J2EE-Based Systems Development
and
Oracle9i JDeveloper

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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
- JDNI
  - 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
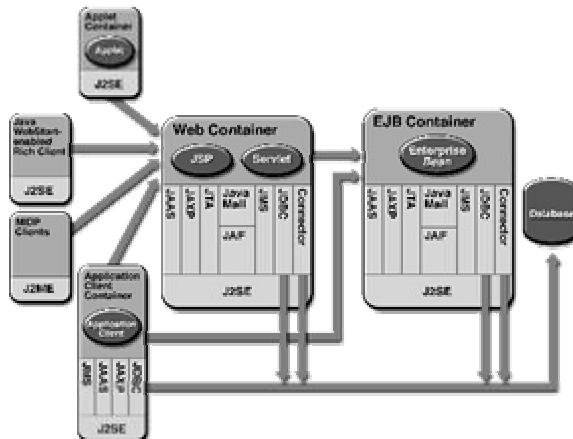
http://java.sun.com/blueprints/guidelines/designing_enterprise_applications_2e/technologies/technologies2.html

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

"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"

- Give a common language for describing a problem and (hopefully) identifying a common solution

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MVC

- Model-View-Controller
  - Design architecture underpinning J2EE

http://java.sun.com/blueprints/patterns/j2ee_patterns/model_view_controller/index.html
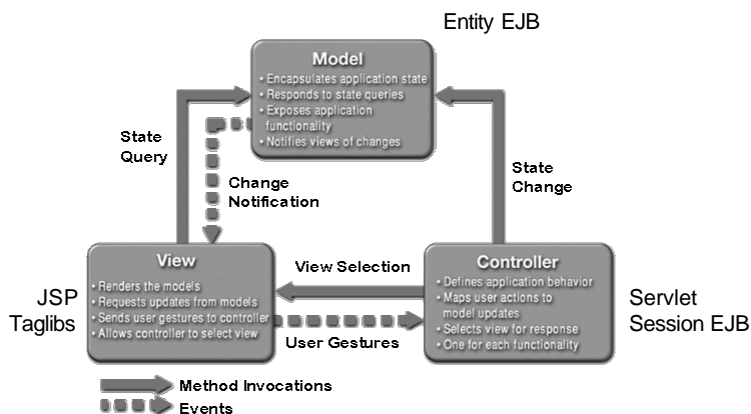
IDEs

- 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

- 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
  - Currrently 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...
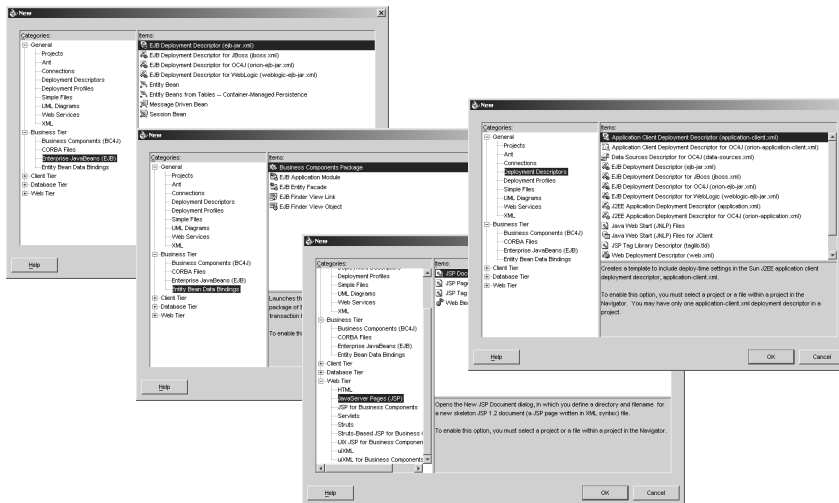
BC4J Components

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

  "A Helping Hand in Every Tier"

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

- 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."

BC4J Components…

- 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

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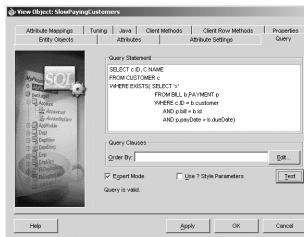
BC4J Components…

