IronJacamar 1.1 User's Guide

Connecting your Enterprise Information Systems
IronJacamar 1.1 User's Guide: Connecting your Enterprise Information Systems
To all Java EE Connector Architecture users, and especially the IronJacamar community
Preface .................................................................................................................. ix
1. About IronJacamar .................................................................................................. ix
2. Why IronJacamar? ..................................................................................................... ix
3. Versions .................................................................................................................... ix
  3.1. IronJacamar 1.1 ..................................................................................................... ix
  3.2. IronJacamar 1.0 ................................................................................................... x
4. The team ................................................................................................................... x
5. Thanks to .................................................................................................................. xi
6. License ..................................................................................................................... xi
1. Introduction ............................................................................................................. 1
  1.1. What's New ......................................................................................................... 1
    1.1.1. Java Connector Architecture 1.7 ................................................................. 1
    1.1.2. Java Connector Architecture 1.6 ................................................................. 2
  1.2. Overview ............................................................................................................ 2
    1.2.1. Outbound resource adapter ........................................................................ 2
    1.2.2. Inbound resource adapter ........................................................................... 4
2. Download .................................................................................................................. 7
  2.1. Download ........................................................................................................... 7
  2.2. Maven repository ............................................................................................... 7
  2.3. Git Access .......................................................................................................... 8
3. Installation ................................................................................................................ 11
  3.1. Compressed Tape Archive (.tar.gz) ................................................................. 11
  3.2. Zip Archive (.zip) ............................................................................................ 11
  3.3. Directory structure .......................................................................................... 12
  3.4. WildFly ............................................................................................................. 12
4. Configuration .......................................................................................................... 13
  4.1. IronJacamar server ......................................................................................... 13
    4.1.1. Using the leak detector pool .................................................................... 14
    4.1.2. Allow obtaining connections during MARKED_FOR_ROLLBACK .......... 14
    4.1.3. Disable enlistment trace ........................................................................... 15
    4.1.4. Disable delistResource calls .................................................................. 15
  4.2. Logging service ............................................................................................... 16
  4.3. Transaction service ........................................................................................ 16
  4.4. JCA .................................................................................................................. 16
    4.4.1. Deployer .................................................................................................... 16
    4.4.2. Work manager ....................................................................................... 21
    4.4.3. Security ................................................................................................. 24
  4.5. Datasources .................................................................................................... 25
  4.6. Web server ...................................................................................................... 26
5. Deployment ............................................................................................................. 29
  5.1. Packaging requirements .............................................................................. 29
  5.2. Deploying resource adapters ....................................................................... 29
    5.2.1. Resource adapter descriptor ................................................................. 31
    5.2.2. Resource adapter extensions ............................................................... 36
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Installation of the plugin</td>
<td>69</td>
</tr>
<tr>
<td>9.2</td>
<td>Configuration of the plugin</td>
<td>69</td>
</tr>
<tr>
<td>9.3</td>
<td>The toolbar</td>
<td>70</td>
</tr>
<tr>
<td>9.4</td>
<td>The menu</td>
<td>71</td>
</tr>
<tr>
<td>9.5.1</td>
<td>Project and package name</td>
<td>73</td>
</tr>
<tr>
<td>9.5.2</td>
<td>Creating a ResourceAdapter</td>
<td>74</td>
</tr>
<tr>
<td>9.5.3</td>
<td>Creating a ManagedConnectionFactory</td>
<td>75</td>
</tr>
<tr>
<td>9.5.4</td>
<td>Creating a MessageListener</td>
<td>76</td>
</tr>
<tr>
<td>9.5.5</td>
<td>Creating an AdminObject</td>
<td>77</td>
</tr>
<tr>
<td>9.5.6</td>
<td>Selecting the build environment</td>
<td>78</td>
</tr>
<tr>
<td>9.6</td>
<td>Validate IronJacamar project</td>
<td>78</td>
</tr>
<tr>
<td>9.7.1</td>
<td>Deploying a RAR file to an IronJacamar server</td>
<td>79</td>
</tr>
<tr>
<td>9.7.2</td>
<td>Generate the -ra.xml and deploy it to IronJacamar server</td>
<td>79</td>
</tr>
<tr>
<td>10.1</td>
<td>Resource adapter information tool</td>
<td>85</td>
</tr>
<tr>
<td>10.2.1</td>
<td>Resource adapters</td>
<td>86</td>
</tr>
<tr>
<td>10.2.2</td>
<td>Data sources</td>
<td>86</td>
</tr>
<tr>
<td>11.1</td>
<td>Overview</td>
<td>89</td>
</tr>
<tr>
<td>11.2</td>
<td>Configuration</td>
<td>89</td>
</tr>
<tr>
<td>11.3</td>
<td>Usage</td>
<td>91</td>
</tr>
<tr>
<td>11.3.1</td>
<td>Simple usage</td>
<td>92</td>
</tr>
<tr>
<td>11.3.2</td>
<td>Advanced usage</td>
<td>102</td>
</tr>
<tr>
<td>12.1</td>
<td>Overview</td>
<td>109</td>
</tr>
<tr>
<td>12.2</td>
<td>Apache Ant</td>
<td>110</td>
</tr>
<tr>
<td>13.1</td>
<td>Website</td>
<td>113</td>
</tr>
<tr>
<td>13.2</td>
<td>User forum</td>
<td>113</td>
</tr>
<tr>
<td>13.3</td>
<td>Developer forum</td>
<td>113</td>
</tr>
<tr>
<td>13.4</td>
<td>Issue tracking</td>
<td>113</td>
</tr>
<tr>
<td>14.1</td>
<td>I think I have found a bug</td>
<td>115</td>
</tr>
<tr>
<td>14.2</td>
<td>I would like to implement a feature</td>
<td>115</td>
</tr>
<tr>
<td>14.3</td>
<td>How do I?</td>
<td>116</td>
</tr>
<tr>
<td>A.1</td>
<td>Java EE Connector Architecture 1.7</td>
<td>117</td>
</tr>
<tr>
<td>A.2</td>
<td>Java EE Connector Architecture 1.6</td>
<td>138</td>
</tr>
<tr>
<td>C. Datasources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>C.1. PostgreSQL</td>
<td>373</td>
<td></td>
</tr>
<tr>
<td>C.2. PostgreSQL XA</td>
<td>373</td>
<td></td>
</tr>
<tr>
<td>C.3. MySQL</td>
<td>374</td>
<td></td>
</tr>
<tr>
<td>C.4. MySQL XA</td>
<td>374</td>
<td></td>
</tr>
<tr>
<td>C.5. H2</td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>C.6. H2 XA</td>
<td>375</td>
<td></td>
</tr>
<tr>
<td>C.7. Derby</td>
<td>376</td>
<td></td>
</tr>
<tr>
<td>C.8. Derby XA</td>
<td>376</td>
<td></td>
</tr>
<tr>
<td>C.9. Oracle</td>
<td>377</td>
<td></td>
</tr>
<tr>
<td>C.10. Oracle XA</td>
<td>378</td>
<td></td>
</tr>
<tr>
<td>C.11. Microsoft SQLServer</td>
<td>378</td>
<td></td>
</tr>
<tr>
<td>C.12. Microsoft SQLServer XA</td>
<td>379</td>
<td></td>
</tr>
<tr>
<td>C.13. IBM DB2</td>
<td>379</td>
<td></td>
</tr>
<tr>
<td>C.14. IBM DB2 XA</td>
<td>380</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Logging codes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D.1. Core: 000000 - 009999</td>
<td>383</td>
</tr>
<tr>
<td>D.2. Common: 010000 - 019999</td>
<td>387</td>
</tr>
<tr>
<td>D.3. Deployers: 020000 - 029999</td>
<td>388</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E. Licenses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E.1. GNU Lesser General Public License 2.1</td>
<td>391</td>
</tr>
<tr>
<td>E.1.1. Preamble</td>
<td>391</td>
</tr>
<tr>
<td>E.1.2. Terms and Conditions for Copying, Distribution and Modification</td>
<td>393</td>
</tr>
<tr>
<td>E.1.3. How to Apply These Terms to Your New Libraries</td>
<td>399</td>
</tr>
<tr>
<td>E.2. Creative Commons Attribution–Share Alike 3.0 Unported License</td>
<td>400</td>
</tr>
<tr>
<td>E.2.1. Definitions</td>
<td>400</td>
</tr>
<tr>
<td>E.2.2. Fair Dealing Rights</td>
<td>402</td>
</tr>
<tr>
<td>E.2.3. License Grant</td>
<td>402</td>
</tr>
<tr>
<td>E.2.4. Restrictions</td>
<td>403</td>
</tr>
<tr>
<td>E.2.5. Representations, Warranties and Disclaimer</td>
<td>404</td>
</tr>
<tr>
<td>E.2.6. Termination</td>
<td>405</td>
</tr>
<tr>
<td>E.2.7. Miscellaneous</td>
<td>405</td>
</tr>
<tr>
<td>E.3. Apache License, Version 2.0</td>
<td>406</td>
</tr>
<tr>
<td>E.3.1. Definitions</td>
<td>406</td>
</tr>
<tr>
<td>E.3.2. Grant of Copyright License</td>
<td>407</td>
</tr>
<tr>
<td>E.3.3. Grant of Patent License</td>
<td>407</td>
</tr>
<tr>
<td>E.3.4. Redistribution</td>
<td>407</td>
</tr>
</tbody>
</table>
E.3.5. Submission of Contributions .......................................................... 408
E.3.6. Trademarks .................................................................................. 408
E.3.7. Disclaimer of Warranty .................................................................. 408
E.3.8. Limitation of Liability ................................................................... 409
E.3.9. Accepting Warranty or Additional Liability ................................. 409
Preface

1. About IronJacamar

The goal of the IronJacamar project is to provide an implementation of the Java Connector Architecture 1.7 specification.

The specification can be found here: http://www.jcp.org/en/jsr/detail?id=322.

The IronJacamar project is licensed under the GNU LESSER GENERAL PUBLIC LICENSE 2.1 (LGPL 2.1) license.

2. Why IronJacamar?

The Java EE Connector Architecture container can be viewed as a foundation inside an application server as it provides connectivity to the other containers such that they can communicate with EISes. Iron is often used as foundation in building houses too.

The Jacamar bird family which lives in Central and South America are glossy elegant birds with long bills and tails. Why we picked the Jacamar family is left as an exercise for the reader :)

3. Versions

This section contains the highlights of the IronJacamar releases. A full description of each release can be found through our issue tracking system at http://issues.jboss.org/browse/JBJCA.

3.1. IronJacamar 1.1

Highlights as compared to IronJacamar 1.0:

- Java EE Connector Architecture 1.7 certified (standalone / Java EE7)
- Lazy connection manager (JCA chapter 7.16)
- Distributed work manager (JCA chapter 10.3.11)
- Advanced pool capacity policies and flush strategies
- Enhanced Arquillian integration
- Eclipse development plugin
- Enterprise Information System testing server
- Resource adapter information tool
- Migration tools
3.2. IronJacamar 1.0

Highlights as compared to previous Java EE Connector Architecture containers inside JBoss Application Server:

- Java EE Connector Architecture 1.6 certified (standalone / Java EE6)
- POJO container environment
- New configuration schemas which focuses on usability
- Fast XML and annotation parsing for quick deployment
- Reauthentication support
- Prefill support for security backed domains
- Support for pool flushing strategies
- Embedded environment for ease of development with Arquillian and ShrinkWrap integration
- New management and statistics integration for components
- Code generator for resource adapters
- Validator tool for resource adapters

4. The team

Jesper Pedersen acts as the lead for the IronJacamar project. He can be reached at jesper (dot) pedersen (at) ironjacamar (dot) org.

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5. Thanks to


6. License

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Chapter 1.

Introduction

The Java Connector Architecture (JCA) defines a standard architecture for connecting the Java EE platform to heterogeneous Enterprise Information Systems (EIS). Examples of EISs include Enterprise Resource Planning (ERP), mainframe transaction processing (TP), databases and messaging systems.

The connector architecture defines a set of scalable, secure, and transactional mechanisms that enable the integration of EISs with application servers and enterprise applications.

The connector architecture also defines a Common Client Interface (CCI) for EIS access. The CCI defines a client API for interacting with heterogeneous EISs.

The connector architecture enables an EIS vendor to provide a standard resource adapter for its EIS. A resource adapter is a system-level software driver that is used by a Java application to connect to an EIS. The resource adapter plugs into an application server and provides connectivity between the EIS, the application server, and the enterprise application. The resource adapter serves as a protocol adapter that allows any arbitrary EIS communication protocol to be used for connectivity. An application server vendor extends its system once to support the connector architecture and is then assured of seamless connectivity to multiple EISs. Likewise, an EIS vendor provides one standard resource adapter which has the capability to plug in to any application server that supports the connector architecture.

1.1. What’s New

1.1.1. Java Connector Architecture 1.7

The Java Connector Architecture 1.7 specification adds the following areas:

- Adds an activation name for message endpoints to uniquely identify them
- Deployment annotations for connection factories and administration objects

Note

The deployment annotations are only meant for developer usage, and should not be used in test or production environments.
1.1.2. Java Connector Architecture 1.6

The Java Connector Architecture 1.6 specification adds the following major areas:

- Ease of Development: The use of annotations reduces or completely eliminates the need to deal with a deployment descriptor in many cases. The use of annotations also reduces the need to keep the deployment descriptor synchronized with changes to source code.
- Generic work context contract: A generic contract that enables a resource adapter to control the execution context of a Work instance that it has submitted to the application server for execution.
- Security work context: A standard contract that enables a resource adapter to establish security information while submitting a Work instance for execution to a WorkManager and while delivering messages to message endpoints residing in the application server.
- Standalone Container Environment: A defined set of services that makes up a standalone execution environment for resource adapters.

1.2. Overview

The Java EE Connector Architecture features three different types of resource adapters

- Outbound: The resource adapter allows the application to communicate to the Enterprise Information System (EIS).
- Inbound: The resource adapter allows messages to flow from the Enterprise Information System (EIS) to the application.
- Bi-directional: The resource adapter features both an outbound and an inbound part.

For more information about Java EE Connector Architecture see the specification.

1.2.1. Outbound resource adapter

The Java Connector Architecture specification consists of a number of outbound components:
The application uses the

- ConnectionFactory: The connection factory is looked up in Java Naming and Directory Interface (JNDI) and is used to create a connection.

- Connection: The connection contains the Enterprise Information System (EIS) specific operations.

The resource adapter contains

- ManagedConnectionFactory: The managed connection factory creates managed connections.

- ManagedConnection: The managed connection represents a physical connection to the target Enterprise Information System (EIS). The managed connection notifies the application server of events such as connection closed and connection error.

IronJacamar - the application server - contains

- ConnectionManager: The connection manager handles all managed connections in regards to pooling, transaction and security.

- ConnectionEventListener: The connection event listener allows the connection manager to know the status of each managed connection.
1.2.2. Inbound resource adapter

The Java Connector Architecture specification consists of a number of inbound components:

- **ActivationSpec**: The activation specification specifies the different properties that the application is looking for from the resource adapter and hence the Enterprise Information System (EIS). This specification can be hidden from the user by a facade provided by the application server.

The resource adapter contains

- **ResourceAdapter**: The resource adapter provides the activation point for inbound communication.

- **Resource adapter specific**: The resource adapter specific code handles communication with the Enterprise Information System (EIS) and deliver messages through the MessageEndpointFactory.

IronJacamar - the application server - contains

- **MessageEndpointFactory**: The MessageEndpointFactory is registered with the ResourceAdapter instance and creates the MessageEndpoint instances.
- MessageEndpoint: The MessageEndpoint contains the actual message from the Enterprise Information System (EIS) which the application uses. This could for example be a message driven Enterprise JavaBean (EJB/MDB).
Chapter 2.

Download

The official IronJacamar project page is http://www.ironjacamar.org/ where you can download the software.

2.1. Download

The download location is: http://www.ironjacamar.org/downloads/

Each release is labelled with a version number and an identifier.

ironjacamar-<major>.<minor>.<patch>.<identifier>

where

- Major: The major version number. Signifies major changes in the implementation.
- Minor: The minor version number. Signifies functional changes to a major version.
- Patch: The patch version number. Signifies a binary compatible change to a minor version.
- Identifier: The identifier. Identifies the level of the quality of the release.
  - Final: Stable release
  - CR: Candidate for Release quality. The implementation is functional complete.
  - Beta: Beta quality. The implementation is almost functional complete.
  - Alpha: Alpha quality. The implementation is a snapshot of the development.

An example

ironjacamar-1.1.0.Final.tar.gz

which is a stable release of the project.

2.2. Maven repository

The IronJacamar distribution is deployed to the JBoss Nexus repository.
Table 2.1. Maven artifacts

<table>
<thead>
<tr>
<th>Artifact</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ironjacamar-arquillian-embedded</td>
<td>The Arquillian extension for the embedded module</td>
</tr>
<tr>
<td>ironjacamar-arquillian-embedded-byteman</td>
<td>The Arquillian/Byteman extension for the embedded module</td>
</tr>
<tr>
<td>ironjacamar-as</td>
<td>WildFly integration tools</td>
</tr>
<tr>
<td>ironjacamar-codegenerator</td>
<td>The code generator</td>
</tr>
<tr>
<td>ironjacamar-common-api</td>
<td>The API for the common module</td>
</tr>
<tr>
<td>ironjacamar-common-impl</td>
<td>The implementation for the common module</td>
</tr>
<tr>
<td>ironjacamar-common-spi</td>
<td>The SPI for the common module</td>
</tr>
<tr>
<td>ironjacamar-core-api</td>
<td>The API / SPI for the core module</td>
</tr>
<tr>
<td>ironjacamar-core-impl</td>
<td>The implementation for the core module</td>
</tr>
<tr>
<td>ironjacamar-depchain</td>
<td>The dependency chain for the IronJacamar container</td>
</tr>
<tr>
<td>ironjacamar-deployers-common</td>
<td>The common classes for the deployer chains</td>
</tr>
<tr>
<td>ironjacamar-deployers-fungal</td>
<td>The deployers for the Fungal kernel based setup</td>
</tr>
<tr>
<td>ironjacamar-embedded</td>
<td>The embedded module</td>
</tr>
<tr>
<td>ironjacamar-jdbc</td>
<td>The core library for the JDBC resource adapters</td>
</tr>
<tr>
<td>ironjacamar-spec-api</td>
<td>The Java EE Connector Architecture 1.7 API</td>
</tr>
<tr>
<td>ironjacamar-test-eis</td>
<td>The Enterprise Information System test server</td>
</tr>
<tr>
<td>ironjacamar-validator</td>
<td>The validator module</td>
</tr>
<tr>
<td>ironjacamar-validator-ant</td>
<td>The Apache Ant tasks for the validator module</td>
</tr>
<tr>
<td>ironjacamar-validator-cli</td>
<td>The command line interface for the validator module</td>
</tr>
<tr>
<td>jdbc-local</td>
<td>A JDBC resource adapter backing standard datasources</td>
</tr>
<tr>
<td>jdbc-xa</td>
<td>A JDBC resource adapter backing XA datasources</td>
</tr>
</tbody>
</table>

2.3. Git Access

If you want to experiment with the latest developments you may checkout the latest code from Git. Be aware that the information provided in this manual might then not be accurate.

The Git repository is located at:
http://github.com/ironjacamar/ironjacamar

You can find additional information about this in the developer guide.
Chapter 3.

Installation

Once you have downloaded the distribution you need to install it in a location of your choice.

3.1. Compressed Tape Archive (.tar.gz)

Extract the distribution using

```
tar xzf ironjacamar-1.1.0.Final.tar.gz
```

The distribution will be located in a directory named

```
ironjacamar-1.1.0.Final
```

3.2. Zip Archive (.zip)

Extract the distribution using

```
unzip ironjacamar-1.1.0.Final.zip
```

or any program capable of handling Zip archives such as WinZip and WinRar.

The distribution will be located in a directory named

```
ironjacamar-1.1.0.Final
```
3.3. Directory structure

The IronJacamar container has the following directory structure:

- bin: Contains the scripts that starts the container.
- config: Contains the configuration of the container.
- deploy: Contains user deployments.
- doc: Contains the documentation.
- lib: Contains all the libraries needed by the container.
- log: Contains the log files for the container.
- system: Contains system deployments.
- tmp: Contains temporary files.

3.4. WildFly

The IronJacamar provides the Java EE Connector Architecture (JCA) container for WildFly 8 and future versions.

The container can be updated in WildFly by using the `as-upgrader.sh` script in the `doc/as` directory. This will allow an easy installation of IronJacamar patch releases to fix bugs in the application server environment.

The script can be used, like:

```
./as-upgrader.sh 1.1.0.Final /path/to/wildfly/installation
```

where `1.1.0.Final` is the version identifier of the IronJacamar container and the path points to the top-level directory of the WildFly installation. You can also use `1.1.1-SNAPSHOT` in order to upgrade to a patch snapshot build.

You can get an overview of all IronJacamar releases by searching our Nexus [https://repository.jboss.org/nexus/] repository.

**Warning**

Make sure that you understand the version policies specified in the developer guide before upgrading.
Configuration

The configuration for the IronJacamar container is mainly located under the `config/` directory.

### 4.1. IronJacamar server

The IronJacamar server can be configured by including an `ironjacamar.properties` file next to the `ironjacamar-sjc.jar` in the `bin/` directory.

This file will allow to override the core options given to the kernel environment, if multiple instances of the IronJacamar container are going to run on the same machine, and network interface.

The options available

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>String</td>
<td>The name of the IronJacamar configuration</td>
</tr>
<tr>
<td>management</td>
<td>boolean</td>
<td>Should management be enabled</td>
</tr>
<tr>
<td>parallel.deploy</td>
<td>boolean</td>
<td>Should parallel deployment be enabled</td>
</tr>
<tr>
<td>remote.access</td>
<td>boolean</td>
<td>Should remote access be enabled</td>
</tr>
<tr>
<td>remote.port</td>
<td>int</td>
<td>The port for remote access</td>
</tr>
<tr>
<td>remote.jmx.access</td>
<td>boolean</td>
<td>Should remote access via JMX be enabled</td>
</tr>
<tr>
<td>use.platform.mbeanserver</td>
<td>boolean</td>
<td>Should the platform MBeanServer be used for management</td>
</tr>
<tr>
<td>bean.management</td>
<td>boolean</td>
<td>Should management for all beans be enabled</td>
</tr>
</tbody>
</table>

An example of an `ironjacamar.properties` file:

```
remote.access=true
```
remote.port=1302

4.1.1. Using the leak detector pool

IronJacamar features a connection pool implementation, which keeps track of connection allocations, and their release in order to provide feedback if a connection is obtained, but never released by the application. This will cause leaks, and lead to applications not being able to obtain any connections.

The leak detector pool provides a stack trace of the leaked connection allocation either during shutdown of the pool, or once the pool is flush using a flush strategy which kills all active connections.

The leak detector pool is configured using the ironjacamar.mcp system property with a value of

```
org.jboss.jca.core.connectionmanager.pool.mcp.LeakDumperManagedConnectionPool
```

This configuration applies to all connection pools used by IronJacamar.

The system property ironjacamar.leaklog can be used to have the leaks dumped out into a special file separate from the logging setup.

An example

```
-Dironjacamar.mcp=org.jboss.jca.core.connectionmanager.pool.mcp.LeakDumperManagedConnectionPool
-Dironjacamar.leaklog=leaks.txt
```

4.1.2. Allow obtaining connections during MARKED_FOR_ROLLBACK

IronJacamar doesn’t allow to obtain a connection once a transaction is in MARKED_FOR_ROLLBACK mode. This allows the container to fail eagerly, since any work after that point is wasted anyway.

However, certain applications depends on getting a connection to perform work.

IronJacamar has a system property called ironjacamar.allow_marked_for_rollback which can be set to true to enable this scenario.
4.1.3. Disable enlistment trace

IronJacamar records transaction enlistment traces in order to help to locate error situations that happen during enlistment of XAResource instances.

This has a performance overhead of course, so in certain situations you may want to disable these traces.

IronJacamar has a system property called ironjacamar.disable_enlistment_trace which can be set to true which does this.

**Warning**

By disabling the enlistment trace tracking down errors during transaction enlistment will become much more difficult. So, only add this system property if you know what you are doing.

4.1.4. Disable delistResource calls

IronJacamar calls transaction.enlistResource(xaResource) for the ManagedConnection when it is enlisting in the transaction.

IronJacamar will also call transaction.delistResource(xaResource, flag) once the ManagedConnection should be disassociated with the transaction. This typically happens on the transaction boundary (beforeCompletion) before the connection is returned to the pool (afterCompletion). This is done as part of the transaction specification contract.

However, in certain scenarios you may want to disable this call, as other Synchronization objects may still want the connection enlisted in the transaction, and hence it depends on the ordering of these objects.

IronJacamar has a system property called ironjacamar.no_delist_resource which is a ',' separated list of pool names where delistResource shouldn't be called. Disabling the delistResource call for all pools can be done by defining ironjacamar.no_delist_resource_all.

**Warning**

By disabling the delistResource call it is up to the resource manager and transaction manager to make sure that the connection is delisted from the transaction in all cases.
Chapter 4. Configuration

4.2. Logging service

The IronJacamar container uses JBoss Logging framework as the implementation.

The configuration is done in the

```
config/logging.properties
```

Consult the JBoss Logging documentation [http://www.jboss.org/community/wiki/JBossBootLogging] on how the service can be configured.

4.3. Transaction service

The IronJacamar container uses Narayana its transaction implementation.

The configuration is done in the

```
config/transaction.xml
```

Consult the Narayana documentation on how the service can be configured.

4.4. JCA

4.4.1. Deployer

The IronJacamar deployer is configured in the

```
config/bootstrap/jca.xml
```

4.4.1.1. Configuration

The configuration of the resource adapter deployer chain is handled by a org.jboss.jca.deployers.fungal.RAConfiguration bean.
<bean name="RAConfiguration"
     class="org.jboss.jca.deployers.fungal.RAConfiguration">
    <property name="ArchiveValidation">true</property>
    <property name="ArchiveValidationFailOnWarn">false</property>
    <property name="ArchiveValidationFailOnError">true</property>
    <property name="BeanValidation">true</property>
    <property name="PrintStream">
        <inject bean="JBossStdioContext" property="Out"/>
    </property>
    <property name="DefaultBootstrapContext">
        <inject bean="DefaultBootstrapContext"/>
    </property>
    <property name="JndiStrategy">
        <inject bean="JndiStrategy"/>
    </property>
    <property name="TransactionManager">
        <inject bean="RealTransactionManager"/>
    </property>
    <property name="MetadataRepository">
        <inject bean="MDR"/>
    </property>
</bean>

Table 4.2. Resource adapter deployer configuration

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArchiveValidation</td>
<td>boolean</td>
<td>Toggle archive validation for the deployment units.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: true</td>
</tr>
<tr>
<td>ArchiveValidationFailOnWarn</td>
<td>boolean</td>
<td>Should an archive validation warning report fail the deployment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: false</td>
</tr>
<tr>
<td>ArchiveValidationFailOnError</td>
<td>boolean</td>
<td>Should an archive validation error report fail the deployment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: true</td>
</tr>
<tr>
<td>BeanValidation</td>
<td>boolean</td>
<td>Toggle bean validation (JSR-303) for the deployment units.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: true</td>
</tr>
<tr>
<td>DefaultBootstrapContext</td>
<td>org.jboss.jca.</td>
<td>Specifies the default bootstrap context for resource adapters</td>
</tr>
<tr>
<td></td>
<td>core.api.bootstrap.CloneableBootstrapContext</td>
<td></td>
</tr>
<tr>
<td>BootstrapContexts</td>
<td>Map&lt;String, org.jboss.jca.&gt;</td>
<td>Bootstrap context map (unique name to a cloneable bootstrap context)</td>
</tr>
</tbody>
</table>
### Configuration

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>core.api.bootstrap.CloneableBootstrapContext&gt;</td>
<td>javax.print.PrintStream</td>
<td>allows developers to bind (through ironjacamar.xml) their resource adapter to a specific bootstrap context instance.</td>
</tr>
<tr>
<td>PrintStream</td>
<td>java.io.PrintStream</td>
<td>Specifies which print stream that should be used to handle the LogWriterS</td>
</tr>
<tr>
<td>MetadataRepository</td>
<td>org.jboss.jca.core.spi.mdr.MetadataRepository</td>
<td>The metadata repository</td>
</tr>
<tr>
<td>ResourceAdapterRepository</td>
<td>org.jboss.jca.core.spi.rar.ResourceAdapterRepository</td>
<td>The resource adapter repository</td>
</tr>
<tr>
<td>ScopeDeployment</td>
<td>boolean</td>
<td>Should each deployment be scoped (isolated) from the container. This feature allows deployment of libraries of a different version than used in the container environment. Default: false</td>
</tr>
<tr>
<td>JndiStrategy</td>
<td>org.jboss.jca.core.spi.naming.JndiStrategy</td>
<td>Specifies the JNDI strategy policy for binding the connection factories into the naming environment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The JNDI strategies are located in the org.jboss.jca.core.naming package</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NoopJndiStrategy: A no operation JNDI strategy which doesn't bind/unbind any objects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SimpleJndiStrategy: A simple JNDI strategy which can bind/unbind a single connection factory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ExplicitJndiStrategy: A JNDI strategy which can requires explicit JNDI names to bind/unbind a connection factory</td>
</tr>
</tbody>
</table>
4.4.1.2. Resource adapter deployer

The initial deployer for resource adapter archives is handled by a `org.jboss.jca.deployers.fungal.RADeployer` bean.

```
<bean name="RADeployer"
      interface="com.github.fungal.spi.deployers.Deployer"
      class="org.jboss.jca.deployers.fungal.RADeployer">
  <property name="Configuration"><inject bean="RAConfiguration"/></property>
  <depends>BeanValidation</depends>
  <depends>JBossStdioContextSelector</depends>
</bean>
```

This deployer will register the resource adapters with the metadata repository in the system.

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td><code>org.jboss.jca.deployers.fungal.RAConfiguration</code></td>
<td>The configuration for the deployer</td>
</tr>
</tbody>
</table>

4.4.1.3. Resource adapter metadata deployer

The deployer for deploying our `-ra.xml` deployment descriptor is handled by a `org.jboss.jca.deployers.fungal.RaXmlDeployer` bean.

```
<bean name="RaXmlDeployer"
      interface="com.github.fungal.spi.deployers.Deployer"
      class="org.jboss.jca.deployers.fungal.RaXmlDeployer">
  <property name="Configuration"><inject bean="DeployerConfiguration"/></property>
  <property name="Kernel"><inject bean="Kernel"/></property>
  <depends>BeanValidation</depends>
  <depends>JBossStdioContextSelector</depends>
</bean>
```

This deployer will activate resource adapters based on the deployment information.
### Table 4.4. Resource adapter metadata deployer

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>org.jboss.jca.deployers.fungal.RAConfiguration</td>
<td>The configuration for the deployer</td>
</tr>
</tbody>
</table>

#### 4.4.1.4. Resource adapter activator

The deployer chain features an activator for resource adapter archives handled by the `org.jboss.jca.deployers.fungal.RAActivator` bean.

```xml
<bean name="RAActivator" class="org.jboss.jca.deployers.fungal.RAActivator">
  <property name="Configuration"><inject bean="RAConfiguration" /></property>
  <property name="Kernel"><inject bean="Kernel" /></property>
  <property name="ExcludeArchives">
    <set elementClass="java.lang.String">
      <value>jdbc-local.rar</value>
      <value>jdbc-xa.rar</value>
    </set>
  </property>
  <depends>BeanValidation</depends>
  <depends>JBossStdioContextSelector</depends>
</bean>
```

This activator will activate any resource adapters which haven't been activated yet unless they are in the excluded list.

### Table 4.5. Resource adapter activator

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>org.jboss.jca.deployers.fungal.RAConfiguration</td>
<td>The configuration for the deployer</td>
</tr>
<tr>
<td>Enabled</td>
<td>boolean</td>
<td>Should the activator be enabled. Default is true</td>
</tr>
<tr>
<td>Kernel</td>
<td>com.github.fungal.api.Kernel</td>
<td>The kernel instance</td>
</tr>
<tr>
<td>ExcludeArchives</td>
<td>java.util.Set</td>
<td>A set of resource adapter archives which should be excluded from activation</td>
</tr>
</tbody>
</table>
4.4.2. Work manager

IronJacamar features a standard work manager on its default setup using one thread pool for short running jobs, and one thread pool for long running jobs identified by the HintsContext.LONGRUNNING_HINT with a value of true.

The configuration of the work manager and the necessary components can be viewed in the jca.xml file.

4.4.2.1. Distributed work manager

A distributed work manager is a work manager instance, which is able to reschedule work execution on another work manager instance on the network.

The distributed work manager has three additional components

- Policy -- When to distribute the work instance
- Selector -- To which work manager instance
- Transport -- How the work instance is transferred to control the distribution process.

Supported policies

- Never -- org.jboss.jca.core.workmanager.policy.Never
  
  Never the distribute the Work instance to another node.

- Always -- org.jboss.jca.core.workmanager.policy.Always
  
  Always the distribute the Work instance to another node.

- WaterMark -- org.jboss.jca.core.workmanager.policy.WaterMark
  
  Distribute the Work instance to another node based on how many free worker threads the current node has available.

Supported selectors

- FirstAvailable -- org.jboss.jca.core.workmanager.selector.FirstAvailable
  
  Select the first available node in the list

- PingTime -- org.jboss.jca.core.workmanager.selector.PingTime
  
  Select the node with the lowest ping time

- MaxFreeThreads -- org.jboss.jca.core.workmanager.selector.MaxFreeThreads
  
  Select the node with highest number of free worker threads

Supported transports
Chapter 4. Configuration

- **Socket**
  
  `org.jboss.jca.core.workmanager.transport.remote.socket.SocketTransport`

  Communication based on `java.net.Socket`, and hence TCP/IP

- **JGroups**
  
  `org.jboss.jca.core.workmanager.transport.remote.jgroups.JGroupsTransport`

  Communication based on the JGroups framework, and hence UDP (by default)

Below is an example of a socket based configuration where two instances `localhost:1299` and `localhost:1300` communicates, taken from the IronJacamar test suite.

```xml
<deployment>

<!-- DistributedWorkManagerThreadGroupSocket -->
<bean name="DistributedWorkManagerThreadGroupSocket" class="java.lang.ThreadGroup">
  <constructor>
    <parameter>dwm</parameter>
  </constructor>
  <ignoreStop/>
  <ignoreDestroy/>
</bean>

<!-- DistributedWorkManagerThreadFactorySocket -->
<bean name="DistributedWorkManagerThreadFactorySocket" interface="java.util.concurrent.ThreadFactory" class="org.jboss.threads.JBossThreadFactory">
  <constructor>
    <parameter><inject bean="DistributedWorkManagerThreadGroupSocket" /></parameter>
    <parameter>false</parameter>
    <parameter>5</parameter>
    <parameter>work</parameter>
    <parameter><null /></parameter>
    <parameter><null /></parameter>
  </constructor>
</bean>

<!-- DistributedWorkManagerShortRunningThreadPoolSocket -->
<bean name="DistributedWorkManagerShortRunningThreadPoolSocket" class="org.jboss.threads.QueueExecutor">
  <constructor>
    <!-- Core threads -->
    <parameter>20</parameter>
    <!-- Max threads -->
    <parameter>100</parameter>
    <!-- 60 seconds keepalive -->
    <parameter>60</parameter>
    <!-- Queue size -->
    <parameter><inject bean="KeepAliveTimeUnit" /></parameter>
    <!-- Queue size -->
    <parameter>1024</parameter>
    <!-- Thread factory -->
    <parameter><inject bean="DistributedWorkManagerThreadFactorySocket" /></parameter>
    <!-- Blocking -->
  </constructor>
</bean>

</deployment>
```
<!-- Handoff executor -->
<parameter>inject bean="RejectingExecutor"/></parameter>
</constructor>
<destroy method="shutdown"/>
</bean>

<!-- DistributedWorkManagerPolicySocket -->
<bean name="DistributedWorkManagerPolicySocket"
     class="org.jboss.jca.core.workmanager.policy.Always"></bean>

<!-- DistributedWorkManagerSelectorSocket -->
<bean name="DistributedWorkManagerSelectorSocket"
     class="org.jboss.jca.core.workmanager.selector.FirstAvailable"></bean>

<!-- DistributedWorkManagerTransportSocket -->
<bean name="DistributedWorkManagerTransportSocket"
     class="org.jboss.jca.core.workmanager.transport.remote.socket.SocketTransport">
  <!-- The id -->
  <property name="Id">1</property>
  <!-- The executor -->
  <property name="ExecutorService">
    <inject bean="Kernel" property="ExecutorService"/>
  </property>
  <!-- The host -->
  <property name="Host">127.0.0.1</property>
  <!-- The port -->
  <property name="Port">1299</property>
  <!-- The peers -->
  <property name="Peers">
    <set class="java.util.HashSet" elementClass="java.lang.String">
      <value>localhost:1300</value>
    </set>
  </property>
  <start method="startup"/>
  <stop method="shutdown"/>
</bean>

<!-- DistributedWorkManagerSocket -->
<bean name="DistributedWorkManagerSocket"
     interface="org.jboss.jca.core.api.workmanager.DistributedWorkManager"
     class="org.jboss.jca.core.workmanager.DistributedWorkManagerImpl">
  <!-- The name -->
  <property name="Name">DWM-Socket</property>

  <!-- The short running thread pool -->
  <property name="ShortRunningThreadPool">
    <inject bean="DistributedWorkManagerShortRunningThreadPoolSocket"/>
  </property>
Chapter 4. Configuration

4.4.3. Security

The Java EE Connector Architecture 1.6 specification allows units of `javax.resource.spi.Work` to be executed in a specific security context.

