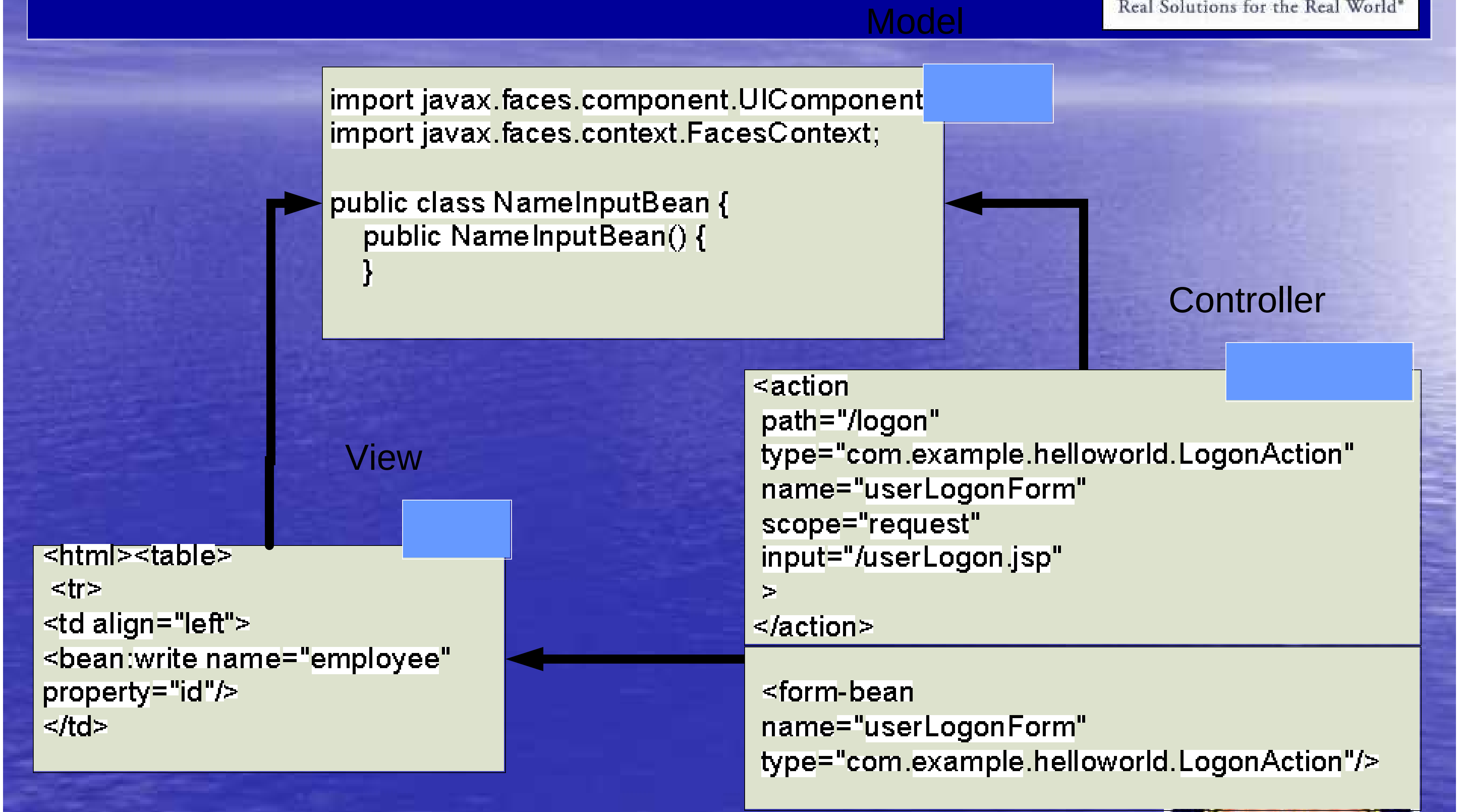

Model

```
import javax.faces.component.UIComponent
import javax.faces.context.FacesContext;

public class NameInputBean {
    public NameInputBean() {
    }
```

Controller

```
<action
 path="/logon"
 type="com.example.helloworld.LogonAction"
 name="userLogonForm"
 scope="request"
 input="/userLogon.jsp"
 >
</action>
```

```
 <form-bean
 name="userLogonForm"
 type="com.example.helloworld.LogonAction"/>
```

View

```
<html><table>
 <tr>
<td align="left">
<bean:write name="employee"
property="id"/>
</td>
```

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Model Details

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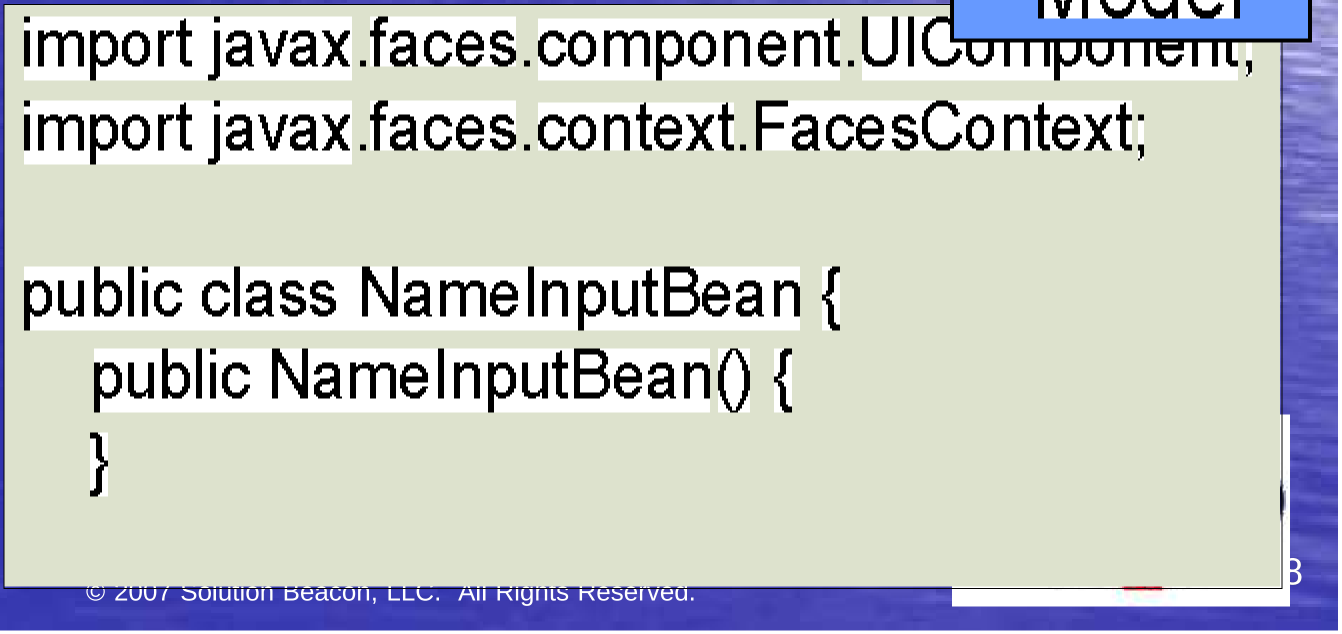
- A Java class (commonly a JavaBean) is used to represent a business entity that the application acts on

Model



```
import javax.faces.component.UIComponent;
import javax.faces.context.FacesContext;

public class NameInputBean {
    public NameInputBean() {
    }
```

