

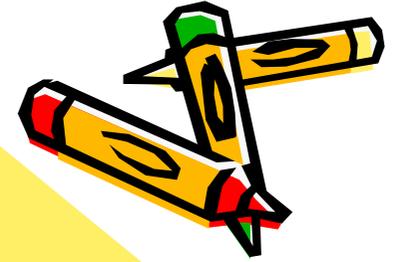
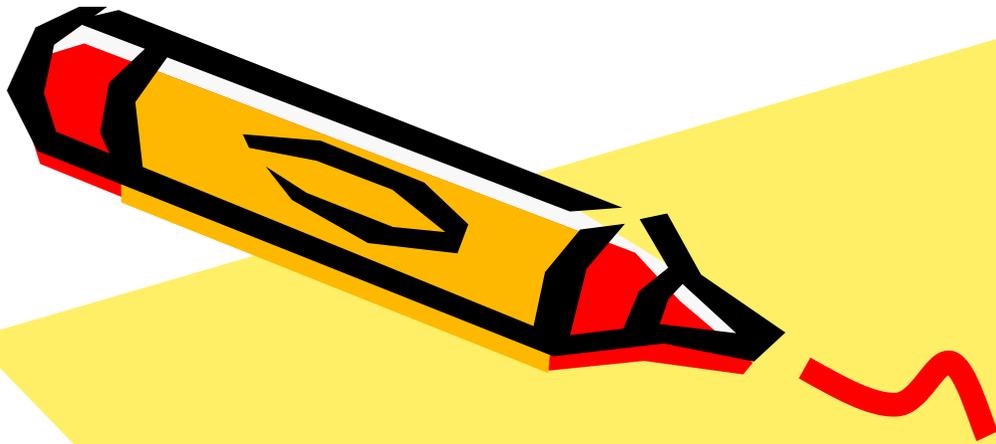
# J2EE-Based Systems Development and Oracle9i JDeveloper

**transentia**

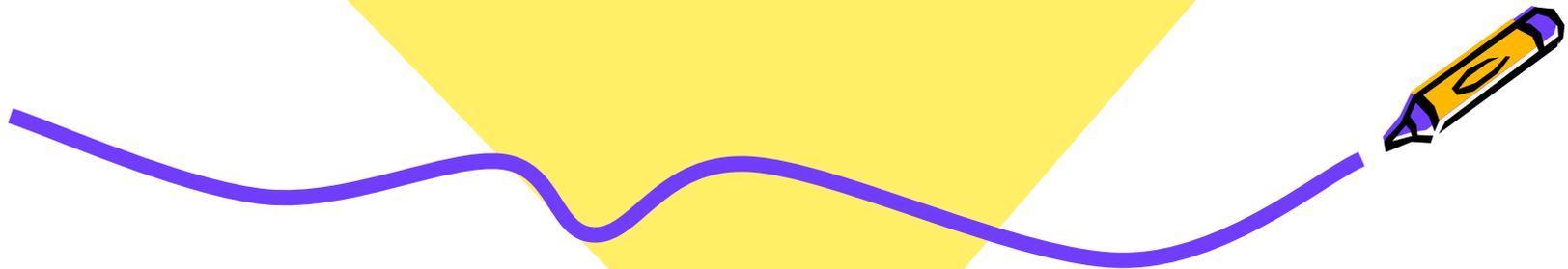
Saturday, March 01, 2003



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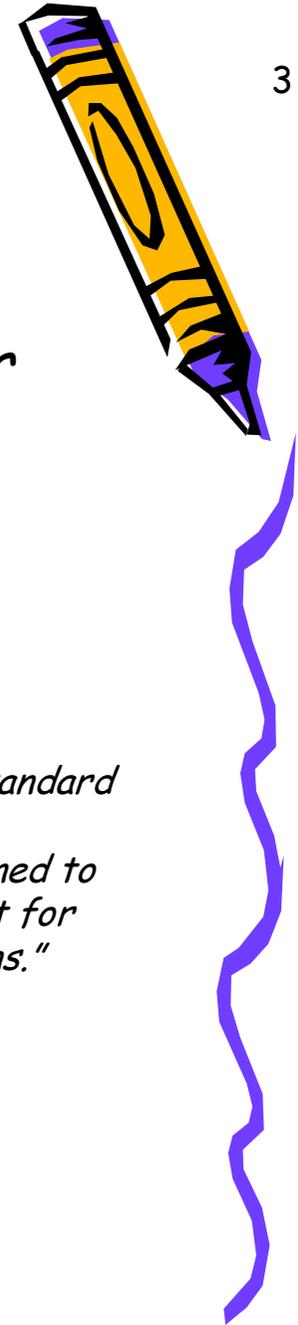
# The J2EE Component Technologies



# J2EE

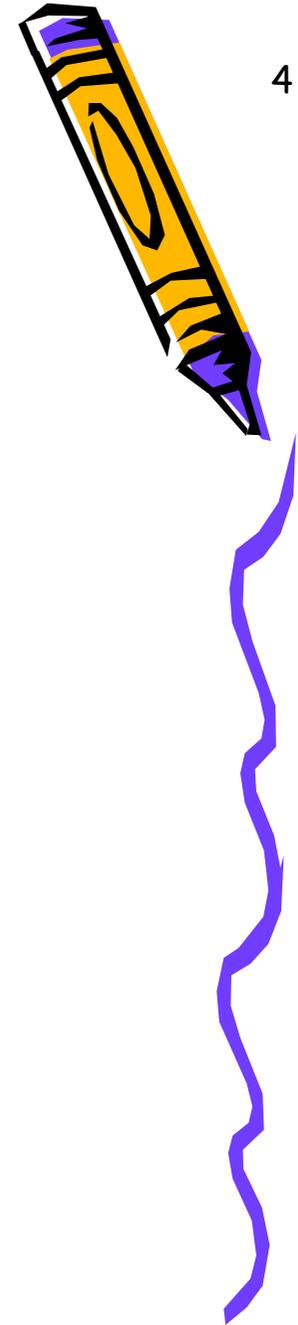
- Java 2, Enterprise Edition
  - A story to join the Java technologies together
  - Server-centric
  - Integration-oriented
  - Component-oriented
  - Simpler
    - N.B. *not* simple!
  - Tool focussed
  - Web-centric
  - Cross-platform
    - As much as Java is, anyway...
  - Churning on Internet timescales

*"The J2EE platform represents a single standard for implementing and deploying enterprise applications. ... the J2EE platform is designed to provide server-side and client-side support for developing enterprise, multitier applications."*



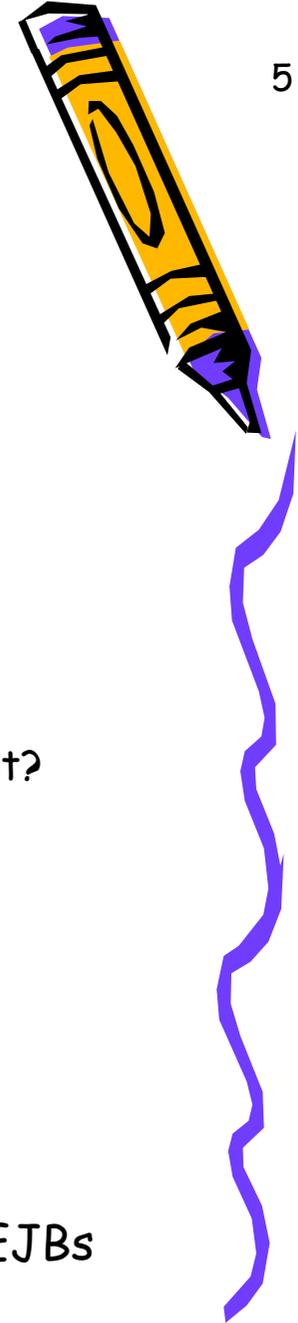
# Alphabet Soup

- JDBC
  - Database connectivity
- JNDI
  - Naming/Directory services
- JAAS
  - Authorisation/Authentication infrastructure
- JMS
  - Messaging Oriented Middleware
- JTA/JTS
  - Transaction handling
- JMX
  - Application management and monitoring
- Servlets
  - Handles web-based client interactions
- JSP
  - Template API to Servlet mechanism
- Taglibs
  - Component/tool API for JSPs