This is done through the use of Java Authentication Service Provider Interface for Containers (JSR-196) callbacks using the `javax.security.auth.callback.Callback` interface.
The support is activated by letting the work instance implement the

`javax.resource.spi.work.WorkContextProvider`

interface and returning an instance of `javax.resource.spi.work.SecurityContext`.

The security callback is configured through the ```workmanager``` element for the deployment, either in `ironjacamar.xml` or in the `-ra.xml` file. See the schema definitions for further details.

There is support for creating a basic security domain which can provide a `javax.security.auth.Subject` instance to deployments that are using ```<security-domain>``` or ```<security-domain-and-application>``` in their setup.

A security domain can be configured through

```xml
<bean
    name="DefaultSecurityDomain"
    interface="org.jboss.security.SubjectFactory"
    class="org.jboss.jca.core.security.DefaultSubjectFactory">
    <property name="SecurityDomain">DefaultSecurityDomain</property>
    <property name="UserName">user</property>
    <property name="Password">password</property>
</bean>
```

beans.

### 4.5. Datasources

The IronJacamar project can deploy datasources using the `datasources-1_0.xsd`, `datasources-1_1.xsd` or `datasources-1_2.xsd` schemas.

The configuration is done in the

`config/bootstrap/ds.xml` file.
### Table 4.6. DsXmlDeployer

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JDBCLocal</td>
<td>String</td>
<td>The name of the jdbc-local.rar deployment</td>
</tr>
<tr>
<td>JDBCXA</td>
<td>String</td>
<td>The name of the jdbc-xa.rar deployment</td>
</tr>
<tr>
<td>TransactionManager</td>
<td>javax.transaction.TransactionManager</td>
<td>The transaction manager</td>
</tr>
<tr>
<td>MetadataRepository</td>
<td>org.jboss.jca.core.spi.mdr.MetadataRepository</td>
<td>The metadata repository</td>
</tr>
<tr>
<td>Kernel</td>
<td>com.github.fungal.api.Kernel</td>
<td>The kernel</td>
</tr>
</tbody>
</table>

The datasource deployer can be removed from the environment by removing the ds.xml file in config/bootstrap/ as well as the reference in config/bootstrap/bootstrap.xml to the file.

Furthermore all jdbc-*.rar files in the system/ directory should be removed too.

### 4.6. Web server

The IronJacamar project features a web server which is used to serve web archive deployments. More information about Jetty can be found at the homepage [http://www.eclipse.org/jetty/].

The configuration is done in the system/web.xml file.

```xml
<bean name="WebServer" class="org.jboss.jca.web.WebServer">
  <property name="Host">${iron.jacamar.bindaddress:localhost}</property>
  <property name="Port">8080</property>
  <property name="ExecutorService"><inject bean="Kernel" property="ExecutorService"/></property>
</bean>
```
Table 4.7. Web server

<table>
<thead>
<tr>
<th>Property</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host</td>
<td>String</td>
<td>Set the bind address for the web server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: localhost</td>
</tr>
<tr>
<td>Port</td>
<td>int</td>
<td>Set the port for the web server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: 8080</td>
</tr>
<tr>
<td>AcceptQueueSize</td>
<td>int</td>
<td>Set the accept queue size for the Jetty connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: 64</td>
</tr>
<tr>
<td>ExecutorService</td>
<td>java.util.concurrent.ExecutorService</td>
<td>The thread pool for the web server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Default: The kernel thread pool</td>
</tr>
</tbody>
</table>

The web server can be removed from the environment by removing the `web.xml` file in `system/`

Furthermore all `.war` files in the same directory should be removed too.

All the Jetty libraries can be removed by deleting the `lib/jetty` directory.
Chapter 5.

Deployment

The IronJacamar distribution contains a deploy/ directory where all deployments should be deployed to.

5.1. Packaging requirements

A resource adapter archive is a structured Java Archive (JAR) file, which bundles all Java classes in JAR files, and optionally contains metadata, resources and native libraries.

A resource adapter archive name ends in the .rar extension.

An example of a resource adapter archive could look like

```
[jpederse@localhost]$ jar tf ra.rar
META-INF/ra.xml
readme.html
ra.jar
images/icon.jpg
win.dll
linux.so
```

See the Java EE Connector Architecture 1.7 specification chapter 20 for further requirements.

5.2. Deploying resource adapters

Resource adapters (.rar) are deployed by copying the resource adapter into the deploy/ directory

```
cp example.rar ironjacamar-1.1.0.Final/deploy
```

on a Un*x based system or
Chapter 5. Deployment

copy example.rar ironjacamar-1.1.0.Final\deploy

don Windows.

The resource adapter can be configured and activated through a META-INF/ironjacamar.xml file in the archive. The format of the XML document is defined by the ironjacamar_1_0.xsd or ironjacamar_1_1.xsd schemas.

A resource adapter can also be configured and activated through deployment of a -ra.xml file in the deploy/ directory - f.ex. deploy/example-ra.xml. The format of the XML document is defined by the resource-adapters_1_0.xsd or resource-adapters_1_1.xsd schemas - f.ex

<resource-adapters>
  <resource-adapter>
    <archive>example.rar</archive>
    <connection-definitions>
      <connection-definition jndi-name="java:/eis/example" class-name="com.example.ra.MCF"/>
    </connection-definitions>
  </resource-adapter>
</resource-adapters>

to bind the connection factory from com.example.ra.MCF under java:/eis/example.

See the schema appendix for additional details about the format.

Alternative the resource adapter deployments will be picked up by the RAActivator bean which bind a single connection factory under

java:/eis/<deploymentName>

- f.ex. java:/eis/example and a single admin object under

java:/eis/ao/<deploymentName>

- f.ex. java:/eis/ao/example.
5.2.1. Resource adapter descriptor

A resource adapter can be configured using two different ways

- META-INF/ironjacamar.xml for internal configuration
- -ra.xml for external configuration
to the resource adapter archive. Both formats share the same layout to ease configuration - only the top-level elements differ.

### Table 5.1. Main elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bean-validation-groups</td>
<td>Specifies bean validation group that should be used</td>
</tr>
<tr>
<td>bootstrap-context</td>
<td>Specifies the unique name of the bootstrap context that should be used</td>
</tr>
<tr>
<td>config-property</td>
<td>The config-property specifies resource adapter configuration properties.</td>
</tr>
<tr>
<td>transaction-support</td>
<td>Define the type of transaction supported by this resource adapter. Valid values are: NoTransaction, LocalTransaction, XATransaction</td>
</tr>
<tr>
<td>connection-definitions</td>
<td>Specifies the connection definitions</td>
</tr>
<tr>
<td>admin-objects</td>
<td>Specifies the administration objects</td>
</tr>
</tbody>
</table>

### Table 5.2. Bean validation groups elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bean-validation-group</td>
<td>Specifies the fully qualified class name for a bean validation group that should be used for validation</td>
</tr>
</tbody>
</table>

### Table 5.3. Connection definition / admin object attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>class-name</td>
<td>Specifies the the fully qualified class name of a managed connection factory or admin object</td>
</tr>
<tr>
<td>jndi-name</td>
<td>Specifies the JNDI name</td>
</tr>
<tr>
<td>enabled</td>
<td>Should the object in question be activated</td>
</tr>
<tr>
<td>use-java-context</td>
<td>Specifies if a java:/ JNDI context should be used</td>
</tr>
<tr>
<td>pool-name</td>
<td>Specifies the pool name for the object</td>
</tr>
<tr>
<td>use-ccm</td>
<td>Enable the cache connection manager</td>
</tr>
<tr>
<td>sharable</td>
<td>Defines the connection as sharable (lazy association) (1.1)</td>
</tr>
<tr>
<td>Attribute</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>enlistment</td>
<td>Defines if the connection should use lazy enlistment if supported (1.1)</td>
</tr>
</tbody>
</table>

Table 5.4. Connection definition elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>config-property</td>
<td>The config-property specifies managed connection factory configuration properties.</td>
</tr>
<tr>
<td>pool</td>
<td>Specifies pooling settings</td>
</tr>
<tr>
<td>xa-pool</td>
<td>Specifies XA pooling settings</td>
</tr>
<tr>
<td>security</td>
<td>Specifies security settings</td>
</tr>
<tr>
<td>timeout</td>
<td>Specifies time out settings</td>
</tr>
<tr>
<td>validation</td>
<td>Specifies validation settings</td>
</tr>
<tr>
<td>recovery</td>
<td>Specifies the XA recovery settings</td>
</tr>
</tbody>
</table>

Table 5.5. Pool elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>min-pool-size</td>
<td>The min-pool-size element indicates the minimum number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0</td>
</tr>
<tr>
<td>initial-pool-size</td>
<td>The initial-pool-size element indicates the initial number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0 (1.1)</td>
</tr>
<tr>
<td>max-pool-size</td>
<td>The max-pool-size element indicates the maximum number of connections for a pool. No more than max-pool-size connections will be created in each sub-pool. This defaults to 20.</td>
</tr>
<tr>
<td>prefill</td>
<td>Whether to attempt to prefill the connection pool. Default is false</td>
</tr>
<tr>
<td>use-strict-min</td>
<td>Specifies if the min-pool-size should be considered strictly. Default false</td>
</tr>
<tr>
<td>flush-strategy</td>
<td>Specifies how the pool should be flush in case of an error. <strong>Valid values</strong> are: FailingConnectionOnly (default), InvalidIdleConnections (1.1), IdleConnections, Gracefully (1.1), EntirePool, AllInvalidIdleConnections (1.1),</td>
</tr>
</tbody>
</table>
Table 5.6. XA pool elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>min-pool-size</td>
<td>The min-pool-size element indicates the minimum number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0.</td>
</tr>
<tr>
<td>initial-pool-size</td>
<td>The initial-pool-size element indicates the initial number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0.</td>
</tr>
<tr>
<td>max-pool-size</td>
<td>The max-pool-size element indicates the maximum number of connections for a pool. No more than max-pool-size connections will be created in each sub-pool. This defaults to 20.</td>
</tr>
<tr>
<td>prefill</td>
<td>Whether to attempt to prefill the connection pool. Default is false.</td>
</tr>
<tr>
<td>use-strict-min</td>
<td>Specifies if the min-pool-size should be considered strictly. Default false.</td>
</tr>
<tr>
<td>flush-strategy</td>
<td>Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), InvalidIdleConnections (1.1), IdleConnections, Gracefully (1.1), EntirePool, AllInvalidIdleConnections (1.1), AllIdleConnections (1.1), AllGracefully (1.1), AllConnections (1.1)</td>
</tr>
<tr>
<td>capacity</td>
<td>Specifies the capacity policies (1.1).</td>
</tr>
<tr>
<td>is-same-rm-override</td>
<td>The is-same-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false</td>
</tr>
<tr>
<td>interleaving</td>
<td>An element to enable interleaving for XA connection factories.</td>
</tr>
<tr>
<td>no-tx-separate-pools</td>
<td>Oracle does not like XA connections getting used both inside and outside a JTA transaction. To workaround</td>
</tr>
</tbody>
</table>
### Element Description

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
</table>
| the problem you can create separate sub-pools for the different contexts | pad-xid
| Should the Xid be padded | wrap-xa-resource
| Should the XAResource instances be wrapped in an org.jboss.jca.core.spi.transaction.xa.XAResourceWrapper instance |

#### Table 5.7. Security elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>application</td>
<td>Indicates that application supplied parameters (such as from getConnection(user, pw)) are used to distinguish connections in the pool.</td>
</tr>
<tr>
<td>security-domain</td>
<td>Indicates Subject (from security domain) are used to distinguish connections in the pool. The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.</td>
</tr>
<tr>
<td>security-domain-and-application</td>
<td>Indicates that either application supplied parameters (such as from getConnection(user, pw)) or Subject (from security domain) are used to distinguish connections in the pool. The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.</td>
</tr>
</tbody>
</table>

#### Table 5.8. Time out elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>blocking-timeout-millis</td>
<td>The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).</td>
</tr>
<tr>
<td>idle-timeout-minutes</td>
<td>The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time</td>
</tr>
</tbody>
</table>
depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>allocation-retry</td>
<td>The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.</td>
</tr>
<tr>
<td>allocation-retry-wait-millis</td>
<td>The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).</td>
</tr>
<tr>
<td>xa-resource-timeout</td>
<td>Passed to XAResource.setTransactionTimeout(). Default is zero which does not invoke the setter. Specified in seconds</td>
</tr>
</tbody>
</table>

Table 5.9. Validation elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>background-validation</td>
<td>An element to specify that connections should be validated on a background thread versus being validated prior to use</td>
</tr>
<tr>
<td>background-validation-millis</td>
<td>The background-validation-millis element specifies the amount of time, in milliseconds, that background validation will run.</td>
</tr>
<tr>
<td>use-fast-fail</td>
<td>Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false). Default is false</td>
</tr>
</tbody>
</table>

Table 5.10. Admin object elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>config-property</td>
<td>Specifies an administration object configuration property.</td>
</tr>
</tbody>
</table>

Table 5.11. Recovery elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>recover-credential</td>
<td>Specifies the user name / password pair or security domain that should be used for recovery.</td>
</tr>
<tr>
<td>recover-plugin</td>
<td>Specifies an implementation of the org.jboss.jca.core.spi.recovery.RecoveryPlugin class.</td>
</tr>
</tbody>
</table>
The deployment schemas are defined in doc/ironjacamar_1_0.xsd, doc/ironjacamar_1_1.xsd, doc/resource-adapters_1_0.xsd and doc/resource-adapters_1_1.xsd.

5.2.2. Resource adapter extensions

A resource adapter can make use of a couple of Java EE Connector Architecture extensions in the IronJacamar container in order to improve the integration.

The extensions include

- org.jboss.jca.core.spi.recovery.RecoveryPlugin: Plugin to provide feedback to the recovery module inside IronJacamar.
- org.jboss.jca.core.spi.statistics.Statistics: Plugin to identify a resource adapter component (ResourceAdapter, ManagedConnectionFactory and admin object) that provides statistics.

The following sections will describe these extensions points.

5.2.2.1. Recovery extension

The IronJacamar recovery extension allows the resource adapter deployment to give feedback to the container if a ManagedConnection can be used for recovery. This extension is used as part of XA recovery in the environment, and should therefore be implemented by all resource adapters capable of working in an XATransaction semantics.

The interface org.jboss.core.spi.recovery.RecoveryPlugin located in the ironjacamar-core-api artifact makes up the SPI for the extension.

The interface contains two methods that should be implemented in a resource adapter specific manner.

The method

```java
public boolean isValid(Object c) throws ResourceException;
```

will return true if the connection can be used for recovery.

The method

```java
public void close(Object c) throws ResourceException;
```
will close a connection that was used for recovery.

The recovery extension is activated by adding a recovery element to the deployment

```
<recovery>
  <recovery-plugin>com.mycompany.myproject.RecoveryPluginImpl</recovery-plugin>
</recovery>
```

The following recovery plugins are provided by IronJacamar

- **org.jboss.jca.core.recovery.DefaultRecoveryPlugin**: Default recovery plugin that tries to call a close() method on the underlying object
- **org.jboss.jca.core.recovery.ConfigurableRecoveryPlugin**: A recovery plugin where the results of the isValid and close can be specified
- **org.jboss.jca.core.recovery.ValidatingManagedConnectionFactoryRecoveryPlugin**: A recovery plugin that uses the javax.resource.spi.ValidatingManagedConnectionFactory interface to verify the connection

**Note**

The IronJacamar container will use a default implementation of the recovery SPI if an implementation isn't specified by the deployment.

### 5.2.2.2. Statistics extension

The IronJacamar statistics extension allows a resource adapter to expose statistics to the container and hence to the environment where IronJacamar is running. Statistics can be enabled for ResourceAdapter, ManagedConnectionFactory and admin object instances.

The extension include two interfaces **org.jboss.core.spi.statistics.Statistics** and **org.jboss.core.spi.statistics.StatisticsPlugin**. Both these interfaces are located in the ironjacamar-core-api artifact.

The Statistics interface will mark a resource adapter component as statistics capable and return the statistics plugin implementation instance.

The StatisticsPlugin interface contains methods to expose and describe each statistic that the plugin makes available. This information will then be made available to the environment where the IronJacamar container is running using the environment's preferred mechanism.
5.2.3. Resource adapter statistics

Resource adapter deployments has the following core statistics values

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ActiveCount</td>
<td>The number of active connections. Each of the connections is either in use by an application or available in the pool</td>
</tr>
<tr>
<td>AvailableCount</td>
<td>The number of available connections in the pool</td>
</tr>
<tr>
<td>AverageBlockingTime</td>
<td>The average time spent blocking on obtaining an exclusive lock on the pool. The value is in milliseconds</td>
</tr>
<tr>
<td>AverageCreationTime</td>
<td>The average time spent creating a connection. The value is in milliseconds</td>
</tr>
<tr>
<td>AverageGetTime</td>
<td>The average time spent obtaining a connection. The value is in milliseconds</td>
</tr>
<tr>
<td>BlockingFailureCount</td>
<td>The number of times where there was a time out getting an exclusive lock on the pool</td>
</tr>
<tr>
<td>CreatedCount</td>
<td>The number of connections created</td>
</tr>
<tr>
<td>DestroyedCount</td>
<td>The number of connections destroyed</td>
</tr>
<tr>
<td>IdleCount</td>
<td>The number of connections currently idle</td>
</tr>
<tr>
<td>InUseCount</td>
<td>The number of connections currently in use</td>
</tr>
<tr>
<td>MaxCreationTime</td>
<td>The maximum time it took to create a connection. The value is in milliseconds</td>
</tr>
<tr>
<td>MaxGetTime</td>
<td>The maximum time it took to obtain a connection. The value is in milliseconds</td>
</tr>
<tr>
<td>MaxUsedCount</td>
<td>The maximum number of connections used</td>
</tr>
<tr>
<td>MaxWaitCount</td>
<td>The maximum number of requests waiting for a connection at the same time</td>
</tr>
<tr>
<td>MaxWaitTime</td>
<td>The maximum time spent waiting for an exclusive lock on the pool</td>
</tr>
<tr>
<td>TimedOut</td>
<td>The number of timed out connections</td>
</tr>
<tr>
<td>TotalBlockingTime</td>
<td>The total time spent waiting for an exclusive lock on the pool. The value is in milliseconds</td>
</tr>
</tbody>
</table>
5.3. Deploying datasources

Datasources (-ds.xml) are deployed by copying the definition into the deploy/ directory

```bash
cp postgres-xa-ds.xml ironjacamar-1.1.0.Final/deploy
```
on a Un*x based system or

```bash
copy postgres-xa-ds.xml ironjacamar-1.1.0.Final\deploy
```
on Windows.

You will need to install the database JDBC driver into the lib/ directory.

You can find examples of datasource definitions in the doc/datasources directory and the schemas: doc/datasources_1_0.xsd, doc/datasources_1_1.xsd and doc/datasources_1_1.xsd.

5.3.1. Datasource descriptor

Datasource descriptors are divided into

- `<datasource>` for a standard datasource
- `<xa-datasource>` for an XA capable datasource
definitions.

A datasource descriptor supports the following parameters.

**Table 5.13. Common datasource attributes**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>jndi-name</td>
<td>Specifies the JNDI name for the datasource</td>
</tr>
</tbody>
</table>
### Chapter 5. Deployment

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pool-name</td>
<td>Specifies the pool name for the datasource used for management</td>
</tr>
<tr>
<td>enabled</td>
<td>Specifies if the datasource should be enabled</td>
</tr>
<tr>
<td>use-java-context</td>
<td>Setting this to false will bind the DataSource into global JNDI</td>
</tr>
<tr>
<td>spy</td>
<td>Enable spy functionality on the JDBC layer - e.g. log all JDBC traffic to the datasource. The logging category jboss.jdbc.spy must be enabled too.</td>
</tr>
<tr>
<td>use-ccm</td>
<td>Enable the cached connection manager</td>
</tr>
<tr>
<td>jta</td>
<td>Enable JTA integration (only <code>&lt;datasource&gt;</code>)</td>
</tr>
</tbody>
</table>

#### Table 5.14. `datasource` elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>connection-url</td>
<td>The JDBC driver connection URL</td>
</tr>
<tr>
<td>driver-class</td>
<td>The fully qualified name of the JDBC driver class</td>
</tr>
<tr>
<td>datasource-class</td>
<td>The fully qualified name of the JDBC datasource class</td>
</tr>
<tr>
<td>driver</td>
<td>An unique name for the JDBC driver specified in the drivers section. Or the name of the .jar file if deployed as standalone deployment</td>
</tr>
<tr>
<td></td>
<td>This element is mandatory when deploying in Wildfly</td>
</tr>
<tr>
<td>connection-property</td>
<td>The connection-property element allows you to pass in arbitrary connection properties to the Driver.connect(url, props) method. Each connection-property specifies a string name/value pair with the property name coming from the name attribute and the value coming from the element content</td>
</tr>
<tr>
<td>new-connection-sql</td>
<td>Specify an SQL statement to execute whenever a connection is added to the connection pool</td>
</tr>
<tr>
<td>transaction-isolation</td>
<td>Set java.sql.Connection transaction isolation level to use. The constants defined by transaction-isolation-values are the possible transaction isolation levels and include: TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE</td>
</tr>
<tr>
<td>url-delimiter</td>
<td>Specifies the delimeter for URLs in connection-url for HA datasources</td>
</tr>
</tbody>
</table>
## Table 5.15. xa-datasource elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xa-datasource-property</td>
<td>Specifies a property to assign to the XADataSource implementation class. Each property is identified by the name attribute and the property value is given by the xa-datasource-property element content. The property is mapped onto the XADataSource implementation by looking for a JavaBeans style getter method for the property name. If found, the value of the property is set using the JavaBeans setter with the element text translated to the true property type using the java.beans.PropertyEditor for the type</td>
</tr>
<tr>
<td>xa-datasource-class</td>
<td>The fully qualified name of the javax.sql.XADataSource implementation class</td>
</tr>
<tr>
<td>driver</td>
<td>An unique name for the JDBC driver specified in the drivers section. Or the name of the .jar file if deployed as standalone deployment.</td>
</tr>
<tr>
<td>url-delimiter</td>
<td>Specifies the delimiter for URLs in the connection url for HA datasources</td>
</tr>
<tr>
<td>url-property</td>
<td>Specifies the property for the URL property in the xa-datasource-property values</td>
</tr>
<tr>
<td>url-selector-strategy-class-name</td>
<td>A class that implements org.jboss.jca.adapters.jdbc.spi.URLXASelectorStrategy</td>
</tr>
<tr>
<td>new-connection-sql</td>
<td>Specifies an SQL statement to execute whenever a connection is added to the connection pool</td>
</tr>
<tr>
<td>transaction-isolation</td>
<td>Set java.sql.Connection transaction isolation level to use. The constants defined by transaction-isolation-values are the possible transaction isolation levels and include: TRANSACTION_READ_UNCOMMITTED</td>
</tr>
</tbody>
</table>

### Datasource descriptor

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>url-selector-strategy-class-name</td>
<td>A class that implements org.jboss.jca.adapters.jdbc.spi.URLSelectorStrategy</td>
</tr>
<tr>
<td>pool</td>
<td>Specifies the pooling settings</td>
</tr>
<tr>
<td>security</td>
<td>Specifies the security settings</td>
</tr>
<tr>
<td>validation</td>
<td>Specifies the validation settings</td>
</tr>
<tr>
<td>timeout</td>
<td>Specifies the time out settings</td>
</tr>
<tr>
<td>statement</td>
<td>Specifies the statement settings</td>
</tr>
</tbody>
</table>
### Table 5.16. Pool settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>min-pool-size</td>
<td>The min-pool-size element indicates the minimum number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0.</td>
</tr>
<tr>
<td>initial-pool-size</td>
<td>The initial-pool-size element indicates the initial number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0 (1.2).</td>
</tr>
<tr>
<td>max-pool-size</td>
<td>The max-pool-size element indicates the maximum number of connections for a pool. No more connections will be created in each sub-pool. This defaults to 20.</td>
</tr>
<tr>
<td>prefill</td>
<td>Whether to attempt to prefill the connection pool. Empty element denotes a true value. Default is false.</td>
</tr>
<tr>
<td>use-strict-min</td>
<td>Define if the min-pool-size should be considered strictly. Default false.</td>
</tr>
<tr>
<td>flush-strategy</td>
<td>Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), InvalidIdleConnections (1.2), IdleConnections, Gracefully (1.2), EntirePool, AllInvalidIdleConnections (1.2), AllIdleConnections (1.2), AllGracefully (1.2), AllConnections (1.2)</td>
</tr>
<tr>
<td>allow-multiple-users</td>
<td>Specifies if multiple users will access the datasource through the getConnection(user, password) method and hence if the internal pool type should account for that (1.1).</td>
</tr>
</tbody>
</table>
### Element Description

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>capacity</td>
<td>Specifies the capacity policies (1.2)</td>
</tr>
<tr>
<td>connection-listener</td>
<td>An org.jboss.jca.adapters.jdbc.spi.listener.ConnectionListener that provides a possible to listen for connection activation and passivation in order to perform actions before the connection is returned to the application or returned to the pool (1.2)</td>
</tr>
</tbody>
</table>

### Table 5.17. XA pool settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>min-pool-size</td>
<td>The min-pool-size element indicates the minimum number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0</td>
</tr>
<tr>
<td>initial-pool-size</td>
<td>The initial-pool-size element indicates the initial number of connections a pool should hold. These are not created until a Subject is known from a request for a connection. This default to 0 (1.2)</td>
</tr>
<tr>
<td>max-pool-size</td>
<td>The max-pool-size element indicates the maximum number of connections for a pool. No more connections will be created in each sub-pool. This defaults to 20</td>
</tr>
<tr>
<td>prefill</td>
<td>Whether to attempt to prefill the connection pool. Empty element denotes a true value. Default is false</td>
</tr>
<tr>
<td>use-strict-min</td>
<td>Define if the min-pool-size should be considered a strictly. Default false</td>
</tr>
<tr>
<td>flush-strategy</td>
<td>Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), InvalidIdleConnections (1.2), IdleConnections, Gracefully (1.2), EntirePool, AllInvalidIdleConnections (1.2), AllIdleConnections (1.2), AllGracefully (1.2), AllConnections (1.2)</td>
</tr>
<tr>
<td>allow-multiple-users</td>
<td>Specifies if multiple users will access the datasource through the getConnection(user, password) method and hence if the internal pool type should account for that (1.1)</td>
</tr>
<tr>
<td>capacity</td>
<td>Specifies the capacity policies (1.2)</td>
</tr>
<tr>
<td>connection-listener</td>
<td>An org.jboss.jca.adapters.jdbc.spi.listener.ConnectionListener that provides a possible to listen for connection activation and passivation in order to perform actions before the connection is returned to the application or returned to the pool (1.2)</td>
</tr>
<tr>
<td>Element</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>activation and passivation in order to perform actions before the connection is returned to the application or returned to the pool (1.2)</td>
</tr>
<tr>
<td>is-same-rm-override</td>
<td>The is-same-rm-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false</td>
</tr>
<tr>
<td>interleaving</td>
<td>An element to enable interleaving for XA connection factories</td>
</tr>
<tr>
<td>no-tx-separate-pools</td>
<td>Oracle does not like XA connections getting used both inside and outside a JTA transaction. To workaround the problem you can create separate sub-pools for the different contexts</td>
</tr>
<tr>
<td>pad-xid</td>
<td>Should the Xid be padded</td>
</tr>
<tr>
<td>wrap-xa-resource</td>
<td>Should the XAResource instances be wrapped in an org.jboss.jca.core.spi.transaction.xa.XAResourceWrapper instance</td>
</tr>
</tbody>
</table>

Table 5.18. Security settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>user-name</td>
<td>Specify the username used when creating a new connection.</td>
</tr>
<tr>
<td>password</td>
<td>Specify the password used when creating a new connection.</td>
</tr>
<tr>
<td>security-domain</td>
<td>Indicates Subject (from security domain) are used to distinguish connections in the pool. The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.</td>
</tr>
<tr>
<td>reauth-plugin</td>
<td>Defines a reauthentication plugin that can be used for reauthentication of physical connections.</td>
</tr>
</tbody>
</table>

Table 5.19. Validation settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>valid-connection-checker</td>
<td>An org.jboss.jca.adapters.jdbc.spi.ValidConnectionChecker that provides a SQLException isValidConnection(Connection e) method to validate</td>
</tr>
<tr>
<td>Element</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>check-valid-connection-sql</td>
<td>Specify an SQL statement to check validity of a pool connection. This may be called when managed connection is taken from pool for use.</td>
</tr>
<tr>
<td>validate-on-match</td>
<td>The validate-on-match element indicates whether or not connection level validation should be done when a connection factory attempts to match a managed connection for a given set. This is typically exclusive to the use of background validation</td>
</tr>
<tr>
<td>background-validation</td>
<td>An element to specify that connections should be validated on a background thread versus being validated prior to use</td>
</tr>
<tr>
<td>background-validation-millis</td>
<td>The background-validation-millis element specifies the amount of time, in milliseconds, that background validation will run</td>
</tr>
<tr>
<td>use-fast-fail</td>
<td>Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false) default false</td>
</tr>
<tr>
<td>stale-connection-checker</td>
<td>An org.jboss.jca.adapters.jdbc.spi.StaleConnectionChecker that provides a boolean isStaleConnection(SQLException e) method which if it returns true will wrap the exception in an org.jboss.jca.adapters.jdbc.StaleConnectionException which is a subclass of SQLException</td>
</tr>
<tr>
<td>exception-sorter</td>
<td>An org.jboss.jca.adapters.jdbc.spi.ExceptionSorter that provides a boolean isExceptionFatal(SQLException e) method to validate is an exception should be broadcast to all javax.resource.spi.ConnectionEventListener as a connectionErrorOccurred message</td>
</tr>
</tbody>
</table>

Table 5.20. Time out settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>blocking-timeout-millis</td>
<td>The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for</td>
</tr>
<tr>
<td>Element</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).</td>
<td></td>
</tr>
<tr>
<td>idle-timeout-minutes</td>
<td>The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.</td>
</tr>
<tr>
<td>set-tx-query-timeout</td>
<td>Whether to set the query timeout based on the time remaining until transaction timeout, any configured query timeout will be used if there is no transaction. The default is false</td>
</tr>
<tr>
<td>query-timeout</td>
<td>Any configured query timeout in seconds The default is no timeout</td>
</tr>
<tr>
<td>use-try-lock</td>
<td>Any configured timeout for internal locks on the resource adapter objects in seconds The default is a 60 second timeout</td>
</tr>
<tr>
<td>allocation-retry</td>
<td>The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.</td>
</tr>
<tr>
<td>allocation-retry-wait-millis</td>
<td>The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).</td>
</tr>
<tr>
<td>xa-resource-timeout</td>
<td>Passed to XAResource.setTransactionTimeout() Default is zero which does not invoke the setter. In seconds</td>
</tr>
</tbody>
</table>

Table 5.21. Statement settings

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>track-statements</td>
<td>Whether to check for unclosed statements when a connection is returned to the pool and result sets are closed when a statement is closed/return to the prepared statement cache. valid values are: false - do not track statements and results; true - track statements and result sets and warn when they are not closed; nowarn - track statements but do no warn about them being unclosed (the default)</td>
</tr>
<tr>
<td>prepared-statement-cache-size</td>
<td>The number of prepared statements per connection in an LRU cache</td>
</tr>
</tbody>
</table>
Datasource descriptor

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>share-prepared-statements</td>
<td>Whether to share prepare statements, i.e. whether asking for same statement twice without closing uses the same underlying prepared statement. The default is false</td>
</tr>
</tbody>
</table>

Table 5.22. Recovery elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>recover-credential</td>
<td>Specifies the user name / password pair or security domain that should be used for recovery.</td>
</tr>
<tr>
<td>recover-plugin</td>
<td>Specifies an implementation of the org.jboss.jca.core.spi.recovery.RecoveryPlugin class.</td>
</tr>
</tbody>
</table>

Table 5.23. Driver attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>An unique name for the JDBC driver</td>
</tr>
<tr>
<td>module</td>
<td>The module definition for the JDBC driver. The format of a module inside WildFly 8+ is com.h2database.h2 which will map to the H2 installation under modules/com/h2database/h2/main. A ':' can be used to identify the slot - f.ex com.h2database.h2:1.3.159. The format for IronJacamar Standalone/Embedded is the name of the .jar file</td>
</tr>
<tr>
<td>major-version</td>
<td>The major version of the driver</td>
</tr>
<tr>
<td>minor-version</td>
<td>The minor version of the driver</td>
</tr>
</tbody>
</table>

Table 5.24. Driver elements

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>driver-class</td>
<td>The fully qualified class name of the driver class</td>
</tr>
<tr>
<td>datasource-class</td>
<td>The fully qualified class name of the datasource class</td>
</tr>
<tr>
<td>xa-datasource-class</td>
<td>The fully qualified class name of the XA datasource class</td>
</tr>
</tbody>
</table>

The datasource deployment schema is defined in doc/datasources_1_0.xsd and doc/datasources_1_1.xsd.
5.3.2. Datasource extensions

The datasource deployments can make use of a couple of extensions in the JDBC resource adapter to improve the connection validation and checking if an exception should reestablish the connection in question.

The extensions include

- **org.jboss.jca.adapters.jdbc.spi.ExceptionSorter**: Plugin to check if a SQLException is fatal for the connection on which it was thrown.


- **org.jboss.jca.adapters.jdbc.spi.ValidConnection**: Plugin to check if a connection is valid for use by the application.

Configuration of the extensions are done by using

- The `<exception-sorter>` tag for an ExceptionSorter

- The `<stale-connection-checker>` tag for a StaleConnection

- The `<valid-connection-checker>` tag for a ValidConnection

IronJacamar features implementations of these extensions for a couple of popular databases. Contributions in this area are most welcome either generic solutions or for a specific database.

**Informix**:

- org.jboss.jca.adapters.jdbc.extensions.informix.InformixExceptionSorter

**Microsoft SQLServer**:

- org.jboss.jca.adapters.jdbc.extensions.mssql.MSSQLValidConnectionChecker

**PostgreSQL**:

- org.jboss.jca.adapters.jdbc.extensions.postgres.PostgreSQLExceptionSorter

- org.jboss.jca.adapters.jdbc.extensions.postgres.PostgreSQLValidConnectionChecker

**MySQL**:

- org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLExceptionSorter

- org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLReplicationValidConnectionChecker

- org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLValidConnectionChecker

**IBM DB2**:

- org.jboss.jca.adapters.jdbc.extensions.db2.DB2ExceptionSorter
Datasource statistics

- org.jboss.jca.adapters.jdbc.extensions.db2.DB2StaleConnectionChecker
- org.jboss.jca.adapters.jdbc.extensions.db2.DB2ValidConnectionChecker

Generic:

- org.jboss.jca.adapters.jdbc.extensions.novendor.NullExceptionSorter
- org.jboss.jca.adapters.jdbc.extensions.novendor.NullStaleConnectionChecker
- org.jboss.jca.adapters.jdbc.extensions.novendor.NullValidConnectionChecker
- org.jboss.jca.adapters.jdbc.extensions.novendor.JDBC4ValidConnectionChecker

Sybase:

- org.jboss.jca.adapters.jdbc.extensions.sybase.SybaseExceptionSorter
- org.jboss.jca.adapters.jdbc.extensions.sybase.SybaseValidConnectionChecker

Oracle:

- org.jboss.jca.adapters.jdbc.extensions.oracle.OracleExceptionSorter
- org.jboss.jca.adapters.jdbc.extensions.oracle.OracleStaleConnectionChecker
- org.jboss.jca.adapters.jdbc.extensions.oracle.OracleValidConnectionChecker

5.3.3. Datasource statistics

Datasources has the following core statistics values

**Table 5.25. Core statistics**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ActiveCount</td>
<td>The number of active connections. Each of the connections is either in use by an application or available in the pool</td>
</tr>
<tr>
<td>AvailableCount</td>
<td>The number of available connections in the pool</td>
</tr>
<tr>
<td>AverageBlockingTime</td>
<td>The average time spent blocking on obtaining an exclusive lock on the pool. The value is in milliseconds</td>
</tr>
<tr>
<td>AverageCreationTime</td>
<td>The average time spent creating a connection. The value is in milliseconds</td>
</tr>
<tr>
<td>AverageGetTime</td>
<td>The average time spent obtaining a connection. The value is in milliseconds</td>
</tr>
<tr>
<td>BlockingFailureCount</td>
<td>The number of times where there was a time out getting an exclusive lock on the pool</td>
</tr>
<tr>
<td>CreatedCount</td>
<td>The number of connections created</td>
</tr>
<tr>
<td>DestroyedCount</td>
<td>The number of connections destroyed</td>
</tr>
<tr>
<td>IdleCount</td>
<td>The number of connections currently idle</td>
</tr>
<tr>
<td>InUseCount</td>
<td>The number of connections currently in use</td>
</tr>
</tbody>
</table>
Datasources has the following JDBC statistics values

**Table 5.26. JDBC statistics**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreparedStatementCacheAccessCount</td>
<td>The number of times that the statement cache was accessed</td>
</tr>
<tr>
<td>PreparedStatementCacheAddCount</td>
<td>The number of statements added to the statement cache</td>
</tr>
<tr>
<td>PreparedStatementCacheCurrentSize</td>
<td>The number of prepared and callable statements currently cached in the statement cache</td>
</tr>
<tr>
<td>PreparedStatementCacheDeleteCount</td>
<td>The number of statements discarded from the cache</td>
</tr>
<tr>
<td>PreparedStatementCacheHitCount</td>
<td>The number of times that statements from the cache were used</td>
</tr>
<tr>
<td>PreparedStatementCacheMissCount</td>
<td>The number of times that a statement request could not be satisfied with a statement from the cache</td>
</tr>
</tbody>
</table>

5.4. General deployment settings

This section will provide an overview of general deployment settings that are shared between resource adapter activations, and datasource deployments.
5.4.1. Flush strategies

The flush strategy option for the connection pool defines how the pool should be flushed in case there is an error on a connection belonging to the pool.