Controller Details

- A XML config file is used to control behavior of the application
- A group of Java Classes implement the controller's API

Controller

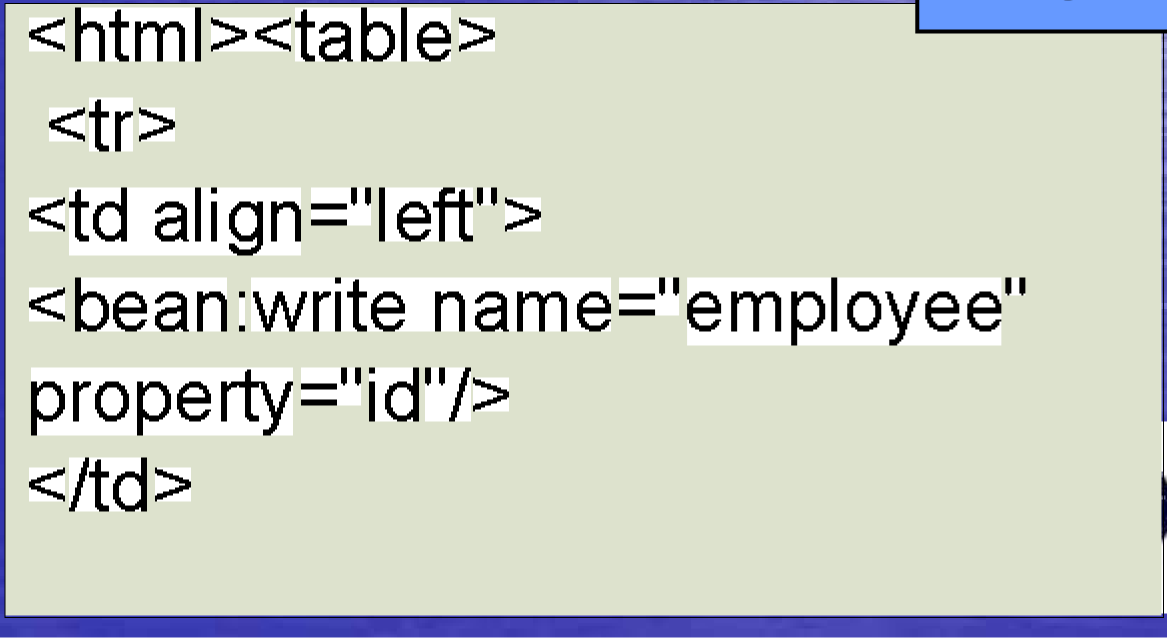
```
<action
 path="/logon"
 type="com.example.helloworld.LogonAction"
 name="userLogonForm"
 scope="request"
 input="/userLogon.jsp"
 >
</action>
```

```
 <form-bean
 name="userLogonForm"
 type="com.example.helloworld.LogonAction"/>
```

MVC Declarative Programming

- Custom tags are used in the JSP page to reference data presented by, or sent to, the Model.

View



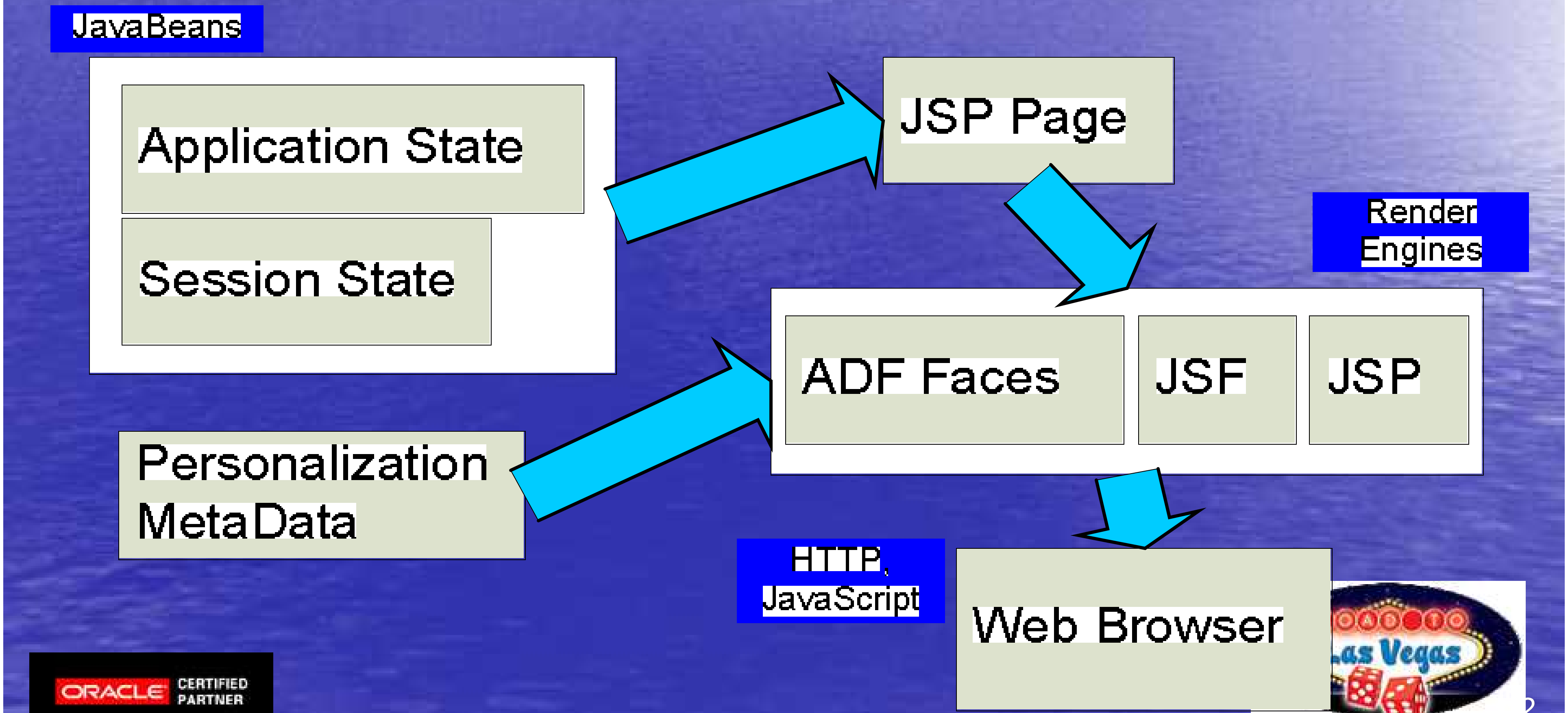
```
<html><table>
 <tr>
<td align="left">
<bean:write name="employee"
property="id"/>
</td>
```

Personalizations

- Changes to page layout or content visibility
- Can be done by administrators or by end users
- The personalizations are applied between the HTML page being generated and it being sent to the client
- Personalizations are stored via data, not code changes

OAF Page Rendering

- A hierarchy of operations, many of which are driven purely by data



JavaBeans

Application State

Session State

Personalization MetaData

JSP Page

Render Engines

ADF Faces

JSF

JSP

HTTP, JavaScript

Web Browser

What is ADF

- The next generation after OAF
- Builds on OAF, adds
  - More dynamic page refreshing
  - Data Binding
  - Ability to build content for limited devices
  - JavaServer Faces
- Moves further into the J2EE architecture

