



What's New in J2EE 1.4

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Agenda

- Quick Overview of J2EE 1.4
- New Kids on the Block
 - New specs
 - and those new to J2EE
- The Gory Details
 - New features in the main specs
- Putting it All Together
 - And some examples



Quick Overview of J2EE 1.4



Do the Numbers ...

■ Major Upgrades

➤ J2EE 1.3 1.4

● 174 248 (42%)

➤ EJB 2.0 2.1

● 572 636 (11%)

➤ Servlet 2.3 2.4

● 257 332 (29%)

➤ JSP 1.2 2.0

● 268 460 (72%)

➤ JCA 1.0 1.5

● 188 299 (59%)



... There's More ...

- New in J2EE 1.4

- JAX-RPC 1.1

- 167

- Web Services for J2EE 1.1 (JSR-109)

- 114

- SAAJ 1.2

- 104+

- JACC 1.0

- 138

- J2EE Deployment API 1.1, Management API 1.0,
JMX 1.2 (partial)

- 84 + 214 + 196

About 3000 pages
Printed double sided
6 inches 15 cm



... And Even More

- J2SE 1.4
- JMS 1.1
- JNDI
- JAAS
- JDBC
- JTA 1.0
- RMI, RMI-IIOP, JavaIDL
- JavaMail 1.3
- JAF 1.0
- JSR-45 (Debugging)
- WS-I Basic Profile 1.0
- WSDL 1.1
- SOAP 1.1
- JAXP 1.2
- XML
- SAX 2
- DOM Level 2
- XSLT
- XML Schema
- JAXR 1.0
- and on it goes ...



Themes for J2EE 1.4

- Web Services
- Messaging
- Web Services
- Easier Web Development
- Web Services
- Some new features
- Web Services



New Kids on the Block

New Specs (or those new to J2EE)



J2EE Web Services

- Web Services for J2EE (JSR-109)
 - New deployment descriptors supporting Web Services
- JAX-RPC 1.1
- SAAJ 1.2
 - SOAP with Attachments API for Java
- JAXR
 - Java API for XML Registries
 - UDDI, ebXML, OASIS
 - No requirement for specific registries



Management and Deployment

- Vendor-Neutral APIs for Tools and IDEs
 - Management API (JSR-77)
 - JMX 1.2
 - Only those parts needed by Management API
 - Deployment API (JSR-88)

- Most deployment descriptors converted from DTD to Schema



XML

- J2EE 1.4 requires support for
 - SAX 2
 - DOM level 2
 - XML Schema and namespaces
 - XSLT



The Gory Details

New Features in EJB, Servlet, JSP, ...



EJB 2.1

- Stateless Session Beans as Web Service Endpoints
- Message Driven Beans improvements
- Message Linking
- EJB as Web Service Client
- Timer Service
- EJB-QL Enhancements



EJB-QL Enhancements

- EJB-QL used by CMP Entity Beans
- Improvements to EJB-QL
 - ORDER BY
 - SUM, COUNT, AVG, MAX, MIN
 - MOD
 - Similar to their SQL counterparts



EJB Timer Service

- EJB can register to receive timed callbacks
 - `ejbTimeout(Timer t)`
 - Not allowed in Stateful Session Beans
- Timers can be triggered
 - At a specific date
 - After an interval
 - At recurring intervals
- EJB must register for callbacks
 - Can't trigger timers from deployment descriptor
 - Not "EJB cron"
 - Initiated by some client request



Message Driven Beans

- Expanded to non-JMS messages
- Integrated with Connector (JCA 1.5)
 - Allows connectors to support other messaging systems
- Message Linking
 - Allows EJBs to send messages to JMS or MDB
 - Similar to ejb-ref
 - message-destination-ref
 - message-destination-link
 - message-destination
 - Also used with JCA 1.5 to link Inbound Resource Adapter to MDB