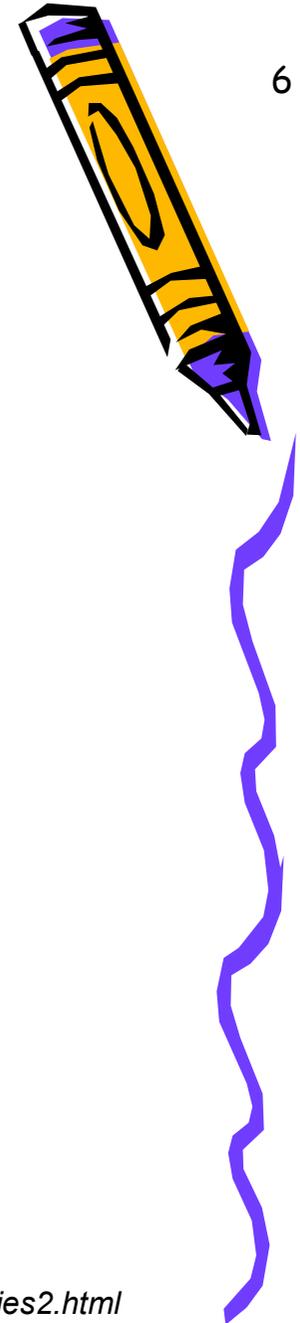
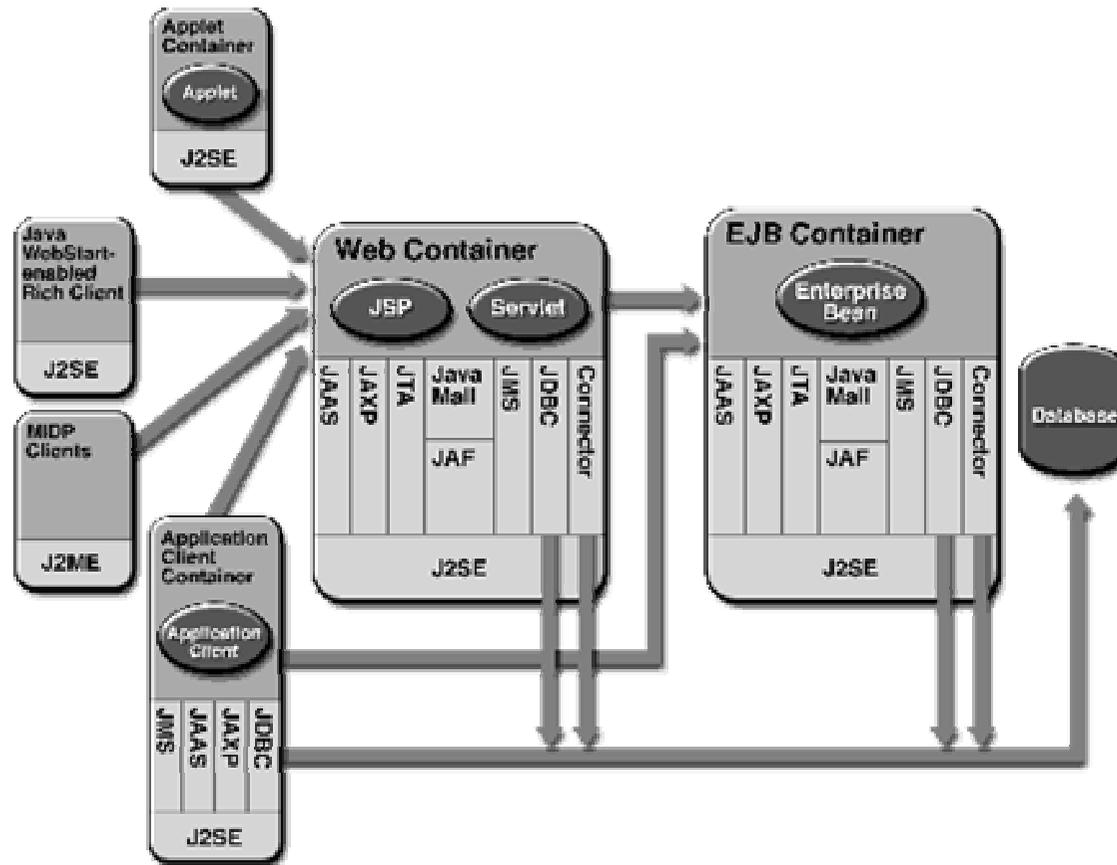
# Alphabet Soup...

- EJBs
  - Framework for enterprise-grade components
- JAXP
  - XML manipulation
- JWS
  - Simplified deployment of Java applications to a desktop
- WebServices
  - XML-based messaging between components
    - An end to the "interoperating object wars"?
    - A way for Object interactions to pass through the firewall at last?
- JCA
  - High-level EIS integration
- JavaMail/JAF
  - Internet email/messaging
- RMI
  - Remote Method Interaction protocol
- Container
  - Life support module for components such as Servlets/JSPs/EJBs



# Architecture(s)

- All the pieces of the puzzle



# Patterns

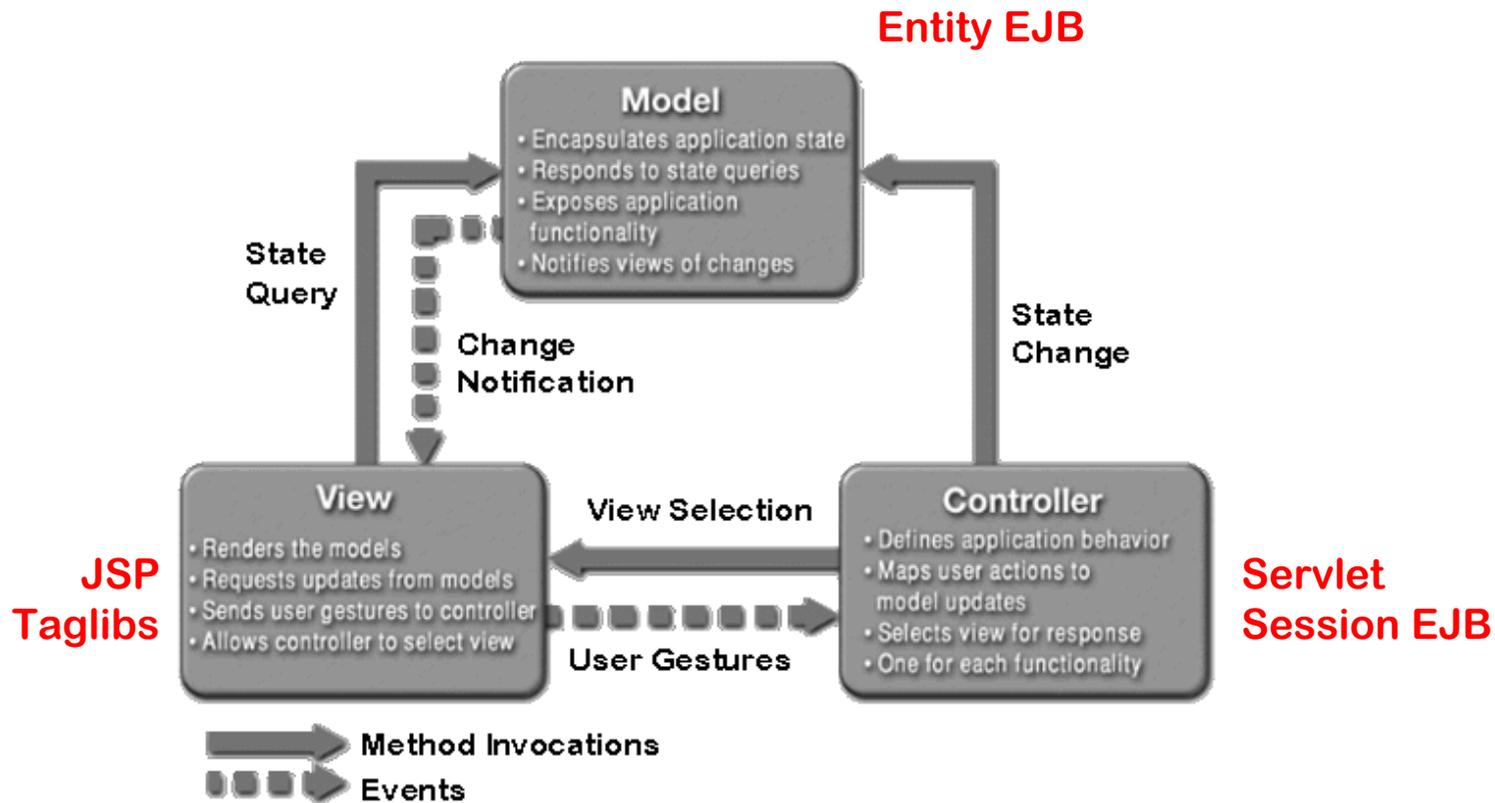
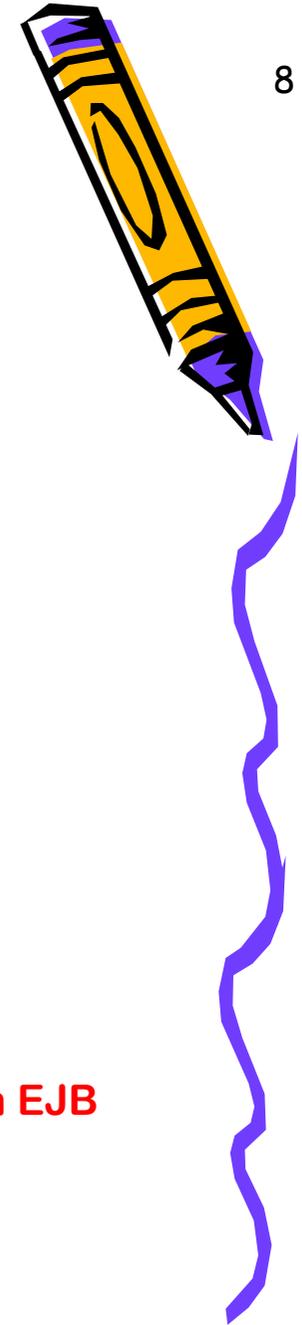
- Patterns underpin much of what the J2EE is about, i.e.:
  - Model/View/Controller (MVC)
  - Data Access Objects
  - Session Façade
  - Value Object
  - Page-by-Page Iterator
  - Fast-Lane Reader
- Give a common language for describing a problem and (hopefully) identifying a common solution

*"A design pattern describes a proven solution to a recurring design problem, placing particular emphasis on the context and forces surrounding the problem, and the consequences and impact of the solution"*