Standards Used by ADF

- *MVC*
- *JSP, Servlets*
- JavaBeans
- Enterprise JavaBeans
- JavaServer Faces

Oracle Technologies Used

- ADF Faces
  - UIX widgets
- TopLink
  - Data persistence
- OC4J
  - J2EE application server

JavaBeans and EJB

- JavaBeans conform to particular coding rules
  - Beans have data fields, each field must be accessed via a Get or a Set method
  - They can be loaded dynamically
- They are used to store data that needs to be used programmatically

JavaBean

```
Public class Employee {
          Private String name;
          Private long id;
          Private Date hireDate;

          public String GetName()…
          public void setName(String s)...
```

Enterprise JavaBean

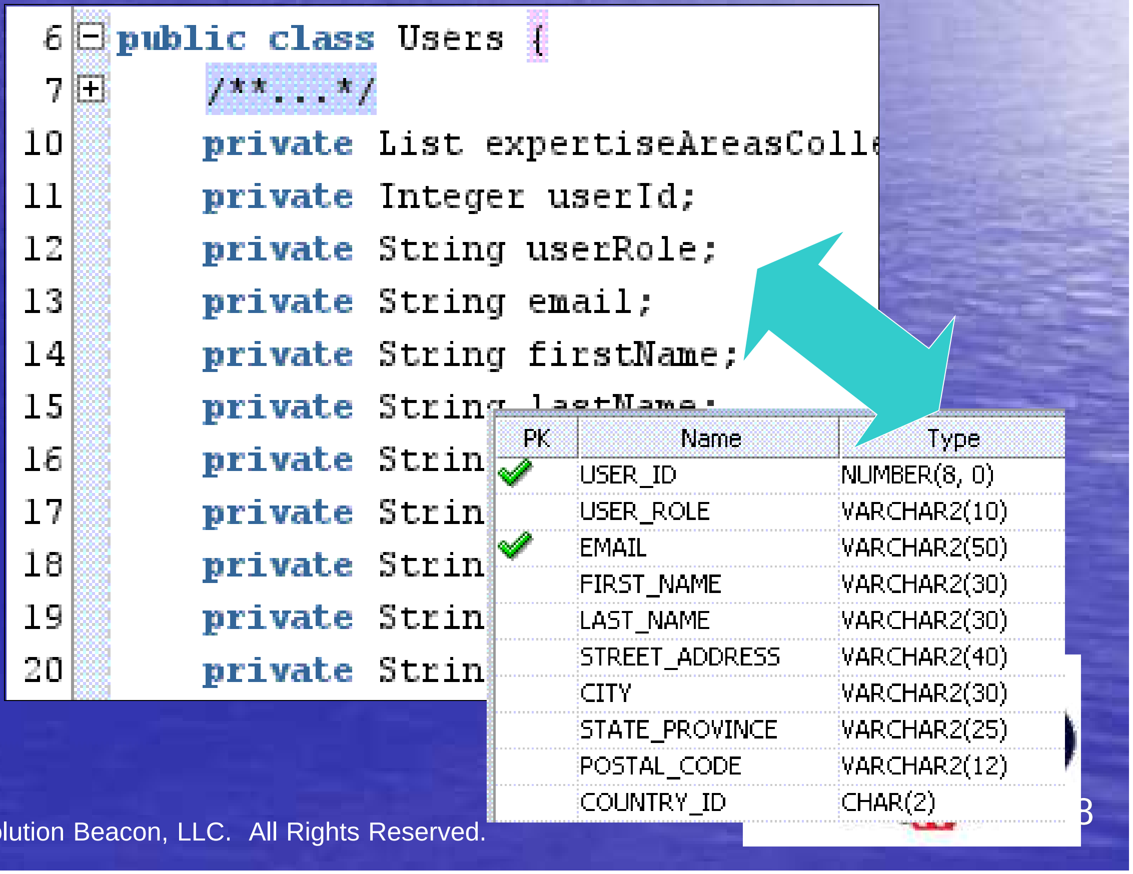
```
          public Object persistEntity(Object entity)…
```

Enterprise JavaBeans

- EJB expands the idea of the basic JavaBean
  - Persistence in a database
  - Remote access
- Java carries the C/UNIX idea of Remote Procedure Call forward in the form of Remote Method Invocation
  - An EJB container must facilitate the use RMI to allow remote client's to access Enterprise JavaBeans

Java / SQL

- A query mechanism must exist to allow objects to be retrieved from the DB as needed
- Datatypes must be mapped between languages:
  - String vs varchar
  - Address vs a table

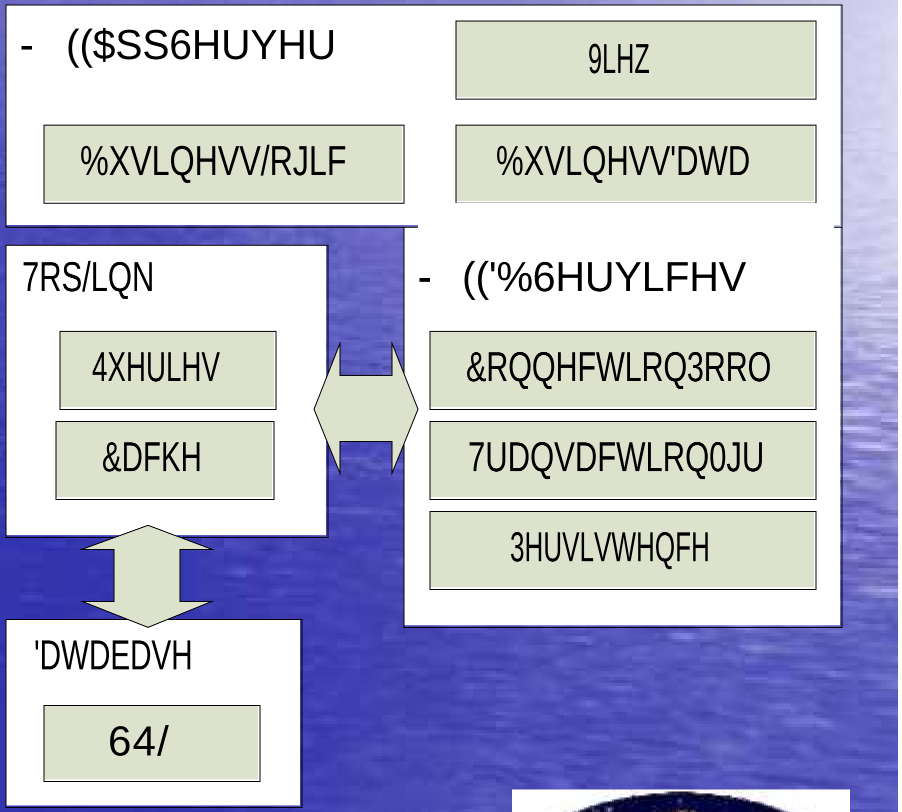


```
public class Users {
    /**...*/
    private List expertiseAreasColle
    private Integer userId;
    private String userRole;
    private String email;
    private String firstName;
    private Strin
    private Strin
    private Strin
    private Strin
    private Strin
    private Strin
```

PK	Name	Type
✓	USER_ID	NUMBER(8, 0)
	USER_ROLE	VARCHAR2(10)
✓	EMAIL	VARCHAR2(50)
	FIRST_NAME	VARCHAR2(30)
	LAST_NAME	VARCHAR2(30)
	STREET_ADDRESS	VARCHAR2(40)
	CITY	VARCHAR2(30)
	STATE_PROVINCE	VARCHAR2(25)
	POSTAL_CODE	VARCHAR2(12)
	COUNTRY_ID	CHAR(2)