In all cases the connection with the error is destroyed, and the pool is scheduled for prefill if supported.

Table 5.27. Flush strategies

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FailingConnectionOnly</td>
<td>Only the connection with the error is destroyed. This is the default strategy.</td>
</tr>
<tr>
<td>InvalidIdleConnections</td>
<td>All idle connections are checked if they are invalid, based on the javax.resource.spi.ValidatingManagedConnectionFactory return value.</td>
</tr>
<tr>
<td>IdleConnections</td>
<td>All idle connections are destroyed.</td>
</tr>
<tr>
<td>Gracefully</td>
<td>All idle connections are destroyed, and all active connections will be destroyed upon return to the pool.</td>
</tr>
<tr>
<td>EntirePool</td>
<td>All connections are destroyed, including current active connections.</td>
</tr>
<tr>
<td>AllInvalidIdleConnections</td>
<td>Like InvalidIdleConnections, but across all credentials for the pool if supported.</td>
</tr>
<tr>
<td>AllIdleConnections</td>
<td>Like IdleConnections, but across all credentials for the pool if supported.</td>
</tr>
<tr>
<td>AllGracefully</td>
<td>Like Gracefully, but across all credentials for the pool if supported.</td>
</tr>
<tr>
<td>AllConnections</td>
<td>Like EntirePool, but across all credentials for the pool if supported.</td>
</tr>
</tbody>
</table>

5.4.2. Capacity policies

The policy for creating and destroying physical connections for a pool can be controlled by specifying which policy that should be used.

The default policies are only to create one connection per request, and to destroy all connections timed out when the idle timeout is scheduled.

5.4.2.1. Increment policies

The following increment policies are supported.
5.4.2.1.1. MaxPoolSize policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.MaxPoolSizeIncrementer` policy will fill the pool to its max size for each request.

This policy is useful when you want to keep the maximum number of connections available all the time.

5.4.2.1.2. Size policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.SizeIncrementer` policy will fill the pool by the specified number of connections for each request.

**Table 5.28. Size policy properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>The number of connections that should be created</td>
</tr>
</tbody>
</table>

This policy is useful when you want to increment with an additional number of connections per request in anticipation that the next request will also need a connection.

This is the default increment policy with a value of 1.

5.4.2.1.3. Watermark policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.WatermarkIncrementer` policy will fill the pool to the specified number of connections for each request.

**Table 5.29. Watermark policy properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watermark</td>
<td>The watermark level for the number of connections</td>
</tr>
</tbody>
</table>

This policy is useful when you want to keep a specified number of connections in the pool at all time.

5.4.2.2. Decrement policies

The following decrement policies are supported.

5.4.2.2.1. MinPoolSize policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.MinPoolSizeDecrementer` policy will decrement the pool to its min size for each request.

This policy is useful when you want to limit the number of connections after each idle timeout request.
5.4.2.2. Size policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.SizeDecrementer` policy will decrement the pool by the specified number of connections for each idle timeout request.

Table 5.30. Size policy properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>The number of connections that should be created</td>
</tr>
</tbody>
</table>

This policy is useful when you want to decrement an additional number of connections per idle timeout request in anticipation that the pool usage will lower over time.

5.4.2.2.3. TimedOut policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.TimedOutDecrementer` policy will removed all connections that have timed out from the pool for each idle timeout request.

This policy is the default decrement policy.

5.4.2.2.4. Watermark policy

The `org.jboss.jca.core.connectionmanager.pool.capacity.WatermarkDecrementer` policy will decrement the pool to the specified number of connections for each idle timeout request.

Table 5.31. Watermark policy properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watermark</td>
<td>The watermark level for the number of connections</td>
</tr>
</tbody>
</table>

This policy is useful when you want to keep a specified number of connections in the pool at all time.
6.1. Starting the container

The IronJacamar container is started by entering the bin/ directory

```bash
cd ironjacamar-1.1.0.Final/bin
```

and executing

```bash
./run.sh
```

on a Un*x based system or

```bash
run.bat
```

on Windows.

The command takes an optional -b argument to define the binding address of the naming server

```bash
./run.sh -b 192.168.0.199
```

Once the container has started you should see a log entry like

```
13:33:10,999 INFO  [Main] Server started in 941ms
```
in the console where the command was executed.

After the container has started you can browse to

http://localhost:8080

to view the project documentation and use the administration console.

### 6.2. Stopping the container

The IronJacamar container is stopped by pressing the Ctrl-C keys.

Once the container has stopped you should see a log entry like

```
13:35:06,752 INFO  [Main] Server stopped in 29ms
```

in the console where the container was running.

Alternative the container can be stopped through the command line interface.

### 6.3. Command line interface

The IronJacamar container can be controlled by a command line interface.

If you are accessing a remote container you can use the -h option to specify the host name.

#### 6.3.1. Deploy

You can deploy a resource adapter archive (.rar) using

```
java -jar fungal-cli.jar deploy <file>
```

where file specifies the resource adapter archive.

#### 6.3.2. Undeploy

You can undeploy a resource adapter archive (.rar) using
**Shutdown**

```bash
java -jar fungal-cli.jar undeploy <file>
```

where **file** specifies the resource adapter archive.

### 6.3.3. Shutdown

You can shutdown the IronJacamar environment by

```bash
java -jar fungal-cli.jar shutdown
```

### 6.4. Apache Ant

The IronJacamar container can be controlled by Apache Ant tasks.

#### 6.4.1. Start

The IronJacamar container can be started by the Apache Ant task
`org.jboss.jca.sjc.ant.Start` which takes a `home` attribute to specify the home directory of the installation.

#### 6.4.2. Stop

The IronJacamar container can be stopped by the Apache Ant task
`org.jboss.jca.sjc.ant.Stop` which takes a `home` attribute to specify the home directory of the installation.

#### 6.4.3. Deploy

Deployments to the IronJacamar container can be done by the Apache Ant task
`org.jboss.jca.sjc.ant.Deploy` which takes a `file` attribute to specify the file that should be deployed. The task takes optional `host` and `port` attributes in order to specify the host and port where the IronJacamar container is located.

#### 6.4.4. Undeploy

Undeploying from the IronJacamar container can be done by the Apache Ant task
`org.jboss.jca.sjc.ant.Undeploy` which takes a `file` attribute to specify the file that should be undeployed. The task takes optional `host` and `port` attributes in order to specify the host and port where the IronJacamar container is located.
6.4.5. Ping

The IronJacamar container can be pinged for availability using the Apache Ant task org.jboss.jca.sjc.ant.Ping. The task takes optional host and port attributes in order to specify the host and port where the IronJacamar container is located.

6.5. Apache Maven

The IronJacamar container can be controlled by Apache Maven mojos.

6.5.1. Start

The IronJacamar container can be started by the Apache Maven mojo org.jboss.jca.sjc.maven.Start which takes a home element to specify the home directory of the installation.

6.5.2. Stop

The IronJacamar container can be stopped by the Apache Maven mojo org.jboss.jca.sjc.maven.Stop which takes a home element to specify the home directory of the installation.

6.5.3. Deploy

Deployments to the IronJacamar container can be done by the Apache Maven mojo org.jboss.jca.sjc.maven.Deploy which takes a file element to specify the file that should be deployed. The mojo takes optional host and port elements in order to specify the host and port where the IronJacamar container is located.

6.5.4. Undeploy

Undeploying from the IronJacamar container can be done by the Apache Maven mojo org.jboss.jca.sjc.maven.Undeploy which takes a file element to specify the file that should be undeployed. The mojo takes optional host and port elements in order to specify the host and port where the IronJacamar container is located.

6.5.5. Ping

The IronJacamar container can be pinged for availability using the Apache Maven mojo org.jboss.jca.sjc.maven.Ping. The mojo takes optional host and port elements in order to specify the host and port where the IronJacamar container is located.
Chapter 7.

7

Validator

7.1. Introduction

The IronJacamar container features a validator which checks resource adapter archives against the Java Connector Architecture (JCA) specification.

The validator is doing a static analysis of the resource adapter classes and checks them against the rules defined in the validator.

The validator is used in the deployer chain of the JCA container, and is available as a standalone tool, as an Apache Ant task and as an Apache Maven plugin too.

7.2. Reports

The validator works by scanning the resource adapter in question and output a report which lists which rules have been violated.

An example could be

Severity: ERROR
Section: 19.4.2
Description: A ResourceAdapter must implement a "public int hashCode()" method.
Code: com.mycompany.myproject.ResourceAdapterImpl

Severity: ERROR
Section: 19.4.2
Description: A ResourceAdapter must implement a "public boolean equals(Object)" method.
Code: com.mycompany.myproject.ResourceAdapterImpl

which means that com.mycompany.myproject.ResourceAdapterImpl is missing an equals and hashCode implementation.

Table 7.1. Validator report

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td>Specifies the severity of the rule.</td>
</tr>
</tbody>
</table>
### Chapter 7. Validator

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ERROR: Critical error which must be fixed in order for the resource adapter to operate correctly.</td>
<td></td>
</tr>
<tr>
<td>• WARN: Error which should be fixed in order for the resource adapter to operate correctly.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section</th>
<th>A reference to a section in the Java Connector Architecture specification where the requirement is defined.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>A short description of the rule.</td>
</tr>
<tr>
<td>Code</td>
<td>The class which triggered the rule.</td>
</tr>
</tbody>
</table>

### 7.3. Running the standalone validator

The validator can be run on the command line by

```bash
cd doc/validator
./validator.sh <file>
```

The reports will be generated into the current directory under the name of `<file>`.log.

### 7.4. Apache Ant integration

The validator integrates with Apache Ant such that you can generate the reports directly from your build environment before deploying the resource adapter into the IronJacamar container.

First you have to define the `taskdef` for the task

```xml
<taskdef name="validator"
    classname="org.jboss.jca.validator.ant.ValidatorTask"
    classpathref="ironjacamar.lib.path.id"/>
```

See the Apache Ant documentation for additional instructions on installation.

### 7.4.1. Usage

```xml
<validator rarFile="${myArchive.rar}" outputDir="${report.dir}"/>
```
### Table 7.2. Apache Ant: validator

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>rarFile</td>
<td>The resource adapter file</td>
</tr>
<tr>
<td>outputDir</td>
<td>The directory where the reports should be generated</td>
</tr>
<tr>
<td>classpath</td>
<td>A classpath to resolve additional dependencies against</td>
</tr>
</tbody>
</table>

#### 7.5. Apache Maven integration

The validator integrates with Apache Maven such that you can generate the reports directly from your build environment before deploying the resource adapter into the IronJacamar container.

To be able to use the validator plugin in your Maven project, you will have to add the following plugin declaration in the pom.xml of your project:

```xml
<build>
  <plugins>
    <plugin>
      <groupId>org.jboss.ironjacamar</groupId>
      <artifactId>ironjacamar-validator-maven</artifactId>
      <!-- The version of the plugin you want to use -->
      <version>1.1.0.Final</version>
      <executions>
        <execution>
          <goals>
            <goal>validate</goal>
          </goals>
        </execution>
      </executions>
      <configuration>
        <!-- output directory -->
        <outputDir>.</outputDir>

        <!-- rar filename -->
        <rarFile>/path/to/myresourceadapter.rar</rarFile>

        <!-- optional classpath
        <classpath>
          <param>classpath1</param>
          <param>classpath2</param>
        </classpath>
        -->
      </configuration>
    </plugin>
  </plugins>
</build>
```
Note
By default, the validator-maven plugin is attached to the "package" phase of Maven.

See the Apache Maven documentation for additional instructions on installation.

7.5.1. Usage

Once you have configured your project's pom.xml to include the validator-maven plugin, as explained earlier, you can generate the report by running the package goal on your project.

mvn clean package

Table 7.3. Apache Maven: validator

<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>rarFile</td>
<td>The resource adapter file</td>
</tr>
<tr>
<td>outputDir</td>
<td>The directory where the reports should be generated</td>
</tr>
<tr>
<td>classpath</td>
<td>A classpath to resolve additional dependencies against</td>
</tr>
</tbody>
</table>
Chapter 8.

8. Code generator

8.1. Introduction

The IronJacamar project includes a resource adapter code generator which can generate a complete code skeleton that will help developers get started with their development tasks.

8.2. Functionality

The code generator will generate a resource adapter code skeleton based on the user input. The code generator supports

- Resource adapter using JCA 1.7 annotations
- Resource adapter using JCA 1.7 metadata
- Resource adapter using JCA 1.6 annotations
- Resource adapter using JCA 1.6 metadata
- Resource adapter using JCA 1.5
- Resource adapter using JCA 1.0
- Apache Ant build environment
- Apache Ant + Ivy build environment
- Gradle build environment
- Apache Maven build environment
- Test suite environment

8.3. Running the tool

The code generator can be run on the command line by

```
./codegen.sh
```

from the `doc/codegenerator` directory.

The code generator supports the following arguments
Table 8.1. Code generator arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-o</td>
<td>Specifies the output directory for the code skeleton.</td>
</tr>
</tbody>
</table>

The developer must then answer various questions regarding the properties of the resource adapter.

8.3.1. Developer Input

This section describes the questions that are asked in order to generate the code.

Table 8.2. Developer input

<table>
<thead>
<tr>
<th>Question</th>
<th>Spec</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile version (1.7/1.6/1.5/1.0)</td>
<td>All</td>
<td>Defines which Java EE Connector Architecture specification that the resource adapter should target</td>
<td></td>
</tr>
<tr>
<td>Type (O/Outbound/I/Inbound/B/Bidirectional)</td>
<td>JCA 1.5+</td>
<td>Defines if the resource adapter should contain outbound communication, inbound communication or both</td>
<td></td>
</tr>
<tr>
<td>Package name</td>
<td>All</td>
<td>The package name of the resource adapter</td>
<td></td>
</tr>
<tr>
<td>Transaction support (N/NoTransaction/L/LocalTransaction/X/XATransaction)</td>
<td>All</td>
<td>The transaction support level</td>
<td></td>
</tr>
<tr>
<td>Reauthentication (Y/Yes/N/No)</td>
<td>All</td>
<td>If the resource adapter supports reauthentication</td>
<td></td>
</tr>
<tr>
<td>Use annotations (Y/Yes/N/No)</td>
<td>JCA 1.6+</td>
<td>Should annotations be used for specifying the structure. If ‘No’ is selected a META-INF/ra.xml is generated</td>
<td></td>
</tr>
<tr>
<td>Include a ResourceAdapter (Y/Yes/N/No)</td>
<td>JCA 1.5+</td>
<td>Should an instance of a resource adapter class be included in the archive</td>
<td>Outbound</td>
</tr>
<tr>
<td>Resource adapter class name</td>
<td>JCA 1.5+</td>
<td>The class name of the resource adapter</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Should the resource adapter class be Serializable (Y/Yes/N/No)</td>
<td>JCA 1.5+</td>
<td>Should the resource adapter class be serializable</td>
<td>Outbound</td>
</tr>
<tr>
<td>Question</td>
<td>Spec</td>
<td>Description</td>
<td>Type</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Managed connection factory class name</td>
<td>All</td>
<td>The class name of the managed connection factory</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Managed connection class name</td>
<td>All</td>
<td>The class name of the managed connection</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Connection interface class name</td>
<td>All</td>
<td>The class name of the connection interface</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Connection implementation class name</td>
<td>All</td>
<td>The class name of the connection implementation</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Connection factory interface class name</td>
<td>All</td>
<td>The class name of the connection factory interface</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Connection factory implementation class name</td>
<td>All</td>
<td>The class name of the connection factory implementation</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Resource adapter config properties</td>
<td>All</td>
<td>Include a configuration properties in the resource adapter instance</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Managed connection factory config properties</td>
<td>All</td>
<td>Include a configuration properties in the managed connection factory instance</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Use ResourceAdapterAssociation (Y/Yes/N/No)</td>
<td>All</td>
<td>Associate the managed connection factory instance with the resource adapter instance</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>Use CCI (Y/Yes/N/No)</td>
<td>All</td>
<td>Use the Common Client Interface for the connection / connection factory in the 'Outbound' part of the resource adapter</td>
<td>Outbound or Bidirectional</td>
</tr>
<tr>
<td>MessageListener interface name</td>
<td>JCA 1.5+</td>
<td>The name of the message listener interface for the activation</td>
<td>Inbound or Bidirectional</td>
</tr>
<tr>
<td>ActivationSpec class name</td>
<td>JCA 1.5+</td>
<td>The class name of the activation specification instance</td>
<td>Inbound or Bidirectional</td>
</tr>
<tr>
<td>ActivationSpec config properties</td>
<td>JCA 1.5+</td>
<td>Include configuration properties in the activation specification instance</td>
<td>Inbound or Bidirectional</td>
</tr>
<tr>
<td>Activation class name</td>
<td>JCA 1.5+</td>
<td>The class name of the activation instance</td>
<td>Inbound or Bidirectional</td>
</tr>
</tbody>
</table>
### 8.4. Generated code

The generated code will consist of the classes making up the resource adapter and a test suite environment based on the embedded distribution.

#### 8.4.1. Apache Ant build environment

The following targets are supported in the Apache Ant build environment

<table>
<thead>
<tr>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>compile</td>
<td>Compiles all the files</td>
</tr>
<tr>
<td>rar</td>
<td>Builds the resource adapter archive</td>
</tr>
<tr>
<td>prepare-test</td>
<td>Prepares the test environment</td>
</tr>
<tr>
<td>test</td>
<td>Executes the tests</td>
</tr>
</tbody>
</table>
### 8.4.2. Apache Ant + Ivy build environment

The following targets are supported in the Apache Ant + Ivy build environment:

<table>
<thead>
<tr>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>docs</td>
<td>Generates the documentation</td>
</tr>
</tbody>
</table>

#### Table 8.4. Apache Ant + Ivy build environment

<table>
<thead>
<tr>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>compile</td>
<td>Compiles all the files</td>
</tr>
<tr>
<td>rar</td>
<td>Builds the resource adapter archive</td>
</tr>
<tr>
<td>prepare-test</td>
<td>Prepares the test environment</td>
</tr>
<tr>
<td>test</td>
<td>Executes the tests</td>
</tr>
<tr>
<td>docs</td>
<td>Generates the documentation</td>
</tr>
</tbody>
</table>

### 8.4.3. Gradle build environment

The Gradle build environment currently support the standard tasks such as:

<table>
<thead>
<tr>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>compile</td>
<td>Compiles all the files</td>
</tr>
<tr>
<td>test</td>
<td>Executes the tests</td>
</tr>
</tbody>
</table>

#### Table 8.5. Gradle build environment

### 8.4.4. Apache Maven build environment

The following targets are supported in the Apache Maven build environment:

<table>
<thead>
<tr>
<th>Target</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>compile</td>
<td>Compiles all the files</td>
</tr>
<tr>
<td>test</td>
<td>Executes the tests</td>
</tr>
</tbody>
</table>

#### Table 8.6. Apache Maven build environment
Eclipse plugin

The IronJacamar Eclipse plugin features development tools used for developing resource adapter applications for the IronJacamar standalone distribution, WildFly or JBoss Enterprise Application Platform 6+.

The plugin allows you to

- Generate a resource adapter skeleton
- Generate a deployment descriptor for a resource adapter
- Validate a resource adapter
- Deploy a resource adapter to an IronJacamar server instance
- Deploy a deployment descriptor to an IronJacamar server instance

9.1. Installation of the plugin

The plugin is installed by

```
cp ironjacamar-eclipse.jar $ECLIPSE_HOME/plugins
```

on Un*x systems, or by

```
copy ironjacamar-eclipse.jar %ECLIPSE_HOME%\plugins
```

on Windows.

9.2. Configuration of the plugin

Open "Window->Preferences" and select the IronJacamar category.
Chapter 9. Eclipse plugin

The IronJacamar home setting must point to the root directory of the IronJacamar installation, like

/home/lgao/sources/ironjacamar/target/sjc

in order to configure the plugin.

The IronJacamar Eclipse plugin can deploy to a remote IronJacamar instance, by specifying the host and port settings.

9.3. The toolbar

The IronJacamar Eclipse plugin provides a toolbar with deployment functionality.
9.4. The menu

The IronJacamar Eclipse plugin provides a menu with validation and deployment functionality.

<table>
<thead>
<tr>
<th>Checkstyle</th>
<th>IronJacamar</th>
<th>Validate Ctrl+6</th>
</tr>
</thead>
<tbody>
<tr>
<td>IronJacamar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Configure</td>
<td></td>
<td>Deploy</td>
</tr>
<tr>
<td>Properties</td>
<td></td>
<td>Deploy rar</td>
</tr>
<tr>
<td></td>
<td>Alt+Enter</td>
<td>Deploy -ra.xml</td>
</tr>
</tbody>
</table>

9.5. Creating a new IronJacamar project

A new IronJacamar project can be created by selecting File->New->Project... and go to the IronJacamar category.

Choose “IronJacamar 1.1 project” and follow the instructions to generate your resource adapter.
Select a wizard

Wizards:

- CVS
- EJB
- IronJacamar
- IronJacamar 1.1 project
- Java
- Java EE
- JavaScript
9.5.1. Project and package name

Specify the project name and package name for the project. You can also select the JCA specification version, the type of the resource adapter (Outbound/Inbound/Bidirectional), the transaction support level, if the resource adapter will support reauthentication and if annotations used be used for a JCA 1.6+ based resource adapter.
9.5.2. Creating a ResourceAdapter

You can choose to include a `ResourceAdapter` class if the JCA profile version is 1.5, 1.6 or 1.7
9.5.3. Creating a ManagedConnectionFactory

If the project is Outbound or Bidirectional then you can fill in the information for the outbound components.
9.5.4. Creating a MessageListener

If the project is Inbound or Bidirectional then you can fill in the information for the message listener and activation specification components.
9.5.5. Creating an AdminObject

This wizard creates an AdminObject for the project.
9.5.6. Selecting the build environment

This wizard will let you choose the build environment to use for your project. Currently IronJacamar supports the Apache Ant, Apache Ant + Apache Ivy or Maven build environments. If Apache Ant is selected, all library files will be copied from your IronJacamar installation.

Note

Please make sure you have installed the Eclipse M2E plugin if you select Apache Maven as your build environment.

9.6. Validate IronJacamar project

The IronJacamar project can be validated by selecting it, and the Validate command in the toolbar will now be enabled. Click on the command to validate your project.

Another way to validate the IronJacamar project is to right click on the project, and select IronJacamar->Validate.
9.7. Deploying an IronJacamar project

The IronJacamar Eclipse plugin provides a way to deploy files to an IronJacamar server.

**Note**

Before any deploy operation, the IronJacamar server needs to be started, otherwise it will lead to an error dialog. Please refer to this for detail on how to start the IronJacamar server.

9.7.1. Deploying a RAR file to an IronJacamar server

Select the IronJacamar project you just created. The Deploy drop down command in the toolbar will be enabled. Click on the command and select 'Deploy rar'.

Another way to deploy the RAR file is to right click on the project, and select IronJacamar->Deploy->Deploy rar from context menu.

The command will build the RAR file first if it doesn't exist, then try to connect the IronJacamar server to deploy it.

9.7.2. Generate the -ra.xml and deploy it to IronJacamar server

Select the IronJacamar project you just created. The Deploy drop down command in the toolbar will be enabled. Click on the command and select 'Deploy -ra.xml'.

Another way to generate the -ra.xml file is to right click on the project, and select IronJacamar->Deploy->Deploy -ra.xml from context menu.

The command will build the RAR file first if it does not exist, then pop up a wizard to generate the -ra.xml according to the RAR file.
There is a wizard page for each ManagedConnectionFactory if the resource adapter is outbound or bidirectional.
Generate the -ra.xml and deploy it to IronJacamar server

The ManagedConnectionFactory can be activated by selecting the 'Activate' checkbox.

There is a wizard page for each AdminObject if the resource adapter includes one or more instances.
The AdminObject can be activated by selecting the 'Activate' checkbox.

There is a miscellaneous page also.
If the Deploy RAR first option is selected, the plugin will try to deploy the RAR file to the IronJacamar server first, then deploy the generated -ra.xml file.
10 Other tools

10.1. Resource adapter information tool

The IronJacamar distribution features a resource adapter information tool, that can provide the important information about the resource adapter and a sample deployment descriptor.

The information about the resource adapter is generated using the following command:

```
./rar-info.sh myeis.rar
```

where the report will be located in `myeis-report.txt`. The tool can take an optional `-classpath` parameter such that additional external dependencies can be resolved against the resource adapter.

The report will contain information about

- The name of the resource adapter
- The Java EE Connector Architecture specification version
- The type of the resource adapter
- If the resource adapter supports reauthentication
- If the resource adapter is compliant (see the validator tool)
- If the resource adapter contains native libraries
- The structure of the resource adapter archive
- Overview of the resource adapter class
- Overview of the managed connection factory classes
- The connectory factory and connection API if common client interface isn't used
- Overview of the admin object classes
- Overview of the activation specification classes
- Metadata included, including the `MANIFEST.MF` file
- A sample deployment descriptor

The tool (`rar-info.sh`) is located in the `doc/as/` directory of the distribution.
10.2. Migration tool

The IronJacamar distribution features a migration tool, that can convert the deployment format used in JBoss Application Server prior to version 7, and JBoss Enterprise Application Platform versions prior to version 6.

Since there are different formats (XSDs) to deploy datasources and a resource adapters the tool can convert to both these formats.

The tool (converter.sh) is located in the doc/as/ directory of the distribution.

10.2.1. Resource adapters

A resource adapter deployment is converted using the following command:

```
./converter.sh -ra old-ds.xml new-ra.xml
```

which will convert the file old-ds.xml to new-ra.xml. The content of new-ra.xml can then be copied into the resource-adapters subsystem in WildFly or used directly in the IronJacamar/Standalone distribution.

**Note**

Note that, the tool will do a best effort to convert all old attributes and elements to the new format. It will be necessary to make additional changes to the generated file. Please, consult this documentation for additional information.

10.2.1.1. WebLogic converter

The resource adapter converter tool can also convert the Oracle WebLogic weblogic-ra.xml files to the IronJacamar format.

The following command line can be used:

```
./converter.sh -ra --weblogic weblogic-ra.xml new-ra.xml
```

to get a best effort conversion of the Oracle WebLogic deployment file.

10.2.2. Data sources

A data source deployment is converted using the following command:
Data sources

./converter.sh -ds old-ds.xml new-ds.xml

which will convert the file old-ds.xml to new-ds.xml. The content of new-ds.xml can then be copied into the datasources subsystem in WildFly or used directly in the IronJacamar/Standalone distribution.

Note

Note that, the tool will do a best effort to convert all old attributes and elements to the new format. It will be necessary to make additional changes to the generated file. Please, consult this documentation for additional information.
11.1. Overview

The IronJacamar embedded configuration provides a way of running a JCA container in-VM.

The configuration is useful when you want a

- JCA container within your environment
- JCA container when doing unit testing

Especially the ability to unit test your resource adapter archives before deploying them into a testing or a production environment will benefit developers.

In order to enhance the experience with working with the embedded configuration the container integrates with the ShrinkWrap [http://www.jboss.org/shrinkwrap] and Arquillian [http://arquillian.org/] frameworks.

11.2. Configuration

You will need all the JAR files located in the

```
$IRON_JACAMAR_HOME/bin
$IRON_JACAMAR_HOME/lib
$IRON_JACAMAR_HOME/lib/embedded
```

directories on your application class loader - f.ex.

```java
java -classpath allthejarfiles.jar yourapp
```

in order to use the embedded configuration.

If you want integration with the Arquillian framework you need to add the JAR files located in the
The Arquillian/Byteman integration is located in the

$IRON_JACAMAR_HOME/lib/embedded/arquillian/byteman
directory.

Furthermore you will need to configure Java Naming and Directory Interface (JNDI) and logging using for example property files.

Sample jndi.properties file:

```
java.naming.factory.initial=org.jnp.interfaces.LocalOnlyContextFactory
java.naming.factory.url.pkgs=org.jboss.naming:org.jnp.interfaces
```

Sample logging.properties file:

```
# Additional logger names to configure (root logger is always configured)
loggers=org.jboss.jca,org.jboss,org.jnp,com.arjuna

# Root logger level
logger.level=${iron.jacamar.log.level:INFO}
logger.handlers=CONSOLE, FILE

# org.jboss.jca
logger.org.jboss.jca.level=DEBUG

# org.jboss
logger.org.jboss.level=INFO

# org.jnp
logger.org.jnp.level=INFO

# com.arjuna
logger.com.arjuna.level=INFO

# Console handler configuration
handler.CONSOLE=org.jboss.logmanager.handlers.ConsoleHandler
handler.CONSOLE.properties=autoFlush
```
### Important

The IronJacamar code generator will generate a test suite based on the Arquillian functionality, so that setup can be used as a starting point for your own integration. The setup will also show you how to use dependencies from the JBoss Nexus Maven repository instead if you choose the Maven or Ant+Ivy based build environment.

### Note

Note that, if you want to be able to deploy datasources you will need to deploy the `jdbc-local.rar` for `<datasource>` support, or `jdbc-xa.rar` for `<xa-datasource>` support. Both archives can be found in the `system/` directory.

#### 11.3. Usage

IronJacamar Embedded supports both a simple and an advanced usage model, using pre-assembled resource adapter archives (.rar) or dynamic resource adapter archives based on ShrinkWrap.

The embedded environment supports registering resource adapters and datasources in the platform `MBeanServer` by setting the system property `ironjacamar.embedded.management` to `true` before starting the environment.
11.3.1. Simple usage

The IronJacamar Embedded container environment supports the following open source testing projects:

1. Arquillian [http://arquillian.org/]
2. ShrinkWrap [http://www.jboss.org/shrinkwrap]

These extensions allow the developer to use the embedded platform with greater ease as there doesn’t have to be a physical representation of the resource adapter archive located to the disk. The Arquillian integration furthermore allows the developer to leave all the embedded container setup to the integration layer instead.


11.3.1.1. Arquillian and ShrinkWrap

The code sample below shows an usage of deploying a ShrinkWrap resource adapter archive into the IronJacamar Embedded environment using Arquillian.

```java
package org.jboss.jca.arquillian.unit;

import org.jboss.jca.arquillian.embedded.Configuration;
import org.jboss.jca.arquillian.rars.simple.TestConnection;
import org.jboss.jca.arquillian.rars.simple.TestConnectionFactory;
import java.util.UUID;
import javax.annotation.Resource;
```
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.logging.Logger;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.api.spec.ResourceAdapterArchive;

import org.junit.Test;
import org.junit.runner.RunWith;

import static org.junit.Assert.assertNotNull;

/**
 *  Unit test for Arquillian integration
 *
 *  @author <a href="mailto:jesper.pedersen@ironjacamar.org">Jesper Pedersen</a>
 */
@RunWith(Arquillian.class)
@Configuration(autoActivate = true)
public class ArquillianTestCase {

  // --------------------------------------------------------------------------------||
  // Class Members ------------------------------------------------------------------||
  // --------------------------------------------------------------------------------||

  private static Logger log = Logger.getLogger(ArquillianTestCase.class);

  private static String deploymentName = "ArquillianTest";

  /**
   * Define the deployment
   *
   * @return The deployment archive
   */
  @Deployment
  public static ResourceAdapterArchive createDeployment() {
    ResourceAdapterArchive raa =
        ShrinkWrap.create(ResourceAdapterArchive.class, deploymentName + ".rar");

    JavaArchive ja = ShrinkWrap.create(JavaArchive.class, UUID.randomUUID().toString() + ".jar");
    ja.addPackage(TestConnection.class.getPackage());
    raa.addAsLibrary(ja);
    raa.addAsManifestResource("simple.rar/META-INF/ra.xml", "ra.xml");

    return raa;
  }

  // Tests ------------------------------------------------------------------------||

  @Resource(mappedName = "java:/eis/ArquillianTest")
  private TestConnectionFactory connectionFactory;

  /**
   * Basic
   * @exception Throwable Throw if case of an error
   */
The class makes use of the `org.jboss.jca.embedded.arquillian.Configuration` annotation in order to specify that the deployed archive should be auto activated through the `RAActivator` bean.

**Note**

Note that, the name for the `ResourceAdapterArchive` must end with the `.rar` extension.

### 11.3.1.2. Arquillian and ShrinkWrap/Descriptors

The code sample below shows how to use Arquillian to deploy a ShrinkWrap resource adapter archive and activate the resource adapter using the ShrinkWrap/Descriptors API.

This example uses the `org.jboss.jca.embedded.arquillian.Configuration` annotation to explicit say not to auto activate the resource adapter archive.
package org.jboss.jca.embedded.unit;

import org.jboss.jca.arquillian.embedded.Configuration;
import org.jboss.jca.embedded.dsl.resourceadapters11.api.ConnectionDefinitionsType;
import org.jboss.jca.embedded.dsl.resourceadapters11.api.ResourceAdapterType;
import org.jboss.jca.embedded.dsl.resourceadapters11.api.ResourceAdaptersDescriptor;
import org.jboss.jca.embedded.rars.simple.TestConnection;
import org.jboss.jca.embedded.rars.simple.TestConnectionFactory;
import org.jboss.jca.embedded.rars.simple.TestConnectionFactoryImpl;
import org.jboss.jca.embedded.rars.simple.TestManagedConnectionFactory;
import org.jboss.jca.embedded.rars.simple.TestResourceAdapter;

import java.util.UUID;
import javax.annotation.Resource;
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.logging.Logger;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.asset.StringAsset;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.descriptor.api.Descriptors;
import org.jboss.shrinkwrap.descriptor.api.connector15.ConnectorDescriptor;
import org.jboss.shrinkwrap.descriptor.api.connector15.OutboundResourceadapterType;
import org.jboss.shrinkwrap.descriptor.api.connector15.ResourceadapterType;

import org.junit.Test;
import org.junit.runner.RunWith;

import static org.junit.Assert.assertNotNull;

/**
 * Unit test for ShrinkWrap/Descriptors integration
 * @author <a href="mailto:jesper.pedersen@ironjacamar.org">Jesper Pedersen</a>
 */
@RunWith(Arquillian.class)
@Configuration(autoActivate = false)
public class ShrinkWrapDescriptorsTestCase {
    // --------------------------------------------------------------------------------
    // Class Members ------------------------------------------------------------------
    // --------------------------------------------------------------------------------

    private static Logger log = Logger.getLogger(ShrinkWrapDescriptorsTestCase.class);

    private static String deploymentName = "sd.rar";

    /**
     * Define the resource adapter archive
     * @return The archive
     */
public static ResourceAdapterArchive createArchive()
{
    ConnectorDescriptor raXml = Descriptors.create(ConnectorDescriptor.class, "ra.xml")
        .version("1.5");
    ResourceadapterType rt = raXml.getOrCreateResourceadapter()
        .resourceadapterClass(TestResourceAdapter.class.getName());
    OutboundResourceadapterType ort = rt.getOrCreateOutboundResourceadapter()
        .transactionSupport("NoTransaction").reauthenticationSupport(false);
    org.jboss.shrinkwrap.descriptor.api.connector15.ConnectionDefinitionType cdt =
        ort.createConnectionDefinition()
            .managedconnectionfactoryClass(TestManagedConnectionFactory.class.getName())
            .connectionfactoryInterface(TestConnectionFactory.class.getName())
            .connectionfactoryImplClass(TestConnectionFactoryImpl.class.getName())
            .connectionInterface(TestConnection.class.getName())
            .connectionImplClass(TestConnectionImpl.class.getName());
    ResourceAdapterArchive raa =
        ShrinkWrap.create(ResourceAdapterArchive.class, deploymentName);
    JavaArchive ja = ShrinkWrap.create(JavaArchive.class, UUID.randomUUID().toString() + ".jar");
    ja.addPackage(TestConnection.class.getPackage());
    raa.addAsLibrary(ja);
    raa.addAsManifestResource(new StringAsset(raXml.exportAsString()), "ra.xml");

    return raa;
}

/**
 * Define the deployment descriptor
 * @return The descriptor
 */
@Deployment(order = 2)
public static ResourceAdaptersDescriptor createDeployment()
{
    ResourceAdaptersDescriptor dashRaXml = Descriptors.create(ResourceAdaptersDescriptor.class, "sd-ra.xml");
    ResourceAdapterType rt = dashRaXml.createResourceAdapter().archive(deploymentName);
    ConnectionDefinitionsType cdst = rt.getOrCreateConnectionDefinitions();
    org.jboss.jca.embedded.dsl.resourceadapters11.api.ConnectionDefinitionType cdt =
        cdst.createConnectionDefinition()
            .className(TestManagedConnectionFactory.class.getName())
            .jndiName("java:/eis/TestConnectionFactory").poolName("TestConnectionFactory");

    return dashRaXml;
}

@Resource(mappedName = "java:/eis/TestConnectionFactory")
private TestConnectionFactory connectionFactory;

/**
 * Basic
 * @exception Throwable Thrown if case of an error
 */
11.3.1.3. Arquillian and Byteman

The code sample below shows how to use Arquillian to deploy a ShrinkWrap resource adapter archive and change the `allocateConnection` of `org.jboss.jca.core.connectionmanager.AbstractConnectionManager` to throw a `ResourceException` when the method is called.