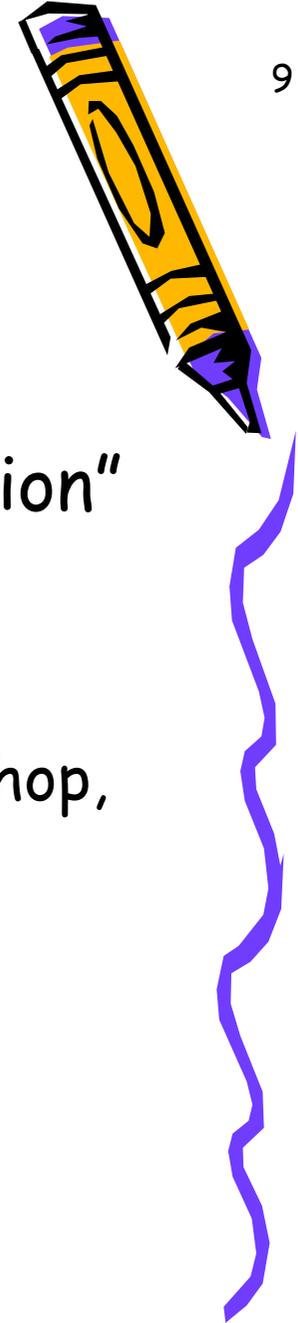
# MVC

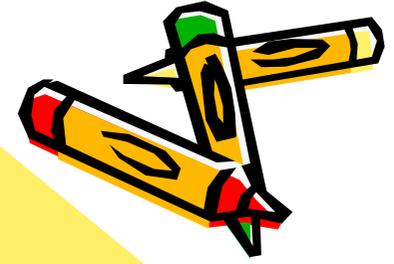
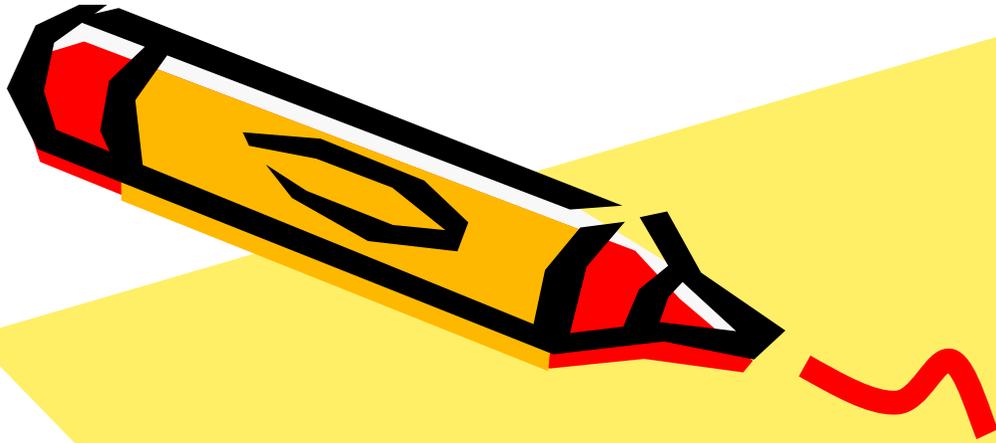
- Model-View-Controller
  - Design architecture underpinning J2EE



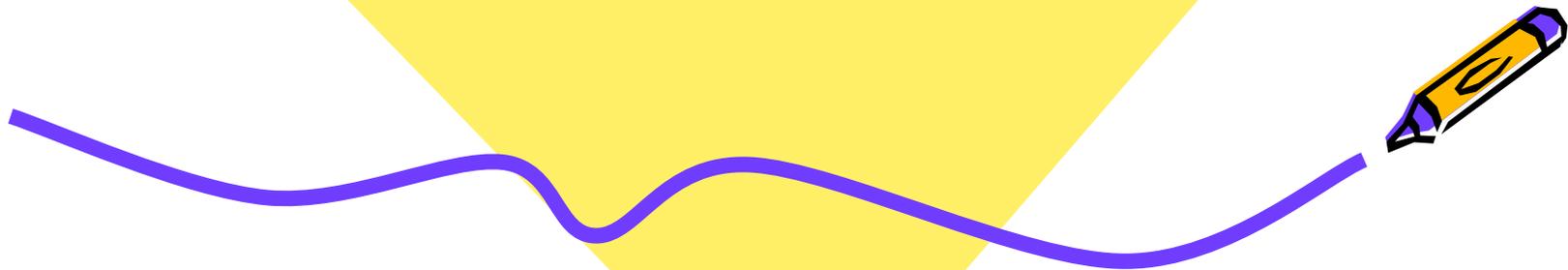
# IDEs

- A major focus of the J2EE technologies
  - Several not solely "for human consumption"
    - Taglibs, EJBs...
  - A burgeoning marketplace
    - JDeveloper, Together/J, WebLogic Workshop, JBuilder, Netbeans/Forte, Eclipse, IDEA, ...
  - A 'difficult' marketplace
    - Getting *hard* to charge \$\$\$ for an IDE
      - Getting hard to charge \$ for an IDE!





# J2EE Development with Oracle9i JDeveloper

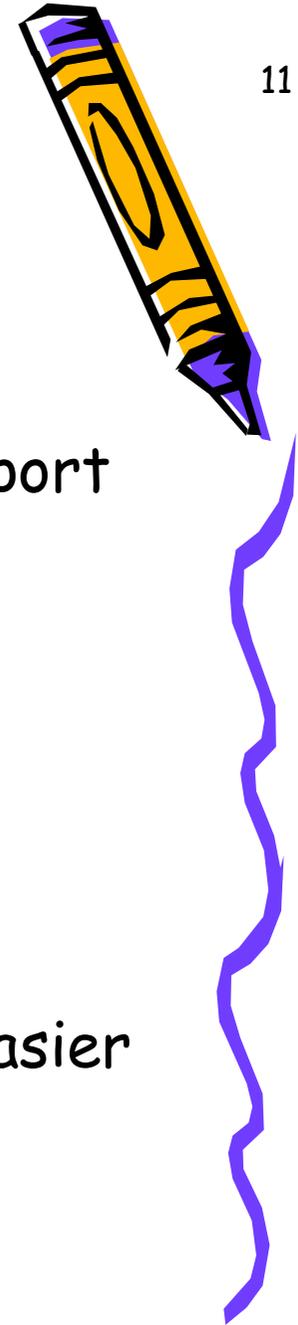


# JDeveloper 9i

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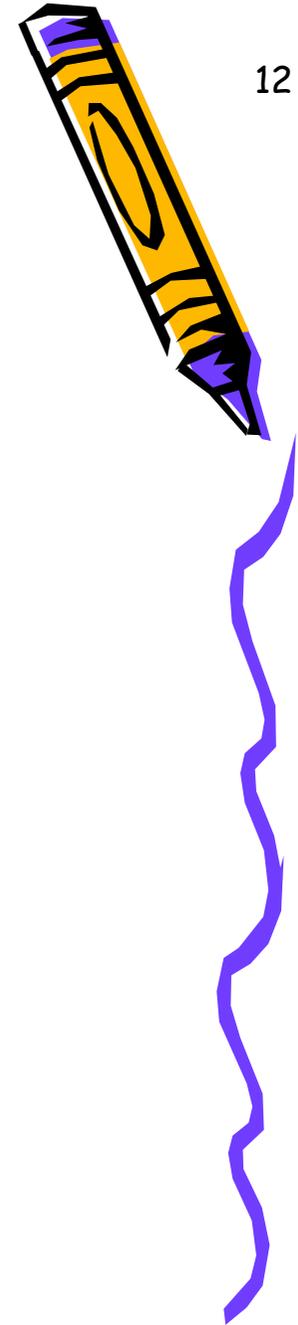
- Introduced May 2002
- Oracle's flagship IDE
  - Free download; ~US\$995 for commercial/support license
- Complete re-write from JDeveloper 3
  - No longer a re-badged JBuilder
- Extensive feature set
- Quite standards-oriented
  - But with lots of Oracle goodies to make life easier
  - Will be revised regularly as standards evolve

*"Oracle believes strongly, and has invested heavily, in the combination of Java, SQL, and XML. Java is used for programming the business and presentation logic, SQL for interacting with the database, and XML for passing information between loosely coupled applications."*



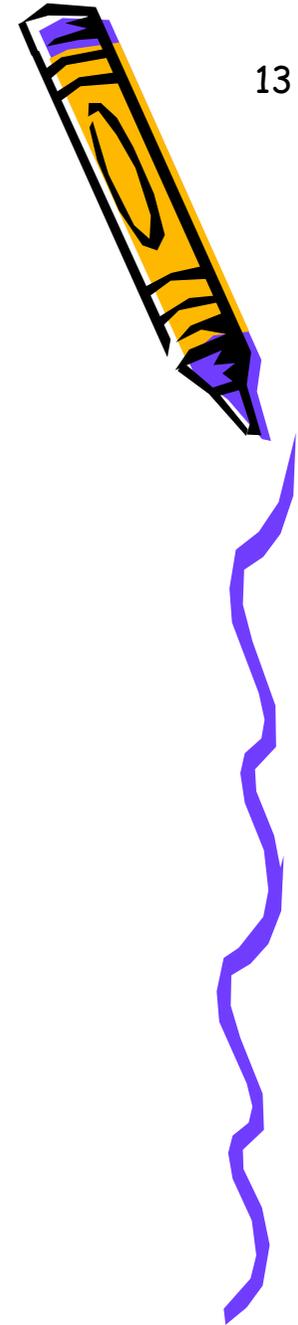
# JDeveloper 9i...

- 100% pure Java
  - Supports Unix/Linux, windows
- Oracle goodies
  - Integrated SQL & PL/SQL support
  - Business Intelligence Beans
  - UIX framework for Oracle Browser look&feel
  - Business Components for Java (BC4J)
    - Pattern framework
- *Many wizards*
- Partial UML modelling support
  - Currently 2 diagram types
    - Class and activity
    - ...more to come
  - Groks BC4J



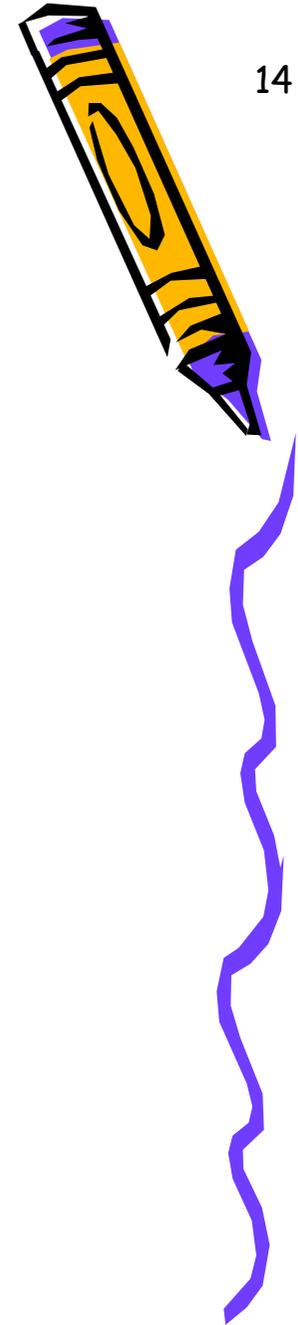
# JDeveloper 9i...