EJB as Web Services Clients

- Use Web Service via JAX-RPC
 - Like “RMI over SOAP”
 - WSDL maps to Java Objects
 - Service Interface
 - Similar to calling another EJB
 - Lookup Service in JNDI
 - service-ref in deployment descriptor
 - `java:comp/env/service/BookOrderService`
 - Get Service Interface, look up stub
 - Make method calls
- Valid for any J2EE Component, not just EJBs



EJB as Web Service Endpoint

- Stateless Session Bean implements Web Service
 - Provide JAX-RPC Service Endpoint Interface
 - Matching WSDL
 - extends `java.rmi.Remote`, throws `RemoteException`
 - Methods must be subset of EJB's Remote Interface
 - EJB can have Remote, Local, and Web Service Endpoint interfaces
 - ✓ Implement new Web Service or WS-enable existing EJB
 - Declare in `META-INF/ejb-jar.xml`
 - `service-endpoint`
 - Declare in `META-INF/webservices.xml`



J2EE Connector Architecture 1.5

- Inbound Resource Adapters
- Ties to Message Driven Beans
- Work Management
 - Threads



Inbound Resource Adapters

- Enables bi-directional communication between EIS and AppServer
- Main use-case is to tie with Message Driven Beans
 - Adapter receives message
 - Processes headers
 - Queues it and notify worker threads
 - Locate proper endpoint (MDB)
 - Dispatch the message
 - MDB can now receive any message type
- Adapters can also call EJBs



JCA and JMS

- J2EE AppServer required to support JMS
 - But not any particular messaging system(s)
 - Most only support one (their own)
 - Limits portability and interoperability
- Messaging vendors can now build JCA adapters
 - Inbound Adapter for Message Provider
 - Delivers to MDB
 - Outbound Adapter for Message Publisher
 - Plug into any J2EE 1.4 AppServer
 - Portability



Work Management

- AppServer reserves the right to restrict creation of Threads
 - Enforce manageability of runtime environment
 - Non-daemon threads can prevent server shutdown
- JCA Solution: Work Management
 - Submit Work instances to WorkManager
 - Work extends Runnable
 - Adds release() method – AppServer signals it wants thread to go away
 - AppServer provides WorkManager and `java.util.Timer`
- Hope this makes it into EJB, Servlet....



Servlet 2.4

- JAX-RPC Web Services Endpoints
- Added listeners to Request Attributes
 - Like session listeners
- Deprecated SingleThreadModel



SingleThreadModel

- SingleThreadModel is deprecated
 - Does not actually protect against concurrency issues
 - Static fields, methods
 - Objects accessed via HTTP Session
 - Use good programming practices instead
 - Be aware of threading issues
 - Avoid fields in Servlet classes
 - Synchronize access where required



JAX-RPC Web Service Endpoint

- Define JAX-RPC interface
 - Matches WSDL
- Provide Implementation class
- Declare in WEB-INF/web.xml
 - servlet
- Declare in WEB-INF/webservices.xml
 - service-impl-bean & servlet-link



JSP 2.0

- Support for Script-less Pages
 - Expression Language (EL)
 - Simple Tags
 - Tag Pages
- Improved XML syntax
- Debugging Support (JSR-45)
- JSP Standard Tag Library (JSTL)
 - Not required by spec



JSP Expression Language (EL)

- Syntax based on ECMAScript and XPath
 - Adopted from JSTL
- Simple, easy to use
 - `${foo.bar}`
- Should eliminate most need for scriptlets
 - Maintain separation of presentation and business logic



EL Examples

- Simple access to request, session, *etc.*

- `${param.requestParamName}`

- `${sessionScope.myObject.attribute}`

- Almost like this scriptlet:

```
<%= ((MyObjectType)
context.getAttribute("myObject",
PageContext.SESSION_SCOPE)).getAttribute() %>
```

- Except no NPE worries

- And much easier to type and read

- Easy and consistent Maps, Lists, and Arrays

- `${myBean.aMap['key']}` or `${myBean.aMap.key}`

- `${myBean.aListOrArray[3]}`



EL Examples

■ Expressions, operators

- `${(myBean.counter mod myBean.howOften) == 0}`
 - eq or `==`
 - mod or `%`
 - lt or `<`
 - ge or `>=`
 - *etc.* to avoid XML escape madness