The framework used to provide this functionality is called Byteman, which allows developers to change behavior of a method to for example throw an exception. This is called fault injection and can be used to increase code coverage of your project.

```java
package org.jboss.jca.arquillian.unit;

import org.jboss.jca.arquillian.embedded.Configuration;
import org.jboss.jca.arquillian.rars.simple.TestConnection;
import org.jboss.jca.arquillian.rars.simple.TestConnectionFactory;

@Test
public void testBasic() throws Throwable {
    assertNotNull(connectionFactory);
    TestConnection c = connectionFactory.getConnection();
    assertNotEquals(c);
    c.callMe();
    c.close();
}
```
import org.jboss.jca.embedded.dsl.InputStreamDescriptor;
import java.util.UUID;
import javax.annotation.Resource;
import javax.resource.ResourceException;
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.extension.byteman.api.BMRule;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.logging.Logger;
import org.jboss.shrinkwrap.api.ResourceAdapterArchive;
import org.jboss.shrinkwrap.descriptor.api.Descriptor;
import org.junit.Test;
import org.junit.runner.RunWith;

import static org.junit.Assert.assertNotNull;
import static org.junit.Assert.fail;

/**
 * Unit test for Byteman integration
 *
 * @author <a href="mailto:jesper.pedersen@ironjacamar.org">Jesper Pedersen</a>
 */
@RunWith(Arquillian.class)
@Configuration(autoActivate = false)
public class BytemanBMTestCase {

    private static Logger log = Logger.getLogger(BytemanBMTestCase.class);

    /**
     * Define the deployment
     *
     * @return The deployment archive
     */
    @Deployment(order = 1)
    public static ResourceAdapterArchive createDeployment() {
        ResourceAdapterArchive raa = ShrinkWrap.create(ResourceAdapterArchive.class, "byteman.rar");

        JavaArchive ja = ShrinkWrap.create(JavaArchive.class, UUID.randomUUID().toString() + ".jar");
        ja.addPackage(TestConnection.class.getPackage());

        raa.addAsLibrary(ja);
        raa.addAsManifestResource("simple.rar/META-INF/ra.xml", "ra.xml");

        return raa;
    }

    /**
     * Define the activation
     *
     * @return The deployment archive
     */
```java
/*@ Deployment (order = 2)
public static Descriptor createDescriptor()
{
    ClassLoader cl = BytemanBMTestCase.class.getClassLoader();
    InputStreamDescriptor isd = new InputStreamDescriptor("byteman-ra.xml",
        cl.getResourceAsStream("byteman-ra.xml"));
    return isd;
}

@Resource (mappedName = "java:/eis/BytemanTest")
private TestConnectionFactory connectionFactory;

/**
 * Byteman
 * @exception Throwable Thrown if case of an error
 */
@Test
@BMRule (name = "Throw exception on allocateConnection",
    targetClass = "org.jboss.jca.core.connectionmanager.AbstractConnectionManager",
    targetMethod = "allocateConnection",
    action = "throw new javax.resource.ResourceException()")
public void testByteman() throws Throwable
{
    assertNotSame(connectionFactory);

    TestConnection c = null;
    try
    {
        c = connectionFactory.getConnection();
        fail("Got a connection");
    }
    catch (ResourceException re)
    {
        // Ok
    }
    catch (Throwable t)
    {
        fail(t.getMessage());
        throw t;
    }
    finally
    {
        if (c != null)
            c.close();
    }
}

See the Byteman [http://www.jboss.org/byteman] web site for a detailed description of the project and additional documentation.
```
Chapter 11. Embedded

11.3.1.4. Arquillian and @ArquillianResource

The Arquillian integration allows the internally used org.jboss.jca.embedded.Embedded or javax.naming.Context instances to be injected into the test case using

```java
import org.jboss.jca.embedded.Embedded;
import javax.naming.Context;
import org.jboss.arquillian.test.api.ArquillianResource;

@RunWith(Arquillian.class)
public class ResourceProviderTestCase {
    @ArquillianResource
    private Embedded embedded;

    @ArquillianResource
    private Context context;
}
```

This will allow direct access to the APIs inside the test case.

11.3.1.5. IronJacamar integration

The code sample below shows how to use Arquillian to deploy a ShrinkWrap resource adapter archive and inject the IronJacamar metadata repository into the test case such that assertions can be made.

The IronJacamar container features various components that makes up the entire Java EE Connector Architecture container. The available list of components can be viewed in the configuration of the container or through the management console under the Kernel category.

```java
/*@*
 * IronJacamar, a Java EE Connector Architecture implementation
 * Copyright 2011, Red Hat Inc, and individual contributors
 * as indicated by the @author tags. See the copyright.txt file in the
 * distribution for a full listing of individual contributors.
 *
 * This is free software; you can redistribute it and/or modify it
 * under the terms of the GNU Lesser General Public License as
 * published by the Free Software Foundation; either version 2.1 of
 * the License, or (at your option) any later version.
 *
 * This software is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
 * Lesser General Public License for more details.
 *
 * You should have received a copy of the GNU Lesser General Public
 */
```
package org.jboss.jca.arquillian.unit;

import org.jboss.jca.arquillian.embedded.Configuration;
import org.jboss.jca.arquillian.embedded.Inject;
import org.jboss.jca.arquillian.rars.simple.TestConnection;
import org.jboss.jca.arquillian.rars.simple.TestConnectionFactory;
import org.jboss.jca.core.spi.mdr.MetadataRepository;
import java.util.UUID;
import javax.annotation.Resource;
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.logging.Logger;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.api.spec.ResourceAdapterArchive;
import org.junit.Test;
import org.junit.runner.RunWith;

import static org.junit.Assert.assertNotNull;
import static org.junit.Assert.assertTrue;

/**
 * Unit test for Arquillian integration and injecting
 *
 * @return The deployment archive
 */
@RunWith(Arquillian.class)
@Configuration(autoActivate = true)
public class InjectTestCase {

// --------------------------------------------------------------------------------||
// Class Members ------------------------------------------------------------------||
// --------------------------------------------------------------------------------||

private static Logger log = Logger.getLogger(InjectTestCase.class);

/**
 * Define the deployment
 *
 * @return The deployment archive
 */
@Deployment
public static ResourceAdapterArchive createDeployment() {
    ResourceAdapterArchive raa =
        ShrinkWrap.create(ResourceAdapterArchive.class, "ArquillianTest.rar");

    JavaArchive ja = ShrinkWrap.create(JavaArchive.class, UUID.randomUUID().toString() + ".jar");
    ja.addPackage(TestConnection.class.getPackage());

    raa.addAsLibrary(ja);
}
raa.addAsManifestResource("simple.rar/META-INF/ra.xml", "ra.xml");

    return raa;
}

//-------------------------------------------------------------------------------------||
// Tests -----------------------------------------------------------------------------||
//-------------------------------------------------------------------------------------||

@Resource(mappedName = "java:/eis/ArquillianTest")
private TestConnectionFactory connectionFactory;

@Inject(name = "MDR")
private MetadataRepository mdr;

/**
 * @exception Throwable Thrown if case of an error
 */
@Test
public void testBasic() throws Throwable {
    assertNotNull(connectionFactory);
    assertNotNull(mdr);
    assertNotNull(mdr.getResourceAdapters());
    assertTrue(mdr.getResourceAdapters().size() == 1);
}

11.3.2. Advanced usage

11.3.2.1. ShrinkWrap

The code sample below shows an advanced usage of deploying a ShrinkWrap resource adapter archive into the IronJacamar Embedded environment.

/*
 * IronJacamar, a Java EE Connector Architecture implementation
 * Copyright 2012, Red Hat Inc, and individual contributors
 * as indicated by the @author tags. See the copyright.txt file in the
 * distribution for a full listing of individual contributors.
 *
 * This is free software; you can redistribute it and/or modify it
 * under the terms of the GNU Lesser General Public License as
 * published by the Free Software Foundation; either version 2.1 of
 * the License, or (at your option) any later version.
 *
 * This software is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
 * Lesser General Public License for more details.
 */
package org.jboss.jca.embedded.unit;

import org.jboss.jca.embedded.Embedded;
import org.jboss.jca.embedded.EmbeddedFactory;
import org.jboss.jca.embedded.rars.simple.TestConnection;
import org.jboss.jca.embedded.rars.simple.TestConnectionFactory;

import java.util.UUID;
import javax.naming.Context;
import javax.naming.InitialContext;
import javax.naming.NamingException;
import org.jboss.logging.Logger;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.api.spec.ResourceAdapterArchive;

import org.junit.AfterClass;
import org.junit.BeforeClass;
import org.junit.Test;

/**
 * Test cases for deploying resource adapter archives (.RAR)
 */
@Author
public class ShrinkWrapTestCase
{
    // ----------------------------------------------------------------------------------
    // Class Members
    // ----------------------------------------------------------------------------------

    private static Logger log = Logger.getLogger(ShrinkWrapTestCase.class);

    private static final String JNDI_PREFIX = "java:/eis/";

    /**
     * Embedded
     */
    private static Embedded embedded;

    /**
     * Basic ShrinkWrap ResourceAdapterArchive test case
     */
    @Test

public void testBasic() throws Throwable {
    Context context = null;

    String name = UUID.randomUUID().toString();

    ResourceAdapterArchive raa =
        ShrinkWrap.create(ResourceAdapterArchive.class, name + "rar");

    JavaArchive ja = ShrinkWrap.create(JavaArchive.class, UUID.randomUUID().toString() + "jar");
    ja.addPackage(TestConnection.class.getPackage());
    raa.addAsLibrary(ja);
    raa.addAsManifestResource("simple.rar/META-INF/ra.xml", "ra.xml");

    try {
        embedded.deploy(raa);
        context = new InitialContext();
        TestConnectionFactory tcf = (TestConnectionFactory) context.lookup(JNDI_PREFIX + name);
        assertNotNull(tcf);
        TestConnection tc = tcf.getConnection();
        tc.callMe();
        tc.close();
    } catch (Exception t) {
        log.error(t.getMessage(), t);
        fail(t.getMessage());
    }

    finally {
        if (context != null)
            try {
                context.close();
            } catch (NamingException ne) {
                // Ignore
            }
    }
}

// Lifecycle Methods

/**
 * Lifecycle start, before the suite is executed
 * @throws Throwable throwable exception
 */
@BeforeClass
### Advanced usage

```java
public static void beforeClass() throws Throwable {
    // Create and set an embedded JCA instance
    embedded = EmbeddedFactory.create();

    // Startup
    embedded.startup();
}

/**
 * Lifecycle stop, after the suite is executed
 * @throws Throwable throwable exception
 */
@AfterClass
public static void afterClass() throws Throwable {
    // Shutdown embedded
    embedded.shutdown();

    // Set embedded to null
    embedded = null;
}
}
```

**Note**

Note that, the name for the `ResourceAdapterArchive` must end with the `.rar` extension.

#### 11.3.2.2. Embedded

The code sample below shows a simple usage of deploying a pre-assembled resource adapter archive into the IronJacamar Embedded environment.

```java
import org.jboss.jca.embedded.Embedded;
import org.jboss.jca.embedded.EmbeddedFactory;
import java.net.URL;
import javax.naming.Context;
import javax.naming.InitialContext;
import javax.naming.NamingException;
import org.junit.AfterClass;
import org.junit.BeforeClass;
import org.junit.Test;
import static org.junit.Assert.*;

public class MyTestCase {

```
Chapter 11. Embedded

```java
/** Embedded */
private static Embedded embedded;

/** JNDI prefix */
private static final String JNDI_PREFIX = "java:/eis/"

/**
 * Simple test to verify deployment of myresourceadapter.rar
 * @throws Throwable throwable exception
 */
@Test
public void testDeployment() throws Throwable {
    URL archive = MyTestCase.class.getResource("myresourceadapter.rar");
    Context context = null;
    try {
        embedded.deploy(archive);
        context = new InitialContext();
        Object o = context.lookup(JNDI_PREFIX + "myresourceadapter");
        assertNotNull(o);
    }
    catch (Throwable t) {
        fail(t.getMessage());
    }
    finally {
        embedded.undeploy(archive);
        if (context != null) {
            try {
                context.close();
            }
            catch (NamingException ne) {
                // Ignore
            }
        }
    }
}

@BeforeClass
public static void beforeClass() throws Throwable {
    // Create an embedded JCA instance
    embedded = EmbeddedFactory.create();
    // Startup
    embedded.startup();
}

@AfterClass
public static void afterClass() throws Throwable {
```
// Shutdown
    embedded.shutdown();
}

**Note**

Note that, the url for the archive must end with the `.rar` extension - either representing a file or a directory.

See the IronJacamar Embedded API documentation for additional functionality.

### 11.3.2.3. Automatic activation of archives

IronJacamar features a bean called `RAActivator` which will automatic create a JNDI binding for connection factories and administration objects. However, sometimes it is of benefit to define these bindings in a `-ra.xml` file, and therefore `RAActivator` has to be disabled during that deployment phase.

This done by using the following code snippet

```java
import org.jboss.jca.deployers.fungal.RAActivator;

// Disable RAActivator
RAActivator raa = embedded.lookup("RAActivator", RAActivator.class);

if (raa == null)
    throw new IllegalStateException("RAActivator not defined");

raa.setEnabled(false);

embedded.deploy("myrar.rar");
embedded.deploy("myrar-ra.xml");

raa.setEnabled(true);
```

which disables the bean, does the deployments and then reenables the bean again.
Chapter 12. EIS test server

Testing an Enterprise Information System can be a complex task, as their installation can quite complex and specific to a certain platform architecture.

As Java developers, and resource adapter developers in particularly, we are interested in a setup that will allow us to test the resource adapter against the EIS with as little difficulty as possible.

Having access to a component that easy integrates into our testing environment, and acts as the EIS in question is of benefit.

12.1. Overview

The IronJacamar EIS test server provides a framework for emulating an Enterprise Information System such that no installation is needed.

The EIS test server contains the following interface

```java
package org.jboss.jca.test.eis;
import java.io.InputStream;
```
import java.io.OutputStream;

/**
 * This interface represents a session between a resource adapter
 * and an Enterprise Information System
 * Once the <code>handle</code> method returns the socket where
 * the communication takes place is closed
 * @author <a href="mailto:jesper.pedersen@ironjacamar.org">Jesper Pedersen</a>
 */
public interface Handler
{
    /**
     * Handle an interaction with a client
     * @param is The input stream
     * @param os The output stream
     */
    public void handle(InputStream is, OutputStream os);
}

which represents a session between the resource adapter and the EIS.

The java.io.InputStream is the incoming communication coming from the resource adapter, and the java.io.OutputStream is the EIS' response to the request.

Once the method returns the socket between the resource adapter and the EIS is closed.

This means that the implementation of the Handler interface will represent the binary protocol between the resource adapter and the EIS. To the resource adapter it will look as it is communicating with the real Enterprise Information System installation.

12.2. Apache Ant

The Apache Ant tasks for starting and stopping the EIS test server are defined as the following:

```xml
<taskdef name="start"
    classname="org.jboss.jca.test.eis.ant.Start"
    classpathref="main.lib.path.id"/>

<taskdef name="stop"
    classname="org.jboss.jca.test.eis.ant.Stop"
    classpathref="main.lib.path.id"/>
```

where main.lib.path.id contains the ironjacamar-test-eis.jar file.

The start task is used, like
which starts the EIS test server on localhost using port 1400 with an implementation of the Handler interface of org.jboss.jca.test.eis.EchoHandler and a classpath of ${build.eis.dir}/test.

The stop task is used, like

```
<stop host="localhost" port="1400"/>
```

which stops the EIS test server on localhost using port 1400.

Between the start and stop tasks the resource adapters unit tests can be executed.

**12.3. Apache Maven**

The Apache Maven mojos for starting and stopping the EIS test server are defined as the following

```
<build>
  <plugins>
    <plugin>
      <groupId>org.jboss.ironjacamar</groupId>
      <artifactId>ironjacamar-test-eis</artifactId>
      <!-- The version of the plugin you want to use -->
      <version>1.1.0.Final</version>
      <executions>
        <execution>
          <goals>
            <goal>start</goal>
          </goals>
        </execution>
      </executions>
    <configuration>
      <host>localhost</host>
      <port>1400</port>
      <handler>org.jboss.jca.test.eis.EchoHandler</handler>
    </configuration>
  </plugin>
</plugins>
```
The **start** mojo will run in the **process-test-classes** phase, and the **stop** mojo will run in the **test** phase.
13 Community

13.1. Website

The website contains the latest information about the project and links to important information.

The website is located at http://www.ironjacamar.org/

13.2. User forum

The user forum is where we discuss matters about the usage of the IronJacamar project.

Our forum is located at http://community.jboss.org/en/ironjacamar

13.3. Developer forum

The developer forum is where we discuss the implementation of the IronJacamar project. This means the internals of the project and not how the project is used.

User questions doesn’t belong here - they should go in the user forum instead.

The forum is located at http://community.jboss.org/en/ironjacamar/dev

13.4. Issue tracking

We are using JIRA to manage our issues in the project.

These are divided into the following categories

- Feature Request: A feature that you would like see implemented.
- Bug: A software defect.

For all of these you should post your request to our user forum first.

The rest of the categories are for team use only.

Our issue tracking system located at http://issues.jboss.org/browse/JBJCA
14 Troubleshooting

14.1. I think I have found a bug

If you think you have found a bug you should verify this by posting to our forum first.

Our forum is located at http://community.jboss.org/en/ironjacamar

You can also search our issue tracking system located at http://issues.jboss.org/browse/JBJCA

14.2. I would like to implement a feature

So you have found an area where you are missing a feature and would like to submit a patch for it, great!

There are a couple of steps to get a feature included

First, you should create a new thread in our development forum where you describe the feature, its design and implementation.

Once there is an agreement on the feature and the design you should proceed with creating the patch.

To maximize your chances of getting the feature in the official build as soon as possible make sure that you run through the following steps:

```
    ant clean
    ant clean test
    ant clean checkstyle
    ant clean findbugs
    ant clean jacoco
```

All these should show that,

1. All your test cases for the feature is passing
2. Your code is correctly formatted according to project rules
3. There isn't any bug reports from the Findbugs environment

4. There is full code coverage based on the JaCoCo report

when done, create a JIRA task (Feature Request) in our JIRA environment and attach the unified
diff formatted patch. See the developer guide for additional details.

Happy Coding!

14.3. How do I?

We can't cover every single issue in this guide, so feel free to drop by our forums to see if a solution
has already been provided. Otherwise feel free to ask your question there.

Our forum is located at http://community.jboss.org/en/ironjacamar
Appendix A. Schemas

All the IronJacamar schemas are deployed under http://www.ironjacamar.org/schema/.

A.1. Java EE Connector Architecture 1.7

```xml
<? xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns="http://www.w3.org/2001/XMLSchema"
  targetNamespace="http://xmlns.jcp.org/xml/ns/javaee"
  xmlns:javaee="http://xmlns.jcp.org/xml/ns/javaee"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified"
  version="1.7">
  <xsd:annotation>
    <xsd:documentation>
      DO NOT ALTER OR REMOVE COPYRIGHT NOTICES OR THIS HEADER.
      
      Copyright (c) 2009-2013 Oracle and/or its affiliates. All rights reserved.
      
      The contents of this file are subject to the terms of either the GNU
      General Public License Version 2 only ("GPL") or the Common Development
      and Distribution License ("CDDL") (collectively, the "License"). You
      may not use this file except in compliance with the License. You can
      obtain a copy of the License at https://glassfish.dev.java.net/public/CDDL+GPL_1_1.html
      or packager/legal/LICENSE.txt. See the License for the specific
      language governing permissions and limitations under the License.
      
      When distributing the software, include this License Header Notice in each
      file and include the License file at packager/legal/LICENSE.txt.
      
      GPL Classpath Exception:
      
      Oracle designates this particular file as subject to the "Classpath"
      exception as provided by Oracle in the GPL Version 2 section of the License
      file that accompanied this code.
      
      Modifications:
      
      If applicable, add the following below the License Header, with the fields
      enclosed by brackets [] replaced by your own identifying information:
      "Portions Copyright [year] [name of copyright owner]"
      
      Contributor(s):
      
      If you wish your version of this file to be governed by only the CDDL or
      only the GPL Version 2, indicate your decision by adding "[Contributor]"
      elects to include this software in this distribution under the [CDDL or GPL
      Version 2] license.* If you don't indicate a single choice of license, a
      recipient has the option to distribute your version of this file under
      either the CDDL, the GPL Version 2 or to extend the choice of license to
      its licensees as provided above. However, if you add GPL Version 2 code
      and therefore, elected the GPL Version 2 license, then the option applies
      only if the new code is made subject to such option by the copyright
      holder.
    </xsd:documentation>
  </xsd:annotation>
</xsd:schema>
```
This is the XML Schema for the Connector 1.7 deployment descriptor. The deployment descriptor must be named "META-INF/ra.xml" in the connector's rar file. All Connector deployment descriptors must indicate the connector resource adapter schema by using the Java EE namespace:

http://xmlns.jcp.org/xml/ns/javae
and by indicating the version of the schema by using the version element as shown below:

```xml
<connector xmlns="http://xmlns.jcp.org/xml/ns/javaee"
           xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
           xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee
                               http://xmlns.jcp.org/xml/ns/javaee/connector_1_7.xsd"
           version="1.7">
  ...
</connector>
```

The instance documents may indicate the published version of the schema using the xsi:schemaLocation attribute for Java EE namespace with the following location:

```xml
http://xmlns.jcp.org/xml/ns/javaee/connector_1_7.xsd
```

The following conventions apply to all Java EE deployment descriptor elements unless indicated otherwise.

- In elements that specify a pathname to a file within the same JAR file, relative filenames (i.e., those not starting with "/") are considered relative to the root of the JAR file's namespace. Absolute filenames (i.e., those starting with "/") also specify names in the root of the JAR file's namespace. In general, relative names are preferred. The exception is .war files where absolute names are preferred for consistency with the Servlet API.

```xml
<xs:annotation>
  <xs:documentation>
    The connector element is the root element of the deployment descriptor for the resource adapter. This element includes general information - vendor name, resource adapter version, icon - about the resource adapter module. It also includes information specific to the implementation of the resource adapter library as specified through the element resourceadapter.
  </xs:documentation>
</xs:annotation>
```
Appendix A. Schemas

```xml
<xs:element
    name="activationspecType">
    <xs:annotation>
        <xs:documentation>
            The activationspecType specifies an activation specification. The information includes fully qualified Java class name of an activation specification and a set of required configuration property names.
        </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element
            name="activationspec-class"
            type="javaee:fully-qualified-classType">
            <xs:annotation>
                <xs:documentation><![CDATA[
                The element activationspec-class specifies the fully qualified Java class name of the activation specification class. This class must implement the javax.resource.spi.ActivationSpec interface. The implementation of this class is required to be a JavaBean.
                Example:
                <activationspec-class>com.wombat.ActivationSpecImpl</activationspec-class>
            ]]]></xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element
        name="required-config-property"
        type="javaee:required-config-propertyType"
        minOccurs="0"
        maxOccurs="unbounded">
        <xs:annotation>
            <xs:documentation>
                The required-config-property element is deprecated since Connectors 1.6 specification. The resource adapter implementation is recommended to use the @NotNull Bean Validation annotation or its XML validation descriptor equivalent to indicate that a configuration property is required to be specified by the deployer. See the Connectors specification for more information.
            </xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element
        name="config-property"
        type="javaee:config-propertyType"
        minOccurs="0"
        maxOccurs="unbounded"/>
```
<xsd:complexType name="adminobjectType">
  <xsd:annotation>
    <xsd:documentation>
      The adminobjectType specifies information about an administered object. Administered objects are specific to a messaging style or message provider. This contains information on the Java type of the interface implemented by an administered object, its Java class name and its configuration properties.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="adminobject-interface" 
      type="javaee:fully-qualified-classType">
      <xsd:annotation>
        <xsd:documentation>
          <![CDATA[ 
            The element adminobject-interface specifies the fully qualified name of the Java type of the interface implemented by an administered object.
          ]]> 
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="adminobject-class" 
      type="javaee:fully-qualified-classType">
      <xsd:annotation>
        <xsd:documentation>
          <![CDATA[ 
            The element adminobject-class specifies the fully qualified Java class name of an administered object.
          ]]> 
        </xsd:documentation>
      </xsd:annotation>
    </xsd:element>
    <xsd:element name="config-property" 
      type="javaee:config-propertyType" 
      minOccurs="0" 
      maxOccurs="#unbounded"/>
  </xsd:sequence>
</xsd:complexType>
The authentication-mechanismType specifies an authentication mechanism supported by the resource adapter. Note that this support is for the resource adapter and not for the underlying EIS instance. The optional description specifies any resource adapter specific requirement for the support of security contract and authentication mechanism.

Note that BasicPassword mechanism type should support the javax.resource.spi.security.PasswordCredential interface. The KerbV5 mechanism type should support the org.ietf.jgss.GSSCredential interface or the deprecated javax.resource.spi.security.GenericCredential interface.

The example values are:

<authentication-mechanism-type>BasicPassword</authentication-mechanism-type>

<authentication-mechanism-type>KerbV5</authentication-mechanism-type>

Any additional security mechanisms are outside the scope of the Connector architecture specification.
The config-property-nameType contains the name of a configuration property.

The connector architecture defines a set of well-defined properties all of type java.lang.String. These are as follows.

ServerName
PortNumber
UserName
Password
ConnectionURL

A resource adapter provider can extend this property set to include properties specific to the resource adapter and its underlying EIS.

Possible values include
ServerName
PortNumber
UserName
Password
ConnectionURL

Example: <config-property-name>ServerName</config-property-name>

The config-property-typeType contains the fully qualified Java type of a configuration property.

The following are the legal values:
Appendix A. Schemas

Used in: config-property

Example:

```
<config-property-type>java.lang.String</config-property-type>
```

<!--  **************************************************** -->

```xml
<xsd:complexType name="config-propertyType">  
  <xsd:annotation>  
    <xsd:documentation>
      The config-propertyType contains a declaration of a single configuration property that may be used for providing configuration information.

      The declaration consists of an optional description, name, type and an optional value of the configuration property. If the resource adapter provider does not specify a value than the deployer is responsible for providing a valid value for a configuration property.

      Any bounds or well-defined values of properties should be described in the description element.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>  
    <xsd:element name="description" type="javaee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="config-property-name" type="javaee:config-property-nameType"/>
    <xsd:element name="config-property-type" type="javaee:config-property-typeType"/>
    <xsd:element name="config-property-value" type="javaee:xsdStringType" minOccurs="0"/>
  </xsd:sequence>  
</xsd:complexType>
```
The element config-property-value contains the value of a configuration entry. Note, it is possible for a resource adapter deployer to override this configuration information during deployment.

Example:
<config-property-value>WombatServer</config-property-value>

The element config-property-ignore is used to specify whether the configuration tools must ignore considering the configuration property during auto-discovery of Configuration properties. See the Connector specification for more details. If unspecified, the container must not ignore the configuration property during auto-discovery. This element must be one of the following, "true" or "false".

The element config-property-supports-dynamic-updates is used to specify whether the configuration property allows its value to be updated, by application server's configuration tools, during the lifetime of the JavaBean instance. See the Connector specification for more details. If unspecified, the container must not dynamically reconfigure the property. This element must be one of the following, "true" or "false".

The element config-property-confidential is used to specify whether the configuration property is confidential and recommends application server's configuration tools to use special
visual aids for editing them. See the Connector specification for more details. If unspecified, the container must not treat the property as confidential.
This element must be one of the following, "true" or "false".

</xsd:documentation>
</xsd:annotation>
</xsd:element>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  ****************************************************** -->
<xsd:complexType name="connection-definitionType">
<xsd:annotation>
<xsd:documentation>
The connection-definitionType defines a set of connection interfaces and classes pertaining to a particular connection type. This also includes configurable properties for ManagedConnectionFactory instances that may be produced out of this set.
</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
<xsd:element name="managedconnectionfactory-class" type="javaee:fully-qualified-classType"/>
<xsd:element name="config-property" type="javaee:config-propertyType" minOccurs="0" maxOccurs="unbounded"/>
</xsd:sequence>
<xsd:element name="connectionfactory-interface" type="javaee:fully-qualified-classType"/>
</xsd:complexType>

Example:
<managedconnectionfactory-class>
com.wombat.ManagedConnectionFactoryImpl
</managedconnectionfactory-class>

]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:element name="config-property" type="javaee:config-propertyType" minOccurs="0" maxOccurs="unbounded"/>
</xsd:sequence>
</xsd:complexType>
The element `connectionfactory-interface` specifies the fully qualified name of the ConnectionFactory interface supported by the resource adapter.

Example:
```
<connectionfactory-interface>com.wombat.ConnectionFactory</connectionfactory-interface>
```

OR
```
<connectionfactory-interface>javax.resource.cci.ConnectionFactory</connectionfactory-interface>
```

The element `connectionfactory-impl-class` specifies the fully qualified name of the ConnectionFactory class that implements resource adapter specific ConnectionFactory interface.

Example:
```
<connectionfactory-impl-class>com.wombat.ConnectionFactoryImpl</connectionfactory-impl-class>
```

The `connection-interface` element specifies the fully qualified name of the Connection interface supported by the resource adapter.

Example:
```
<connection-interface>javax.resource.cci.Connection</connection-interface>
```
Appendix A. Schemas

The connection-impl-classType specifies the fully qualified name of the Connection class that implements resource adapter specific Connection interface. It is used by the connection-impl-class elements.

Example:

```xml
<connection-impl-class>com.wombat.ConnectionImpl</connection-impl-class>
```

The connectorType defines a resource adapter.

```xml
<connectorType>
  <module-name type="javaee:string" minOccurs="0"/>
</connectorType>
```

The element module-name specifies the name of the resource adapter.

If there is no module-name specified, the module-name is determined as defined in Section EE.8.1.1 and EE.8.1.2 of the Java Platform, Enterprise Edition (Java EE) Specification, version 6.

The element vendor-name specifies the name of
resource adapter provider vendor.

If there is no vendor-name specified, the application server must consider the default "" (empty string) as the name of the resource adapter provider vendor.

</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:element name="eis-type"
    type="javaee:xsdsStringType"
    minOccurs="0">
<xsd:annotation>
<xsd:documentation>
The element eis-type contains information about the type of the EIS. For example, the type of an EIS can be product name of EIS independent of any version info.

This helps in identifying EIS instances that can be used with this resource adapter.

If there is no eis-type specified, the application server must consider the default "" (empty string) as the type of the EIS.

</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:element name="resourceadapter-version"
    type="javaee:xsdsStringType"
    minOccurs="0">
<xsd:annotation>
<xsd:documentation>
The element resourceadapter-version specifies a string-based version of the resource adapter from the resource adapter provider.

If there is no resourceadapter-version specified, the application server must consider the default "" (empty string) as the version of the resource adapter.

</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:element name="license"
    type="javaee:licenseType"
    minOccurs="0"/>
<xsd:element name="resourceadapter"
    type="javaee:resourceadapterType"/>
<xsd:element name="required-work-context"
    type="javaee:fully-qualified-classType"
    minOccurs="0"
    maxOccurs="unbounded">
<xsd:annotation>
<xsd:documentation>
The element required-work-context specifies a fully qualified class name that implements WorkContext interface, that the resource adapter requires the application server to support.

The version indicates the version of the schema to be used by the deployment tool. This element doesn't have a default, and the resource adapter developer/deployer is required to specify it. The element allows the deployment tool to choose which schema to validate the descriptor against.

The metadata-complete attribute defines whether the deployment descriptor for the resource adapter module is complete, or whether the class files available to the module and packaged with the resource adapter should be examined for annotations that specify deployment information.

If metadata-complete is set to "true", the deployment tool of the application server must ignore any annotations that specify deployment information, which might be present in the class files of the application. If metadata-complete is not specified or is set to "false", the deployment tool must examine the class files of the application for annotations, as specified by this specification. If the deployment descriptor is not included or is included but not marked metadata-complete, the deployment tool will process annotations.

Application servers must assume that metadata-complete is true for resource adapter modules with deployment descriptor version lower than 1.6.
The `credentia-interfaceType` specifies the interface that the resource adapter implementation supports for the representation of the credentials. This element(s) that use this type, i.e. credential-interface, should be used by application server to find out the Credential interface it should use as part of the security contract.

The possible values are:

- `javax.resource.spi.security.PasswordCredential`
- `org.ietf.jgss.GSSCredential`
- `javax.resource.spi.security.GenericCredential`

The `inbound-resourceadapterType` specifies information about an inbound resource adapter. This contains information specific to the implementation of the resource adapter library as specified through the messageadapter element.

The messagelistener-type element content must be unique in the messageadapter. Several messagelisteners cannot use the same messagelistener-type.
Appendix A. Schemas

```xml
<xsd:complexType name="licenseType">
  <xsd:annotation>
    <xsd:documentation>
      The licenseType specifies licensing requirements for the resource adapter module. This type specifies whether a license is required to deploy and use this resource adapter, and an optional description of the licensing terms (examples: duration of license, number of connection restrictions). It is used by the license element.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="description" type="javaee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="license-required" type="javaee:true-falseType"/>
  </xsd:sequence>
</xsd:complexType>

<xs:complexType name="messageadapterType">
  <xsd:annotation>
    <xsd:documentation>
      The messageadapterType specifies information about the messaging capabilities of the resource adapter. This contains information specific to the implementation of the resource adapter library as specified through the messagelistener element.
    </xsd:documentation>
  </xsd:annotation>
</xsd:complexType>
```

The licenseType specifies licensing requirements for the resource adapter module. This type specifies whether a license is required to deploy and use this resource adapter, and an optional description of the licensing terms (examples: duration of license, number of connection restrictions). It is used by the license element.

The messageadapterType specifies information about the messaging capabilities of the resource adapter. This contains information specific to the implementation of the resource adapter library as specified through the messagelistener element.
The messagelistenerType specifies information about a specific message listener supported by the messaging resource adapter. It contains information on the Java type of the message listener interface and an activation specification.

Example:

```xml
<messagelistener-type>javax.jms.MessageListener</messagelistener-type>
```
The outbound-resourceadapterType specifies information about an outbound resource adapter. The information includes fully qualified names of classes/interfaces required as part of the connector architecture specified contracts for connection management, level of transaction support provided, one or more authentication mechanisms supported and additional required security permissions.

If any of the outbound resource adapter elements (transaction-support, authentication-mechanism, reauthentication-support) is specified through this element or metadata annotations, and no connection-definition is specified as part of this element or through annotations, the application server must consider this an error and fail deployment.

If there is no authentication-mechanism specified as part of this element or metadata annotations, then the resource adapter does not support any standard security authentication mechanisms as part of security contract. The application server ignores the security part of the system contracts in this case.

If there is no transaction-support specified as part of this element or metadata annotation, then the application server must consider that the resource adapter does not support either the resource manager local or JTA transactions and must consider the transaction support as NoTransaction. Note that resource adapters may specify the level of transaction support to be used at runtime for a ManagedConnectionFactory through the TransactionSupport interface.

If there is no reauthentication-support specified as part of this element or metadata annotation, then the application server must consider that the resource adapter does not support re-authentication of ManagedConnections.