Object Persistence

- The desire in a J2EE environment is to prevent application code from interacting directly with the DB
- This is achieved by allowing the J2EE container to access to common DB services



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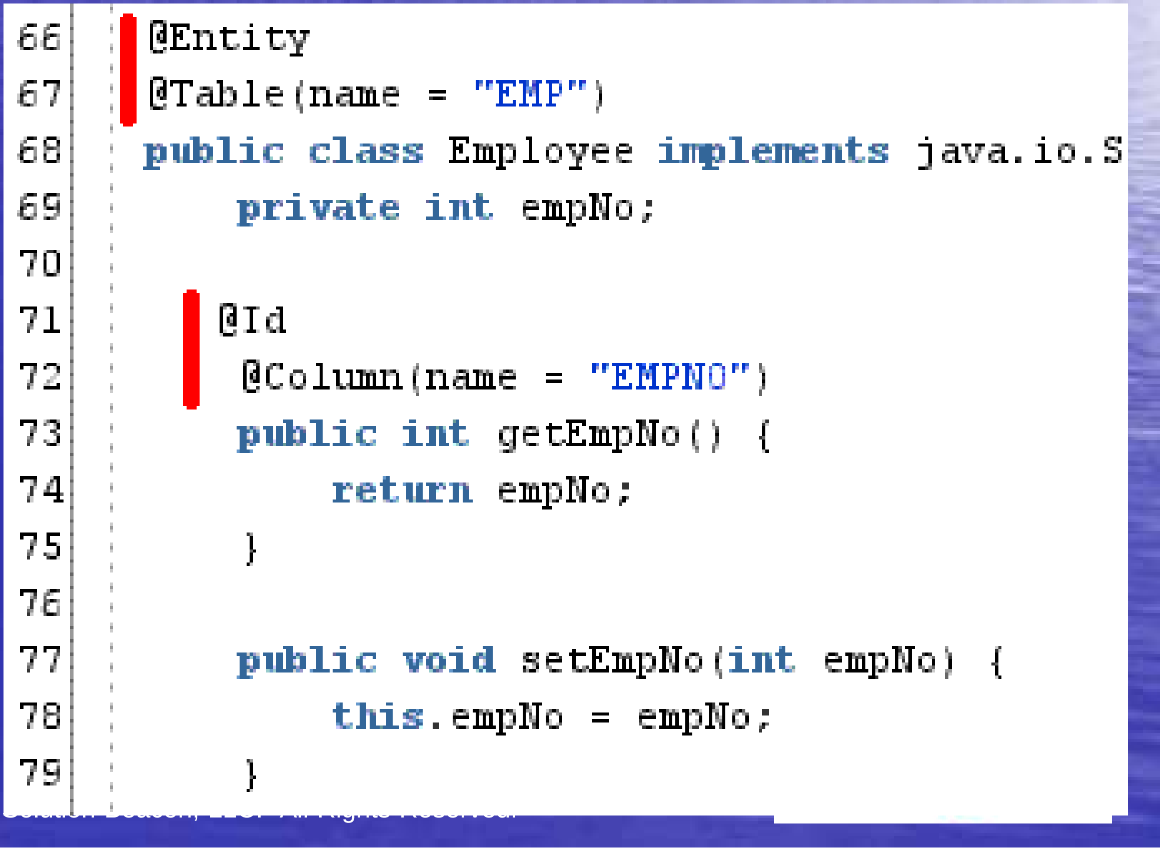
EJB 3.0 Persistence

- Based on annotation
- Uses a tool to generate the code’s skeleton and annotations
- Uses other tools at compile and runtime to turn the annotations into actual code



```
@Entity
@Table(name = "EMP")
public class Employee implements java.io.S
    private int empNo;

    @Id
    @Column(name = "EMPNO")
    public int getEmpNo() {
        return empNo;
    }

    public void setEmpNo(int empNo) {
        this.empNo = empNo;
    }
```

TopLink versus EJB 3.0

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- TopLink is an established Oracle standard
- EJB 3.0’s Java Persistence API is an emerging industry wide standard…
  - … Java Persistence API was added in latest J2EE spec
  - Can be used outside of EJB, by J2SE apps
  - Based on ideas submitted by various J2EE vendors including Oracle

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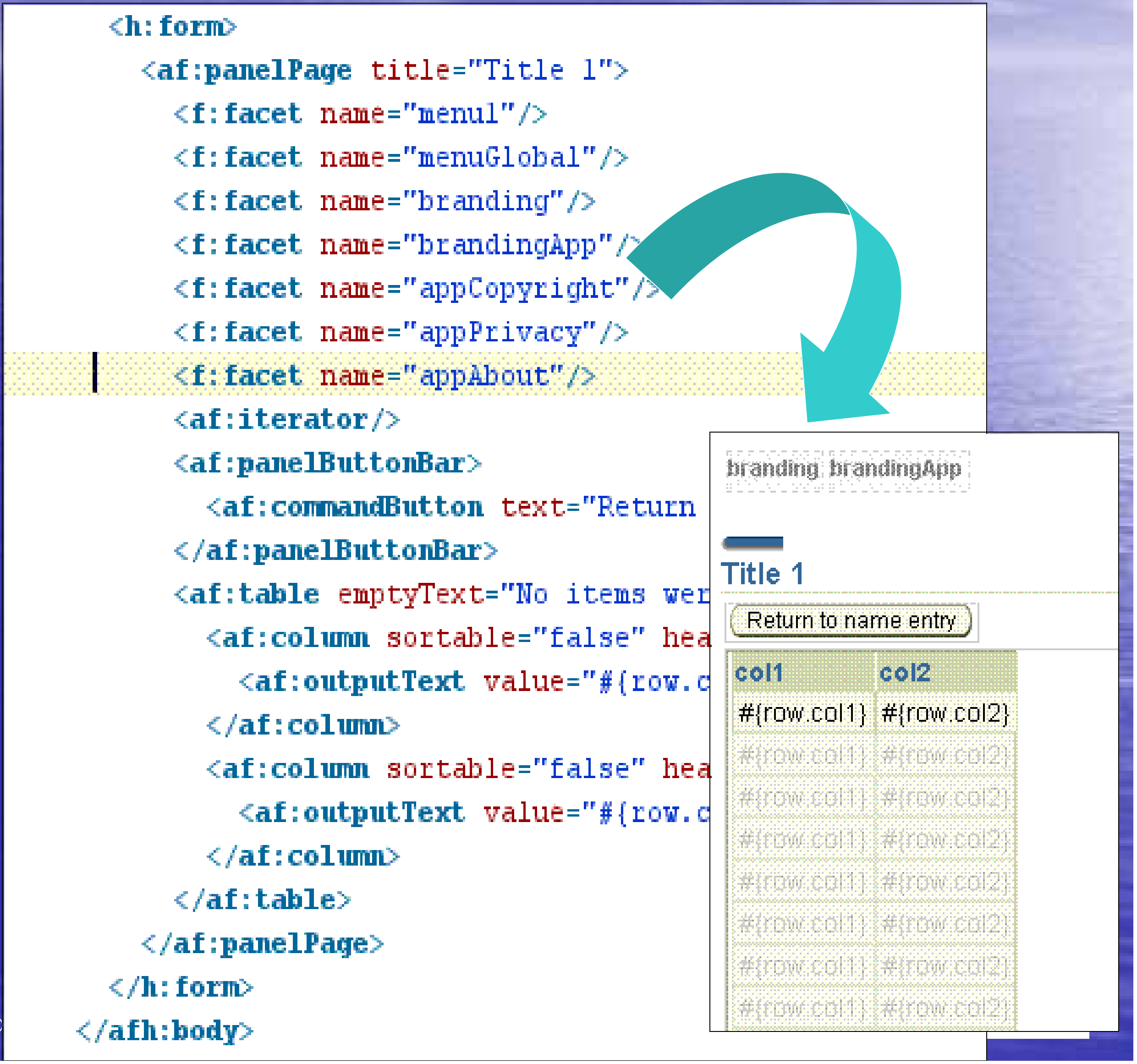
Road to Las Vegas