- XML
  - Schemas, XSL, XHTML
  - WebServices
- Extensive 2-tier development support
- Integrated debugging
- Integrated profilers and CodeCoach
- Support for WebDAV and source-code management
- Support for J2EE
- Others
  - Ant/Struts/JUnit/Jalopy/etc...
- And more...and more...and more....



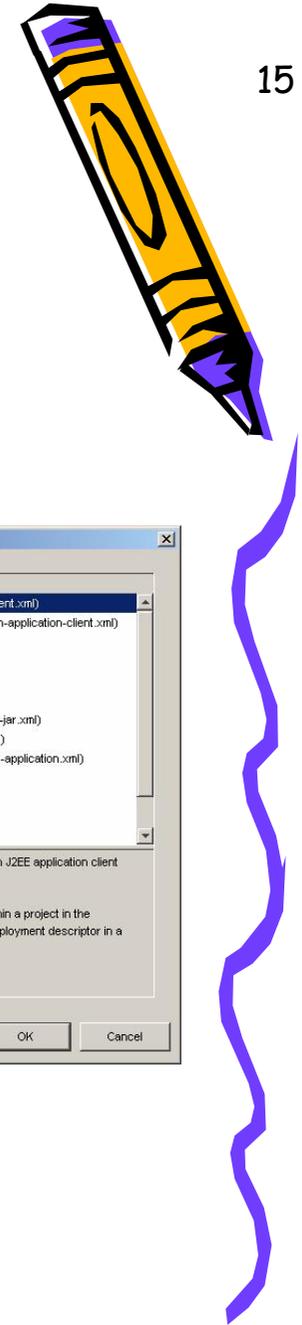
# 'Plain' J2EE

- Not really where the fun is
  - A capable IDE; lots of wizards, etc.
- Oracle9iAS Containers for J2EE (OC4J)
  - Now (JDeveloper 9i 9.0.3) supporting J2EE 1.3.1
- Can target other AppServers
  - OC4J/JBoss/WebLogic 6.x/7
    - Has been a bit buggy...
- End-to-end Development/Deployment support
- Servlets/JSPs/Taglibs
- EJBs
  - Plain J2EE Session EJBs
  - CMP/BMP Entity EJBs
    - EJB 1.1/2.0 variants
    - Top-down development of new functionality or bottom-up mapping to existing persistent data
  - Message Driven Beans



# 'Plain' J2EE...

- Wizard wonderland...



The image displays four overlapping 'New' dialog boxes from an IDE, illustrating the complexity of choosing a project type in a 'Plain' J2EE environment. Each dialog box shows a tree view of categories and a list of items.

- Top-left dialog:** Shows 'Enterprise JavaBeans (EJB)' selected in the 'Business Tier' category. The 'Items' list includes various EJB deployment descriptors and bean types like 'Entity Bean' and 'Session Bean'.
- Middle-left dialog:** Shows 'Entity Bean Data Bindings' selected in the 'Business Tier' category. The 'Items' list includes 'Business Components Package', 'EJB Application Module', 'EJB Entity Facade', 'EJB Finder View Link', and 'EJB Finder View Object'.
- Bottom-left dialog:** Shows 'JavaServer Pages (JSP)' selected in the 'Web Tier' category. The 'Items' list includes 'JSP Document', 'JSP Page', 'JSP Tag', and 'Web Bean'.
- Right dialog:** Shows 'Application Client Deployment Descriptor (application-client.xml)' selected in the 'Client Tier' category. The 'Items' list includes various deployment descriptors and files like 'Java Web Start (JNLP) Files' and 'JSP Tag Library Descriptor (taglib.tld)'. A text box at the bottom explains that this option requires selecting a project or file within a project in the Navigator.

# BC4J Components

- Here's where the real fun/value is...

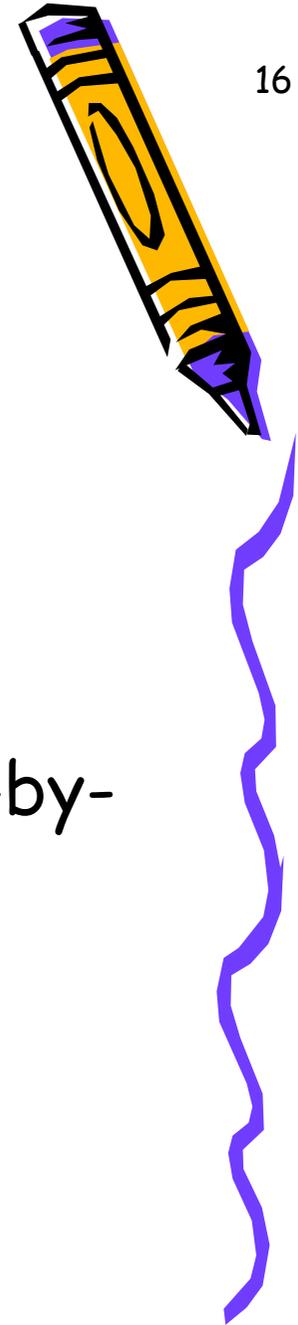
*"A Helping Hand in Every Tier"*

- Based on Java Enterprise Blueprints
  - Provides the 'glue' that a system needs
  - Session façade, fast-lane reader, page-by-page iterator, value object, etc.
  - Plus various additions

*"A programming tool that allows you to build reusable modules and business components can dramatically reduce your development times, letting you bring new applications to market faster.*

*That's the kind of tool Oracle's Business Components for Java (BC4J) is."*

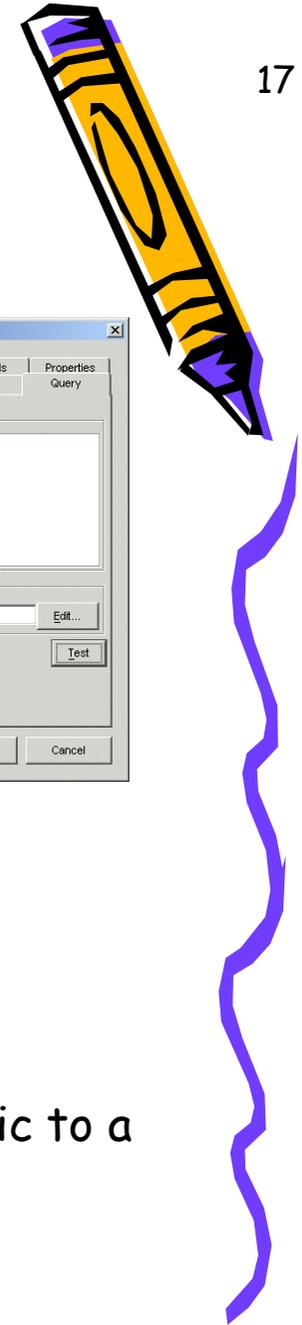
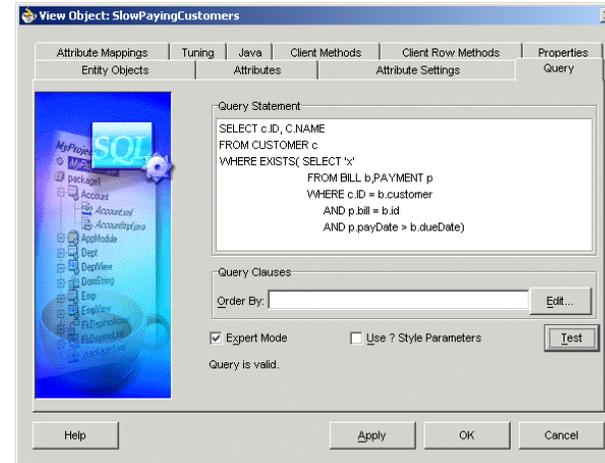
*"...a carefully-architected blend of J2EE technologies. ...At its core, BC4J is a metadata-driven Data Access Objects framework."*



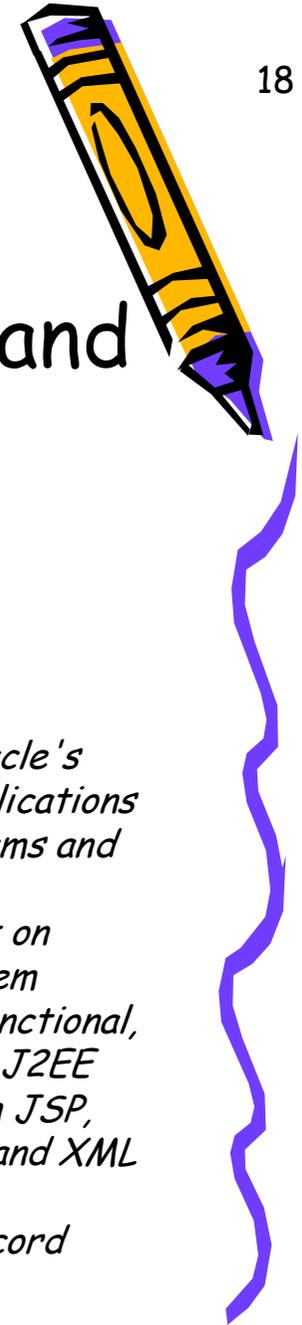
# BC4J Components...