The element reauthentication-support specifies whether the resource adapter implementation supports re-authentication of existing Managed-Connection instance. Note that this information is for the resource adapter implementation and not for the
underlying EIS instance. This element must have either a "true" or "false" value.

</xsd:documentation>
</xsd:annotation>
</xsd:element>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->
<xsd:complexType name="required-config-propertyType">
<xsd:annotation>
<xsd:documentation><![CDATA[
The required-config-propertyType contains a declaration of a single configuration property used for specifying a required configuration property name. It is used by required-config-property elements.

Usage of this type is deprecated from Connectors 1.6 specification. Refer to required-config-property element for more information.

Example:

<required-config-property>
  <config-property-name>Destination</config-property-name>
</required-config-property>
]]></xsd:documentation>
</xsd:annotation>
<xsd:sequence>
<xsd:element name="description" type="javaee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="config-property-name" type="javaee:config-property-nameType"/>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->
<xsd:complexType name="resourceadapterType">
<xsd:annotation>
<xsd:documentation>
The resourceadapterType specifies information about the resource adapter. The information includes fully qualified resource adapter Java class name, configuration properties, information specific to the implementation of the resource

</xsd:documentation>
</xsd:annotation>
</xsd:complexType>
adapter library as specified through the outbound-resourceadapter and inbound-resourceadapter elements, and an optional set of administered objects.

</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:element name="config-property" type="javaee:config-propertyType" minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="outbound-resourceadapter" type="javaee:outbound-resourceadapterType" minOccurs="0"/>
<xsd:unique name="connectionfactory-interface-uniqueness">
<xsd:annotation>
<xsd:documentation>
The connectionfactory-interface element content must be unique in the outbound-resourceadapter. Multiple connection-definitions cannot use the same connectionfactory-type.
</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:selector xpath="javaee:connection-definition"/>
<xsd:field xpath="javaee:connectionfactory-interface-interface"/>
</xsd:unique>
</xsd:element>
<xsd:element name="inbound-resourceadapter" type="javaee:inbound-resourceadapterType" minOccurs="0"/>
<xsd:element name="adminobject" type="javaee:adminobjectType" minOccurs="0" maxOccurs="unbounded"/>
<xsd:unique name="adminobject-type-uniqueness">
<xsd:annotation>
<xsd:documentation>The adminobject-interface and adminobject-class element content must be unique in the resourceadapterType. Several admin objects
can not use the same adminobject-interface and adminobject-class.

</xsd:documentation>
</xsd:annotation>
<xsd:selector xpath="javaee:adminobject"/>
<xsd:field xpath="javaee:adminobject-interface"/>
<xsd:field xpath="javaee:adminobject-class"/>
</xsd:unique>
</xsd:element>
<xsd:element name="security-permission"
    type="javaee:security-permissionType"
    minOccurs="0"
    maxOccurs="unbounded"/>
</xsd:sequence>
<xsd:attribute name="id"
    type="xsd:ID"/>
</xsd:complexType>

<!--  ****************************************************** -->
<xsd:complexType name="security-permissionType">
    <xsd:annotation>
        <xsd:documentation>
The security-permissionType specifies a security permission that is required by the resource adapter code.

The security permission listed in the deployment descriptor are ones that are different from those required by the default permission set as specified in the connector specification. The optional description can mention specific reason that resource adapter requires a given security permission.

</xsd:documentation>
</xsd:annotation>
</xsd:complexType>

<xsd:element name="description"
    type="javaee:descriptionType"
    minOccurs="0"
    maxOccurs="unbounded"/>
<xsd:element name="security-permission-spec"
    type="javaee:xsd StringType">
</xsd:annotation>
</xsd:documentation>

The element security-permission-spec specifies a security permission based on the Security policy file syntax. Refer to the following URL for Sun's implementation of the security permission specification:

http://docs.oracle.com/javase/6/docs/technotes/guides/security/PolicyFiles.html

</xsd:documentation>
</xsd:annotation>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
</xsd:schema>

A.2. Java EE Connector Architecture 1.6

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns="http://www.w3.org/2001/XMLSchema"
    targetNamespace="http://java.sun.com/xml/ns/javaee"
    xmlns:javaee="http://java.sun.com/xml/ns/javaee"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified"
    attributeFormDefault="unqualified"
    version="1.6">
<xsd:annotation>
    <xsd:documentation>
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This is the XML Schema for the Connector 1.6 deployment descriptor. The deployment descriptor must be named "META-INF/ra.xml" in the connector's rar file. All Connector deployment descriptors must indicate the connector resource adapter schema by using the Java EE namespace:code and therefore, elected the GPL Version 2 license, then the option applies only if the new code is made subject to such option by the copyright holder.
http://java.sun.com/xml/ns/javaee

and by indicating the version of the schema by
using the version element as shown below:

```xml
<connector xmlns="http://java.sun.com/xml/ns/javaee"
xmns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
   http://java.sun.com/xml/ns/javaee/connector_1_6.xsd"
version="1.6">
   ...
</connector>
```

The instance documents may indicate the published version of
the schema using the xsi:schemaLocation attribute for Java EE
namespace with the following location:

```xml
http://java.sun.com/xml/ns/javaee/connector_1_6.xsd
```

The following conventions apply to all Java EE
deployment descriptor elements unless indicated otherwise.

- In elements that specify a path name to a file within the
  same JAR file, relative filenames (i.e., those not
  starting with "/") are considered relative to the root of
  the JAR file's namespace. Absolute filenames (i.e., those
  starting with "/") also specify names in the root of the
  JAR file's namespace. In general, relative names are
  preferred. The exception is .war files where absolute
  names are preferred for consistency with the Servlet API.

```xml
<xsd:include schemaLocation="javaee_6.xsd"/>
```

The connector element is the root element of the deployment
descriptor for the resource adapter. This element includes
general information - vendor name, resource adapter version,
icon - about the resource adapter module. It also includes
information specific to the implementation of the resource
adapter library as specified through the element
classRef.
The activationspecType specifies an activation specification. The information includes fully qualified Java class name of an activation specification and a set of required configuration property names.

Example:
<activationspec-class>com.wombat.ActivationSpecImpl</activationspec-class>

The required-config-property element is deprecated since Connectors 1.6 specification. The resource adapter implementation is recommended to use the @NotNull Bean Validation annotation or its XML validation descriptor equivalent to indicate that a configuration property is required to be specified by the deployer. See the Connectors specification for more information.
Appendix A. Schemas

```xml
<xs:complexType name="adminobjectType">
  <xs:annotation>
    <xs:documentation>
      The adminobjectType specifies information about an administered object. Administered objects are specific to a messaging style or message provider. This contains information on the Java type of the interface implemented by an administered object, its Java class name and its configuration properties.
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="adminobject-interface">
      <xs:annotation>
        <xs:documentation>
          The element adminobject-interface specifies the fully qualified name of the Java type of the interface implemented by an administered object.
        </xs:documentation>
      </xs:annotation>
      <xs:complexType name="fully-qualified-classType"/>
    </xs:element>
    <xs:element name="adminobject-class">
      <xs:annotation>
        <xs:documentation>
          The element adminobject-class specifies the fully qualified Java class name of an administered object.
        </xs:documentation>
      </xs:annotation>
      <xs:complexType name="fully-qualified-classType"/>
    </xs:element>
    <xs:element name="config-property">
      <xs:complexType name="javaee:config-propertyType" type="javaee:fully-qualified-classType" minOccurs="0" maxOccurs="unbounded"/>
      </xs:complexContent>
      </xs:complexType>
```

Example:

```xml
<adminobject-interface>javax.jms.Destination
</adminobject-interface>
```

```xml
<adminobject-class>com.wombat.DestinationImpl
</adminobject-class>
```

Example:

```xml
<config-property key="java-class" type="javaee:fully-qualified-classType">
```
The authentication-mechanismType specifies an authentication mechanism supported by the resource adapter. Note that this support is for the resource adapter and not for the underlying EIS instance. The optional description specifies any resource adapter specific requirement for the support of security contract and authentication mechanism.

Note that BasicPassword mechanism type should support the javax.resource.spi.security.PasswordCredential interface. The Kerbv5 mechanism type should support the org.ietf.jgss.GSSCredential interface or the deprecated javax.resource.spi.security.GenericCredential interface.

The element authentication-mechanism-type specifies type of an authentication mechanism.

The example values are:

<authentication-mechanism-type>BasicPassword</authentication-mechanism-type>

<authentication-mechanism-type>Kerbv5</authentication-mechanism-type>

Any additional security mechanisms are outside the scope of the Connector architecture specification.
The config-property-nameType contains the name of a configuration property.

The connector architecture defines a set of well-defined properties all of type java.lang.String. These are as follows.

ServerName
PortNumber
UserName
Password
ConnectionURL

A resource adapter provider can extend this property set to include properties specific to the resource adapter and its underlying EIS.

Possible values include
ServerName
PortNumber
UserName
Password
ConnectionURL

Example: <config-property-name>ServerName</config-property-name>
java.lang.Double, java.lang.Byte, java.lang.Short,
java.lang.Long, java.lang.Float, java.lang.Character

Used in: config-property

Example:
<config-property-type>java.lang.String</config-property-type>

]}>
</xsd:documentation>
</xsd:annotation>
</xsd:simpleContent>
<xsd:restriction base="javaee:string">
<xsd:enumeration value="java.lang.Boolean"/>
<xsd:enumeration value="java.lang.String"/>
<xsd:enumeration value="java.lang.Integer"/>
<xsd:enumeration value="java.lang.Double"/>
<xsd:enumeration value="java.lang.Byte"/>
<xsd:enumeration value="java.lang.Short"/>
<xsd:enumeration value="java.lang.Long"/>
<xsd:enumeration value="java.lang.Float"/>
<xsd:enumeration value="java.lang.Character"/>
</xsd:restriction>
</xsd:simpleContent>
</xsd:complexType>

<!--  ***************************************************** -->
<xsd:complexType name="config-propertyType">
<xsd:annotation>
<xsd:documentation>
The config-propertyType contains a declaration of a single
configuration property that may be used for providing
configuration information.

The declaration consists of an optional description, name,
type and an optional value of the configuration property. If
the resource adapter provider does not specify a value than
the deployer is responsible for providing a valid value for
a configuration property.

Any bounds or well-defined values of properties should be
described in the description element.

</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
<xsd:element name="description"

type="javaee:descriptionType"

minOccurs="0"

maxOccurs="unbounded"/>
<xsd:element name="config-property-name"

type="javaee:config-property-nameType"/>
<xsd:element name="config-property-type"

type="javaee:config-property-typeType"/>
<xsd:element name="config-property-value"

type="javaee:xsdStringType"
The element config-property-value contains the value of a configuration entry. Note, it is possible for a resource adapter deployer to override this configuration information during deployment.

Example:
<config-property-value>WombatServer</config-property-value>

The element config-property-ignore is used to specify whether the configuration tools must ignore considering the configuration property during auto-discovery of Configuration properties. See the Connector specification for more details. If unspecified, the container must not ignore the configuration property during auto-discovery. This element must be one of the following, "true" or "false".

The element config-property-supports-dynamic-updates is used to specify whether the configuration property allows its value to be updated, by application server's configuration tools, during the lifetime of the JavaBean instance. See the Connector specification for more details. If unspecified, the container must not dynamically reconfigure the property. This element must be one of the following, "true" or "false".

The element config-property-confidential is used to specify whether the configuration property is confidential. This element must be one of the following, "true" or "false".
The element `config-property-confidential` is used to specify whether the configuration property is confidential and recommends application server's configuration tools to use special visual aids for editing them. See the Connector specification for more details. If unspecified, the container must not treat the property as confidential. This element must be one of the following, "true" or "false".

```xml
</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:attribute name="id"
    type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->

<xsd:complexType name="connection-definitionType">
    <xsd:annotation>
        <xsd:documentation>
The connection-definitionType defines a set of connection interfaces and classes pertaining to a particular connection type. This also includes configurable properties for ManagedConnectionFactory instances that may be produced out of this set.

</xsd:documentation>
</xsd:annotation>
<xsd:sequence>
    <xsd:element name="managedconnectionfactory-class"
        type="javaee:fully-qualified-classType"/>
    <xsd:annotation>
        <![CDATA[
The element managedconnectionfactory-class specifies the fully qualified name of the Java class that implements the javax.resource.spi.ManagedConnectionFactory interface. This Java class is provided as part of resource adapter's implementation of connector architecture specified contracts. The implementation of this class is required to be a JavaBean.

Example:
<managedconnectionfactory-class>
    com.wombat.ManagedConnectionFactoryImpl
</managedconnectionfactory-class>
]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xsd:element name="config-property"
    type="javaee:config-propertyType"
    minOccurs="0"
    maxOccurs="unbounded"/>
```
Appendix A. Schemas

<xsd:element name="connectionfactory-interface" type="javaee:fully-qualified-classType">
  <xsd:annotation>
    <xsd:documentation><![CDATA[
The element connectionfactory-interface specifies the fully qualified name of the ConnectionFactory interface supported by the resource adapter.

Example:
<connectionfactory-interface>com.wombat.ConnectionFactory</connectionfactory-interface>

OR

<connectionfactory-interface>javax.resource.cci.ConnectionFactory</connectionfactory-interface>
]]></xsd:documentation>
  </xsd:annotation>
</xsd:element>

<xsd:element name="connectionfactory-impl-class" type="javaee:fully-qualified-classType">
  <xsd:annotation>
    <xsd:documentation><![CDATA[
The element connectionfactory-impl-class specifies the fully qualified name of the ConnectionFactory class that implements resource adapter specific ConnectionFactory interface.

Example:
<connectionfactory-impl-class>com.wombat.ConnectionFactoryImpl</connectionfactory-impl-class>
]]></xsd:documentation>
  </xsd:annotation>
</xsd:element>

<xsd:element name="connection-interface" type="javaee:fully-qualified-classType">
  <xsd:annotation>
    <xsd:documentation><![CDATA[
The connection-interface element specifies the fully qualified name of the Connection interface supported by the resource adapter.

Example:
<connection-interface>javax.resource.cci.Connection</connection-interface>
]]></xsd:documentation>
  </xsd:annotation>
</xsd:element>
The connection-impl-classType specifies the fully qualified name of the Connection class that implements resource adapter specific Connection interface. It is used by the connection-impl-class elements.

Example:

```xml
<connection-impl-class>com.wombat.ConnectionImpl</connection-impl-class>
```

The connectorType defines a resource adapter.

The element module-name specifies the name of the resource adapter.

If there is no module-name specified, the module-name is determined as defined in Section EE.8.1.1 and EE.8.1.2 of the Java Platform, Enterprise Edition (Java EE) Specification, version 6.
The element vendor-name specifies the name of resource adapter provider vendor.

If there is no vendor-name specified, the application server must consider the default "" (empty string) as the name of the resource adapter provider vendor.

The element eis-type contains information about the type of the EIS. For example, the type of an EIS can be product name of EIS independent of any version info.

This helps in identifying EIS instances that can be used with this resource adapter.

If there is no eis-type specified, the application server must consider the default "" (empty string) as the type of the EIS.

The element resourceadapter-version specifies a string-based version of the resource adapter from the resource adapter provider.

If there is no resourceadapter-version specified, the application server must consider the default "" (empty string) as the version of the resource adapter.
maxOccurs="unbounded">
  <xsd:annotation>
    <xsd:documentation>
      The element required-work-context specifies a fully qualified class
      name that implements WorkContext interface, that the resource adapter
      requires the application server to support.
    </xsd:documentation>
  </xsd:annotation>
</xsd:element>
</xsd:sequence>
<xsd:attribute
  name="version"
  type="javaee:dewey-versionType"
  fixed="1.6"
  use="required">
  <xsd:annotation>
    <xsd:documentation>
      The version indicates the version of the schema to be used by the
      deployment tool. This element doesn't have a default, and the resource adapter
      developer/deployer is required to specify it. The element allows the deployment
      tool to choose which schema to validate the descriptor against.
    </xsd:documentation>
  </xsd:annotation>
</xsd:attribute>
<xsd:attribute
  name="metadata-complete"
  type="xsd:boolean">
  <xsd:annotation>
    <xsd:documentation>
      The metadata-complete attribute defines whether the deployment
      descriptor for the resource adapter module is complete, or whether
      the class files available to the module and packaged with the resource
      adapter should be examined for annotations that specify deployment
      information.

      If metadata-complete is set to "true", the deployment tool of the
      application server must ignore any annotations that specify deployment
      information, which might be present in the class files of the
      application. If metadata-complete is not specified or is set to "false",
      the deployment tool must examine the class files of the application for
      annotations, as specified by this specification. If the
      deployment descriptor is not included or is included but not marked
      metadata-complete, the deployment tool will process annotations.

      Application servers must assume that metadata-complete is true for
      resource adapter modules with deployment descriptor version
      lower than 1.6.
    </xsd:documentation>
  </xsd:annotation>
</xsd:attribute>
<xsd:attribute
  name="id"
  type="xsd:ID"/>
</xsd:complexType>
Appendix A. Schemas

<!--  ***************************************************** -->
<xsd:complexType name="credential-interfaceType">
  <xsd:annotation>
    <xsd:documentation>
The credential-interfaceType specifies the interface that the resource adapter implementation supports for the representation of the credentials. This element(s) that use this type, i.e. credential-interface, should be used by application server to find out the Credential interface it should use as part of the security contract.

The possible values are:

javax.resource.spi.security.PasswordCredential
org.ietf.jgss.GSSCredential
javax.resource.spi.security.GenericCredential

</xsd:documentation>
  </xsd:annotation>
  <xsd:simpleContent>
    <xsd:restriction base="javaee:fully-qualified-classType">
      <xsd:enumeration value="javax.resource.spi.security.PasswordCredential"/>
      <xsd:enumeration value="org.ietf.jgss.GSSCredential"/>
      <xsd:enumeration value="javax.resource.spi.security.GenericCredential"/>
    </xsd:restriction>
  </xsd:simpleContent>
</xsd:complexType>

<!--  ***************************************************** -->
<xsd:complexType name="inbound-resourceadapterType">
  <xsd:annotation>
    <xsd:documentation>
The inbound-resourceadapterType specifies information about an inbound resource adapter. This contains information specific to the implementation of the resource adapter library as specified through the messageadapter element.

</xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="messageadapter" type="javaee:messageadapterType" minOccurs="0">
      <xsd:unique name="messageadapter-type-uniqueness"></xsd:unique>
    </xsd:element>
  </xsd:sequence>
</xsd:complexType>

The messagelistener-type element content must be unique in the messageadapter. Several messagelisteners can not use the same messagelistener-type.
<xsd:complexType name="licenseType">
  <xsd:documentation>
    The licenseType specifies licensing requirements for the resource adapter module. This type specifies whether a license is required to deploy and use this resource adapter, and an optional description of the licensing terms (examples: duration of license, number of connection restrictions). It is used by the license element.
  </xsd:documentation>
  <xsd:sequence>
    <xsd:element name="description" type="javaee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="license-required" type="javaee:true-falseType"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!-- ************************************************************************************************ -->

<xsd:complexType name="messageadapterType">
  <xsd:documentation>
    The messageadapterType specifies information about the messaging capabilities of the resource adapter. This
Appendix A. Schemas

contains information specific to the implementation of the resource adapter library as specified through the messagelistener element.

</xsd:documentation>
</xsd:annotation>
</xsd:sequence>
<xsd:element name="messagelistener"
    type="javaee:messagelistenerType"
    maxOccurs="unbounded"/>
</xsd:sequence>
<xsd:attribute name="id"
    type="xsd:ID"/>
</xsd:complexType>

<!--  ***************************************************** -->
<xsd:complexType name="messagelistenerType">
    <xsd:annotation>
        <xsd:documentation>
            The messagelistenerType specifies information about a specific message listener supported by the messaging resource adapter. It contains information on the Java type of the message listener interface and an activation specification.
        </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
        <xsd:element name="messagelistener-type"
            type="javaee:fully-qualified-classType">
            <xsd:annotation>
                <xsd:documentation><![CDATA[
                    The element messagelistener-type specifies the fully qualified name of the Java type of a message listener interface.
                ]]></xsd:documentation>
            </xsd:annotation>
        </xsd:element>
        <xsd:element name="activationspec"
            type="javaee:activationspecType"/>
    </xsd:sequence>
    <xsd:attribute name="id"
        type="xsd:ID"/>
</xsd:complexType>

<!--  ***************************************************** -->
<xsd:complexType name="outbound-resourceadapterType">
  <xsd:annotation>
    <xsd:documentation>
      The outbound-resourceadapterType specifies information about an outbound resource adapter. The information includes fully qualified names of classes/interfaces required as part of the connector architecture specified contracts for connection management, level of transaction support provided, one or more authentication mechanisms supported and additional required security permissions.

      If any of the outbound resource adapter elements (transaction-support, authentication-mechanism, reauthentication-support) is specified through this element or metadata annotations, and no connection-definition is specified as part of this element or through annotations, the application server must consider this an error and fail deployment.

      If there is no authentication-mechanism specified as part of this element or metadata annotations, then the resource adapter does not support any standard security authentication mechanisms as part of security contract. The application server ignores the security part of the system contracts in this case.

      If there is no transaction-support specified as part of this element or metadata annotation, then the application server must consider that the resource adapter does not support either the resource manager local or JTA transactions and must consider the transaction support as NoTransaction. Note that resource adapters may specify the level of transaction support to be used at runtime for a ManagedConnectionFactory through the TransactionSupport interface.

      If there is no reauthentication-support specified as part of this element or metadata annotation, then the application server must consider that the resource adapter does not support re-authentication of ManagedConnections.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="connection-definition"
      type="javaee:connection-definitionType"
      maxOccurs="unbounded"
      minOccurs="0"/>
    <xsd:element name="transaction-support"
      type="javaee:transaction-supportType"
      minOccurs="0"/>
    <xsd:element name="authentication-mechanism"
      type="javaee:authentication-mechanismType"
      minOccurs="0"
      maxOccurs="unbounded"/>
    <xsd:element name="reauthentication-support"
      type="javaee:true-falseType"
      minOccurs="0"/>
  </xsd:sequence>
  <xsd:annotation>
    <xsd:documentation>
      The element reauthentication-support specifies whether the resource adapter implementation supports
Appendix A. Schemas

Re-authentication of existing Managed-Connection instance. Note that this information is for the resource adapter implementation and not for the underlying EIS instance. This element must have either a "true" or "false" value.

```xml
<xs:complexType name="required-config-propertyType">
  <xs:annotation>
    <xs:documentation><![CDATA[
      The required-config-propertyType contains a declaration of a single configuration property used for specifying a required configuration property name. It is used by required-config-property elements.

      Usage of this type is deprecated from Connectors 1.6 specification. Refer to required-config-property element for more information.

      Example:

      <required-config-property>
        <config-property-name>Destination</config-property-name>
      </required-config-property>
    ]]>]
  </xs:documentation>
  <xs:sequence>
    <xs:element name="description" type="javaee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="config-property-name" type="javaee:config-property-nameType"/>
  </xs:sequence>
  <xs:attribute name="id" type="xs:ID"/>
</xs:complexType>
```

The resourceadapterType specifies information about the...
resource adapter. The information includes fully qualified resource adapter Java class name, configuration properties, information specific to the implementation of the resource adapter library as specified through the outbound-resourceadapter and inbound-resourceadapter elements, and an optional set of administered objects.

The element resourceadapter-class specifies the fully qualified name of a Java class that implements the javax.resource.spi.ResourceAdapter interface. This Java class is provided as part of resource adapter's implementation of connector architecture specified contracts. The implementation of this class is required to be a JavaBean.

The connectionfactory-interface element content must be unique in the outbound-resourceadapter. Multiple connection-definitions can not use the same connectionfactory-type.

The inbound-resourceadapter and adminobject elements allow for the specification of additional Java objects to be used by the resource adapter.
The adminobject-interface and adminobject-class element content must be unique in the resourceadapterType. Several admin objects can not use the same adminobject-interface and adminobject-class.

```xml
<xs:complexType name="security-permissionType">
  <xs:annotation>
    <xs:documentation>
      The security-permissionType specifies a security permission that is required by the resource adapter code.

      The security permission listed in the deployment descriptor are ones that are different from those required by the default permission set as specified in the connector specification. The optional description can mention specific reason that resource adapter requires a given security permission.
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="description" type="javaee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="security-permission-spec" type="javaee:xsdStringType" />
  </xs:sequence>
</xs:complexType>
```

The element security-permission-spec specifies a security permission based on the Security policy file syntax. Refer to the following URL for Sun's implementation of the security permission specification:

http://java.sun.com/javase/6/docs/technotes/guides/security/PolicyFiles.html
A.3. Java EE Connector Architecture 1.5
This is the XML Schema for the Connector 1.5 deployment descriptor. The deployment descriptor must be named "META-INF/ra.xml" in the connector's rar file. All Connector deployment descriptors must indicate the connector resource adapter schema by using the J2EE namespace:

http://java.sun.com/xml/ns/j2ee

and by indicating the version of the schema by using the version element as shown below:
The instance documents may indicate the published version of the schema using the xsi:schemaLocation attribute for J2EE namespace with the following location:

http://java.sun.com/xml/ns/j2ee/connector_1_5.xsd

The following conventions apply to all J2EE deployment descriptor elements unless indicated otherwise.

- In elements that specify a pathname to a file within the same JAR file, relative filenames (i.e., those not starting with "/") are considered relative to the root of the JAR file's namespace. Absolute filenames (i.e., those starting with "/") also specify names in the root of the JAR file's namespace. In general, relative names are preferred. The exception is .war files where absolute names are preferred for consistency with the Servlet API.
Appendix A. Schemas

<!--  **************************************************** -->
<xsd:complexType name="activationspecType">
  <xsd:annotation>
    <xsd:documentation>
      The activationspecType specifies an activation specification. The information includes fully qualified Java class name of an activation specification and a set of required configuration property names.
    </xsd:documentation>
  </xsd:annotation>

  <xsd:sequence>
    <xsd:element name="activationspec-class"
      type="j2ee:fully-qualified-classType">
      <xsd:annotation>
        <xsd:documentation>
          The element activationspec-class specifies the fully qualified Java class name of the activation specification class. This class must implement the javax.resource.spi.ActivationSpec interface. The implementation of this class is required to be a JavaBean.
        </xsd:documentation>
      </xsd:annotation>
      <![CDATA[

        The element activationspec-class specifies the fully qualified Java class name of the activation specification class. This class must implement the javax.resource.spi.ActivationSpec interface. The implementation of this class is required to be a JavaBean.

        Example:
        <activationspec-class>com.wombat.ActivationSpecImpl</activationspec-class>

      ]]>}
    </xsd:element>
    <xsd:element name="required-config-property"
      type="j2ee:required-config-propertyType"
      minOccurs="0"
      maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->
<xsd:complexType name="adminobjectType">
  <xsd:annotation>
    <xsd:documentation>
      The adminobjectType specifies information about an administered object. Administered objects are specific to a messaging style or message provider. This contains information on the Java type of the interface implemented by an administered object, its Java class name and its configuration properties.
    </xsd:documentation>
  </xsd:annotation>
</xsd:complexType>
<xsd:sequence>
  <xsd:element name="adminobject-interface"
               type="j2ee:fully-qualified-classType">
    <xsd:annotation>
      <xsd:documentation><![CDATA[
The element adminobject-interface specifies the fully qualified name of the Java type of the interface implemented by an administered object.

Example:
<adminobject-interface>javax.jms.Destination</adminobject-interface>
]]></xsd:documentation>
  </xsd:annotation>
</xsd:element>
  <xsd:element name="adminobject-class"
               type="j2ee:fully-qualified-classType">
    <xsd:annotation>
      <xsd:documentation><![CDATA[
The element adminobject-class specifies the fully qualified Java class name of an administered object.

Example:
<adminobject-class>com.wombat.DestinationImpl</adminobject-class>
]]></xsd:documentation>
    </xsd:annotation>
</xsd:element>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->
<xsd:complexType name="authentication-mechanismType">
  <xsd:annotation>
    <xsd:documentation>
The authentication-mechanismType specifies an authentication mechanism supported by the resource adapter. Note that this support is for the resource adapter and not for the underlying EIS instance. The optional description specifies any resource adapter specific requirement for the support of security contract and authentication mechanism.
    </xsd:documentation>
  </xsd:annotation>
</xsd:complexType>
Note that BasicPassword mechanism type should support the
javax.resource.spi.security.PasswordCredential interface.
The Kerb5 mechanism type should support the
org.ietaf.jgss.GSSCredential interface or the deprecated
javax.resource.spi.security.GenericCredential interface.

</xsd:documentation>
</xsd:annotation>

</xsd:sequence>
<xsd:element name="description" type="j2ee:descriptionType"
minOccurs="0"
maxOccurs="unbounded"/>
<xsd:element name="authentication-mechanism-type" type="j2ee:xsdStringType"/>
<xsd:element name="credential-interface" type="j2ee:credential-interfaceType"/>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!|--  **************************************************** -->

<xsd:complexType name="config-property-nameType">
<xsd:annotation>
<xsd:documentation>
The config-property-nameType contains the name of a
configuration property.

The connector architecture defines a set of well-defined
properties all of type java.lang.String. These are as
follows.
A resource adapter provider can extend this property set to include properties specific to the resource adapter and its underlying EIS.

Possible values include
ServerName
PortNumber
UserName
Password
ConnectionURL

Example: &lt;config-property-name&gt;ServerName&lt;/config-property-name&gt;

The config-property-typeType contains the fully qualified Java type of a configuration property.

The following are the legal values:
java.lang.Boolean, java.lang.String, java.lang.Integer,
java.lang.Double, java.lang.Byte, java.lang.Short,
java.lang.Long, java.lang.Float, java.lang.Character

Used in: config-property

Example:
&lt;config-property-type&gt;java.lang.String&lt;/config-property-type&gt;
The config-propertyType contains a declaration of a single configuration property that may be used for providing configuration information.

The declaration consists of an optional description, name, type and an optional value of the configuration property. If the resource adapter provider does not specify a value than the deployer is responsible for providing a valid value for a configuration property.

Any bounds or well-defined values of properties should be described in the description element.

The element config-property-value contains the value of a configuration entry. Note, it is possible for a resource adapter deployer to override this configuration information during deployment.

Example:
<config-property-value>WombatServer</config-property-value>
The connection-definitionType defines a set of connection interfaces and classes pertaining to a particular connection type. This also includes configurable properties for ManagedConnectionFactory instances that may be produced out of this set.

The element managedConnectionFactory-class specifies the fully qualified name of the Java class that implements the javax.resource.spi.ManagedConnectionFactory interface. This Java class is provided as part of resource adapter's implementation of connector architecture specified contracts. The implementation of this class is required to be a JavaBean.

Example:
<managedConnectionFactory-class>
com.wombat.ManagedConnectionFactoryImpl
</managedConnectionFactory-class>

The element connectionFactory-interface specifies the fully qualified name of the ConnectionFactory interface supported by the resource adapter.

Example:
<connectionFactory-interface>com.wombat.ConnectionFactory
</connectionFactory-interface>
Appendix A. Schemas

OR

<connectionfactory-interface>javax.resource.cci.ConnectionFactory</connectionfactory-interface>

]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="connectionfactory-impl-class"
type="j2ee:fully-qualified-classType">
<xsd:annotation>
<xsd:documentation>
<![CDATA[
The element connectionfactory-impl-class specifies the fully qualified name of the ConnectionFactory class that implements resource adapter specific ConnectionFactory interface.

Example:

<connectionfactory-impl-class>com.wombat.ConnectionFactoryImpl</connectionfactory-impl-class>

]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="connection-interface"
type="j2ee:fully-qualified-classType">
<xsd:annotation>
<xsd:documentation>
<![CDATA[
The connection-interface element specifies the fully qualified name of the Connection interface supported by the resource adapter.

Example:

<connection-interface>javax.resource.cci.Connection</connection-interface>

]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="connection-impl-class"
type="j2ee:fully-qualified-classType">
<xsd:annotation>
<xsd:documentation>
<![CDATA[
The connection-impl-classType specifies the fully qualified name of the Connection class that implements resource adapter specific Connection interface. It is used by the connection-impl-class

]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>
elements.

Example:

```xml
<connection-impl-class>com.wombat.ConnectionImpl</connection-impl-class>
```

The `connectorType` defines a resource adapter.

```xml
<xsd:complexType name="connectorType">
  <xsd:annotation>
    <xsd:documentation>
      The element vendor-name specifies the name of
      resource adapter provider vendor.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:element name="vendor-name" type="j2ee:xsdStringType">
    <xsd:annotation>
      <xsd:documentation>
        The element eis-type contains information about the
        type of the EIS. For example, the type of an EIS can
        be product name of EIS independent of any version info.
        This helps in identifying EIS instances that can be
        used with this resource adapter.
      </xsd:documentation>
    </xsd:annotation>
  </xsd:element>
</xsd:complexType>
```

<!--  **************************************************** -->
Appendix A. Schemas

The element resourceadapter-version specifies a string-based version of the resource adapter from the resource adapter provider.

</xsd:documentation>
</xsd:annotation>

</xsd:element>
<xsd:element name="license"
type="j2ee:licenseType"
minOccurs="0"/>
<xsd:element name="resourceadapter"
type="j2ee:resourceadapterType"/>
</xsd:sequence>
<xsd:attribute name="version"
type="j2ee:dewey-versionType"
fixed="1.5"
use="required">
</xsd:annotation>
</xsd:documentation>

The version specifies the version of the connector architecture specification that is supported by this resource adapter. This information enables deployer to configure the resource adapter to support deployment and runtime requirements of the corresponding connector architecture specification.

</xsd:documentation>
</xsd:annotation>
</xsd:attribute>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->

<xsd:complexType name="credential-interfaceType">
<xsd:annotation>
<xsd:documentation>
The credential-interfaceType specifies the interface that the resource adapter implementation supports for the representation of the credentials. This element(s) that use this type, i.e. credential-interface, should be used by application server to find out the Credential interface it should use as part of the security contract.

The possible values are:

javax.resource.spi.security.PasswordCredential
org.ietf.jgss.GSSCredential
javax.resource.spi.security.GenericCredential
</xsd:documentation>
</xsd:annotation>
<xsd:simpleContent>
  <xsd:restriction base="j2ee:fully-qualified-classType">
    <xsd:enumeration value="javax.resource.spi.security.PasswordCredential"/>
    <xsd:enumeration value="org.ietf.jgss.GSSCredential"/>
    <xsd:enumeration value="javax.resource.spi.security.GenericCredential"/>
  </xsd:restriction>
</xsd:simpleContent>

<xsds:complexType name="inbound-resourceadapterType">
  <xsd:annotation>
    <xsd:documentation>
      The inbound-resourceadapterType specifies information about an inbound resource adapter. This contains information specific to the implementation of the resource adapter library as specified through the messageadapter element.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="messageadapter"
      type="j2ee:messageadapterType"
      minOccurs="0"/>
    <xsd:unique name="messagelistener-type-uniqueness">
      <xsd:annotation>
        <xsd:documentation>
          The messagelistener-type element content must be unique in the messageadapter. Several messagelisteners cannot use the same messagelistener-type.
        </xsd:documentation>
      </xsd:annotation>
      <xsd:selector xpath="j2ee:messagelistener"/>
      <xsd:field xpath="j2ee:messagelistener-type"/>
    </xsd:unique>
  </xsd:sequence>
  <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<xsds:complexType name="licenseType">
  <xsd:annotation>
    <xsd:documentation>
      The licenseType specifies licensing requirements for the resource adapter module. This type specifies whether a license is required to deploy and use this resource adapter, and an optional description of the licensing terms (examples: duration of license, number of connection
Appendix A. Schemas

172

The message adapter type specifies information about the message adapter. It is used by the license element.

```
<xs:complexType name="messageadapterType">
  <xs:annotation>
    <xs:documentation>
The element message-adapter specifies the message adapter name.

message-adapter is optional. If present, it must be one of the message adapters supported by the messaging system. It is used by the license element.

```

```
<xs:complexType name="messagelistenerType">
  <xs:annotation>
    <xs:documentation>
The message listener type specifies information about the message listener. It supports the JMS specification and the JTA specification. It is used by the license element.

```

```
<xs:complexType name="messageadapterType">
  <xs:annotation>
    <xs:documentation>
The element message-adapter specifies the message adapter name.

message-adapter is optional. If present, it must be one of the message adapters supported by the messaging system. It is used by the license element.

```

```
<xs:complexType name="messagelistenerType">
  <xs:annotation>
    <xs:documentation>
The message listener type specifies information about the message listener. It supports the JMS specification and the JTA specification. It is used by the license element.

```

```
<xs:complexType name="messageadapterType">
  <xs:annotation>
    <xs:documentation>
The element message-adapter specifies the message adapter name.

message-adapter is optional. If present, it must be one of the message adapters supported by the messaging system. It is used by the license element.

```
of the message listener interface and an activation specification.

</xsd:documentation>
</xsd:annotation>

<xsd:sequence>
  <xsd:element name="messagelistener-type"
      type="j2ee:fully-qualified-classType">
    <xsd:documentation>
      The element messagelistener-type specifies the fully qualified name of the Java type of a message listener interface.