JSF and ADF Faces

- JavaServer faces simplifies the design of HTML UI
  - By providing tags to represent common data elements
  - By providing components which can help to validate data as it’s being entered
- ADF brings tags representing common Oracle UI elements

ADF Faces – Declarative UI

- Extends the JSP concept to expose Oracle’s own UIX widgets
- Replaces even simple HTML tags with abstract elements



```
    <h:form>
      <af:panelPage title="Title 1">
        <f:facet name="menu1"/>
        <f:facet name="menuGlobal"/>
        <f:facet name="branding"/>
        <f:facet name="brandingApp"/>
        <f:facet name="appCopyright"/>
        <f:facet name="appPrivacy"/>
        <f:facet name="appAbout"/>
        <af:iterator/>
        <af:panelButtonBar>
          <af:commandButton text="Return
        </af:panelButtonBar>
        <af:table emptyText="No items wer
          <af:column sortable="false" hea
            <af:outputText value="#{row.c
          </af:column>
          <af:column sortable="false" hea
            <af:outputText value="#{row.c
          </af:column>
        </af:table>
      </af:panelPage>
    </h:form>
  </afh:body>
```

branding brandingApp

Title 1

Return to name entry

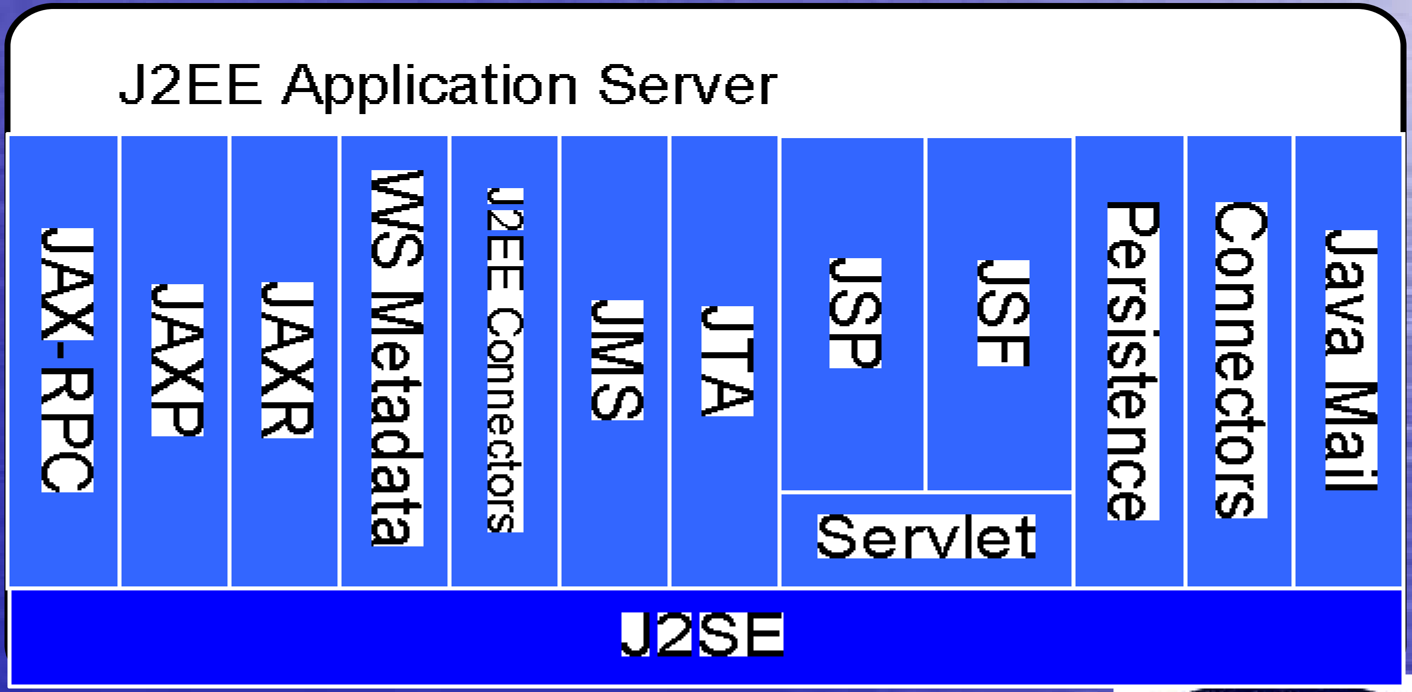
col1	col2
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}
#{row.col1}	#{row.col2}

OC4J – J2EE Server

- J2EE defines a specification for the applications server
- Defines clear interfaces and mechanisms for interacting with other infrastructure, such as Identity Management (LDAP)
- Individual vendors then select portions of the spec that they will implement
- Focuses on server side technologies