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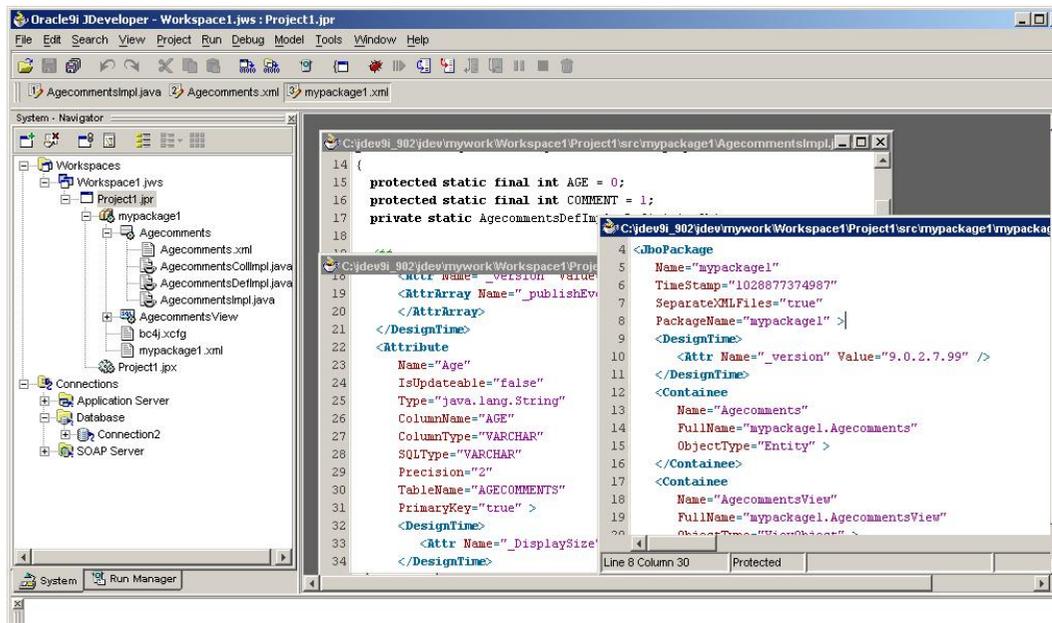
- Five basic interrelated framework components:
  - Entity Objects
    - Lightweight Data Access Objects
  - View Objects
    - Companion fully-updatable DAOs that assist in joining, filtering, projecting, and sorting
    - configurable
  - Associations
  - View Links
    - Build hierarchies of master-detail queries
  - Domain
    - Ease manipulation of complex data types
  - Application Modules
    - Provide a Model/View/Controller application object
    - Can contain both process and business logic that is specific to a particular application task
    - Wrap access to the other data access objects in the framework



# BC4J Components...



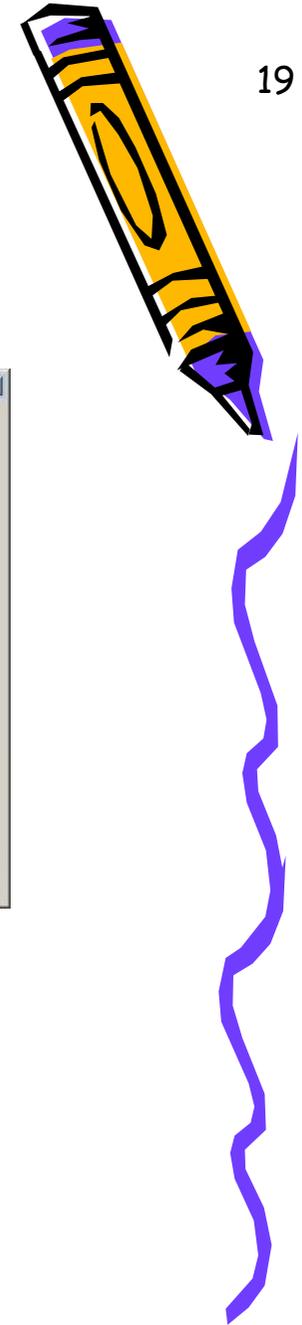
- Each component has 2 parts: XML deployment/configuration metadata and Java object code
- Can deploy to EJBs/CORBA/DAO/...
  - Tries to remain AppServer agnostic
    - DAO/EJB1.1 preferred



*"Over 20 of Oracle's own internal applications development teams and many external customers count on BC4J to help them deliver highly functional, well-performing J2EE applications with JSP, Servlet, Swing, and XML Web Services interfaces in record time."*

# BC4J Components...

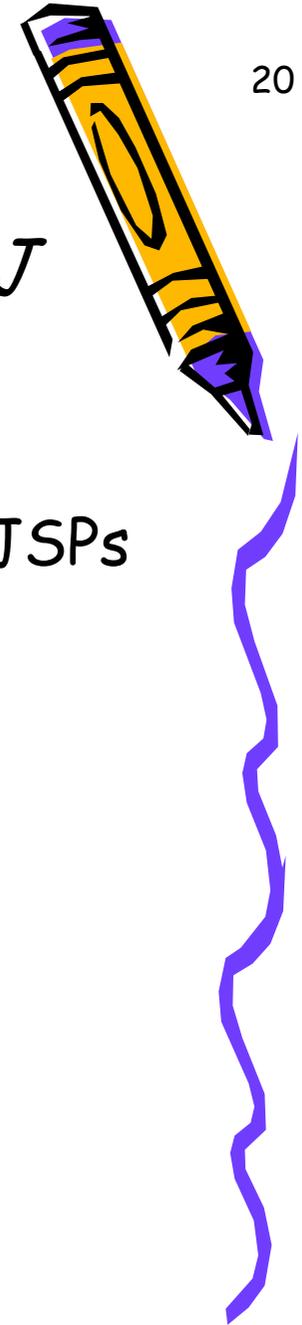
- Wizard wonderland...take 2...



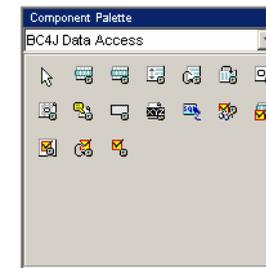
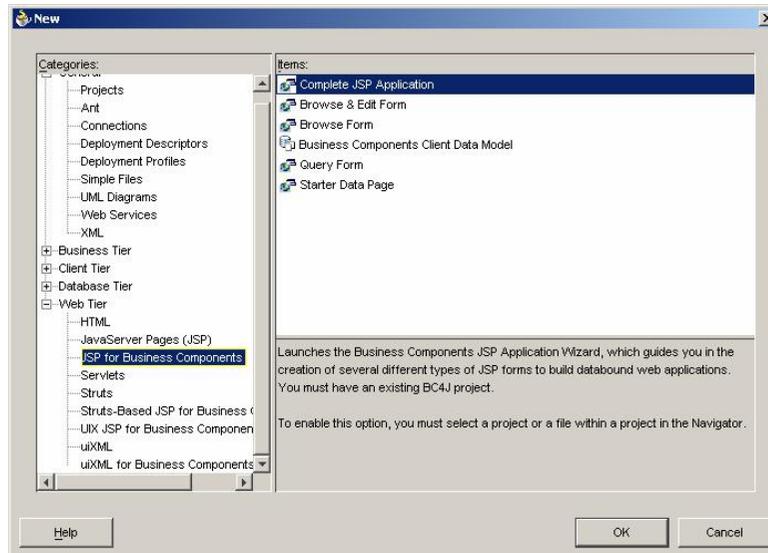
The image shows four overlapping screenshots of the Entity Object Wizard dialog boxes in Oracle JDeveloper, illustrating the steps of creating an entity object:

- Entity Object Wizard, Step 1 of 4: Name**: Shows the 'Name' field set to 'Agecomments', 'Package' set to 'mypackage1', and 'Extends Entity' set to an empty field. The 'Database Objects' section shows 'Schema Object' set to 'APP.AGECOMMENTS' and 'Database Schema' set to '<all schemas>'. Checkboxes for 'Tables', 'Views', 'Synonyms', and 'Snapshots' are visible.
- Entity Object Wizard, Step 2 of 4: Attributes**: Shows the 'Entity Attributes' list with 'Age' and 'Comment' selected. 'New...' and 'New from Table...' buttons are present.
- Entity Object Wizard, Step 3 of 4: Attribute Settings**: Shows the 'Select Attribute' dropdown set to 'Age'. The 'Attribute' section has 'Name' set to 'Age', 'Type' set to 'String', and 'Default' set to an empty field. Checkboxes for 'Persistent', 'Primary Key', 'Discriminator', and 'Mandatory' are visible. The 'Updateable' section has 'Always' selected. The 'Refresh After' section has 'Update' and 'Insert' selected.
- Entity Object Wizard, Step 4 of 4: Java**: Shows the 'Entity Definition Class' set to 'AgecommentsDefImpl', 'Entity Collection Class' set to 'AgecommentsCollImpl', and 'Entity Object Class' set to 'AgecommentsImpl'. Checkboxes for 'Generate Java File' are visible for each class. The 'Generate Methods' section has 'Accessors', 'Data Manipulation Methods', 'Validate Method', 'Create Method', and 'Remove Method' selected.

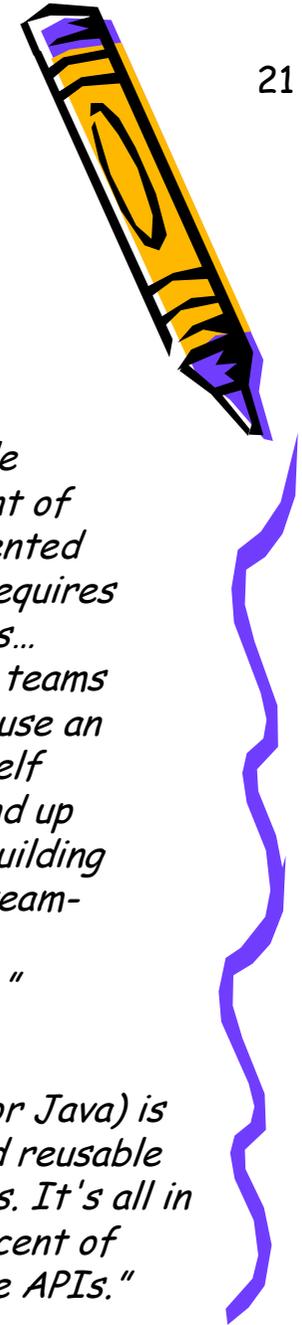
# BC4J Components...