      Example:

      <messagelistener-type>javax.jms.MessageListener</messagelistener-type>
    </xsd:documentation>
  </xsd:element>
  <xsd:element name="activationspec"
      type="j2ee:activationspecType"/>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>

<!--  **************************************************** -->

<xsd:complexType name="outbound-resourceadapterType">
  <xsd:annotation>
    <xsd:documentation>
      The outbound-resourceadapterType specifies information about an outbound resource adapter. The information includes fully qualified names of classes/interfaces required as part of the connector architecture specified contracts for connection management, level of transaction support provided, one or more authentication mechanisms supported and additional required security permissions.

      If there is no authentication-mechanism specified as part of resource adapter element then the resource adapter does not support any standard security authentication mechanisms as part of security contract. The application server ignores the security part of the system contracts in this case.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="connection-definition"
      type="j2ee:connection-definitionType"
Appendix A. Schemas

```xml
maxOccurs="unbounded"/>
<xsd:element name="transaction-support"
    type="j2ee:transaction-supportType"/>
<xsd:element name="authentication-mechanism"
    type="j2ee:authentication-mechanismType"
    minOccurs="0"
    maxOccurs="unbounded"/>
<xsd:element name="reauthentication-support"
    type="j2ee:true-falseType">
    <xsd:annotation>
        <xsd:documentation>
The element reauthentication-support specifies whether the resource adapter implementation supports re-authentication of existing Managed-Connection instance. Note that this information is for the resource adapter implementation and not for the underlying EIS instance. This element must have either a "true" or "false" value.
    </xsd:documentation>
</xsd:annotation>
</xsd:element>
</xsd:sequence>
<xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
<!--  **************************************************** -->
<xsd:complexType name="required-config-propertyType">
    <xsd:annotation>
        <xsd:documentation>
            <![CDATA[
The required-config-propertyType contains a declaration of a single configuration property used for specifying a required configuration property name. It is used by required-config-property elements.

Example:
<required-config-property>Destination</required-config-property>
]]>
        </xsd:documentation>
    </xsd:annotation>
    <xsd:sequence>
        <xsd:element name="description"
            type="j2ee:descriptionType"
            minOccurs="0"
            maxOccurs="unbounded"/>
        <xsd:element name="config-property-name"
            type="j2ee:config-property-nameType"/>
    </xsd:sequence>
    <xsd:attribute name="id" type="xsd:ID"/>
</xsd:complexType>
```
<xsd:complexType name="resourceadapterType">
    <xsd:annotation>
        <xsd:documentation>
            The resourceadapterType specifies information about the resource adapter. The information includes fully qualified resource adapter Java class name, configuration properties, information specific to the implementation of the resource adapter library as specified through the outbound-resourceadapter and inbound-resourceadapter elements, and an optional set of administered objects.
        </xsd:documentation>
    </xsd:annotation>

    <xsd:sequence>
        <xsd:element name="resourceadapter-class" type="j2ee:fully-qualified-classType" minOccurs="0"/>
        <xsd:element name="config-property" type="j2ee:config-propertyType" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:element name="outbound-resourceadapter" type="j2ee:outbound-resourceadapterType" minOccurs="0"/>
    </xsd:sequence>

    The element resourceadapter-class specifies the fully qualified name of a Java class that implements the javax.resource.spi.ResourceAdapter interface. This Java class is provided as part of resource adapter’s implementation of connector architecture specified contracts. The implementation of this class is required to be a JavaBean.

    The connectionfactory-interface element content must be unique in the outbound-resourceadapter. Multiple connection-definition can not use the same connectionfactory-type.
Appendix A. Schemas

```xml
<xs:complexType name="j2ee:adminobjectType">
  <xs:sequence>
    <xs:element name="adminobject" type="j2ee:adminobjectType" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="security-permission" type="j2ee:security-permissionType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="id" type="xsd:ID"/>
</xs:complexType>

<!--  **************************************************** -->

<xs:complexType name="security-permissionType">
  <xs:annotation>
    <xs:documentation>
      The security-permissionType specifies a security permission that is required by the resource adapter code.

      The security permission listed in the deployment descriptor are ones that are different from those required by the default permission set as specified in the connector specification. The optional description can mention specific reason that resource adapter requires a given security permission.
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="description" type="j2ee:descriptionType" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="security-permission-spec" type="j2ee:xsdStringType">
      <xs:annotation>
        <xs:documentation>
          The element security-permission-spec specifies a security permission based on the Security policy file syntax. Refer to the following URL for Sun's implementation of the security permission specification:
          http://java.sun.com/products/jdk/1.4/docs/guide/security/PolicyFiles.html#FileSyntax
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="id" type="xsd:ID"/>
</xs:complexType>

<!--  **************************************************** -->
```

The security-permissionType specifies a security permission that is required by the resource adapter code.

The security permission listed in the deployment descriptor are ones that are different from those required by the default permission set as specified in the connector specification. The optional description can mention specific reason that resource adapter requires a given security permission.

The element security-permission-spec specifies a security permission based on the Security policy file syntax. Refer to the following URL for Sun's implementation of the security permission specification:

http://java.sun.com/products/jdk/1.4/docs/guide/security/PolicyFiles.html#FileSyntax
The transaction-supportType specifies the level of transaction support provided by the resource adapter. It is used by transaction-support elements.

The value must be one of the following:

- NoTransaction
- LocalTransaction
- XATransaction
Appendix A. Schemas

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<!--
This is the XML DTD for the Connector 1.0 deployment descriptor. All Connector 1.0 deployment descriptors must include a DOCTYPE of the following form:

<!DOCTYPE connector PUBLIC
"-//Sun Microsystems, Inc.//DTD Connector 1.0//EN"
"http://java.sun.com/dtd/connector_1_0.dtd">

-->"?

The following conventions apply to all J2EE deployment descriptor elements unless indicated otherwise.

- In elements that contain PCDATA, leading and trailing whitespace in the data may be ignored.

- In elements whose value is an "enumerated type", the value is case sensitive.

- In elements that specify a pathname to a file within the same JAR file, relative filenames (i.e., those not starting with "/") are considered relative to the root of the JAR file's namespace. Absolute filenames (i.e., those starting with "/") also specify names in the root of the JAR file's namespace. In general, relative names are preferred. The exception is .war files where absolute names are preferred for consistency with the servlet API.

-->"?

The connector element is the root element of the deployment descriptor for the resource adapter. This element includes general information - vendor name, version, specification version supported, icon - about the resource adapter module. It also includes information specific to the implementation of the resource adapter library as specified through the element resourceadapter.

-->"

The element authentication-mechanism specifies an authentication mechanism supported by the resource adapter. Note that this support is for the resource adapter and not for the underlying EIS instance. The
optional description specifies any resource adapter specific requirement
for the support of security contract and authentication mechanism.

Note that BasicPassword mechanism type should support the
javax.resource.spi.security.PasswordCredential interface.
The KerbV5 mechanism type should support the
javax.resource.spi.security.GenericCredential interface.

Used in: resourceadapter
-->
  <!ELEMENT authentication-mechanism (description?,
  authentication-mechanism-type, credential-interface)>
</!
-->
The element authentication-mechanism-type specifies type of an authentication
mechanism.

The example values are:
  <authentication-mechanism-type>BasicPassword</authentication-mechanism-type>
  <authentication-mechanism-type>KerbV5</authentication-mechanism-type>

Any additional security mechanisms are outside the scope of the
Connector architecture specification.

Used in: authentication-mechanism
-->
  <!ELEMENT authentication-mechanism-type (#PCDATA)>
</!
-->
The element config-property contains a declaration of a single
configuration property for a ManagedConnectionFactory instance.

Each ManagedConnectionFactory instance creates connections to a
specific EIS instance based on the properties configured on the
ManagedConnectionFactory instance. The configurable properties are
specified only once in the deployment descriptor, even though a
resource adapter can be used to configure multiple ManagedConnectionFactory
instances (that create connections to different instances of
the same EIS).

The declaration consists of an optional description, name, type
and an optional value of the configuration property. If the resource
adapter provider does not specify a value than the deployer is
responsible for providing a valid value for a configuration property.

Any bounds or well-defined values of properties should be described
in the description element.

Used in: resourceadapter
-->
  <!ELEMENT config-property (description?,
  config-property-name, config-property-type, config-property-value?)>
</!
-->
The element config-property-name contains the name of a configuration
property.
Appendix A. Schemas

The connector architecture defines a set of well-defined properties all of type java.lang.String. These are as follows:

- <config-property-name>ServerName</config-property-name>
- <config-property-name>PortNumber</config-property-name>
- <config-property-name>UserName</config-property-name>
- <config-property-name>Password</config-property-name>
- <config-property-name>ConnectionURL</config-property-name>

A resource adapter provider can extend this property set to include properties specific to the resource adapter and its underlying EIS.

Used in: config-property

Example: <config-property-name>ServerName</config-property-name>

<!--
<!ELEMENT config-property-name (#PCDATA)>
-->

The element config-property-type contains the fully qualified Java type of a configuration property as required by ManagedConnectionFactory instance.

The following are the legal values of config-property-type:

- java.lang.Boolean, java.lang.String, java.lang.Integer,
- java.lang.Double, java.lang.Byte, java.lang.Short,

Used in: config-property

Example: <config-property-type>java.lang.String</config-property-type>

<!--
<!ELEMENT config-property-type (#PCDATA)>
-->

The element config-property-value contains the value of a configuration entry.

Used in: config-property

Example: <config-property-value>WombatServer</config-property-value>

<!--
<!ELEMENT config-property-value (#PCDATA)>
-->

The element connection-impl-class specifies the fully-qualified name of the Connection class that implements resource adapter specific Connection interface.

Used in: resourceadapter

Example: <connection-impl-class>com.wombat.ConnectionImpl</connection-impl-class>

<!--
<!ELEMENT connection-impl-class (#PCDATA)>
-->

The element connection-interface specifies the fully-qualified name of the Connection interface supported by the resource adapter.
Used in: resourceadapter

Example: <connection-interface>javax.resource.cci.Connection</connection-interface>

<!--
The element connection-interface specifies the fully-qualified name of the ConnectionFactory interface that implements resource adapter specific ConnectionFactory interface.

Used in: resourceadapter

Example: <connectionfactory-impl-class>com.wombat.ConnectionFactoryImpl</connectionfactory-impl-class>

<!--
The element connectionfactory-impl-class specifies the fully-qualified name of the ConnectionFactory class that implements resource adapter specific ConnectionFactory interface.

Used in: resourceadapter

Example: <connectionfactory-interface>javax.resource.spi.security.PasswordCredential</connectionfactory-interface>

OR
<connectionfactory-interface>javax.resource.spi.security.GenericCredential</connectionfactory-interface>

<!--
The element connectionfactory-interface specifies the fully-qualified name of the ConnectionFactory interface supported by the resource adapter.

Used in: resourceadapter

Example: <credential-interface>javax.resource.spi.security.PasswordCredential</credential-interface>

<credential-interface>javax.resource.spi.security.GenericCredential</credential-interface>

<!--
The description element is used to provide text describing the parent element. The description element should include any information that the resource adapter rar file producer wants to provide to the consumer of the resource adapter rar file (i.e., to the Deployer). Typically, the tools used by the resource adapter rar file consumer will display the description when processing the parent element that contains the description.

Used in: authentication-mechanism
-->

<credential-interface>javax.resource.spi.security.PasswordCredential</credential-interface>

<credential-interface>javax.resource.spi.security.GenericCredential</credential-interface>
Appendix A. Schemas

Used in: authentication-mechanism, config-property, connector, license, security-permission

<!--
<!ELEMENT description (#PCDATA)>

<--
The display-name element contains a short name that is intended to be displayed by tools. The display name need not be unique.

Used in: connector

Example:

<display-name>Employee Self Service</display-name>

<!--
<!ELEMENT display-name (#PCDATA)>

<--
The element eis-type contains information about the type of the EIS. For example, the type of an EIS can be product name of EIS independent of any version info.

This helps in identifying EIS instances that can be used with this resource adapter.

Used in: connector

-->  
<!ELEMENT eis-type (#PCDATA)>

<--
The icon element contains small-icon and large-icon elements that specify the file names for small and a large GIF or JPEG icon images used to represent the parent element in a GUI tool.

Used in: connector

-->  
<!ELEMENT icon (small-icon?, large-icon?)>

<--
The large-icon element contains the name of a file containing a large (32 x 32) icon image. The file name is a relative path within the resource adapter's rar file.

The image may be either in the JPEG or GIF format. The icon can be used by tools.

Used in: icon

Example:

<large-icon>employee-service-icon32x32.jpg</large-icon>

-->  
<!ELEMENT large-icon (#PCDATA)>

<--
The element license specifies licensing requirements for the resource adapter module. This element specifies whether a license is required
to deploy and use this resource adapter, and an optional description
of the licensing terms (examples: duration of license, number of
connection restrictions).

Used in: connector

```xml
<ELEMENT license (description?, license-required)>
```

The element license-required specifies whether a license is required
to deploy and use the resource adapter. This element must be one of
the following:

```xml
<license-required>true</license-required>
<license-required>false</license-required>
```

Used in: license

```xml
<ELEMENT license-required (#PCDATA)>
```

The element managedconnectionfactory-class specifies the fully qualified
name of the Java class that implements the javax.resource.spi.Managed-
ConnectionFactory interface. This Java class is provided as part of
resource adapter's implementation of connector architecture specified
contracts.

Used in: resourceadapter

Example:
```xml
<managedconnectionfactory-class>com.wombat.ManagedConnectionFactoryImpl
</managedconnectionfactory-class>
```

```xml
<ELEMENT managedconnectionfactory-class (#PCDATA)>
```

The element reauthentication-support specifies whether the resource
adapter implementation supports re-authentication of existing Managed-
Connection instance. Note that this information is for the resource
adapter implementation and not for the underlying EIS instance.

This element must be one of the following:

```xml
<reauthentication-support>true</reauthentication-support>
<reauthentication-support>false</reauthentication-support>
```

Used in: resourceadapter

```xml
<ELEMENT reauthentication-support (#PCDATA)>
```

The element resourceadapter specifies information about the resource
adapter. The information includes fully-qualified names of
class/interfaces required as part of the connector architecture
specified contracts, level of transaction support provided,
configurable properties for ManagedConnectionFactory instances,
one or more authentication mechanisms supported and additional
required security permissions.

If there is no authentication-mechanism specified as part of
resource adapter element then the resource adapter does not
support any standard security authentication mechanisms as part of security contract. The application server ignores the security part of the system contracts in this case.

Used in: connector
-->  
<!ELEMENT resourceadapter (managedconnectionfactory-class, connectionfactory-interface, connectionfactory-impl-class, connection-interface, connection-impl-class, transaction-support, config-property*, authentication-mechanism*, reauthentication-support, security-permission*)>

<-- The element security permission specifies a security permission that is required by the resource adapter code.

The security permission listed in the deployment descriptor are ones that are different from those required by the default permission set as specified in the connector specification. The optional description can mention specific reason that resource adapter requires a given security permission.

Used in: resourceadapter
-->  
<!ELEMENT security-permission (description?, security-permission-spec)>

<-- The element permission-spec specifies a security permission based on the Security policy file syntax. Refer to the following URL for Sun's implementation of the security permission specification:
http://java.sun.com/products/jdk/1.3/docs/guide/security/PolicyFiles.html#FileSyntax

Used in: security-permission
-->  
<!ELEMENT security-permission-spec (#PCDATA)>

<-- The small-icon element contains the name of a file containing a small (16 x 16) icon image. The file name is a relative path within the resource adapter's rar file.

The image may be either in the JPEG or GIF format.
The icon can be used by tools.

Used in: icon

Example:

<small-icon>employee-service-icon16x16.jpg</small-icon>

-->  
<!ELEMENT small-icon (#PCDATA)>

<-- The element spec-version specifies the version of the connector architecture specification that is supported by this resource adapter. This information enables deployer to configure the resource
adapter to support deployment and runtime requirements of the corresponding connector architecture specification.

Used in: connector

Example:
   <spec-version>1.0</spec-version>

<!--
</!ELEMENT spec-version (#PCDATA)>

<!--
The transaction-support element specifies the level of transaction support provided by the resource adapter.
The value of transaction-support must be one of the following:
<transaction-support>NoTransaction</transaction-support>
<transaction-support>LocalTransaction</transaction-support>
<transaction-support>XATransaction</transaction-support>

Used in: resourceadapter

<!--
</!ELEMENT transaction-support (#PCDATA)>

<!--
The element vendor-name specifies the name of resource adapter provider vendor.

Used in: connector

Example:
   <vendor-name>Wombat Corp.</vendor-name>

<!--
</!ELEMENT vendor-name (#PCDATA)>

<!--
The element version specifies a string-based version of the resource adapter from the resource adapter provider.

Used in: connector

Example:
   <version>1.0</version>

<!--
</!ELEMENT version (#PCDATA)>

<!--
The ID mechanism is to allow tools that produce additional deployment information (i.e., information beyond the standard deployment descriptor information) to store the non-standard information in a separate file, and easily refer from these tool-specific files to the information in the standard deployment descriptor.

Tools are not allowed to add the non-standard information into the standard deployment descriptor.

<!--
</!ATTLIST authentication-mechanism id ID #IMPLIED>
</!ATTLIST authentication-mechanism-type id ID #IMPLIED>
</!ATTLIST config-property id ID #IMPLIED>
</!ATTLIST config-property-name id ID #IMPLIED>
Appendix A. Schemas

A.5. IronJacamar 1.0

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified"
    targetNamespace="http://www.ironjacamar.org/doc/schema"
    xmlns="http://www.ironjacamar.org/doc/schema"
    version="1.0">
  <xs:complexType name="boolean-presenceType"></xs:complexType>

  <xs:complexType name="config-propertyType" mixed="true">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies an override for a config-property element in ra.xml or a @ConfigProperty
      ]]></xs:documentation>
    </xs:annotation>
    <xs:simpleContent>
      <xs:extension base="xs:token">
        <xs:attribute use="required" name="name" type="xs:token">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Specifies the name of the config-property
            ]]></xs:documentation>
          </xs:annotation>
        </xs:attribute>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
</xs:schema>
```
<xs:complexType name="ironjacamarType">
  <xs:sequence>
    <xs:element name="bean-validation-groups" type="bean-validation-groupsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies bean validation group that should be used
        ]]>]
      </xs:documentation>
    </xs:element>
    <xs:element name="bootstrap-context" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the unique name of the bootstrap context that should be used
        ]]>]
      </xs:documentation>
    </xs:element>
    <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The config-property specifies resource adapter configuration properties.
        ]]>]
      </xs:documentation>
    </xs:element>
    <xs:element name="transaction-support" type="transaction-supportType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the transaction support level of the resource adapter
        ]]>]
      </xs:documentation>
    </xs:element>
    <xs:element name="connection-definitions" type="connection-definitionsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the connection definitions
        ]]>]
      </xs:documentation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:documentation>
  <!CDATA[
    Specifies the administration objects
  ]>
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:simpleType name="transaction-supportType">
  <xs:annotation>
    <xs:documentation>
      <!CDATA[
        Define the type of transaction supported by this resource adapter.
        Valid values are: NoTransaction, LocalTransaction, XATransaction
      ]>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:token">
    <xs:enumeration value="NoTransaction" />
    <xs:enumeration value="LocalTransaction" />
    <xs:enumeration value="XATransaction" />
  </xs:restriction>
</xs:simpleType>

<xs:attributeGroup name="common-attribute">
  <xs:attribute name="class-name" type="xs:token" use="optional">
    <xs:annotation>
      <xs:documentation>
        <!CDATA[
          Specifies the fully qualified class name of a managed connection factory
          or admin object
        ]>
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="jndi-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation>
        <!CDATA[
          Specifies the JNDI name
        ]>
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
    <xs:annotation>
      <xs:documentation>
        <!CDATA[
          Should the object in question be activated
        ]>
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute default="true" name="use-java-context" type="xs:boolean">
    <xs:annotation>
    </xs:annotation>
  </xs:attribute>
</xs:attributeGroup>

<xs:complexType name="admin-objectType">
    <xs:sequence>
        <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
            <xs:annotation>
                <xs:documentation><![CDATA[
                    Specifies an administration object configuration property.
                ]]>"
            </xs:documentation>
        </xs:element>
    </xs:sequence>
    <xs:attributeGroup ref="common-attribute"/>
</xs:complexType>

<xs:complexType name="timeoutType">
    <xs:sequence>
        <xs:element name="blocking-timeout-millis" type="xs:nonNegativeInteger" minOccurs="0">
            <xs:annotation>
                <xs:documentation><![CDATA[
                    The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).
                ]]>"
            </xs:documentation>
        </xs:element>
        <xs:element name="idle-timeout-minutes" type="xs:nonNegativeInteger" minOccurs="0">
            <xs:annotation>
                <xs:documentation><![CDATA[
                    The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.
                ]]>"
            </xs:documentation>
        </xs:element>
    </xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:element name="allocation-retry">
  <xs:annotation>
    <xs:documentation><![CDATA[
The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.
]]>
  </xs:annotation>
</xs:element>

<xs:element name="allocation-retry-wait-millis">
  <xs:annotation>
    <xs:documentation><![CDATA[
The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).
]]>
  </xs:annotation>
</xs:element>

<xs:element name="xa-resource-timeout">
  <xs:annotation>
    <xs:documentation><![CDATA[
Passed to XAResource.setTransactionTimeout(). Default is zero which does not invoke the setter.
Specified in seconds - e.g. 5 minutes
]]></xs:documentation>
  </xs:annotation>
</xs:element>
```

```xml
<xs:complexType name="validationType">
  <xs:sequence>
    <xs:element name="background-validation" type="xs:boolean" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
An element to specify that connections should be validated on a background thread versus being validated prior to use
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
The background-validation-millis element specifies the amount of time, in millis, that background validation will run.
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false). Default is false. e.g. <use-fast-fail>true</use-fast-fail>
<xs:element name="security" type="securityType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
        Specifies security settings
    ]]> 
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="timeout" type="timeoutType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
        Specifies timeout settings
    ]]> 
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="validation" type="validationType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
        Specifies validation settings
    ]]> 
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="recovery" type="recoverType" minOccurs="0" maxOccurs="1"></xs:element>
</xs:sequence>

<xs:attribute name="use-ccm" type="xs:boolean" default="true" use="optional">
  <xs:annotation>
    <xs:documentation><![CDATA[
        Enable cached connection manager
    ]]> 
  </xs:documentation>
</xs:annotation>
</xs:attribute>

<xs:attributeGroup ref="common-attribute"></xs:attributeGroup>
</xs:complexType>

<xs:complexType name="poolType">
  <xs:sequence>
    <xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
            The min-pool-size element indicates the minimum number of connections a pool should hold. This default to 0. Ex: <min-pool-size>1</min-pool-size>
        ]]> 
      </xs:documentation>
    </xs:annotation>
    <xs:element name="max-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
The max-pool-size element indicates the maximum number of connections for a pool. No more than max-pool-size connections will be created in each sub-pool. This defaults to 20.

Whether to attempt to prefill the connection pool. Default is false. e.g. <prefill>false</prefill>.

Specifies if the min-pool-size should be considered strictly. Default false

Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), IdleConnections, EntirePool

The is-same-rm-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false. Ex: <is-same-rm-override>true</is-same-rm-override>
Appendix A. Schemas

<xs:annotation>
  <xs:documentation>
    <![CDATA[
      An element to enable interleaving for XA connection factories
      Ex: <interleaving/>
    ]]>  
  </xs:documentation>
</xs:annotation>

<xs:element name="no-tx-separate-pools" type="boolean-presenceType" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[
        Oracle does not like XA connections getting used both inside and outside a JTA transaction.
        To workaround the problem you can create separate sub-pools for the different contexts
        using <no-tx-separate-pools/>
        Ex: <no-tx-separate-pools/>
      ]]>  
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="pad-xid" type="xs:boolean" default="false" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[
        Should the Xid be padded
        Ex: <pad-xid>true</pad-xid>
      ]]>  
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="wrap-xa-resource" type="xs:boolean" default="true" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[
        Should the XAResource instances be wrapped in a org.jboss.tm.XAResourceWrapper instance
        Ex: <wrap-xa-resource>true</wrap-xa-resource>
      ]]>  
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:complexType name="securityType">
  <xs:sequence>
    <xs:choice>
      <xs:element name="application" type="boolean-presenceType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation>
            <![CDATA[
              Indicates that app supplied parameters (such as from getConnection(user, pw))
              are used to distinguish connections in the pool.
              Ex:
            ]]>  
          </xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:choice>
  </xs:sequence>
</xs:complexType>
<xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates Subject (from security domain) are used to distinguish connections
      in the pool.
      The content of the security-domain is the name of the JAAS security manager
      that will handle
      authentication. This name correlates to the JAAS login-config.xml descriptor
      application-policy/name attribute.
      Ex:
      <security-domain>HsqlDbRealm</security-domain>
    ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="security-domain-and-application" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates that either app supplied parameters (such as from
      getConnection(user, pw)) or Subject (from security domain) are used to
      distinguish connections in the pool. The content of the
      security-domain is the name of the JAAS security manager that will handle
      authentication. This name correlates to the JAAS login-config.xml descriptor
      application-policy/name attribute.
      Ex:
      <security-domain-and-application>HsqlDbRealm</security-domain-and-application>
    ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
</xs:choice>
</xs:sequence>
</xs:complexType>
<xs:complexType name="bean-validation-groupsType">
  <xs:sequence>
    <xs:element name="bean-validation-group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the fully qualified class name for a bean validation group that should be used for validation
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="recoverType">
  <xs:sequence>
    <xs:element name="recover-credential" type="credentialType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the security options used when creating a connection during recovery. Note: if this credential are not specified the security credential are used for recover too
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the extension plugin used in spi (core.spi.xa) which can be implemented by various plugins to provide better feedback to the XA recovery system.
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="no-recovery" type="xs:boolean" default="false" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specify if the xa-datasource should be excluded from recovery. Default false.
      ]]>></xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:complexType>

<xs:complexType name="extensionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType"></xs:element>
  </xs:sequence>
  <xs:attribute name="class-name" type="xs:token" use="required"></xs:attribute>
</xs:complexType>

<xs:complexType name="credentialType">
  <xs:sequence>
  </xs:sequence>
</xs:complexType>
<xs:element name="user-name" type="xs:token" minOccurs="0">
    <xs:annotation>
        <xs:documentation><![CDATA[
            Specify the username used when creating a new connection.
            Ex: <user-name>sa</user-name>
        ]]>        </xs:documentation>
    </xs:annotation>
</xs:element>

<xs:element name="password" type="xs:token" minOccurs="0">
    <xs:annotation>
        <xs:documentation><![CDATA[
            Specify the password used when creating a new connection.
            Ex: <password>sa-pass</password>
        ]]>        </xs:annotation>
    </xs:element>

<xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
    <xs:annotation>
        <xs:documentation><![CDATA[
            Indicates Subject (from security domain) are used to distinguish connections in the pool.

            The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
            Ex: <security-domain>HsqlDbRealm</security-domain>
        ]]>        </xs:documentation>
    </xs:annotation>
</xs:element>

<xs:element name="ironjacamar" type="ironjacamarType">
    <xs:annotation>
        <xs:documentation><![CDATA[
            Specifies the fully qualified class name for a bean validation group that should be used for validation
        ]]>        </xs:annotation>
    </xs:element>
</xs:complexType>
Appendix A. Schemas

A.6. IronJacamar 1.1

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified"
    targetNamespace="http://www.ironjacamar.org/doc/schema"
    xmlns="http://www.ironjacamar.org/doc/schema"
    version="1.0">
    <xs:complexType name="boolean-presenceType"></xs:complexType>
    <xs:complexType name="config-propertyType" mixed="true">
        <xs:annotation>
            <xs:documentation>
                "Specifies an override for a config-property element in ra.xml or a @ConfigProperty"
            </xs:documentation>
        </xs:annotation>
        <xs:simpleContent>
            <xs:extension base="xs:token">
                <xs:attribute use="required" name="name" type="xs:token">
                    <xs:annotation>
                        <xs:documentation>
                            "Specifies the name of the config-property"
                        </xs:documentation>
                    </xs:annotation>
                </xs:attribute>
            </xs:extension>
        </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="ironjacamarType">
        <xs:sequence>
            <xs:element name="bean-validation-groups" type="bean-validation-groupsType" minOccurs="0" maxOccurs="1"/>
            <xs:element name="bootstrap-context" type="xs:token" minOccurs="0" maxOccurs="1"/>
        </xs:sequence>
    </xs:complexType>
</xs:schema>
```
<xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation><![CDATA[
      The config-property specifies resource adapter configuration properties.
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="transaction-support" type="transaction-supportType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the transaction support level of the resource adapter.
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="workmanager" type="workmanagerType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the settings for the WorkManager used by this resource adapter.
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="connection-definitions" type="connection-definitionsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the connection definitions.
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="admin-objects" type="admin-objectsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the administration objects.
    ]]>  
  </xs:annotation>
</xs:element>

<xs:simpleType name="transaction-supportType">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Define the type of transaction supported by this resource adapter.
      Valid values are: NoTransaction, LocalTransaction, XATransaction.
    ]]>  
  </xs:annotation>
</xs:simpleType>
<xs:restriction base="xs:token">
  <xs:enumeration value="NoTransaction" />
  <xs:enumeration value="LocalTransaction" />
  <xs:enumeration value="XATransaction" />
</xs:restriction>
</xs:simpleType>

<xs:attributeGroup name="common-attribute">
  <xs:attribute name="class-name" type="xs:token" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the the fully qualified class name of a managed connection factory or admin object
      ]]>]
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="jndi-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the JNDI name
      ]]>]
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Should the object in question be activated
      ]]>]
    </xs:annotation>
  </xs:attribute>
  <xs:attribute default="true" name="use-java-context" type="xs:boolean">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies if a java:/ JNDI context should be used
      ]]>]
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="pool-name" type="xs:token" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the pool name for the object
      ]]>]
    </xs:annotation>
  </xs:attribute>
</xs:attributeGroup>

<xs:complexType name="admin-objectType">
  <xs:sequence>
<xs:element name="config-property" type="config-propertyType">
    <xs:annotation>
        <xs:documentation>
            <![CDATA[
                Specifies an administration object configuration property.
            ]]>
        </xs:annotation>
    </xs:element>
</xs:sequence>
<xs:attributeGroup ref="common-attribute"></xs:attributeGroup>
</xs:complexType>

<xs:complexType name="timeoutType">
    <xs:sequence>
        <xs:element name="blocking-timeout-millis" type="xs:nonNegativeInteger" minOccurs="0">
            <xs:annotation>
                <xs:documentation>
                    <![CDATA[
                        The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).
                    ]]>
                </xs:annotation>
            </xs:element>
        </xs:element>
        <xs:element name="idle-timeout-minutes" type="xs:nonNegativeInteger" minOccurs="0">
            <xs:annotation>
                <xs:documentation>
                    <![CDATA[
                        The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.
                    ]]>
                </xs:annotation>
            </xs:element>
        </xs:element>
        <xs:element name="allocation-retry" type="xs:nonNegativeInteger" minOccurs="0" maxOccurs="1">
            <xs:annotation>
                <xs:documentation>
                    <![CDATA[
                        The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.
                    ]]>
                </xs:annotation>
            </xs:element>
        </xs:element>
        <xs:element name="allocation-retry-wait-millis" type="xs:nonNegativeInteger" minOccurs="0" maxOccurs="1">
            <xs:annotation>
                <xs:documentation>
                    <![CDATA[
                        The allocation retry wait millis element indicates the time in milliseconds
                    ]]>
                </xs:annotation>
            </xs:element>
        </xs:element>
    </xs:sequence>
</xs:complexType>
Appendix A. Schemas

to wait between retrying to allocate a connection. The default is 5000 (5 seconds).

</xs:element>
</xs:complexType>

<xs:complexType name="xa-resource-timeout">
<xs:annotation>
<xs:documentation><![CDATA[
Passed to XAResource.setTransactionTimeout(). Default is zero which does not
invoke the setter.
Specified in seconds - e.g. 5 minutes
</xa-resource-timeout>300</xa-resource-timeout>
]]></xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="validationType">
<xs:sequence>
<xs:element name="background-validation" type="xs:boolean" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
An element to specify that connections should be validated on a background
thread versus being validated prior to use
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
The background-validation-millis element specifies the amount of
time, in millis, that background validation will run.
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="use-fast-fail" type="xs:boolean" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
Whether fail a connection allocation on the first connection if it
is invalid (true) or keep trying until the pool is exhausted of all potential
connections (false). Default is false. e.g. <use-fast-fail>true</use-fast-fail>
]]></xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="connection-definitionsType">
<xs:sequence>

<xs:element name="xa-resource-timeout" type="xs:nonNegativeInteger" minOccurs="0" maxOccurs="1">
<xs:annotation>
<xs:documentation><![CDATA[
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:element name="connection-definition" type="connection-definitionType"

type="connection-definitionType"

minOccurs="1" maxOccurs="unbounded">
<xs:annotation>
<![CDATA[
Specifies a connection definition
]]>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="connection-definitionType">
<xs:sequence>
<xs:element name="config-property" type="config-propertyType"

minOccurs="0" maxOccurs="unbounded">
<xs:annotation>
<![CDATA[
The config-property specifies managed connection factory configuration properties.
]]>
</xs:annotation>
</xs:element>
<xs:choice>
<xs:element name="pool" type="poolType" minOccurs="0" maxOccurs="1">
<xs:annotation>
<![CDATA[
Specifies pooling settings
]]>
</xs:annotation>
</xs:element>
<xs:element name="xa-pool" type="xa-poolType" minOccurs="0" maxOccurs="1">
<xs:annotation>
<![CDATA[
Specifies xa-pooling settings
]]>
</xs:annotation>
</xs:element>
</xs:choice>
<xs:element name="security" type="securityType" minOccurs="0" maxOccurs="1">
<xs:annotation>
<![CDATA[
Specifies security settings
]]>
</xs:annotation>
</xs:element>
<xs:element name="timeout" type="timeoutType" minOccurs="0" maxOccurs="1">
<xs:annotation>
<![CDATA[
Specifies timeout settings
]]>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:complexType name="poolType">
  <xs:sequence>
    <xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0"/>
    <xs:element name="initial-pool-size" type="xs:nonNegativeInteger" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
```
<xs:annotation>
  <xs:documentation><![CDATA[  
    The initial-pool-size element indicates the initial number of connections a pool should hold. This default to 0. Ex: <initial-pool-size>1</initial-pool-size> ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="max-pool-size" type="xs:nonNegativeInteger" minOccurs="0">  
<xs:annotation>  
  <xs:documentation><![CDATA[  
    The max-pool-size element indicates the maximum number of connections for a pool. No more than max-pool-size connections will be created in each sub-pool. This defaults to 20. ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="prefill" type="xs:boolean" minOccurs="0">  
<xs:annotation>  
  <xs:documentation><![CDATA[  
    Whether to attempt to prefill the connection pool. Default is false. e.g. < PREFILL>false</ PREFILL>. ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="use-strict-min" type="xs:boolean" minOccurs="0" maxOccurs="1">  
<xs:annotation>  
  <xs:documentation><![CDATA[  
    Specifies if the min-pool-size should be considered strictly. Default false ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="flush-strategy" type="xs:token" minOccurs="0" maxOccurs="1">  
<xs:annotation>  
  <xs:documentation><![CDATA[  
    Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), InvalidIdleConnections, IdleConnections, Gracefully, EntirePool, AllInvalidIdleConnections, AllIdleConnections, AllGracefully, AllConnections ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="capacity" type="capacityType" minOccurs="0" maxOccurs="1">  
<xs:annotation>  
  <xs:documentation><![CDATA[  
    Specifies the capacity policies for the pool ]]>
  </xs:documentation>
</xs:annotation>
</xs:element>
Appendix A. Schemas

```xml
<xs:complexType name="xa-poolType">
  <xs:complexContent>
    <xs:extension base="poolType">
      <xs:sequence>
        <xs:element name="is-same-rm-override" type="xs:boolean" minOccurs="0"> </xs:element>
        <xs:element name="interleaving" type="boolean-presenceType" minOccurs="0"> </xs:element>
        <xs:element name="no-tx-separate-pools" type="boolean-presenceType" minOccurs="0"> </xs:element>
        <xs:element name="pad-xid" type="xs:boolean" default="false" minOccurs="0"> </xs:element>
        <xs:element name="wrap-xa-resource" type="xs:boolean" default="true" minOccurs="0"> </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

The `is-same-rm-override` element allows one to unconditionally set whether the `javax.transaction.xa.XAResource.isSameRM(XAResource)` returns true or false. Ex: `<is-same-rm-override>true</is-same-rm-override>`

An element to enable interleaving for XA connection factories. Ex: `<interleaving/>`.

Oracle does not like XA connections getting used both inside and outside a JTA transaction. To workaround the problem you can create separate sub-pools for the different contexts using `<no-tx-separate-pools/>`.

Should the Xid be padded? Ex: `<pad-xid>true</pad-xid>`.