J2EE Technologies

- A rich suite of APIs built on a common core

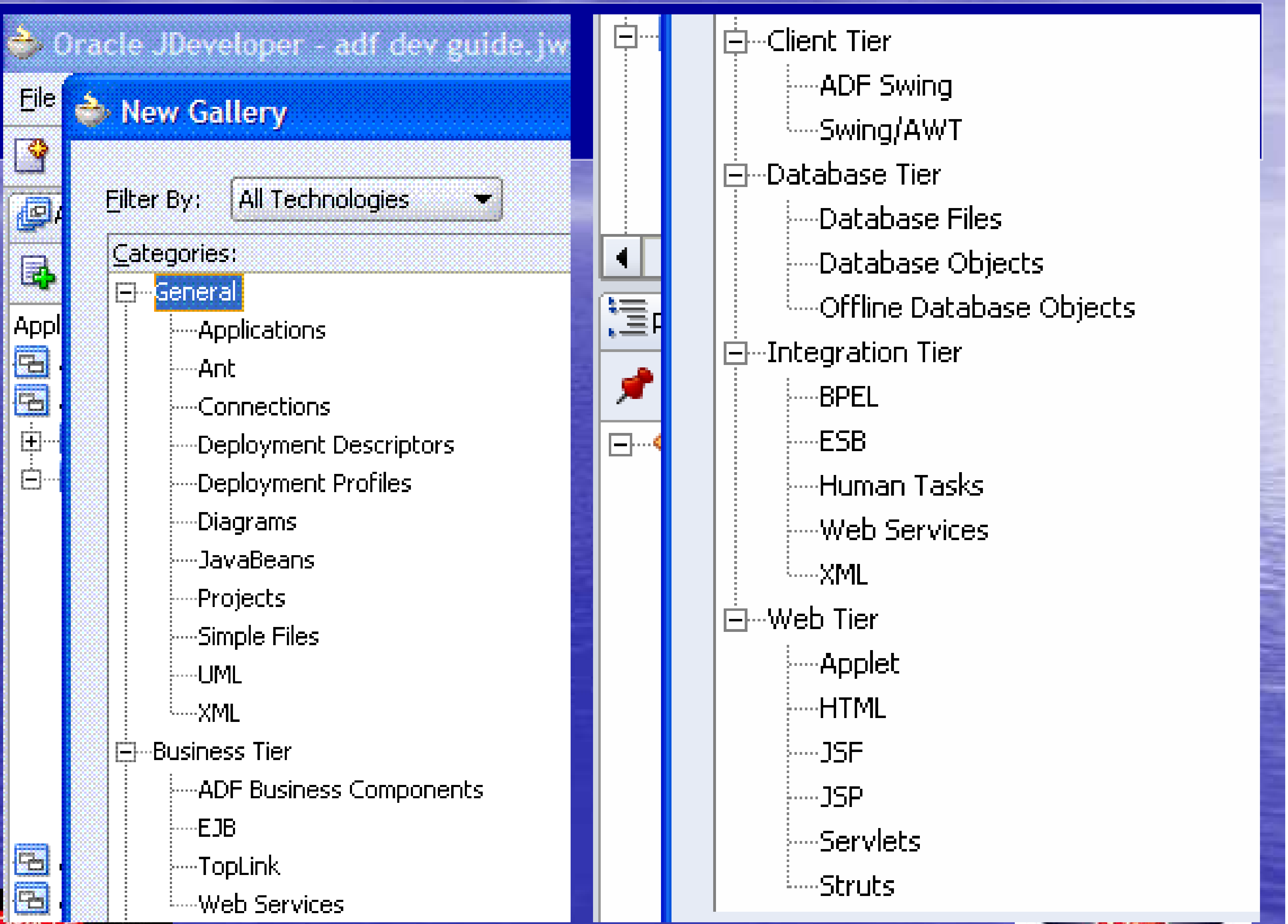


Development in J2EE

- Java is rich with OpenSource solutions
  - J2EE app servers: JBoss, Tomcat, GlassFish
  - Developer tools: Eclipse, NetBeans
  - Frameworks: Struts, Tapestry, Turbine
  - Persistence: Hibernate, OJB
- Some of these are sold as commercial applications with vendor support and consulting
- None of the developers tools offer tight integration into proprietary application servers
- Few of them offer a complete development solution

JDeveloper

- Oracle’s full featured developer’s toolkit
- Very feature rich for plain Java, J2EE, and Oracle specific development
- Supports design, coding, testing, packaging, and deployment



Oracle JDeveloper - adf dev guide.jw

New Gallery

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  - ADF Business Components
  - EJB
  - TopLink
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- Client Tier
  - ADF Swing
  - Swing/AWT
- Database Tier
  - Database Files
  - Database Objects
  - Offline Database Objects
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  - ESB
  - Human Tasks
  - Web Services
  - XML
- Web Tier
  - Applet
  - HTML
  - JSF
  - JSP
  - Servlets
  - Struts

J2EE Application Deployment

- J2EE applications are composed of a number of components
  - Classes, Servlets
  - HTML, JSP, and images
  - XML configuration files
- Logical groups of Classes become Jar files
- All content is organized into a specific directory structure
- Results are combined into a special Jar file

Packed Contents

/	
/META-INF	application.xml
application.war	the actual application!

War File Contents

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/	
/META-INF	
/css (custom)	style sheets
/images (custom)	static images
/html (custom)	static HTML pages
/WEB-INF	web.xml, struts.xml
/WEB-INF/classes	individual Class files
/WEB-INF/lib	Jar files of Classes

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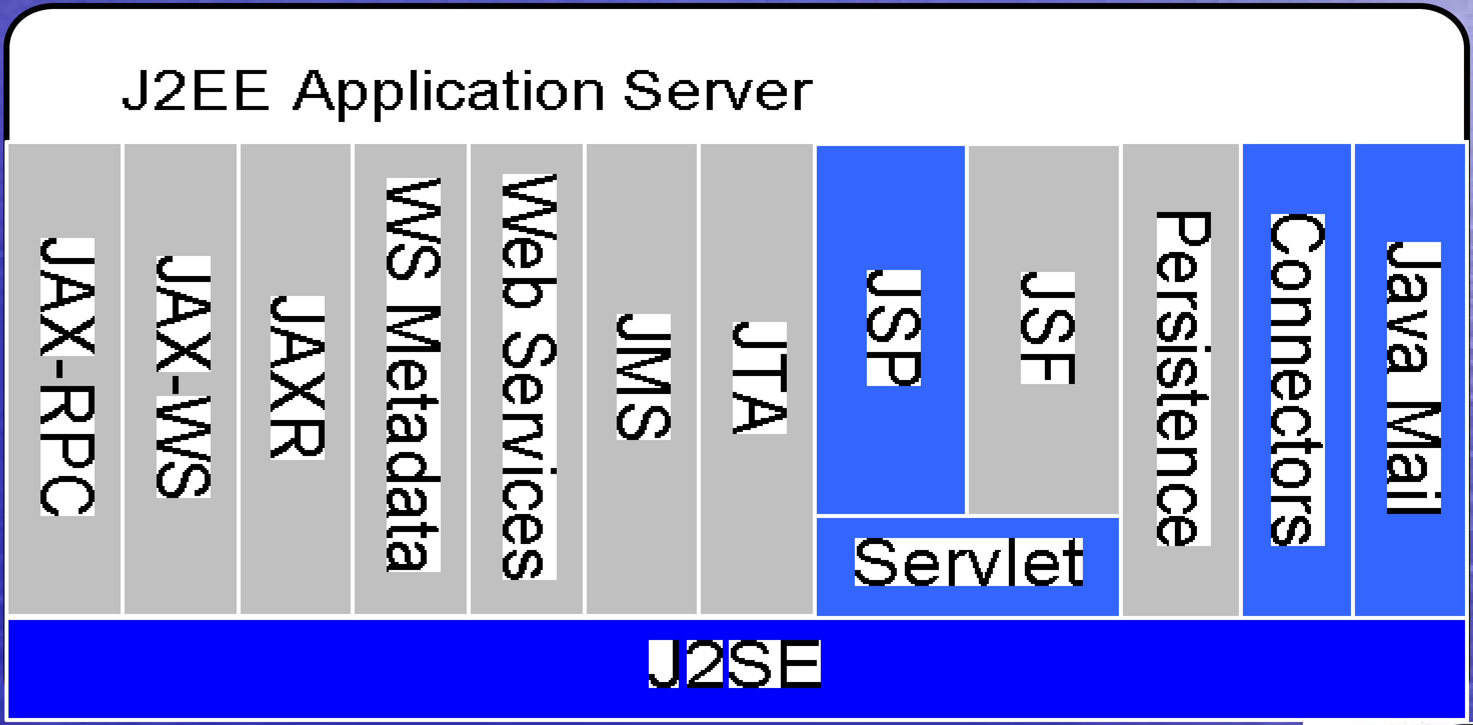
The Future