- Also provides framework-oriented *BC4J JSP application*
  - Pre-canned JSP solutions
  - Template-driven approach for data-bound JSPs
    - Bind to various BC4J pre-canned components
    - Bind to AppModule



# BC4J Value Judgement



- Whether to "buy in" to all these BC4J/Wizards/goodies...
  - *"ay, there's the rub..."*

*"There are a few areas where JDeveloper can lock unsuspecting developers into an Oracle-only solution (the Web Services integration frameworks and the Business Objects support both require Oracle provided libraries), but there's nothing inherently wrong with a server vendor making it easy to use their servers."*

InfoWorld rates BC4J as having no 'cons'



*"I'd like to see Oracle submit a BC4J JSR or utilize another mechanism to guarantee that I won't be locked into a vendor-proprietary solution if I use the BC4J framework."*

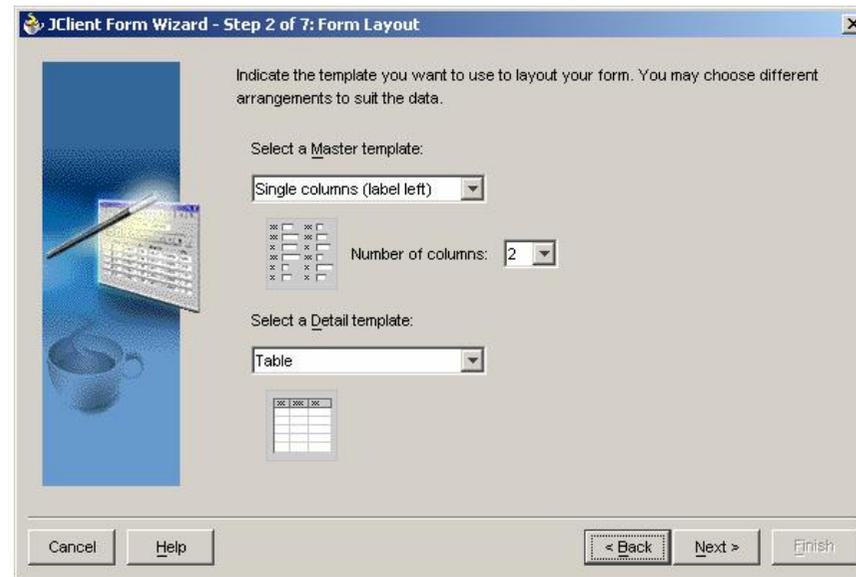
*"Large scale development of object-oriented software requires frameworks... Inevitably, teams that don't use an off-the-shelf offering end up gradually building their own team-specific framework."*

*"BC4J (Business Components for Java) is very hot stuff. It lets you build reusable components like blocks in Forms. It's all in JDeveloper and is very reminiscent of Designer module APIs and table APIs."*

(Designer slated to go away in 2004)

# JClient

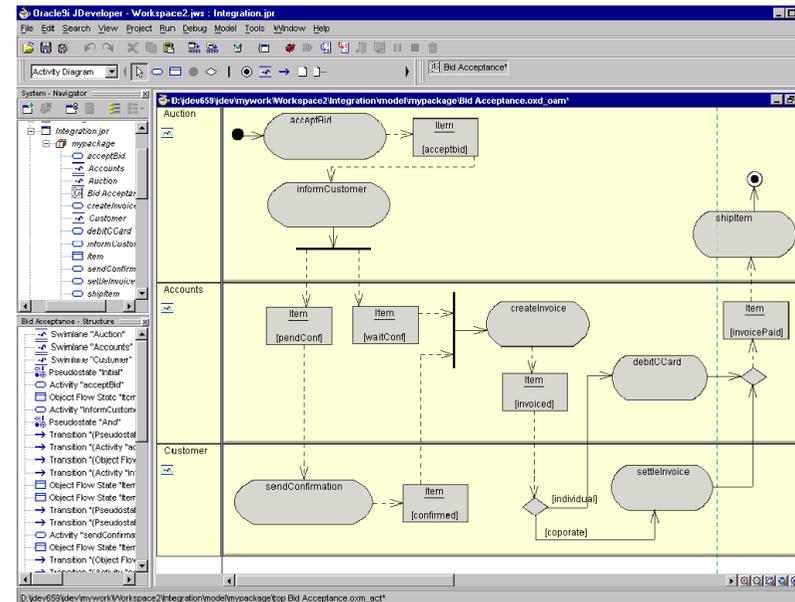
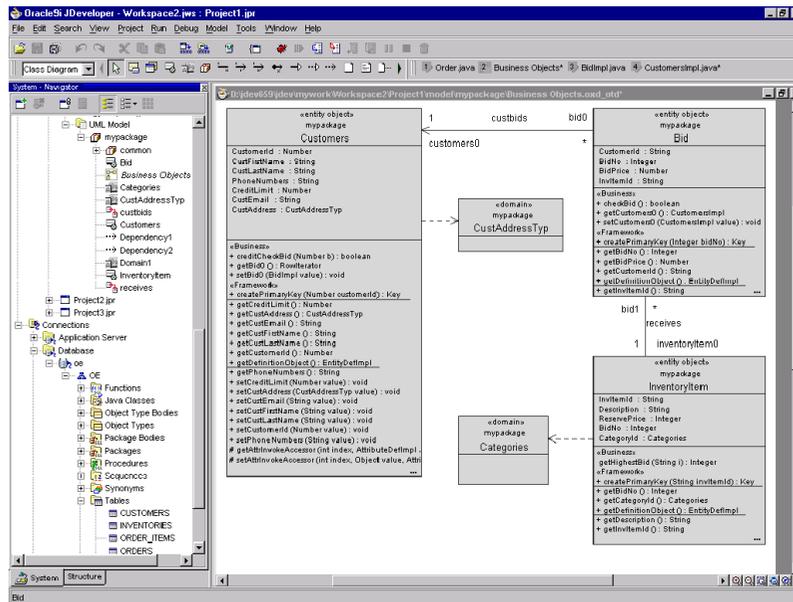
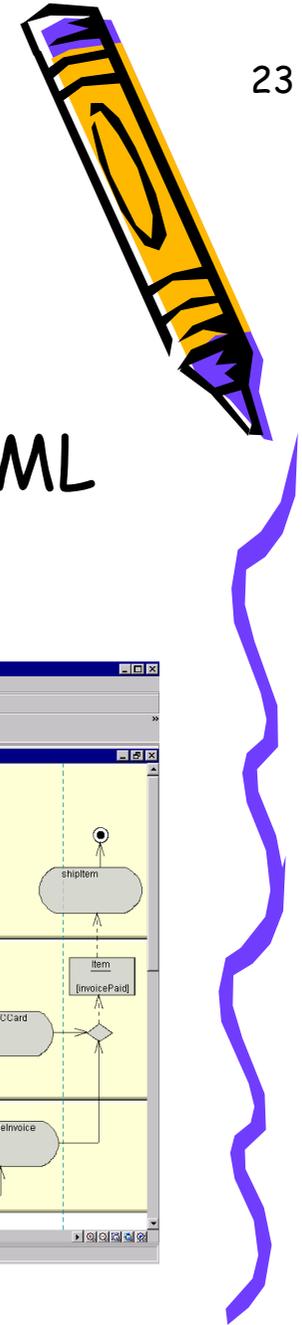
- Framework for Java client applications
  - Wizards generate code to bind Swing components to BC4J business component data sources



- Can be packaged for Java Web Start
- Handles 'smarts' like lazy load/update...

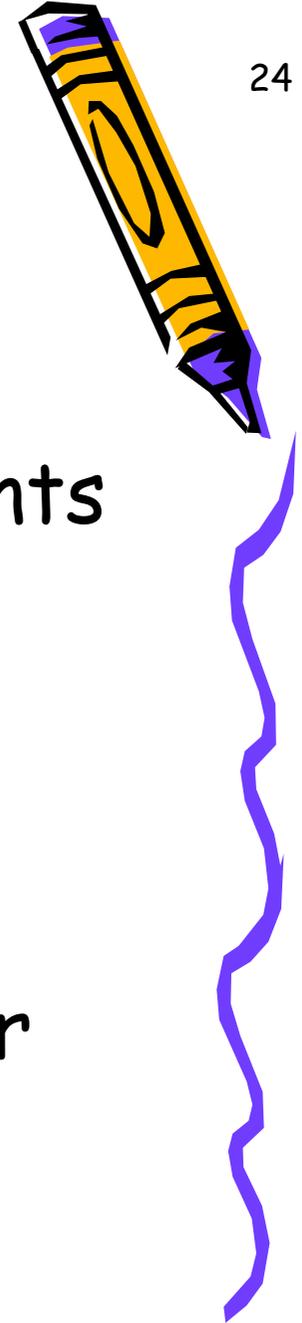
# UML Modelling/Generation

- Supports class and activity diagrams
  - Generates plain J2EE or BC4J code
- Supports XMI for exchange with other UML tools



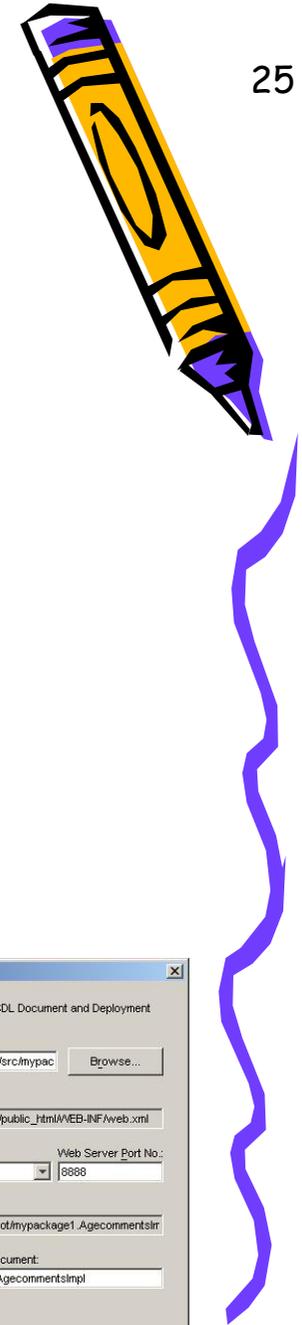
# WebServices

- Being introduced into the J2EE through J2EE 1.4 and JSR 109
- JDeveloper can 'wrap' most components as WebServices
  - BC4J & EJBs...
  - Also PL/SQL
- Oracle provides a WebServices tag library with OC4J to make life easier
  - Can use with JDeveloper, obviously



# WebServices...

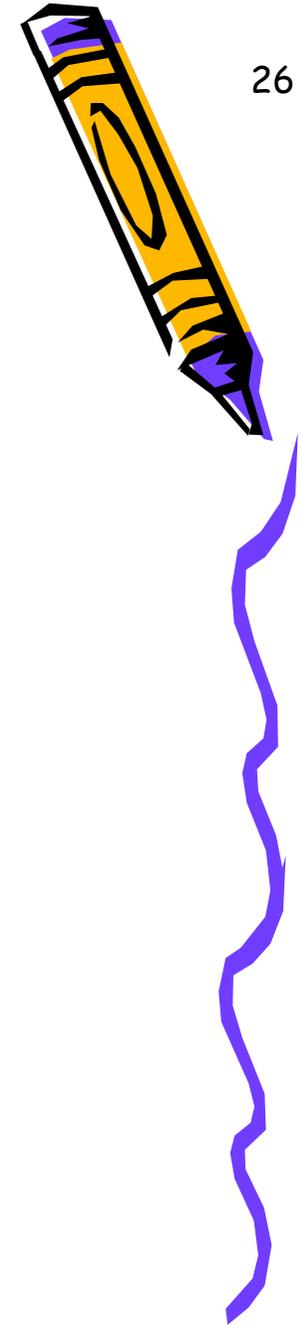
- Wizard wonderland...take 3...