The `wrap-xa-resource` element is true by default.
Should the XAResource instances be wrapped in a org.jboss.tm.XAResourceWrapper instance

Ex: <wrap-xa-resource>true</wrap-xa-resource>

```xml
<xs:element name="application" type="boolean-presenceType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates that app supplied parameters (such as from getConnection(user, pw)) are used to distinguish connections in the pool.
      Ex: <application/>
    ]]>}
  </xs:annotation>
</xs:element>
<xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates Subject (from security domain) are used to distinguish connections in the pool. The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
      Ex: <security-domain>HsqlDbRealm</security-domain>
    ]]>}
  </xs:annotation>
</xs:element>
<xs:element name="security-domain-and-application" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates that either app supplied parameters (such as from getConnection(user, pw)) or Subject (from security domain) are used to distinguish connections in the pool. The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
      Ex: <security-domain-and-application>HsqlDbRealm</security-domain-and-application>
    ]]>}
  </xs:annotation>
</xs:element>
```
Appendix A. Schemas

<xs:complexType name="admin-objectsType">
  <xs:sequence>
    <xs:element name="admin-object" type="admin-objectType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the setup for an admin object
        ]]>}
      </xs:documentation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="bean-validation-groupsType">
  <xs:sequence>
    <xs:element name="bean-validation-group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the fully qualified class name for a bean validation group that should be used for validation
        ]]>}
      </xs:documentation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="recoverType">
  <xs:sequence>
    <xs:element name="recover-credential" type="credentialType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the security options used when creating a connection during recovery.
          Note: if this credential are not specified the security credential are used for recover too
        ]]>}
      </xs:documentation>
    </xs:element>
    <xs:element name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the extension plugin used in spi (core.spi.xa) which can be implemented by various plugins to provide better feedback to the XA recovery system.
        ]]>}
      </xs:documentation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="extensionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType"></xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="credentialType">
  <xs:sequence>
    <xs:element name="user-name" type="xs:token" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specify the username used when creating a new connection.
          Ex: <user-name>sa</user-name>
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="password" type="xs:token" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specify the password used when creating a new connection.
          Ex: <password>sa-pass</password>
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Indicates Subject (from security domain) are used to distinguish connections in the pool.
          The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
          Ex: <security-domain>HsqlDbRealm</security-domain>
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>

<xs:attribute name="no-recovery" type="xs:boolean" default="false" use="optional">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specify if the xa-datasource should be excluded from recovery.
      Default false.
    ]]></xs:documentation>
  </xs:annotation>
</xs:attribute>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:complexType name="workmanagerType">
  <xs:sequence>
    <xs:element name="security" type="workmanagerSecurityType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines the security model used by the WorkManager instance
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityType">
  <xs:sequence>
    <xs:element name="mapping-required" type="xs:boolean" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines if a mapping is required for security credentials. A value of false means "Case 1" as defined in section 16.4.3, and a value of true means "Case 2" as defined in section 16.4.4.
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="domain" type="xs:token" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines the name of the security domain that should be used
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="default-principal" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines a default principal name that should be added to the used Subject instance
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="default-groups" type="workmanagerSecurityGroupsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines a default groups that should be added to the used Subject instance
        ]]>></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
<xs:element name="mappings" type="workmanagerSecurityMappingsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Defines the mappings that should be applied for Case 2
    ]]>  
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityGroupsType">
  <xs:sequence>
    <xs:element name="group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The name of the group
        ]]>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingsType">
  <xs:sequence>
    <xs:element name="users" type="workmanagerSecurityMappingsUsersType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The mappings for the users
        ]]>  
      </xs:annotation>
    </xs:element>
    <xs:element name="groups" type="workmanagerSecurityMappingsGroupsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The mappings for the groups
        ]]>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingsUsersType">
  <xs:sequence>
    <xs:element name="map" type="workmanagerSecurityMappingType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the mappings for the users
        ]]>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingsGroupsType">
  <xs:sequence>
    <xs:element name="group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the mappings for the groups
        ]]>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
Appendix A. Schemas

A user mapping

]]>
</xs:documentation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingsGroupsType">
<xs:sequence>
<xs:element name="map" type="workmanagerSecurityMappingType" minOccurs="1" maxOccurs="unbounded">
<xs:annotation>
<xs:documentation><![CDATA[
A group mapping
]]></xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingType">
<xs:sequence>
<xs:attribute name="from" type="xs:token" use="required">
<xs:annotation>
<xs:documentation><![CDATA[
Specify the original value
]]></xs:documentation>
</xs:annotation>
</xs:attribute>
<xs:attribute name="to" type="xs:token" use="required">
<xs:annotation>
<xs:documentation><![CDATA[
Specify the mapped value
]]></xs:documentation>
</xs:annotation>
</xs:attribute>
</xs:sequence>
</xs:complexType>

<xs:complexType name="capacityType">
<xs:sequence>
<xs:element name="incrementer" type="extensionType" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
Defines the policy for incrementing connections in the pool
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="decrementer" type="extensionType" minOccurs="0">
<xs:annotation>
A.7. Resource adapters 1.0

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"

targetNamespace="http://www.ironjacamar.org/doc/schema"
xmlns="http://www.ironjacamar.org/doc/schema">

<xs:complexType name="boolean-presenceType"></xs:complexType>

<xs:complexType name="config-propertyType" mixed="true">
<xs:annotation>
<xs:documentation><![CDATA[
Specifies an override for a config-property element in ra.xml or a @ConfigProperty
]]></xs:documentation>
</xs:annotation>
<xs:simpleContent>
<xs:extension base="xs:token">
<xs:attribute use="required" name="name" type="xs:token">
<xs:annotation>
<xs:documentation><![CDATA[
Specifies the name of the config-property
]]></xs:documentation>
</xs:annotation>
</xs:attribute>
</xs:extension>
</xs:simpleContent>
</xs:complexType>
<xs:complexType name="resource-adapterType">
  <xs:sequence>
    <xs:element name="archive" type="xs:token" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the resource adapter archive to be activated
          E.g. <archive>myra.rar</archive>
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="bean-validation-groups" type="bean-validation-groupsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies bean validation group that should be used
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="bootstrap-context" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the unique name of the bootstrap context that should be used
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="config-property" type="config.PropertyType" minOccurs="0" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The config-property specifies resource adapter configuration properties.
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="transaction-support" type="transaction-supportType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the transaction support level of the resource adapter
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="connection-definitions" type="connection-definitionsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the connection definitions
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:element name="admin-objects" type="admin-objectsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[
        Specifies the administration objects
      ]]>  
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:complexType name="transaction-supportType">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[
        Define the type of transaction supported by this resource adapter.
        Valid values are: NoTransaction, LocalTransaction, XATransaction
      ]]>  
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:token">
    <xs:enumeration value="NoTransaction" />
    <xs:enumeration value="LocalTransaction" />
    <xs:enumeration value="XATransaction" />
  </xs:restriction>
</xs:simpleType>

<xs:attributeGroup name="common-attribute">
  <xs:attribute name="class-name" type="xs:token" use="optional">
    <xs:annotation>
      <xs:documentation>
        <![CDATA[
          Specifies the the fully qualified class name of a managed connection factory
          or admin object
        ]]>  
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="jndi-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation>
        <![CDATA[
          Specifies the JNDI name
        ]]>  
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
    <xs:annotation>
      <xs:documentation>
        <![CDATA[
          Should the object in question be activated
        ]]>  
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:attributeGroup>
Appendix A. Schemas

```xml
<xs:complexType name="admin-objectType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The config-property specifies administration object configuration properties.
        ]]>]
      </xs:documentation>
    </xs:element>
    <xs:attributeGroup ref="common-attribute"/>
  </xs:sequence>
  <xs:attributeGroup/>
</xs:complexType>

<xs:complexType name="timeoutType">
  <xs:sequence>
    <xs:element name="blocking-timeout-millis" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).
        ]]>]
      </xs:documentation>
    </xs:element>
    <xs:element name="idle-timeout-minutes" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends
        ]]>]
      </xs:documentation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.

</xs:documentation>
</xs:annotation>
</xs:element>
</xs:element>
<xs:element name="allocation-retry">
    <xs:annotation>
        <xs:documentation><![CDATA[
The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.
]]></xs:documentation>
    </xs:annotation>
</xs:element>
</xs:element>
<xs:element name="allocation-retry-wait-millis">
    <xs:annotation>
        <xs:documentation><![CDATA[
The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).
]]></xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="xa-resource-timeout">
    <xs:annotation>
        <xs:documentation><![CDATA[
Passed to XAResource.setTransactionTimeout(). Default is zero which does not invoke the setter.
Specified in seconds - e.g. 5 minutes
]]></xs:documentation>
    </xs:annotation>
</xs:element>
</xs:complexType>
<xs:complexType name="validationType">
    <xs:sequence>
        <xs:element name="background-validation" type="xs:boolean" minOccurs="0">
            <xs:annotation>
                <xs:documentation><![CDATA[
An element to specify that connections should be validated on a background thread versus being validated prior to use
]]></xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0">
            <xs:annotation>
                <xs:documentation><![CDATA[
]]></xs:documentation>
            </xs:annotation>
        </xs:element>
    </xs:sequence>
</xs:complexType>
The background-validation-millis element specifies the amount of time, in millis, that background validation will run.

Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false) default false. e.g. <use-fast-fail>true</use-fast-fail>

Specifies activation of resource adapters

Specifies activation of a resource adapter

Specifies a connection definition
<xs:complexType name="connection-definitionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[The config-property specifies managed connection factory configuration properties.]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:choice>
      <xs:element name="pool" type="poolType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[Specifies pooling settings]]></xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="xa-pool" type="xa-poolType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[Specifies xa-pooling settings]]></xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="security" type="securityType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[Specifies security settings]]></xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="timeout" type="timeoutType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[Specifies timeout settings]]></xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="validation" type="validationType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[Specifies validation settings]]></xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:choice>
  </xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:element name="recovery" type="recoverType" minOccurs="0" maxOccurs="1"/>
</xs:element>
<xs:sequence>
<xs:attribute name="use-ccm" type="xs:boolean" default="true" use="optional"/>
<xs:annotation>
  <![CDATA[
    Enable cached connection manager
  ]]>
</xs:annotation>
</xs:attribute>
<xs:attributeGroup ref="common-attribute"/>
</xs:complexType>
<xs:complexType name="poolType">
<xs:sequence>
<xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
  <![CDATA[
    The min-pool-size element indicates the minimum number of connections a pool should hold. This default to 0. Ex: <min-pool-size>1</min-pool-size>
  ]]>
</xs:element>
<xs:element name="max-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
  <![CDATA[
    The max-pool-size element indicates the maximum number of connections for a pool. No more than max-pool-size connections will be created in each sub-pool. This defaults to 20.
  ]]>
</xs:element>
<xs:element name="prefill" type="xs:boolean" minOccurs="0">
  <![CDATA[
    Whether to attempt to prefill the connection pool. Default is false. e.g. <prefill>false</prefill>.
  ]]>
</xs:element>
<xs:element name="use-strict-min" type="xs:boolean" minOccurs="0" maxOccurs="1">
  <![CDATA[
    Define if the min-pool-size should be considered strictly. Default false
  ]]>
</xs:element>
</xs:sequence>
</xs:complexType>
```
<xs:element name="flush-strategy" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies how the pool should be flush in case of an error.
      Valid values are: FailingConnectionOnly (default), IdleConnections, EntirePool
    ]]>"
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="xa-poolType">
  <xs:complexContent>
    <xs:extension base="poolType">
      <xs:sequence>
        <xs:element name="is-same-rm-override" type="xs:boolean" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
              The is-same-rm-override element allows one to unconditionally
              set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns
              true or false. Ex: <is-same-rm-override>true</is-same-rm-override>
            ]]>"
          </xs:annotation>
        </xs:element>
        <xs:element name="interleaving" type="boolean-presenceType" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
              An element to enable interleaving for XA connection factories
              Ex: <interleaving/>
            ]]>"
          </xs:annotation>
        </xs:element>
        <xs:element name="no-tx-separate-pools" type="boolean-presenceType" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Oracle does not like XA connections getting used both inside and outside
              a JTA transaction. To workaround the problem you can create separate sub-pools for the
              different contexts
              using <no-tx-separate-pools/>
              Ex: <no-tx-separate-pools/>
            ]]>"
          </xs:annotation>
        </xs:element>
        <xs:element name="pad-xid" type="xs:boolean" default="false" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Should the Xid be padded
            ]]>"
          </xs:annotation>
        </xs:element>
      </xs:sequence>
    </xs:extension>
</xs:complexType>
Ex: <pad-xid>true</pad-xid>

]]>
</xs:documentation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="securityType">
<xs:sequence>
<xs:choice>
<xs:element name="application" type="boolean-precenceType" minOccurs="0" maxOccurs="1">
<xs:annotation>
<xs:documentation><![CDATA[
Indicates that app supplied parameters (such as from getConnection(user, pw))
are used to distinguish connections in the pool.
Ex: 
<application/>
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
<xs:annotation>
<xs:documentation><![CDATA[
Indicates Subject (from security domain) are used to distinguish connections
in the pool.
The content of the security-domain is the name of the JAAS security manager
that will handle
authentication. This name correlates to the JAAS login-config.xml descriptor
application-policy/name attribute.
Ex: 
<security-domain>HsqlDbRealm</security-domain>
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="security-domain-and-application" type="xs:token" minOccurs="0" maxOccurs="1">
<xs:annotation>
<xs:documentation><![CDATA[
Indicates that either app supplied parameters (such as from
getConnection(user, pw)) or Subject (from security domain) are used to
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="security-domain-and-application" type="xs:token" minOccurs="0" maxOccurs="1">
<xs:annotation>
<xs:documentation><![CDATA[
Indicates that either app supplied parameters (such as from
getConnection(user, pw)) or Subject (from security domain) are used to
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
distinguish connections in the pool. The content of the
security-domain is the name of the JAAS security manager that will handle
authentication. This name correlates to the JAAS login-config.xml descriptor
application-policy/name attribute.

Ex:
<security-domain-and-application>HsqlDbRealm</security-domain-and-application>
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:choice>
</xs:sequence>
</xs:complexType>

<xs:complexType name="admin-objectsType">
<xs:sequence>
  <xs:element name="admin-object" type="admin-objectType" minOccurs="1" maxOccurs="unbounded">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the setup for an admin object
      ]]>]]>
    </xs:documentation>
  </xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="bean-validation-groupsType">
<xs:sequence>
  <xs:element name="bean-validation-group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the fully qualified class name for a bean validation group that
        should be used for validation
      ]]>]]>
    </xs:documentation>
  </xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="recoverType">
<xs:sequence>
  <xs:element name="recover-credential" type="credentialType" minOccurs="0" maxOccurs="1">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the security options used when creating a connection during recovery.
        Note: if this credential are not specified the security credential are used for recover too
      ]]>]]>
    </xs:documentation>
  </xs:element>
  <xs:element name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
    <xs:annotation>
      <xs:documentation>
<xs:annotation>
  <xs:documentation>
    <![CDATA[
      Specifies the extension plugin used in spi (core.spi.xa) which can be implemented by various plugins to provide better feedback to the XA recovery system.
    ]]>  
  </xs:documentation>
</xs:annotation>

<xs:complexType name="extensionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType"/>
  </xs:sequence>
  <xs:attribute name="no-recovery" type="xs:boolean" default="false" use="optional">
    <xs:annotation>
      <xs:documentation>
        <![CDATA[
          Specify if the xa-datasource should be excluded from recovery. Default false.
        ]]>  
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:complexType>

<xs:complexType name="credentialType">
  <xs:sequence>
    <xs:element name="user-name" type="xs:token" minOccurs="0"/>
    <xs:element name="password" type="xs:token" minOccurs="0"/>
    <xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          <![CDATA[
            Indicates Subject (from security domain) are used to distinguish connections in the pool.
            The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor
          ]]>  
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
application-policy/name attribute.
Ex:
<security-domain>HsqlDbRealm</security-domain>
}}>
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:schema>

A.8. Resource adapters 1.1

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
  <xs:complexType name="boolean-presenceType"></xs:complexType>
  <xs:complexType name="config-propertyType" mixed="true">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies an override for a config-property element in ra.xml or a @ConfigProperty
      ]]>}
    </xs:documentation>
    </xs:annotation>
    <xs:simpleContent>
      <xs:extension base="xs:token">
        <xs:attribute use="required" name="name" type="xs:token">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Specifies the name of the config-property
            ]]>}
          </xs:documentation>
        </xs:attribute>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <xs:complexType name="resource-adapterType">
    <xs:sequence>
      <xs:element name="archive" type="xs:token" minOccurs="1" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[
            Specifies the resource adapter archive to be activated
            E.g. <archive>myra.rar</archive>
          ]]>}
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:schema>
```
Appendix A. Schemas

```xml
<xs:element name="bean-validation-groups" type="bean-validation-groupsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
    Specifies bean validation group that should be used
 ]]></xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="bootstrap-context" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
    Specifies the unique name of the bootstrap context that should be used
 ]]></xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation><![CDATA[
    The config-property specifies resource adapter configuration properties.
 ]]></xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="transaction-support" type="transaction-supportType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
    Specifies the transaction support level of the resource adapter
 ]]></xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="workmanager" type="workmanagerType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
    Specifies the settings for the WorkManager used by this resource adapter
 ]]></xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="connection-definitions" type="connection-definitionsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
    Specifies the connection definitions
 ]]></xs:documentation>
  </xs:annotation>
</xs:element>
```
<xs:element name="admin-objects" type="admin-objectsType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the administration objects
    ]]>  
  </xs:annotation>
  <xs:sequence>
    <xs:element name="admin-objects" type="admin-objectsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the administration objects
        ]]>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="id" type="xs:token" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        An unique identifier for the resource adapter
      ]]>  
    </xs:annotation>
  </xs:attribute>
</xs:complexType>

<xs:simpleType name="transaction-supportType">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Define the type of transaction supported by this resource adapter.
      Valid values are: NoTransaction, LocalTransaction, XATransaction
    ]]>  
  </xs:annotation>
  <xs:restriction base="xs:token">
    <xs:enumeration value="NoTransaction" />
    <xs:enumeration value="LocalTransaction" />
    <xs:enumeration value="XATransaction" />
  </xs:restriction>
</xs:simpleType>

<xs:attributeGroup name="common-attribute">
  <xs:attribute name="class-name" type="xs:token" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the the fully qualified class name of a managed connection factory
        or admin object
      ]]>  
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="jndi-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the JNDI name
      ]]>  
    </xs:annotation>
  </xs:attribute>
</xs:attributeGroup>
Appendix A. Schemas

<x:s:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
  <x:s:annotation>
    <![CDATA[
        Should the object in question be activated
    ]]> 
  </x:s:annotation>
</x:s:attribute>

<x:s:attribute default="true" name="use-java-context" type="xs:boolean">
  <x:s:annotation>
    <![CDATA[
        Specifies if a java:/ JNDI context should be used
    ]]> 
  </x:s:annotation>
</x:s:attribute>

<x:s:attribute name="pool-name" type="xs:token" use="optional">
  <x:s:annotation>
    <![CDATA[
        Specifies the pool name for the object
    ]]> 
  </x:s:annotation>
</x:s:attribute>

<x:s:complexType name="admin-objectType">
  <x:s:sequence>
    <x:s:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
      <x:s:annotation>
        <![CDATA[
            The config-property specifies administration object configuration properties.
        ]]> 
      </x:s:annotation>
    </x:s:element>
  </x:s:sequence>
  <x:s:attributeGroup ref="common-attribute"/>
</x:s:complexType>

<x:s:complexType name="timeoutType">
  <x:s:sequence>
    <x:s:element name="blocking-timeout-millis" type="xs:nonNegativeInteger" minOccurs="0">
      <x:s:annotation>
        <![CDATA[
            The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).
        ]]> 
      </x:s:annotation>
    </x:s:element>
  </x:s:sequence>
</x:s:complexType>
The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.

The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.

The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).

Passed to XAResource.setTransactionTimeout(). Default is zero which does not invoke the setter. Specified in seconds - e.g. 5 minutes

The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.

The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.

The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).

Passed to XAResource.setTransactionTimeout(). Default is zero which does not invoke the setter. Specified in seconds - e.g. 5 minutes
Appendix A. Schemas

```xml
<![CDATA[
  An element to specify that connections should be validated on a background
thread versus being validated prior to use
]]>
</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      The background-validation-millis element specifies the amount of
time, in millis, that background validation will run.
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="use-fast-fail" type="xs:boolean" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      Whether fail a connection allocation on the first connection if it
      is invalid (true) or keep trying until the pool is exhausted of all potential
      connections (false) default false. e.g. <use-fast-fail>true</use-fast-fail>
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="resource-adapters" type="resource-adaptersType">
  <xs:annotation>
    <xs:documentation>
      Specifies activation of resource adapters
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:complexType name="resource-adaptersType">
  <xs:sequence>
    <xs:element name="resource-adapter" type="resource-adapterType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>
          Specifies activation of a resource adapter
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="connection-definitionsType">
  <xs:sequence>
```
<xs:element name="connection-definition" type="connection-definitionType">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies a connection definition
    ]]>  
  </xs:annotation>
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The config-property specifies managed connection factory configuration properties.
        ]]>  
      </xs:annotation>
      <xs:choice>
        <xs:element name="pool" type="poolType" minOccurs="0" maxOccurs="1">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Specifies pooling settings
            ]]>  
          </xs:annotation>
        </xs:element>
        <xs:element name="xa-pool" type="xa-poolType" minOccurs="0" maxOccurs="1">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Specifies xa-pooling settings
            ]]>  
          </xs:annotation>
        </xs:element>
      </xs:choice>
      <xs:element name="security" type="securityType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[
            Specifies security settings
          ]]>  
        </xs:annotation>
      </xs:element>
      <xs:element name="timeout" type="timeoutType" minOccurs="0" maxOccurs="1">
        <xs:annotation>
          <xs:documentation><![CDATA[
            Specifies timeout settings
          ]]>  
        </xs:annotation>
      </xs:element>
    </xs:element>
  </xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:complexType name="poolType">
  <xs:sequence>
    <xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          The min-pool-size element indicates the minimum number of connections a pool should hold. This default to 0. Ex: <min-pool-size>1</min-pool-size>
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="initial-pool-size" type="xs:nonNegativeInteger" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          Specifies validation settings
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="validation" type="validationType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          Specifies validation settings
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="recovery" type="recoverType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          Defines the connections as sharable which allows lazy association to be enabled if supported
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="enlistment" type="xs:boolean" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          Defines if lazy enlistment should be used if supported by the resource adapter
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
  <xs:attributeGroup ref="common-attribute"/>
</xs:complexType>
```
The initial-pool-size element indicates the initial number of connections a pool should hold. This defaults to 0. Ex: <initial-pool-size>1</initial-pool-size>

The max-pool-size element indicates the maximum number of connections for a pool. No more than max-pool-size connections will be created in each sub-pool. This defaults to 20.

Whether to attempt to prefill the connection pool. Default is false. E.g. <prefill>false</prefill>

Define if the min-pool-size should be considered strictly. Default is false.

Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), InvalidIdleConnections, IdleConnections, Gracefully, EntirePool, AllInvalidIdleConnections, AllIdleConnections, AllGracefully, AllConnections.

Specifies the capacity policies for the pool.
Appendix A. Schemas

    </xs:complexType>
    <xs:complexType name="xa-poolType">
        <xs:complexContent>
            <xs:extension base="poolType">
                <xs:sequence>
                    <xs:element name="is-same-rm-override" type="xs:boolean" minOccurs="0">
                        <xs:annotation>
                            <xs:documentation>
                                <![CDATA[
                                  The is-same-rm-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false. Ex: <is-same-rm-override>true</is-same-rm-override>
                                ]]>  
                            </xs:documentation>
                        </xs:annotation>
                    </xs:element>
                    <xs:element name="interleaving" type="boolean-presenceType" minOccurs="0">
                        <xs:annotation>
                            <xs:documentation>
                                <![CDATA[
                                  An element to enable interleaving for XA connection factories Ex: <interleaving/>
                                ]]>  
                            </xs:documentation>
                        </xs:annotation>
                    </xs:element>
                    <xs:element name="no-tx-separate-pools" type="boolean-presenceType" minOccurs="0">
                        <xs:annotation>
                            <xs:documentation>
                                <![CDATA[
                                  Oracle does not like XA connections getting used both inside and outside a JTA transaction. To workaround the problem you can create separate sub-pools for the different contexts using <no-tx-separate-pools/> Ex: <no-tx-separate-pools/>
                                ]]>  
                            </xs:documentation>
                        </xs:annotation>
                    </xs:element>
                    <xs:element name="pad-xid" type="xs:boolean" default="false" minOccurs="0">
                        <xs:annotation>
                            <xs:documentation>
                                <![CDATA[
                                  Should the Xid be padded Ex: <pad-xid>true</pad-xid>
                                ]]>  
                            </xs:documentation>
                        </xs:annotation>
                    </xs:element>
                    <xs:element name="wrap-xa-resource" type="xs:boolean" default="true" minOccurs="0">
                        <xs:annotation>
                            <xs:documentation>
                                <![CDATA[
                                ]]>  
                            </xs:documentation>
                        </xs:annotation>
                    </xs:element>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
Should the XAResource instances be wrapped in a org.jboss.tm.XAResourceWrapper instance?
Ex: <wrap-xa-resource>true</wrap-xa-resource>
Appendix A. Schemas

```xml
<xs:complexType name="admin-objectsType">
  <xs:sequence>
    <xs:element name="admin-object" type="admin-objectType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the setup for an admin object
        ]]>)
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="bean-validation-groupsType">
  <xs:sequence>
    <xs:element name="bean-validation-group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the fully qualified class name for a bean validation group that should be used for validation
        ]]>)
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="recoverType">
  <xs:sequence>
    <xs:element name="recover-credential" type="credentialType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the security options used when creating a connection during recovery. Note: if this credential are not specified the security credential are used for recover too
        ]]>)
      </xs:annotation>
    </xs:element>
    <xs:element name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the extension plugin used in spi (core.spi.xa) which can be implemented by various plugins to provide better feedback to the XA recovery system.
        ]]>)
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

236
<xs:element name="no-recovery" type="xs:boolean" default="false" use="optional">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specify if the xa-datasource should be excluded from recovery.
      Default false.
    ]]> 
  </xs:annotation>
</xs:element>

<xs:complexType name="extensionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType"/>
    <xs:attribute name="class-name" type="xs:token" use="required"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="credentialType">
  <xs:sequence>
    <xs:element name="user-name" type="xs:token" minOccurs="0"/>
    <xs:element name="password" type="xs:token" minOccurs="0"/>
    <xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates Subject (from security domain) are used to distinguish connections in the pool.
      The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
      Ex: <security-domain>HsqlDbRealm</security-domain>
    ]]> 
  </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:complexType name="workmanagerType">
  <xs:sequence>
    <xs:element name="security" type="workmanagerSecurityType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines the security model used by the WorkManager instance
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityType">
  <xs:sequence>
    <xs:element name="mapping-required" type="xs:boolean" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines if a mapping is required for security credentials. A value of false means
          "Case 1" as defined in section 16.4.3, and a value of true means "Case 2" as
          defined in section 16.4.4.
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="domain" type="xs:token" minOccurs="1" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines the name of the security domain that should be used
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="default-principal" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines a default principal name that should be added to the used Subject instance
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="default-groups" type="workmanagerSecurityGroupsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines a default groups that should be added to the used Subject instance
        ]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="mappings" type="workmanagerSecurityMappingsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
<xs:documentation>
  <![CDATA[
    Defines the mappings that should be applied for Case 2
  ]]>  
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityGroupsType">
  <xs:sequence>
    <xs:element name="group" type="xs:token" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>
          <![CDATA[
            The name of the group
          ]]>  
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingsType">
  <xs:sequence>
    <xs:element name="users" type="workmanagerSecurityMappingsUsersType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          <![CDATA[
            The mappings for the users
          ]]>  
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="groups" type="workmanagerSecurityMappingsGroupsType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          <![CDATA[
            The mappings for the groups
          ]]>  
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingsUsersType">
  <xs:sequence>
    <xs:element name="map" type="workmanagerSecurityMappingType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation>
          <![CDATA[
            A user mapping
          ]]>  
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<xs:complexType name="workmanagerSecurityMappingsGroupsType">
  <xs:sequence>
    <xs:element name="map" type="workmanagerSecurityMappingType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          A group mapping
        ]]>  
      </xs:documentation>
    </xs:element>
    <xs:element/>
    <xs:element/>
    <xs:element/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="workmanagerSecurityMappingType">
  <xs:sequence>
    <xs:attribute name="from" type="xs:token" use="required">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specify the original value
        ]]>  
      </xs:documentation>
    </xs:attribute>
    <xs:attribute name="to" type="xs:token" use="required">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specify the mapped value
        ]]>  
      </xs:documentation>
    </xs:attribute>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="capacityType">
  <xs:sequence>
    <xs:element name="incrementer" type="extensionType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines the policy for incrementing connections in the pool
        ]]>  
      </xs:documentation>
    </xs:element>
    <xs:element name="decrementer" type="extensionType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Defines the policy for decrementing connections in the pool
        ]]>  
      </xs:documentation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
A.9. Datasources 1.0

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified"
  targetNamespace="http://www.ironjacamar.org/doc/schema"
  xmlns="http://www.ironjacamar.org/doc/schema">
  <xs:element name="datasources" type="datasourcesType">
    <xs:annotation>
      <xs:documentation><![CDATA[
The datasources element is the root of the JDBC datasource configuration
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:complexType name="datasourcesType">
    <xs:sequence>
      <xs:choice
        minOccurs="0"
        maxOccurs="unbounded">
        <xs:element name="datasource" type="datasourceType">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Specifies a non-XA datasource, using local transactions
]]></xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="xa-datasource" type="xa-datasourceType">
          <xs:annotation>
            <xs:documentation><![CDATA[
              Specifies a XA datasource
]]></xs:documentation>
          </xs:annotation>
        </xs:element>
      </xs:choice>
      <xs:element name="drivers" type="driversType" maxOccurs="1" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
</xs:schema>
```
<xs:element name="connection-url" type="xs:token">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[ The JDBC driver connection URL Ex: &lt;connection-url&gt;jdbc:hsqldb:hsql://localhost:1701</connection-url> ]]>
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="driver-class" type="xs:token" maxOccurs="1" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[ The fully qualified name of the JDBC driver class Ex: &lt;driver-class&gt;org.hsqldb.jdbcDriver&lt;/driver-class&gt; ]]>
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[ The fully qualified name of the JDBC datasource class Ex: &lt;datasource-class&gt;org.h2.jdbcx.JdbcDataSource&lt;/datasource-class&gt; ]]>
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="driver" type="xs:token" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[ An unique reference to the classloader module which contains the JDBC driver
      The accepted format is driverName#majorVersion.minorVersion ]]>
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="connection-property" type="connection-propertyType" minOccurs="0" maxOccurs="unbounded">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[ The connection-property element allows you to pass in arbitrary connection
      properties to the Driver.connect(url, props) method. Each connection-property
      specifies a string name/value pair with the property name coming from the
      name attribute and the value coming from the element content. Ex: &lt;connection-property name="char.encoding"&gt;UTF-8&lt;/connection-property&gt; ]]>
    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="new-connection-sql" type="xs:string" minOccurs="0">
  <xs:annotation>
    <xs:documentation>
      <![CDATA[ Specify an SQL statement to execute whenever a connection is added ]]>
    </xs:documentation>
  </xs:annotation>
</xs:element>
to the connection pool.

</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="transaction-isolation" type="transaction-isolationType" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
Set java.sql.Connection transaction isolation level to use. The constants defined by transaction-isolation-values are the possible transaction isolation levels and include: TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-delimiter" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
Specifies the delimeter for URLs in connection-url for HA datasources
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-selector-strategy-class-name" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
A class that implements org.jboss.jca.adapters.jdbc.URLSelectorStrategy
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="pool" type="poolType" minOccurs="0" maxOccurs="1">
<xs:annotation>
<xs:documentation><![CDATA[
Specifies the pooling settings
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="security" type="dsSecurityType" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
Specifies the security settings
]]></xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="validation" type="validationType" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[
Specifies the validation settings
]]></xs:documentation>
</xs:annotation>
</xs:element>

Appendix A. Schemas

```xml
<xs:element name="timeout" type="timeoutType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the time out settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="statement" type="statementType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the statement settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:attribute name="jta" type="xs:boolean" default="true" use="optional">  
  <xs:annotation>
    <xs:documentation><![CDATA[
      Enable JTA integration
    ]]>  
  </xs:annotation>
</xs:attribute>

<xs:attributeGroup ref="common-datasourceAttributes"/>

<xs:complexType name="xa-datasourceType">
  <xs:sequence>
    <xs:element name="xa-datasource-property" type="xa-datasource-propertyType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies a property to assign to the XADataSource implementation class. Each property is identified by the name attribute and the property value is given by the xa-datasource-property element content. The property is mapped onto the XADataSource implementation by looking for a JavaBeans style getter method for the property name. If found, the value of the property is set using the JavaBeans setter with the element text translated to the true property type using the java.beans.PropertyEditor for the type. Ex:
          <xa-datasource-property name="IfxWAITTIME">10</xa-datasource-property>
          <xa-datasource-property name="IfxIFXHOST">myhost.mydomain.com</xa-datasource-property>
          <xa-datasource-property name="PortNumber">1557</xa-datasource-property>
          <xa-datasource-property name="DatabaseName">mydb</xa-datasource-property>
          <xa-datasource-property name="ServerName">myserver</xa-datasource-property>
        ]]>  
      </xs:annotation>
    </xs:element>
    <xs:element name="xa-datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <xs:documentation>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
Datasources 1.0

<xs:documentation>
<![CDATA[
The fully qualified name of the javax.sql.XADataSource implementation class. Ex: <xa-datasource-class>oracle.jdbc.xa.client.OracleXADatasource</xa-datasource-class>
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="driver" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[
An unique reference to the classloader module which contains the JDBC driver. The accepted format is driverName#majorVersion.minorVersion
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-delimiter" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[
Specifies the delimiter for URLs in the connection url for HA datasources.
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-selector-strategy-class-name" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[
A class that implements org.jboss.jca.adapters.jdbc.URLSelectorStrategy.
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="new-connection-sql" type="xs:string" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[
Specifies an SQL statement to execute whenever a connection is added to the connection pool.
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="transaction-isolation" type="transaction-isolationType" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[
Set java.sql.Connection transaction isolation level to use. The constants defined by transaction-isolation-values are the possible transaction isolation levels and include: TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="xa-pool" type="xa-poolType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the pooling settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="security" type="dsSecurityType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the security settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="validation" type="validationType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the validation settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="timeout" type="timeoutType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the time out settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="statement" type="statementType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the statement settings
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="recovery" type="recoverType" minOccurs="0" maxOccurs="1">
  <xs:attributeGroup ref="common-datasourceAttributes" />
</xs:element>

<xs:complexType name="boolean-presenceType" />
<xs:attributeGroup name="common-datasourceAttributes">
  <xs:attribute name="jndi-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the JNDI name for the datasource
      ]]>  
    </xs:annotation>
  </xs:attribute>
</xs:attributeGroup>
<xs:attribute name="pool-name" type="xs:token" use="required">
  <xs:annotation>
    <xs:documentation>
      Specifies the pool name for the datasource used for management
    </xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
  <xs:annotation>
    <xs:documentation>
      Specifies if the datasource should be enabled
    </xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute default="true" name="use-java-context" type="xs:boolean">
  <xs:annotation>
    <xs:documentation>
      Setting this to false will bind the DataSource into global JNDI
      Ex: use-java-context="true"
    </xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute default="false" name="spy" type="xs:boolean">
  <xs:annotation>
    <xs:documentation>
      Enable spy functionality on the JDBC layer - e.g. log all JDBC traffic to the datasource.
      Remember to enable the logging category (org.jboss.jdbc) too.
      Ex: spy="true"
    </xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:attribute default="true" name="use-ccm" type="xs:boolean">
  <xs:annotation>
    <xs:documentation>
      Enable the use of a cached connection manager
      Ex: use-ccm="true"
    </xs:documentation>
  </xs:annotation>
</xs:attribute>

<xs:simpleType name="transaction-isolationType">
  <xs:annotation>
    <xs:documentation>
      Define constants used as the possible transaction isolation levels in transaction-isolation
    </xs:documentation>
  </xs:annotation>
</xs:simpleType>
Appendix A. Schemas

```xml
<xs:simpleType name="transaction-isolation-type">
  <xs:restriction base="xs:token">
    <xs:enumeration value="TRANSACTION_READ_UNCOMMITTED" />
    <xs:enumeration value="TRANSACTION_READ_COMMITTED" />
    <xs:enumeration value="TRANSACTION_REPEATABLE_READ" />
    <xs:enumeration value="TRANSACTION_SERIALIZABLE" />
    <xs:enumeration value="TRANSACTION_NONE" />
  </xs:restriction>
</xs:simpleType>
```

```xml
<xs:complexType name="xa-datasource-propertyType" mixed="true">
  <xs:attribute name="name" use="required" type="xs:token" />
</xs:complexType>
```

```xml
<xs:complexType name="connection-propertyType" mixed="true">
  <xs:attribute name="name" use="required" type="xs:token" />
</xs:complexType>
```

```xml
<xs:complexType name="validationType">
  <xs:sequence>
    <xs:element name="valid-connection-checker" type="extensionType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
An org.jboss.jca.adapters.jdbc.ValidConnectionChecker that provides a SQLException isValidConnection(Connection e) method to validate if a connection is valid. An exception means the connection is destroyed. This overrides the check-valid-connection-sql when present. Ex:
<valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.vendor.OracleValidConnectionChecker"/>
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="check-valid-connection-sql" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
Specify an SQL statement to check validity of a pool connection. This may be called when managed connection is taken from pool for use.
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="validate-on-match" type="xs:boolean" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
The validate-on-match element indicates whether or not connection level validation should be done when a connection factory attempts to match a managed connection for a given set. This is typically exclusive to the use of background validation
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
<xs:element name="background-validation" type="xs:boolean" minOccurs="0">
  <xs:documentation><![CDATA[
    An element to specify that connections should be validated on a background thread versus being validated prior to use
  ]]>]
</xs:documentation>
</xs:element>

<xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:documentation><![CDATA[
    The background-validation-millis element specifies the amount of time, in millis, that background validation will run.
  ]]>]
</xs:documentation>
</xs:element>

<xs:element name="use-fast-fail" type="xs:boolean" minOccurs="0">
  <xs:documentation><![CDATA[
    Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false) default false. e.g. <use-fast-fail>true</use-fast-fail>
  ]]>]
</xs:documentation>
</xs:element>

<xs:element minOccurs="0" name="stale-connection-checker" type="extensionType">
  <xs:documentation><![CDATA[
    An org.jboss.jca.adapters.jdbc.StaleConnectionChecker that provides a boolean isStaleConnection(SQLException e) method which if it it returns true will wrap the exception in an org.jboss.jca.adapters.jdbc.StaleConnectionException which is a subclass of SQLException. Ex:
  ]]>
  <stale-connection-checker class-name="org.jboss.jca.adapters.jdbc.vendor.OracleStaleConnectionChecker"/>
</xs:documentation>
</xs:element>

<xs:element name="exception-sorter" type="extensionType" minOccurs="0">
  <xs:documentation><![CDATA[
    An org.jboss.jca.adapters.jdbc.ExceptionSorter that provides a boolean isExceptionFatal(SQLException e) method to validate is an exception should be broadcast to all javax.resource.spi.ConnectionEventListener as a connectionErrorOccurred message. Ex:
  ]]>
  <exception-sorter class-name="org.jboss.jca.adapters.jdbc.vendor.OracleExceptionSorter"/>
</xs:documentation>
</xs:element>
Appendix A. Schemas

```xml
<xs:complexType name="timeoutType">
  <xs:sequence>
    <xs:element name="blocking-timeout-millis" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="idle-timeout-minutes" type="xs:nonNegativeInteger" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[
The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="set-tx-query-timeout" type="boolean-presenceType" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[Whether to set the query timeout based on the time remaining until transaction timeout, any configured query timeout will be used if there is no transaction. The default is false. e.g. <set-tx-query-timeout/>
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="query-timeout" type="xs:nonNegativeInteger" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[Any configured query timeout in seconds The default is no timeout e.g. 5 minutes <query-timeout>300</query-timeout>
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="use-try-lock" type="xs:nonNegativeInteger" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[Any configured timeout for internal locks on the resource adapter objects in seconds The default is a 60 second timeout e.g. 5 minutes <use-try-lock>300</use-try-lock>
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:sequence>
</xs:complexType>
```
The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.

