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
... 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
  service-impl-bean & ejb-link
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
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

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

Methods

- ${\text{myTag:staticMethod}(42, \text{otherBean.foo})}$
  - Static methods
  - Declared by taglib in TLD
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](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/](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

  - 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

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