- Each component has 2 parts: XML deployment/configuration metadata and Java object code
- Can deploy to EJBs/CORBA/DAO/…
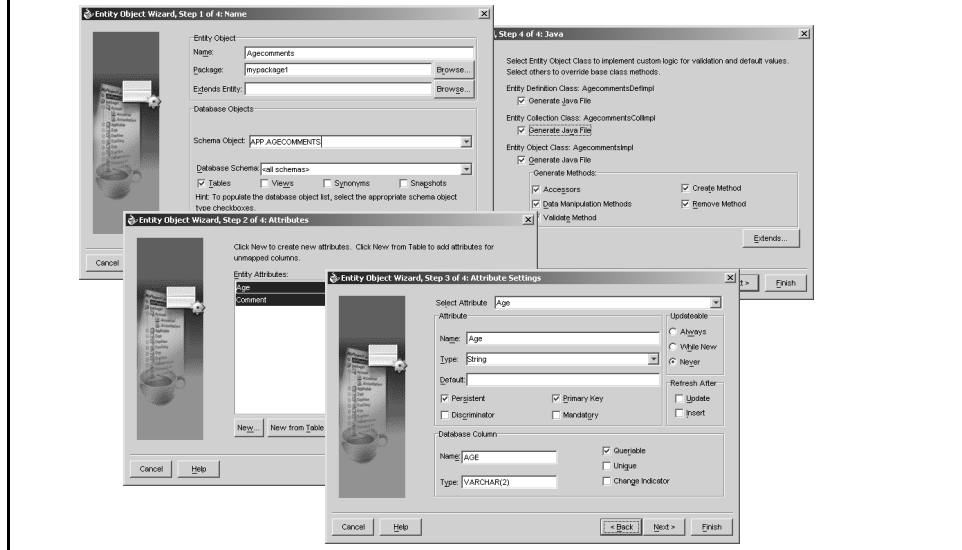 - Tries to remain AppServer agnostic
    - DAO/EJB1.1 preferred
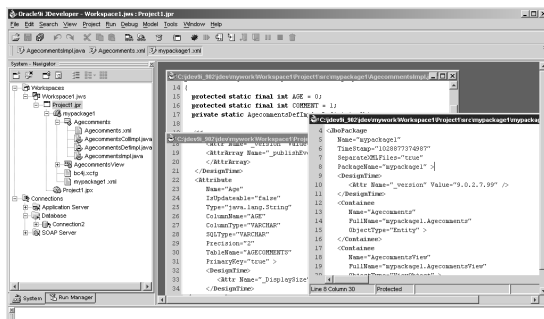
"Over 20 of Oracle's own internal applications development teams and many external customers count on BC4J to help them deliver highly functional, well-performing J2EE applications with JSP, Servlet, Swing, and XML Web Services interfaces in record time."

BC4J Components…

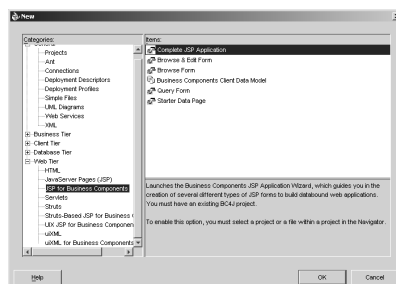- Wizard wonderland…take 2…

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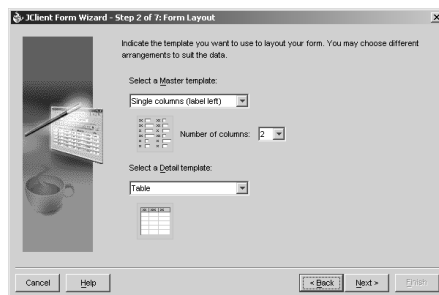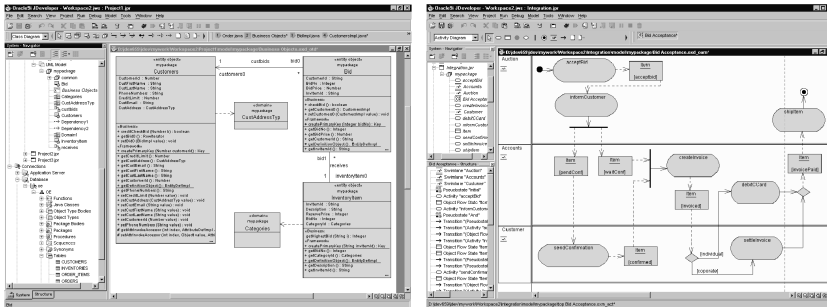
    - Can be packaged for Java Web Start
    - Handles 'smarts' like lazy load/update…