The screenshot displays the Oracle9i JDeveloper IDE interface. The main window shows a WSDL file for 'AgecommentsImpl.wsdl'. The 'System Navigator' on the left shows a project structure with 'Agecomments' and 'AgecommentsImpl.java'. Overlaid on the IDE are three windows from the 'Web Service Publishing Wizard':

- Step 1 of 3: Web Service Class, Name and Platform:** Shows 'mypackage1.AgecommentsImpl' selected as the class to publish. The 'Web Service Name' is 'mypackage1.AgecommentsImpl' and the 'Deployment Platform' is 'Oracle J2EE Web Ser'.
- Step 2 of 3: Exposed Methods:** Shows a list of methods from 'AgecommentsImpl' with checkboxes. The 'getAge()' and 'getComment()' methods are selected.
- Step 3 of 3: File Locations:** Shows the configuration for the WSDL document and deployment. The 'WSDL Document URL' is 'file:C:\dev9i\_902\dev\mywork\Workspace1\Project1\src\mypac...'. The 'Deployment Descriptor File URL' is 'file:C:\dev9i\_902\dev\mywork\Workspace1\Project1\public\_html\WEB-INF\web.xml'. The 'Web Server Port No.' is '8888'. The 'Web Service Endpoint' is 'http://localhost:8888/Workspace1-Project1-context-root/mypackage1\_AgecommentsItr'. The 'targetNamespace' is 'http://tempuri.org/jdeveloper/generated/mypackage1\_AgecommentsImpl'.

# WebServices...

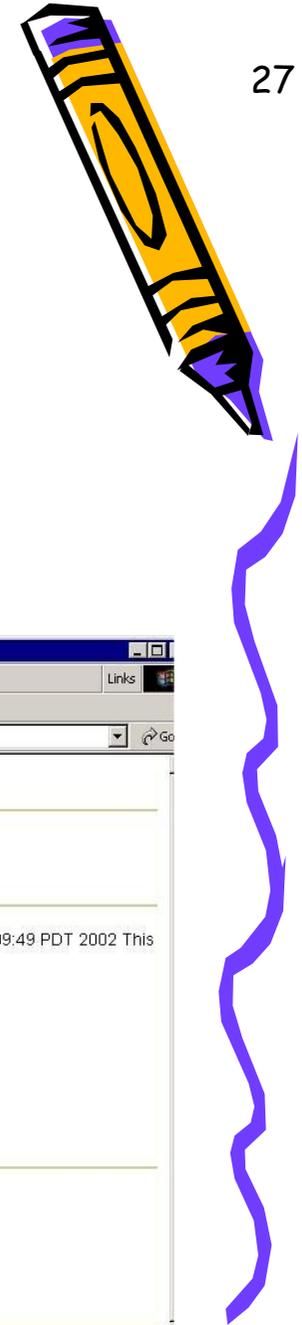


- Example: check an item on ebay

```
<%@ page contentType="text/html"%>
<%@ taglib uri="http://xmlns.oracle.com/j2ee/jsp/tld/ws/wstaglib.tld"
      prefix="ws" %>

<HTML>
<HEAD>
<META HTTP-EQUIV="Content-Type" CONTENT="text/html; " >
</HEAD>
<BODY>
<% String itemID = request.getParameter("itemID"); %>
<ws:webservice id="ebay"
  wsdlUrl="http://www.xmethods.net/sd/2001/EBayWatcherService.wsdl"
  binding="eBayWatcherBinding"
  soapLocation="http://services.xmethods.net:80/soap/servlet/rpcrouter"
  scope="page">
  <ws:property name="http.proxyHost" value="www-proxy.us.oracle.com"/>
  <ws:property name="http.proxyPort" value="80"/>
</ws:webservice>
<ws:invoke id="price" webservice="ebay" operation="getCurrentPrice">
  <ws:part name="auction_id" value="<%=itemID%>"/>
</ws:invoke>
<B>Action price for eBay Item # <%=itemID%> is :</B>
<P>
&lt;%= price%>@<%=new java.util.Date()%>
</P>
</BODY>
</HTML>
```

# PL/SQL WebService



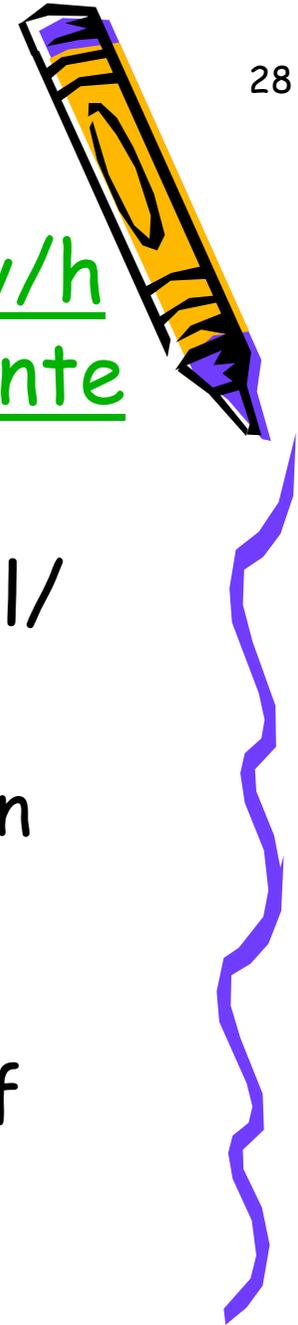
- JDeveloper makes it easy to expose PL/SQL as a WebService

The screenshot shows the JDeveloper IDE interface. On the left, the 'New' dialog is open, with 'Web Services' selected in the 'Categories' pane. The 'Items' pane lists 'PL/SQL Web Service' as the selected option. In the foreground, the 'PL/SQL Web Service Publishing Wizard - Step 2 of 3: Program Units' is displayed. It features a list of program units with checkboxes: PROCEDURE ADDEMP (checked), PROCEDURE CHANGEMP (unchecked), FUNCTION GETADDR (checked), FUNCTION GETEMP(IN) (checked), FUNCTION GETEMP(IN) (unchecked), and PROCEDURE REMOVEEMP (checked). To the right, a Microsoft Internet Explorer window displays the 'Company endpoint' page. The page content includes: 'Company endpoint', a link to 'Service Description (rpc style)', 'Company service', a generation date of 'Wed Aug 07 12:09:49 PDT 2002', a list of supported operations (getemp, removeemp, addemp, getaddress), and 'oc4j client' information (Proxy Jar, Proxy Source).

# Extensions Exchange

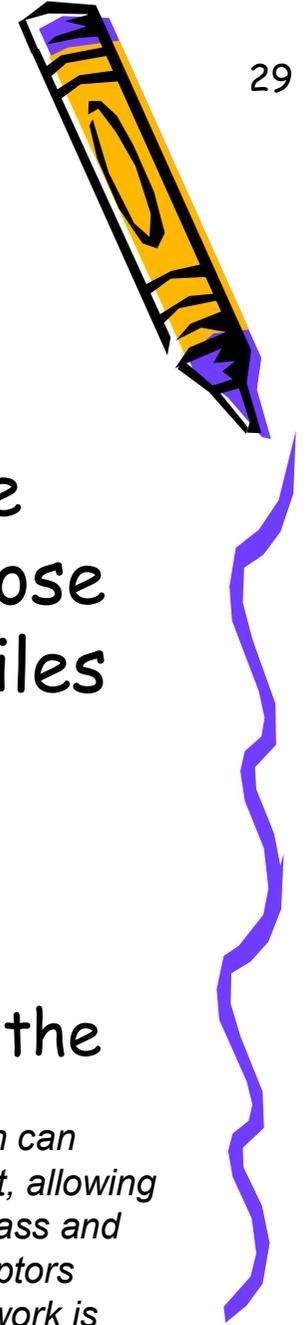
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- <http://otn.oracle.com/products/jdev/hdocs/partners/addins/exchange/content.html>
- Lots of user-contributed/commercial/Oracle-developed extensions
  - Often concerned with bringing the Open Source world to JDeveloper
    - JUnit, Jalopy, Ant, Struts, etc.
  - Sometimes rolled into JDeveloper itself



# Cat Among Pigeons Time

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- XDoclet
  - Very appealing
  - A generic Java tool that lets you create custom Javadoc @tags and based on those @tags generate source code or other files (such as xml deployment descriptors)
  - "Continuous Reconfiguration"
    - Don't have to worry about outdating deployment meta-data whenever you touch the code
  - Integrated into the build process with Ant

*"This free open source solution can simplify your EJB development, allowing you to work just with a bean class and have the interfaces and descriptors generated for you. This framework is growing, and isn't just for EJBs."*