■ Methods

- `${myTag:staticMethod(42, otherBean.foo)}`
 - Static methods



Simple Tags

- New SimpleTag interface

- And SimpleTagSupport class
- Much simpler lifecycle than “classic” tags
 - doTag()
 - No instance pooling or reuse
- Easier to implement correctly

- JSPFragment

- For accessing tag body content
- No scriptlets allowed in Simple Tag body



- Also added Dynamic attribute names (all tags)



Tag Files

- Write Tags using JSP
- Great for tags that output HTML or XML content
 - Classic and Simple tags still good for "action" tags
- No TLD required – implicit
 - WEB-INF/tags/foo.tag
 - `<%@ taglib prefix="x" tagdir="WEB-INF/tags" %>`
 - `<x:foo/>`
- Can pass attributes and even body
- Can also be packaged in jars like normal tags



JSP Descriptor Elements

- Automatic prelude and coda page inclusion
 - Header and Footer pages
 - Can have multiple includes (they are ordered)
- Disable EL
 - For older pages, to avoid "\${" conflicts
- Disable scripting
 - Enforce presentation / logic separation
- Property Groups
 - Configure groups of JSP pages (by URI patterns)



Putting it All Together

What do we do with all of this?



Three Main Themes

- Web Services
 - Clients and Endpoints
- Web Development
 - Script-less JSP
- Messaging
 - Connectors and MDB



Writing Web Services in J2EE

■ Options

- JAX-RPC class as Servlet
- JAX-RPC as Stateless Session Bean

■ Deployment

- Generate JAX-RPC stubs, *etc.* from WSDL
- Package stubs, WSDL, classes in `ejb-jar` or `war`
- `ejb-jar.xml` or `web.xml`
- `webservices.xml`
- `webservicesclient.xml`

■ Client Access

- JAX-RPC or plain SOAP/HTTP



Code Break

- Web Service Endpoints
 - EJB Stateless Session Bean
- Web Service Client
 - service-ref



Web Improvements

- Script-less JSPs

- Expression Language

- More understandable by HTML developers

- Simple Tags

- Easier to replace scriptlets with tags

- Tags Files

- Reusable HTML/JSP

- Useful to Web developers, not just Tag authors

- JSTL – JSP Standard Tag Library

- Not required by JSP 2.0 or J2EE 1.4

- Implementations are available (Struts)



Code Break

- Look at some JSP examples
 - Expression Language
 - Tag Files
 - Simple Tags



Messaging

- JCA for receiving inbound messages
- Connect to MDB
 - message-link in deployment descriptor
- MDB to process message
 - Not limited to JMS
 - Email (SMTP server)
 - JMS providers not known to your vendor
 - Logging or Auditing
 - Custom Messaging systems
 - Bi-directional EIS communication



Code Break

- What does connector-based messaging look like?



Summary

- J2EE 1.4 is a huge change
 - New Features
 - Web Services
 - Messaging
 - Web Development
- Think about your deployments and projects
 - Can some of these new features help?



Web References

- <http://java.sun.com/j2ee>
 - Check out the J2EE 1.4 Tutorial
 - Read all the specs
 - Or at least the first 3000 pages...
- <http://www.theserverside.com/>
 - Articles
 - What's New in J2EE 1.4 by Floyd Marinescu
 - What's New in EJB 2.1 by Richard Monson-Haefel
- <http://www.onjava.com/>
 - Articles



Related Sessions

- JSP 2.0 and EL
 - Bryan Basham
- Web Services and JAX-RPC Topics
 - Denise Hatzidakis
 - Kelvin Lawrence
 - Simon Nash
 - Many others...
- EJB
 - Kimberly Jennery



The End – Thank You

- Please fill out evaluations

- Example Code
 - On the conference CDROM
 - <http://www.avitek.com/landers>