- Driven by industry standards
  - Release of the Java EE 5 spec drives the use of EJB
  - J2EE is driving towards web services and SOA
- Fusion makes the move to a SOA based environment
  - Same Java syntax, new programming models
  - Event driven processing
  - Focus on business modeling and processes
  - Distributed applications communicating via Enterprise Service Bus and Web Services

Past Environment

- Components used in OAF



J2EE Application Server

JAX-RPC

JAX-WS

JAXR

WS Metadata

Web Services

JMS

JTA

JSP

JSF

Servlet

Persistence

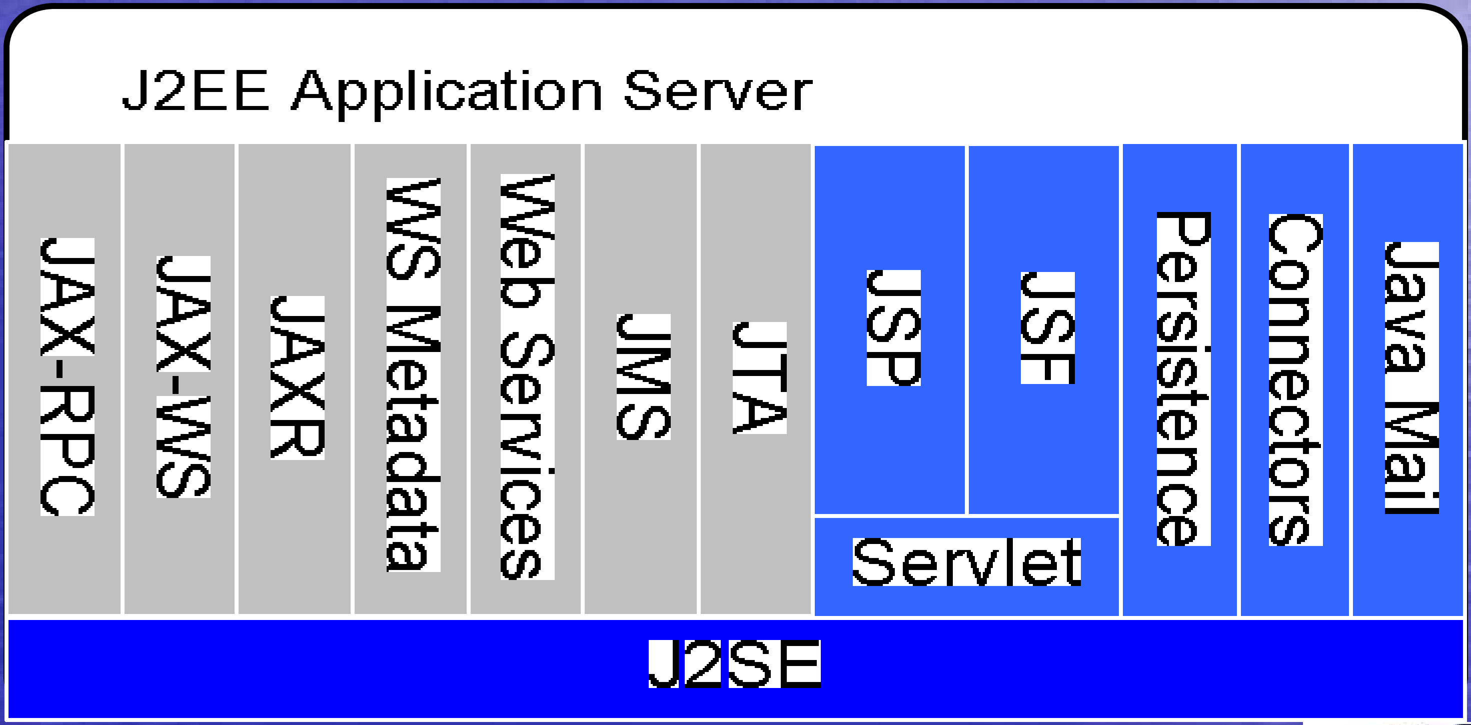
Connectors

Java Mail

J2SE

Present Environment

- Components used in ADF



J2EE Application Server

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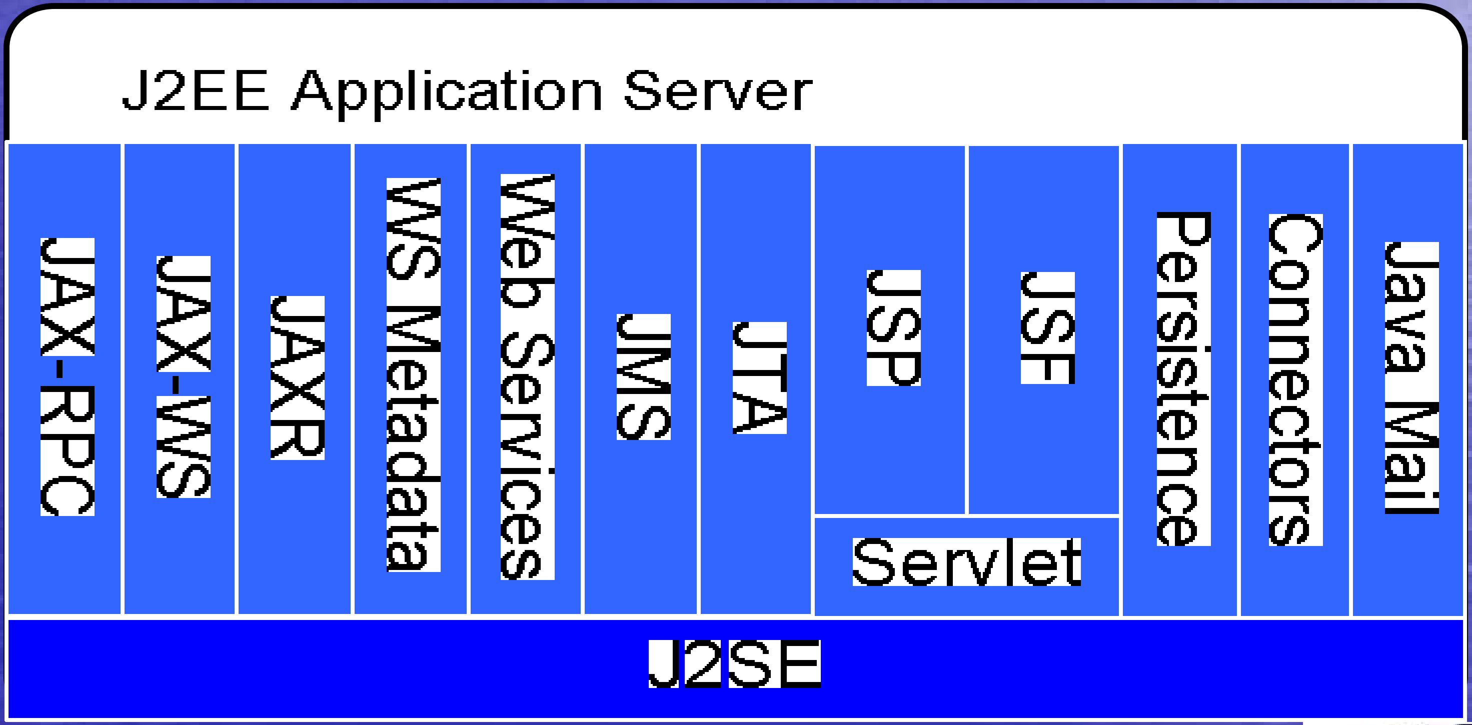
Future State