UML Modelling/Generation

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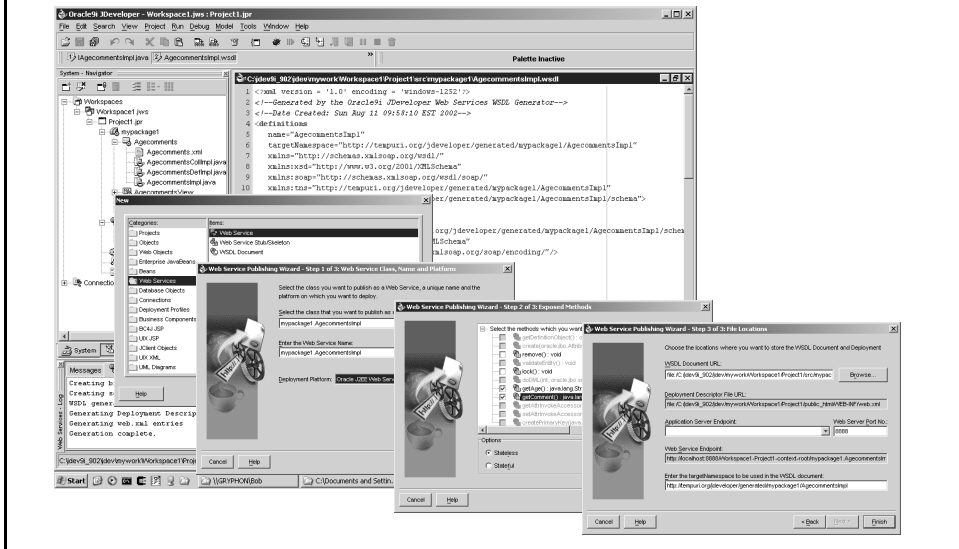- Supports XMI for exchange with other UML tools

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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...

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:propertyname="http.proxyHost " value="www-proxy.us.oracle.com"/>
 <ws:propertyname="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>
$<%= price%>@<%=new java.util.Date()%>
</P>
</BODY>
</HTML>
```
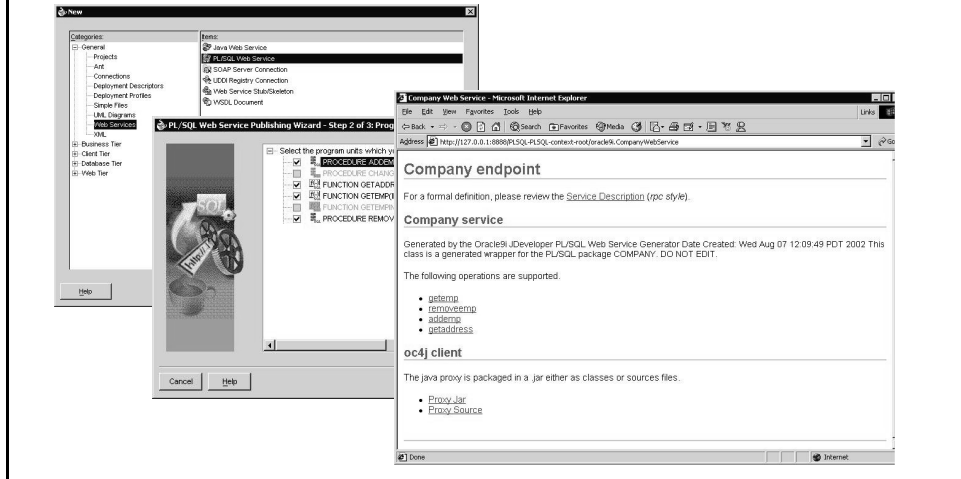
PL/SQL WebService

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

Extensions Exchange

- http://otn.oracle.com/products/jdev/htdocs/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

- 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

- 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

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

  - Looking to be (almost) the best thing since sliced bread ☺
    - Already very solid

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://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-106.ibm.com/developerworks/java/library/j-webstart/?dwzone=java
  - http://xdoclet.sourceforge.net
  - http://java.about.com/cs/ides

About the Author

- Mr. Bob Brown is a specialist in Middleware, Java, Advanced Java, CORBA, XML, OO development and Linux.
- Bob has many years experience as a software researcher and developer and also possesses more than 10 years experience in tertiary-level lecturing in Europe, Asia and Australia. Bob has conducted training sessions on behalf of Oracle Australia and is a certified instructor for BEA WebLogic Enterprise and WebLogic Server.
- Bob is a frequent speaker at conferences throughout the world. Bob introduced Oracle's JDeveloper and Toplink technologies at the 2002 Oracle Australia User Group conference series and also presented an overview of WebServices to the 2001 Oracle Australia User Group conference. Bob also introduced WebServices to the 2001 Software Engineering Australia (Queensland node) "IncITe the future" conference.
- In 1998, Bob was the recipient of an IBM 'residency' and was sponsored to work at IBM's Austin, Texas, research centre on Java Design, Programming and Optimisation for the Network Computer. This work has been published as a Prentice-Hall book entitled *JAVA Thin-Client Programming for a Network Computing Environment*. In April 2000, Bob was asked to return to IBM's Austin, research centre to undertake a second residency entitled *Connecting e-business to the Enterprise*.