# XDoclet...

```
/**
 * @ejb:bean type="Stateless"
 *           name="MyXDocletEJB"
 *           jndi-name="the-ejb-name"
 *           display-name="The EJB"
 *
 * @ejb:env-entry name="parameter" type="java.lang.String" value="some.data"
 */
public class EJB implements SessionBean {

    /**
     * @ejb:interface-method view-type="remote"
     */
    public void aMethod(String someParam) throws RemoteException {
```

```
<target name="ejbdoclet" depends="prepare">

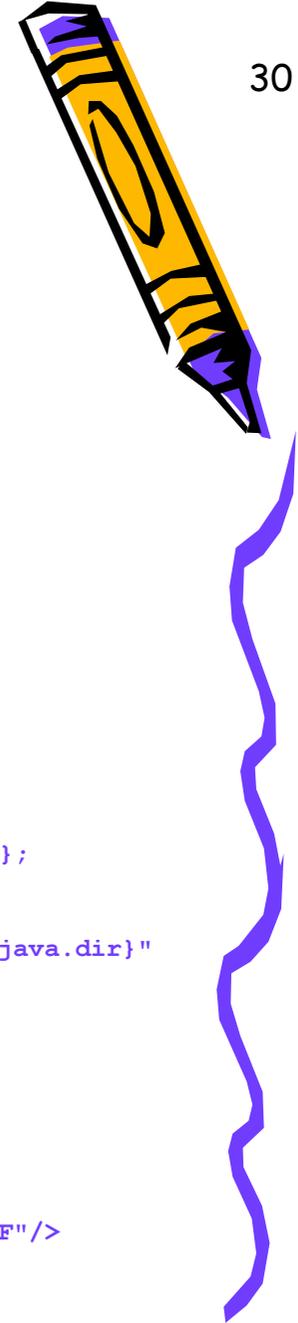
    <taskdef name="ejbdoclet"
             classname="xdoclet.ejb.EjbDocletTask"
             classpath="{java.class.path};{xdoclet.jar.path};
             {log4j.jar.path};{ant.jar.path}"/>

    <ejbdoclet sourcepath="{java.dir}" destdir="{generated.java.dir}"
               ejbspec="2.0">

        <fileset dir="{java.dir}">
            <include name="**/EJB.java" />
        </fileset>

        <remoteinterface/>
        <homeinterface/>
        <deploymentdescriptor destdir="{build.dir}/ejb/META-INF"/>
        <orion destdir="{build.dir}/ejb/META-INF" />

    </ejbdoclet>
</target>
```

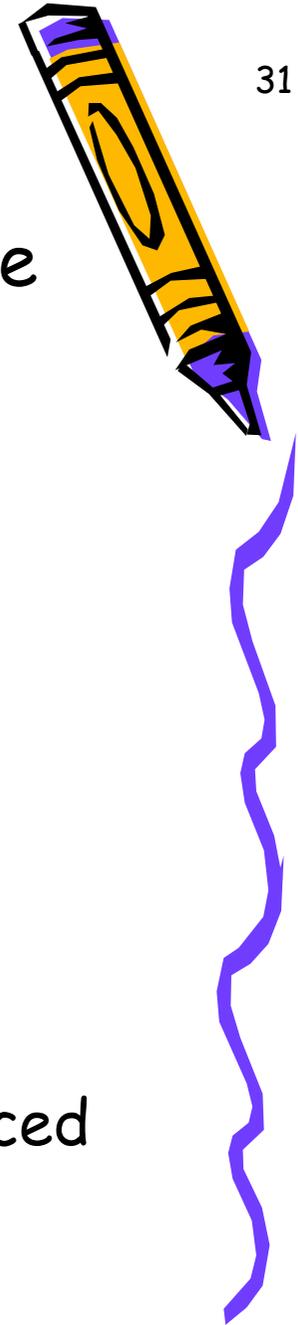


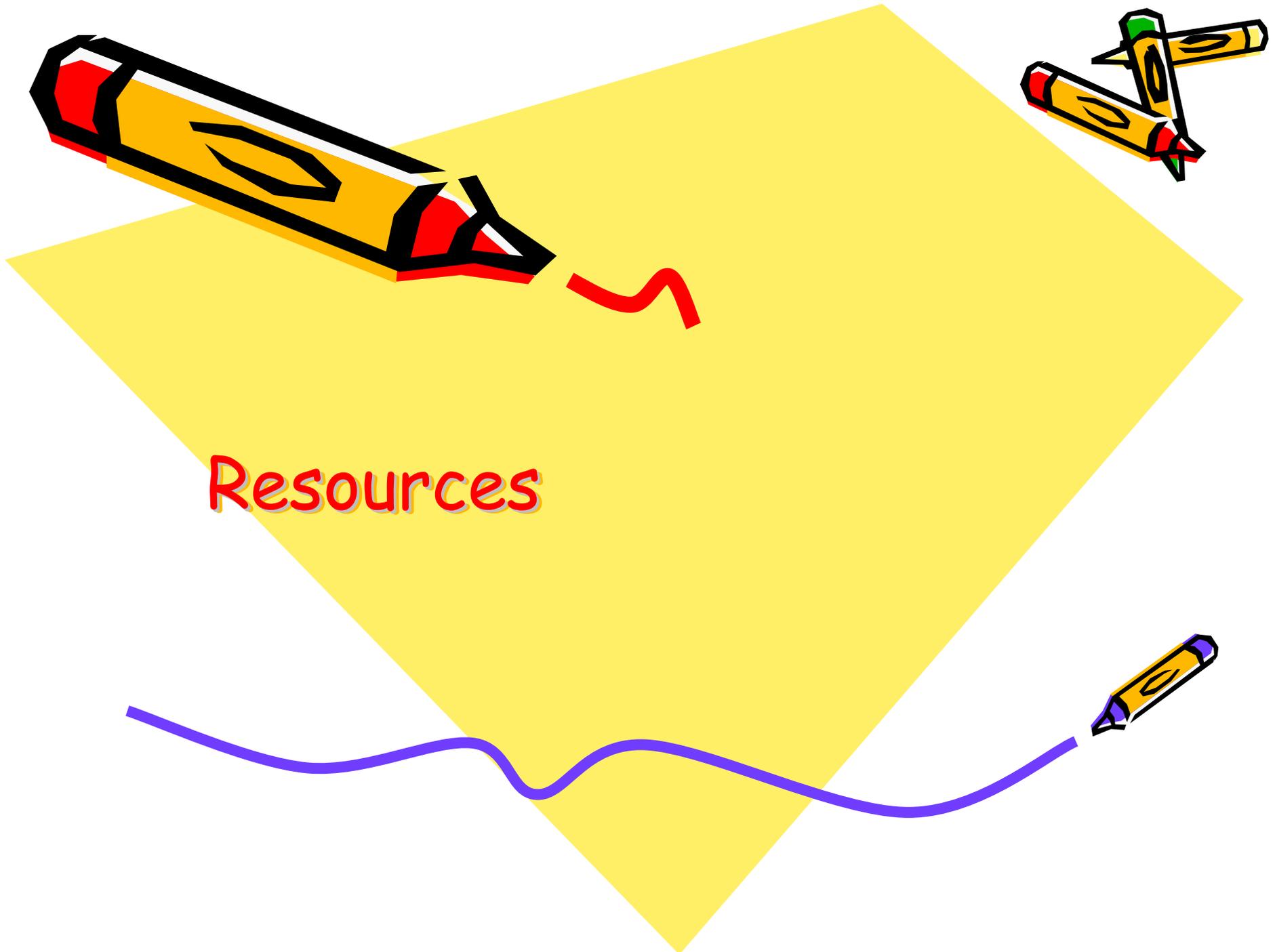
# The Future for JDeveloper

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- Version 9.0.3.1 (14 Feb 2003) now available for download
  - Improved/Updated support for
    - J2EE
      - JSPs/Servlets
      - EJBs
    - Struts
    - UML
    - Ant
    - WebServices
    - CVS
    - XML
  - Looking to be (almost) the best thing since sliced bread 😊
    - Already very solid

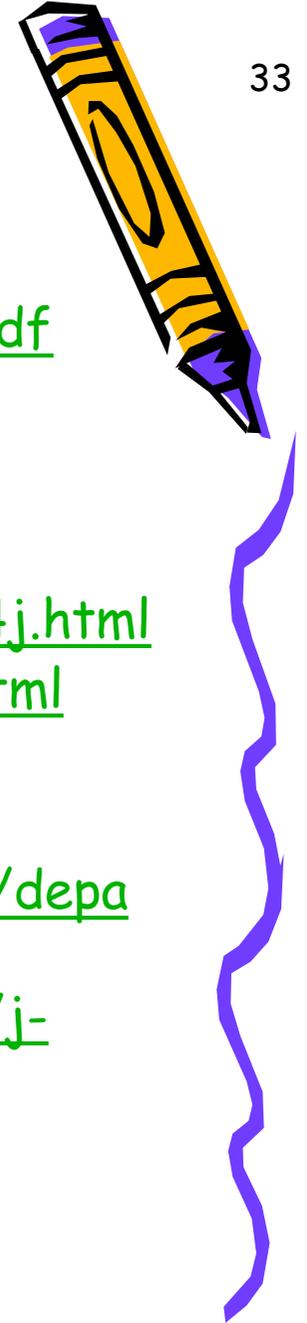
*"JDeveloper is Oracle's strategic development tool, and as such will continue to evolve quickly, especially in the modeling field."*





Resources

# Resources



- These slides:
  - <http://www.transentia.com.au/material/NZOUG2003.pdf>
- Where to find more...
  - <http://java.sun.com/blueprints/enterprise/index.html>
  - <http://otn.oracle.com/products/jdev/>
  - [http://otn.oracle.com/products/jdev/htdocs/j2ee\\_bc4j.html](http://otn.oracle.com/products/jdev/htdocs/j2ee_bc4j.html)
  - <http://technet.oracle.com/products/ids/daily/feb12.html>
  - <http://www.dulcian.com/papers>
    - *Don't be a Muggle! Be a JDeveloper 9i Wizard!*
  - [http://www.fawcette.com/javapro/2002\\_05/magazine/departments/productreviews/default\\_pf.asp](http://www.fawcette.com/javapro/2002_05/magazine/departments/productreviews/default_pf.asp)
  - <http://www-106.ibm.com/developerworks/java/library/j-webstart/?dwzone=java>
  - <http://xdoclet.sourceforge.net>
  - <http://java.about.com/cs/ides>