- Components needed for SOA and web services



J2EE Application Server

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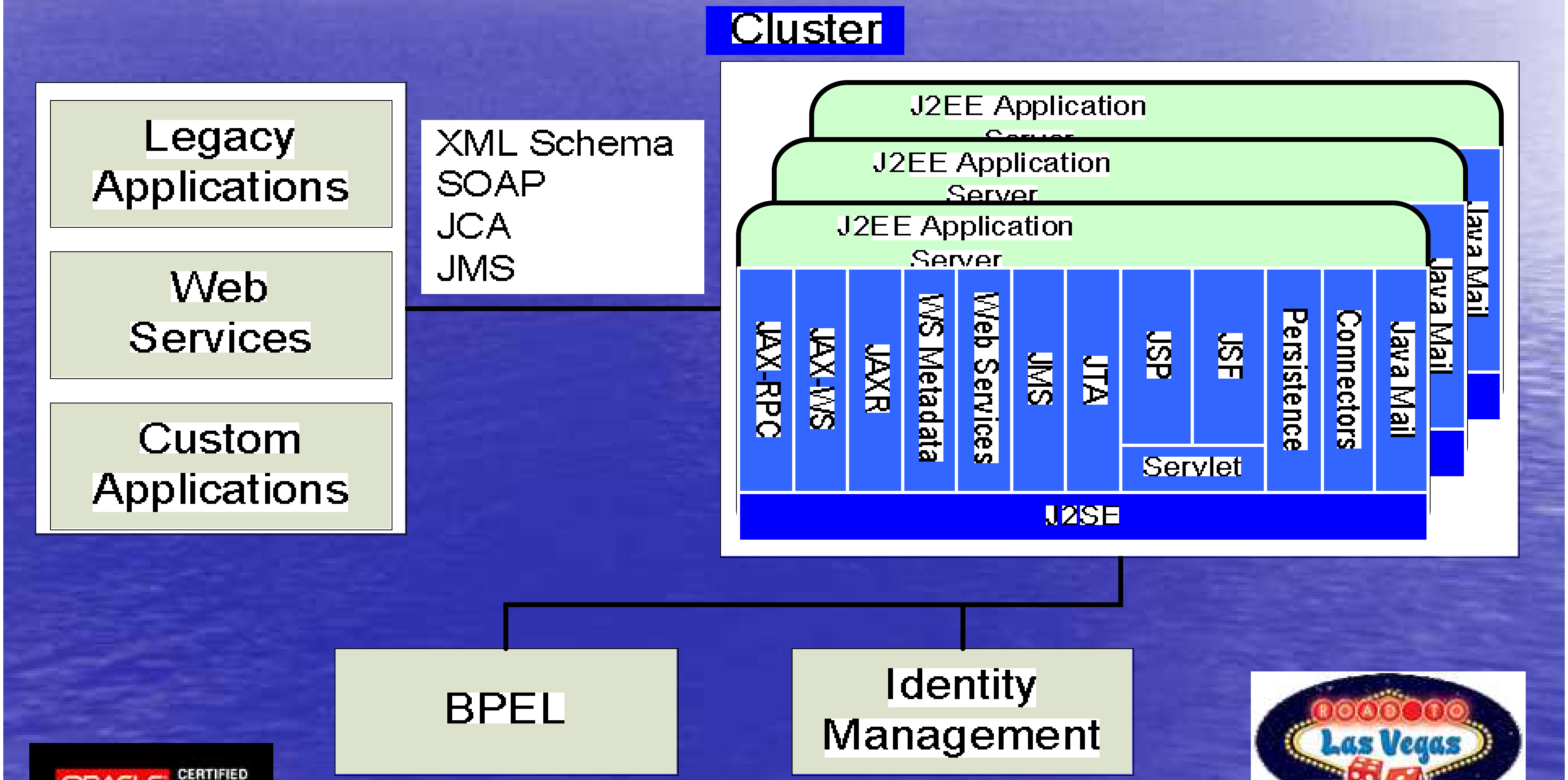
J2SE

J2EE in the Architecture



Cluster

Legacy Applications

Web Services

Custom Applications

XML Schema
SOAP
JCA
JMS

J2EE Application Server

J2EE Application Server

J2EE Application Server

JAX-RPC
JAX-WS
JAXR
WS Metadata
Web Services
JMS
JTA
JSP
JSF
Servlet
Persistence
Connectors
Java Mail
Java Mail
Java Mail

J2SE

BPEL

Identity Management

Questions and Answers

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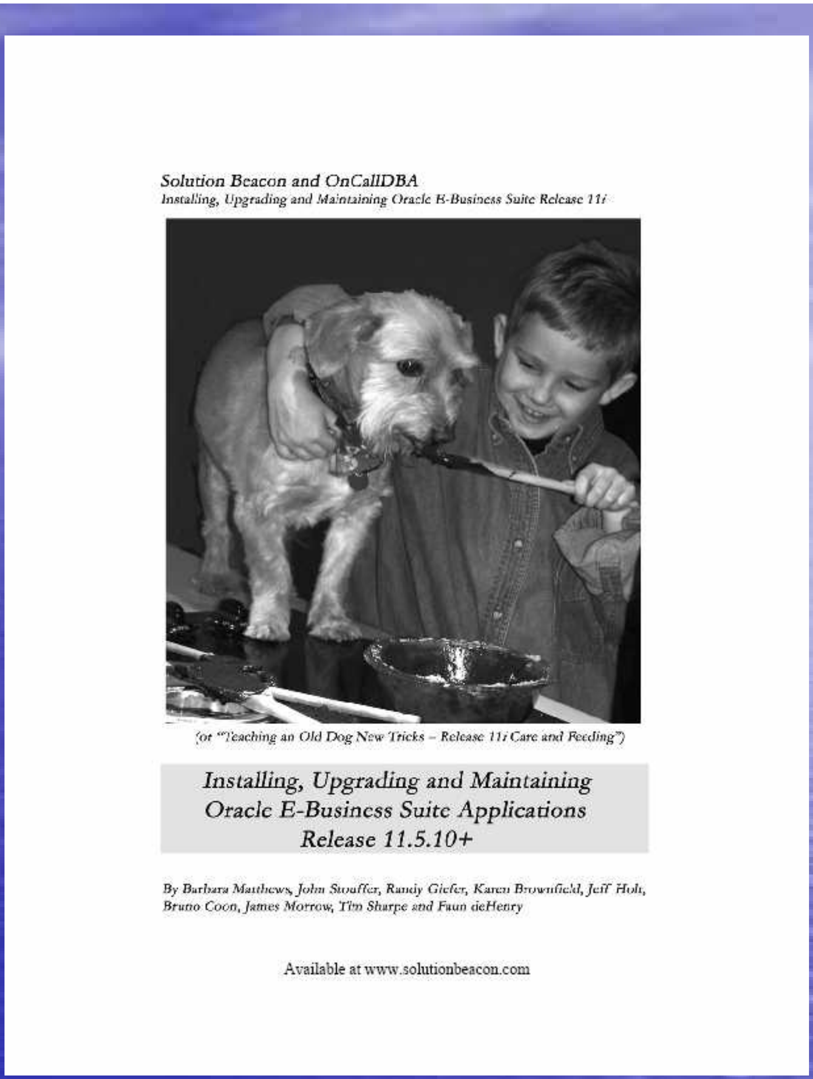

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