The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).

Passed to XAResource.setTransactionTimeout() Default is zero which does not invoke the setter. In seconds e.g. 5 minutes <xa-resource-timeout>300</xa-resource-timeout>
Appendix A. Schemas

```xml
<xs:element name="prepared-statement-cache-size" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      The number of prepared statements per connection in an LRU cache
    ]]>    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="share-prepared-statements" type="boolean-presenceType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Whether to share prepare statements, i.e. whether asking for same statement twice without closing uses the same underlying prepared statement. The default is false. e.g. <share-prepared-statements/>
    ]]>    </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:complexType name="poolType">
  <xs:sequence>
    <xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The min-pool-size element indicates the minimum number of connections a pool should hold. This default to 0. Ex: <min-pool-size>1</min-pool-size>
        ]]>        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="max-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The max-pool-size element indicates the maximum number of connections for a pool. No more connections will be created in each sub-pool. This defaults to 20.
        ]]>        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="prefill" type="xs:boolean" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Whether to attempt to prefill the connection pool. Empty element denotes a true value. e.g. <prefill>true</prefill>. Default is false
        ]]>        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="use-strict-min" type="xs:boolean" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation>
          <!--Comment content here-->
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

252
Define if the min-pool-size should be considered strictly.
Default false

Specifies how the pool should be flush in case of an error.
Valid values are: FailingConnectionOnly (default), IdleConnections, EntirePool

The is-same-rm-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false. Ex: <is-same-rm-override>true</is-same-rm-override>

An element to enable interleaving for XA connection factories
Ex: <interleaving/>

Oracle does not like XA connections getting used both inside and outside a JTA transaction.
To workaround the problem you can create separate sub-pools for the different contexts using <no-tx-separate-pools/>
Ex: <no-tx-separate-pools/>
<xs:element name="pad-xid" type="xs:boolean" default="false" minOccurs="0">
  <xs:annotation>
    <![CDATA[
      Should the Xid be padded
      Ex: &lt;pad-xid>true&lt;/pad-xid>
    ]]>  
  </xs:annotation>
</xs:element>

<xs:element name="wrap-xa-resource" type="xs:boolean" default="true" minOccurs="0">
  <xs:annotation>
    <![CDATA[
      Should the XAResource instances be wrapped in a org.jboss.tm.XAResourceWrapper instance
      Ex: &lt;wrap-xa-resource>true&lt;/wrap-xa-resource>
    ]]>  
  </xs:annotation>
</xs:element>

<xs:complexType name="dsSecurityType">
  <xs:sequence>
    <xs:element name="user-name" type="xs:token" minOccurs="0">
      <xs:annotation>
        <![CDATA[
          Specify the username used when creating a new connection.
          Ex: &lt;user-name>sa&lt;/user-name>
        ]]>  
      </xs:annotation>
    </xs:element>
    <xs:element name="password" type="xs:token" minOccurs="0">
      <xs:annotation>
        <![CDATA[
          Specify the password used when creating a new connection.
          Ex: &lt;password>sa-pass&lt;/password>
        ]]>  
      </xs:annotation>
    </xs:element>
    <xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <![CDATA[
          Indicates Subject (from security domain) are used to distinguish connections in the pool.
          The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
          Ex: &lt;security-domain>HsqlDbRealm&lt;/security-domain>
        ]]>  
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
Datasources 1.0

]]>
</xs:documentation>
</xs:annotation>
</xs:element>
</xs:complexType>

<xs:complexType name="extensionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="class-name" type="xs:token" use="required"/>
</xs:complexType>

<xs:complexType name="config-propertyType" mixed="true">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies a Java bean property value
    ]]>]
  </xs:annotation>
  <xs:extension base="xs:token">
    <xs:attribute use="required" name="name" type="xs:token"/>
  </xs:extension>
</xs:complexType>

<xs:complexType name="recoverType">
  <xs:sequence>
    <xs:element name="recover-credential" type="dsSecurityType" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
  <xs:documentation><![CDATA[
    Specifies the security options used when creating a connection during recovery.
    Note: if this credential are not specified the security credential are used for recover too
  ]]>]
</xs:complexType>

<xs:complexType name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the extension plugin used in spi (core.spi.xa)
      which can be implemented by various plugins to provide better feedback to the XA recovery system.
    ]]>]
</xs:complexType>
Appendix A. Schemas

```xml
<xs:complexType name="driverType">
  <xs:sequence>
    <xs:element name="driver-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <!CDATA[
        The fully qualified name of the JDBC driver class Ex: <driver-class>org.hsqldb.jdbcDriver</driver-class>
      ]>
    </xs:element>
    <xs:element name="datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <!CDATA[
        The fully qualified name of the javax.sql.DataSource implementation class.
      ]>
    </xs:element>
    <xs:element name="xa-datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <!CDATA[
        The fully qualified name of the javax.sql.XADataSource implementation class. Ex: <xa-datasource-class>oracle.jdbc.xa.client.OracleXDataSource</xa-datasource-class>
      ]>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="name" type="xs:token" use="required">
    <!CDATA[
      Specifies the symbolic name of this driver used to reference this driver
    ]>
  </xs:attribute>
  <xs:attribute name="module" type="xs:token" use="optional">
```
A.10. Datasources 1.1

<?xml version="1.0" encoding="UTF-8"?>
  xmlns="http://www.ironjacamar.org/doc/schema">
  <xs:element name="datasources" type="datasourcesType">
    <xs:annotation>
      <xs:documentation><![CDATA[
      Specifies the name of AS7 module providing this driver.
      This tag is not used in IronJacamar standalone container.
      ]]>
    </xs:annotation>
  </xs:element>
</xs:schema>
Appendix A. Schemas

The datasources element is the root of the JDBC datasource configuration

```xml
<xs:complexType name="datasourcesType">
  <xs:sequence>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element name="datasource" type="datasourceType">
        <xs:annotation>
          <xs:documentation><![CDATA[
            Specifies a non-XA datasource, using local transactions
          ]]>}
        </xs:annotation>
      </xs:element>
      <xs:element name="xa-datasource" type="xa-datasourceType">
        <xs:annotation>
          <xs:documentation><![CDATA[
            Specifies a XA datasource
          ]]>}
        </xs:annotation>
      </xs:element>
    </xs:choice>
    <xs:element name="drivers" type="driversType" maxOccurs="1" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
```

```xml
<xs:complexType name="datasourceType" mixed="false">
  <xs:sequence>
    <xs:element name="connection-url" type="xs:token">
      <xs:annotation>
        <xs:documentation><![CDATA[
        ]]>}
      </xs:annotation>
    </xs:element>
    <xs:element name="driver-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The fully qualified name of the JDBC driver class Ex: <driver-class>org.hsqldb.jdbcDriver</driver-class>
        ]]>}
      </xs:annotation>
    </xs:element>
    <xs:element name="datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
          The fully qualified name of the JDBC datasource class Ex: <datasource-class>org.h2.jdbcx.JdbcDataSource</datasource-class>
        ]]>}
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```
Datasources 1.1

<x:schema name="driver" type="xs:token" minOccurs="0">
  <xs:annotation>
    <![CDATA[
An unique reference to the classloader module which contains the JDBC driver
The accepted format is driverName#majorVersion.minorVersion
]]>
  </xs:annotation>
</xs:schema>

<x:schema name="connection-property" type="connection-propertyType" minOccurs="0" maxOccurs="unbounded">
  <xs:annotation>
    <![CDATA[
The connection-property element allows you to pass in arbitrary connection
properties to the Driver.connect(url, props) method. Each connection-property
specifies a string name/value pair with the property name coming from the
name attribute and the value coming from the element content. Ex:
<connection-property name="char.encoding">UTF-8</connection-property>
]]>
  </xs:annotation>
</xs:schema>

<x:schema name="new-connection-sql" type="xs:string" minOccurs="0">
  <xs:annotation>
    <![CDATA[
Specify an SQL statement to execute whenever a connection is added
to the connection pool.
]]>
  </xs:annotation>
</xs:schema>

<x:schema name="transaction-isolation" type="transaction-isolationType" minOccurs="0">
  <xs:annotation>
    <![CDATA[
Set java.sql.Connection transaction isolation level to use. The constants
defined by transaction-isolation-values are the possible transaction isolation
levels and include: TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED
TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE
]]>
  </xs:annotation>
</xs:schema>

<x:schema name="url-delimiter" type="xs:token" minOccurs="0">
  <xs:annotation>
    <![CDATA[
Specifies the delimeter for URLs in connection-url for HA datasources
]]>
  </xs:annotation>
</xs:schema>

<x:schema name="url-selector-strategy-class-name" type="xs:token" minOccurs="0">
</xs:schema>
A class that implements org.jboss.jca.adapters.jdbc.URLSelectorStrategy

Specifies the pooling settings

Specifies the security settings

Specifies the validation settings

Specifies the time out settings

Specifies the statement settings

Enable JTA integration
Datasources 1.1

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>xa-datasource-property</td>
<td>Specifies a property to assign to the XADataSource implementation class. Each property is identified by the name attribute and the property value is given by the xa-datasource-property element content. The property is mapped onto the XADataSource implementation by looking for a JavaBeans style getter method for the property name. If found, the value of the property is set using the JavaBeans setter with the element text translated to the true property type using the java.beans.PropertyEditor for the type. Ex: <code>&lt;xa-datasource-property name=&quot;IfxWAITTIME&quot;&gt;10&lt;/xa-datasource-property&gt;</code></td>
</tr>
<tr>
<td>xa-datasource-class</td>
<td>The fully qualified name of the javax.sql.XADataSource implementation class. Ex: <code>&lt;xa-datasource-class&gt;oracle.jdbc.xa.client.OracleXADataSource&lt;/xa-datasource-class&gt;</code></td>
</tr>
<tr>
<td>driver</td>
<td>An unique reference to the classloader module which contains the JDBC driver. The accepted format is driverName#majorVersion.minorVersion</td>
</tr>
<tr>
<td>url-delimiter</td>
<td>Specifies the delimiter for URLs in the connection url for HA datasources</td>
</tr>
</tbody>
</table>
Appendix A. Schemas

```xml
<xs:element name="url-selector-strategy-class-name" type="xs:token" minOccurs="0">
  <xs:annotation>
    <!CDATA[
      A class that implements org.jboss.jca.adapters.jdbc.URLSelectorStrategy
    ]>
  </xs:annotation>
</xs:element>

<xs:element name="new-connection-sql" type="xs:string" minOccurs="0">
  <xs:annotation>
    <!CDATA[
      Specifies an SQL statement to execute whenever a connection is added
to the connection pool.
    ]>
  </xs:annotation>
</xs:element>

<xs:element name="transaction-isolation" type="transaction-isolationType" minOccurs="0">
  <xs:annotation>
    <!CDATA[
      Set java.sql.Connection transaction isolation level to use. The constants
declared by transaction-isolation-values are the possible transaction isolation
levels and include: TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED
TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE
    ]>
  </xs:annotation>
</xs:element>

<xs:element name="xa-pool" type="xa-poolType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <!CDATA[
      Specifies the pooling settings
    ]>
  </xs:annotation>
</xs:element>

<xs:element name="security" type="dsSecurityType" minOccurs="0">
  <xs:annotation>
    <!CDATA[
      Specifies the security settings
    ]>
  </xs:annotation>
</xs:element>

<xs:element name="validation" type="validationType" minOccurs="0">
  <xs:annotation>
    <!CDATA[
      Specifies the validation settings
    ]>
  </xs:annotation>
</xs:element>
```

<xs:element name="timeout" type="timeoutType" minOccurs="0">
    <xs:annotation>
        <xs:documentation><![CDATA[
            Specifies the time out settings
        ]]> 
    </xs:annotation> 
</xs:element> 

<xs:element name="statement" type="statementType" minOccurs="0">
    <xs:annotation>
        <xs:documentation><![CDATA[
            Specifies the statement settings
        ]]> 
    </xs:annotation> 
</xs:element> 

<xs:element name="recovery" type="recoverType" minOccurs="0" maxOccurs="1"></xs:element>
</xs:sequence>
</xs:attributeGroup ref="common-datasourceAttributes" />
</xs:complexType>

<xs:complexType name="boolean-presenceType" />
<xs:attributeGroup name="common-datasourceAttributes">
    <xs:attribute name="jndi-name" type="xs:token" use="required">
        <xs:annotation>
            <xs:documentation><![CDATA[
                Specifies the JNDI name for the datasource
            ]]> 
        </xs:annotation> 
</xs:attribute>

    <xs:attribute name="pool-name" type="xs:token" use="required">
        <xs:annotation>
            <xs:documentation><![CDATA[
                Specifies the pool name for the datasource used for management
            ]]> 
        </xs:annotation> 
</xs:attribute>

    <xs:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
        <xs:annotation>
            <xs:documentation><![CDATA[
                Specifies if the datasource should be enabled
            ]]> 
        </xs:annotation> 
</xs:attribute>

    <xs:attribute default="true" name="use-java-context" type="xs:boolean">
        <xs:annotation>
            <xs:documentation><![CDATA[
                Setting this to false will bind the DataSource into global JNDI
                Ex: use-java-context="true"
            ]]> 
        </xs:annotation> 
</xs:attribute>
</xs:attributeGroup>
Enable spy functionality on the JDBC layer - e.g. log all JDBC traffic to the datasource. Remember to enable the logging category (org.jboss.jdbc) too.

Ex: spy="true"

Enable the use of a cached connection manager

Ex: use-ccm="true"

Define constants used as the possible transaction isolation levels in transaction-isolation type. Include: TRANSACTION_READ_UNCOMMITTED, TRANSACTION_READ_COMMITTED, TRANSACTION_REPEATABLE_READ, TRANSACTION_SERIALIZABLE, TRANSACTION_NONE

An org.jboss.jca.adapters.jdbc.ValidConnectionChecker that provides a SQLException isValidConnection(Connection e) method to validate is a connection
is valid. An exception means the connection is destroyed. This overrides the check-valid-connection-sql when present. Ex:

```xml
<valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.vendor.OracleValidConnectionChecker"/>
</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="check-valid-connection-sql" type="xs:string" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[ Specify an SQL statement to check validity of a pool connection. This may be called when managed connection is taken from pool for use. ]]>]]>
</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="validate-on-match" type="xs:boolean" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[ The validate-on-match element indicates whether or not connection level validation should be done when a connection factory attempts to match a managed connection for a given set. This is typically exclusive to the use of background validation. ]]>]]>
</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="background-validation" type="xs:boolean" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[ An element to specify that connections should be validated on a background thread versus being validated prior to use. ]]>]]>
</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[ The background-validation-millis element specifies the amount of time, in millis, that background validation will run. ]]>]]>
</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="use-fast-fail" type="xs:boolean" minOccurs="0">
<xs:annotation>
<xs:documentation><![CDATA[ Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false) default false. e.g. <use-fast-fail>true</use-fast-fail> ]]>]]>
</xs:documentation>
</xs:annotation>
</xs:element>
An org.jboss.jca.adapters.jdbc.StaleConnectionChecker that provides a boolean isStaleConnection(SQLException e) method which if it returns true will wrap the exception in an org.jboss.jca.adapters.jdbc.StaleConnectionException which is a subclass of SQLException. Ex:
<stale-connection-checker class-name="org.jboss.jca.adapters.jdbc.vendor.OracleStaleConnectionChecker"/>

An org.jboss.jca.adapters.jdbc.ExceptionSorter that provides a boolean isExceptionFatal(SQLException e) method to validate is an exception should be broadcast to all javax.resource.spi.ConnectionEventListener as a connectionErrorOccurred message. Ex:
<exception-sorter class-name="org.jboss.jca.adapters.jdbc.vendor.OracleExceptionSorter"/>

The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).

The idle-timeout-minutes elements indicates the maximum time in minutes a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.
<xs:element name="set-tx-query-timeout" type="boolean-presenceType" minOccurs="0">
  <xs:documentation><![CDATA[
Whether to set the query timeout based on the time remaining until
transaction timeout, any configured query timeout will be used if there is
no transaction. The default is false. e.g. <set-tx-query-timeout/>
]]></xs:documentation>
</xs:element>

<xs:element name="query-timeout" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:documentation><![CDATA[
Any configured query timeout in seconds. The default is no timeout
e.g. 5 minutes <query-timeout>300</query-timeout>
]]></xs:documentation>
</xs:element>

<xs:element name="use-try-lock" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:documentation><![CDATA[
Any configured timeout for internal locks on the resource adapter
objects in seconds. The default is a 60 second timeout e.g. 5 minutes <use-
try-lock>300</use-try-lock>
]]></xs:documentation>
</xs:element>

<xs:element name="allocation-retry" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:documentation><![CDATA[
The allocation retry element indicates the number of times that allocating
a connection should be tried before throwing an exception. The default is 0.
]]></xs:documentation>
</xs:element>

<xs:element name="allocation-retry-wait-millis" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:documentation><![CDATA[
The allocation retry wait millis element indicates the time in milliseconds
to wait between retrying to allocate a connection. The default is 5000 (5 seconds).
]]></xs:documentation>
</xs:element>

<xs:element name="xa-resource-timeout" type="xs:token" minOccurs="0">
  <xs:documentation><![CDATA[
Passed to XAResource.setTransactionTimeout() Default is zero which
]]></xs:documentation>
</xs:element>
 Appendix A. Schemas

does not invoke the setter. In seconds e.g. 5 minutes <xa-resource-timeout>300</
xa-resource-timeout>

</xs:element>
</xs:sequence>
</xs:complexType>

<xs:complexType name="track-statementsType">
  <xs:restriction base="xs:token">
    <xs:enumeration value="true"/>
    <xs:enumeration value="false"/>
    <xs:enumeration value="nowarn"/>
  </xs:restriction>
</xs:complexType>

<xs:complexType name="statementType">
  <xs:sequence>
    <xs:element name="track-statements" type="track-statementsType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>
          Whether to check for unclosed statements when a connection is returned
to the pool and result sets are closed when a statement is closed/return
to the prepared statement cache. valid values are: false - do not track statements and results true - track statements and result sets and warn when they are not closed nowarn - track statements but do no warn about them being unclosed (the default) e.g. <track-statements>nowarn</track-statements>
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="poolType">
  <xs:sequence>
    <xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation>
          The number of prepared statements per connection in an LRU cache
        </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="share-prepared-statements" type="boolean-presenceType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>
          Whether to share prepare statements, i.e. whether asking for same statement twice without closing uses the same underlying prepared statement. The default is false. e.g. <share-prepared-statements/>
        </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
The min-pool-size element indicates the minimum number of connections a pool should hold. This default to 0. Ex: `<min-pool-size>1</min-pool-size>`

The max-pool-size element indicates the maximum number of connections for a pool. No more connections will be created in each sub-pool. This defaults to 20.

Whether to attempt to prefill the connection pool. Empty element denotes a true value, e.g. `<prefill>true</prefill>`, Default is false

Define if the min-pool-size should be considered strictly. Default false

Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), IdleConnections, EntirePool

Specifies if multiple users will access the datasource through the getConnection(user, password) method and hence if the internal pool type should account for that
The is-same-rm-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false. Ex: <is-same-rm-override>true</is-same-rm-override>

An element to enable interleaving for XA connection factories
Ex: <interleaving/>

Oracle does not like XA connections getting used both inside and outside a JTA transaction.
To workaround the problem you can create separate sub-pools for the different contexts
Ex: <no-tx-separate-pools/>

Should the Xid be padded
Ex: <pad-xid>true</pad-xid>

Should the XAResource instances be wrapped in a org.jboss.tm.XAResourceWrapper instance
Ex: <wrap-xa-resource>true</wrap-xa-resource>
Datasources 1.1

Ex: `<wrap-xa-resource>true</wrap-xa-resource>```

```xml
<xs:complexType name="dsSecurityType">
  <xs:sequence>
    <xs:element name="user-name" type="xs:token" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
Specify the username used when creating a new connection.
Ex: <user-name>sa</user-name>
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="password" type="xs:token" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
Specify the password used when creating a new connection.
Ex: <password>sa-pass</password>
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
Indicates Subject (from security domain) are used to distinguish connections in the pool.
The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
Ex: <security-domain>HsqlDbRealm</security-domain>
]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="reauth-plugin" type="extensionType" minOccurs="0" maxOccurs="1"></xs:element>
  </xs:sequence>
  <xs:attribute name="class-name" type="xs:token" use="required"/>
</xs:complexType>
```
<xs:complexType name="config-propertyType" mixed="true">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies a Java bean property value
    ]]> </xs:documentation>
  </xs:annotation>
  <xs:simpleContent>
    <xs:extension base="xs:token">
      <xs:attribute use="required" name="name" type="xs:token">
        <xs:annotation>
          <xs:documentation><![CDATA[
            Specifies the name of the config-property
          ]]> </xs:documentation>
        </xs:annotation>
      </xs:attribute>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="recoverType">
  <xs:sequence>
    <xs:element name="recover-credential" type="dsSecurityType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the security options used when creating a connection during recovery.
          Note: if this credential are not specified the security credential are used for recover too
        ]]> </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
      <xs:annotation>
        <xs:documentation><![CDATA[
          Specifies the extension plugin used in spi (core.spi.xa) which can be implemented by various plugins to provide better feedback to the XA recovery system.
        ]]> </xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="no-recovery" type="xs:boolean" default="false" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specify if the xa-datasource should be excluded from recovery. Default false.
      ]]> </xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:complexType>
<xs:complexType name="driverType">
  <xs:sequence>
    <xs:element name="driver-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <![CDATA[
          The fully qualified name of the JDBC driver class. Ex: <driver-class>org.hsqldb.jdbcDriver</driver-class>
        ]]>}
      </xs:annotation>
    </xs:element>
    <xs:element name="datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <![CDATA[
          The fully qualified name of the javax.sql.DataSource implementation class. Ex: <datasource-class>org.apache.commons.pool.impl.PooledObjectFactory</datasource-class>
        ]]>}
      </xs:annotation>
    </xs:element>
    <xs:element name="xa-datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <![CDATA[
          The fully qualified name of the javax.sql.XADataSource implementation class. Ex: <xa-datasource-class>oracle.jdbc.xa.client.OracleXADataSource</xa-datasource-class>
        ]]>}
      </xs:annotation>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="name" type="xs:token" use="required">
    <xs:annotation>
      <![CDATA[
        Specifies the symbolic name of this driver used to reference this driver
      ]]>}
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="module" type="xs:token" use="optional">
    <xs:annotation>
      <![CDATA[
        Specifies the name of the AS7 module providing this driver. This tag is not used in IronJacamar standalone container.
      ]]>}
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="major-version" type="xs:int" use="optional">
    <xs:annotation>
      <![CDATA[
        Specifies the major version of this driver. If the major and minor version is omitted the fist available Driver in module will be used.
      ]]>}
    </xs:annotation>
  </xs:attribute>
</xs:complexType>
A.11. Datasources 1.2

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified"
    targetNamespace="http://www.ironjacamar.org/doc/schema"
    xmlns="http://www.ironjacamar.org/doc/schema">
    <xs:element name="datasources" type="datasourcesType">
        <xs:annotation>
            <xs:documentation>
                <!CDATA[
                    The datasources element is the root of the JDBC datasource configuration
                ]>}
            </xs:documentation>
        </xs:annotation>
        <xs:complexType name="datasourcesType">
            <xs:sequence>
                <xs:choice
                    minOccurs="0" maxOccurs="unbounded">
                    <xs:element name="datasource" type="datasourceType"/>
                </xs:choice>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
</xs:schema>
<xs:element name="xa-datasource" type="xa-datasourceType">
  <xs:annotation>
    <xs:documentation><![CDATA[
        Specifies a XA datasource
    ]]>)
  </xs:annotation>
</xs:element>

<xs:element name="drivers" type="driversType" maxOccurs="1" minOccurs="0"></xs:element>

<xs:complexType name="datasourceType" mixed="false">
  <xs:sequence>
    <xs:element name="connection-url" type="xs:token">
      <xs:annotation>
        <xs:documentation><![CDATA[
        ]]>)
      </xs:annotation>
    </xs:element>
    <xs:element name="driver-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
            The fully qualified name of the JDBC driver class Ex: <driver-class>org.hsqldb.jdbcDriver</driver-class>]
        ]]>)
      </xs:annotation>
    </xs:element>
    <xs:element name="datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
            The fully qualified name of the JDBC datasource class Ex: <datasource-class>org.h2.jdbcx.JdbcDataSource</datasource-class>]
        ]]>)
      </xs:annotation>
    </xs:element>
    <xs:element name="driver" type="xs:token" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
            An unique reference to the classloader module which contains the JDBC driver
            The accepted format is driverName#majorVersion.minorVersion
        ]]>)
      </xs:annotation>
    </xs:element>
    <xs:element name="connection-property" type="connection-propertyType" minOccurs="0" maxOccurs="unbounded">
      <xs:annotation>
Appendix A. Schemas

<xsd:documentation><![CDATA[
The connection-property element allows you to pass in arbitrary connection properties to the Driver.connect(url, props) method. Each connection-property specifies a string name/value pair with the property name coming from the name attribute and the value coming from the element content. Ex:
<connection-property name="char.encoding">UTF-8</connection-property>]]></xsd:documentation>

<xsd:element name="new-connection-sql" type="xs:string" minOccurs="0">
<xsd:annotation>
<xsd:documentation><![CDATA[
Specify an SQL statement to execute whenever a connection is added to the connection pool.]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="transaction-isolation" type="transaction-isolationType" minOccurs="0">
<xsd:annotation>
<xsd:documentation><![CDATA[
Set java.sql.Connection transaction isolation level to use. The constants defined by transaction-isolation-values are the possible transaction isolation levels and include: TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="url-delimiter" type="xs:token" minOccurs="0">
<xsd:annotation>
<xsd:documentation><![CDATA[
Specifies the delimiter for URLs in connection-url for HA datasources]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="url-selector-strategy-class-name" type="xs:token" minOccurs="0">
<xsd:annotation>
<xsd:documentation><![CDATA[
A class that implements org.jboss.jca.adapters.jdbc.URLSelectorStrategy]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>

<xsd:element name="pool" type="poolType" minOccurs="0" maxOccurs="1">
<xsd:annotation>
<xsd:documentation><![CDATA[
Specifies the pooling settings]]>
</xsd:documentation>
</xsd:annotation>
</xsd:element>
<xs:element name="security" type="dsSecurityType" minOccurs="0">
  <xs:annotation>
    <![CDATA[
      Specifies the security settings
    ]]>
  </xs:annotation>
</xs:element>

<xs:element name="validation" type="validationType" minOccurs="0">
  <xs:annotation>
    <![CDATA[
      Specifies the validation settings
    ]]>
  </xs:annotation>
</xs:element>

<xs:element name="timeout" type="timeoutType" minOccurs="0">
  <xs:annotation>
    <![CDATA[
      Specifies the time out settings
    ]]>
  </xs:annotation>
</xs:element>

<xs:element name="statement" type="statementType" minOccurs="0">
  <xs:annotation>
    <![CDATA[
      Specifies the statement settings
    ]]>
  </xs:annotation>
</xs:element>

<xs:attribute name="jta" type="xs:boolean" default="true" use="optional">
  <xs:annotation>
    <![CDATA[
      Enable JTA integration
    ]]>
  </xs:annotation>
</xs:attribute>

<xs:attributeGroup ref="common-datasourceAttributes"/>
</xs:complexType>

<xs:complexType name="xa-datasourceType">
  <xs:sequence>
    <xs:element name="xa-datasource-property" type="xa-datasource-propertyType" minOccurs="1" maxOccurs="unbounded">
      <xs:annotation>
        <![CDATA[
          Specifies a property to assign to the XADataSource implementation class.
          Each property is identified by the name attribute and the property value
          is given by the xa-datasource-property element content. The property is mapped
        ]]>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
onto the XADataSource implementation by looking for a JavaBeans style getter
method for the property name. If found, the value of the property is set
using the JavaBeans setter with the element text translated to the true property
type using the java.beans.PropertyEditor for the type. Ex:
<xa-datasource-property name="IfxWAITTIME">10</xa-datasource-property>
<xa-datasource-property name="IfxIPXHOST">myhost.mydomain.com</xa-datasource-
property>
<xa-datasource-property name="PortNumber">1557</xa-datasource-property>
<xa-datasource-property name="DatabaseName">mydb</xa-datasource-property>
<xa-datasource-property name="ServerName">myserver</xa-datasource-property>
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="xa-datasource-class" type="xs:token" maxOccurs="1" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[

The fully qualified name of the javax.sql.XADataSource implementation
class. Ex: <xa-datasource-class>oracle.jdbc.xa.client.OracleXADataSource</xa-
datasource-class>
]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="driver" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[

An unique reference to the classloader module which contains the JDBC driver
The accepted format is driverName#majorVersion.minorVersion

]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-delimiter" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[

Specifies the delimeter for URLs in the connection url for HA datasources

]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-property" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[

Specifies the property for the URL property in the xa-datasource-property values

]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="url-selector-strategy-class-name" type="xs:token" minOccurs="0">
<xs:annotation>
<xs:documentation>
<![CDATA[

A class that implements org.jboss.jca.adapters.jdbc.URLSelectorStrategy

]]>
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="new-connection-sql" type="xs:string" minOccurs="0">
  <!['CDATA['
      Specifies an SQL statement to execute whenever a connection is added to the connection pool.
    ]]>}
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="transaction-isolation" type="transaction-isolationType" minOccurs="0">
  <!['CDATA['
      Set java.sql.Connection transaction isolation level to use. The constants defined by
      transaction-isolation-values are the possible transaction isolation levels and include:
      TRANSACTION_READ_UNCOMMITTED TRANSACTION_READ_COMMITTED
      TRANSACTION_REPEATABLE_READ TRANSACTION_SERIALIZABLE TRANSACTION_NONE
    ]]>}
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="xa-pool" type="xa-poolType" minOccurs="0" maxOccurs="1">
  <!['CDATA['
      Specifies the pooling settings
    ]]>}
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="security" type="dsSecurityType" minOccurs="0">
  <!['CDATA['
      Specifies the security settings
    ]]>}
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="validation" type="validationType" minOccurs="0">
  <!['CDATA['
      Specifies the validation settings
    ]]>}
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="timeout" type="timeoutType" minOccurs="0">
  <!['CDATA['
      Specifies the timeout settings
    ]]>}
</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="statement" type="statementType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the statement settings
    ]]> </xs:documentation>
  </xs:annotation>
</xs:element>

<xs:element name="recovery" type="recoverType" minOccurs="0" maxOccurs="1">
  <xs:attributeGroup ref="common-datasourceAttributes" />
</xs:element>

<xs:complexType name="boolean-presenceType" />
<xs:attributeGroup name="common-datasourceAttributes">

  <xs:attribute name="jndi-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the JNDI name for the datasource
      ]]> </xs:documentation>
    </xs:annotation>
  </xs:attribute>

  <xs:attribute name="pool-name" type="xs:token" use="required">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies the pool name for the datasource used for management
      ]]> </xs:documentation>
    </xs:annotation>
  </xs:attribute>

  <xs:attribute name="enabled" type="xs:boolean" default="true" form="unqualified" use="optional">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Specifies if the datasource should be enabled
      ]]> </xs:documentation>
    </xs:annotation>
  </xs:attribute>

  <xs:attribute default="true" name="use-java-context" type="xs:boolean">
    <xs:annotation>
      <xs:documentation><![CDATA[
        Setting this to false will bind the DataSource into global JNDI
        Ex: use-java-context="true"
      ]]> </xs:documentation>
    </xs:annotation>
  </xs:attribute>

  <xs:attribute default="false" name="spy" type="xs:boolean">
    <xs:annotation>
      <xs:documentation><![CDATA[
      ]]> </xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:attributeGroup>
Enable spy functionality on the JDBC layer - e.g. log all JDBC traffic to the datasource.
Remember to enable the logging category (org.jboss.jdbc) too.
Ex: spy="true"

Enable the use of a cached connection manager
Ex: use-ccm="true"

Define constants used as the possible transaction isolation levels in transaction-isolation type. Include: TRANSACTION_READ_UNCOMMITTED, TRANSACTION_READ_COMMITTED, TRANSACTION_REPEATABLE_READ, TRANSACTION_SERIALIZABLE, TRANSACTION_NONE

An org.jboss.jca.adapters.jdbc.ValidConnectionChecker that provides a SQLException isValidConnection(Connection e) method to validate if a connection is valid. An exception means the connection is destroyed. This overrides the check-valid-connection-sql when present. Ex:

<valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.vendor.OracleValidConnectionChecker"/>

Appendix A. Schemas

```xml
<xs:element name="check-valid-connection-sql" type="xs:string" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specify an SQL statement to check validity of a pool connection. This may be called when managed connection is taken from pool for use.
    ]]>"
  </xs:annotation>
</xs:element>

<xs:element name="validate-on-match" type="xs:boolean" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      The validate-on-match element indicates whether or not connection level validation should be done when a connection factory attempts to match a managed connection for a given set. This is typically exclusive to the use of background validation
    ]]>"
  </xs:annotation>
</xs:element>

<xs:element name="background-validation" type="xs:boolean" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      An element to specify that connections should be validated on a background thread versus being validated prior to use
    ]]>"
  </xs:annotation>
</xs:element>

<xs:element name="background-validation-millis" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      The background-validation-millis element specifies the amount of time, in millis, that background validation will run.
    ]]>"
  </xs:annotation>
</xs:element>

<xs:element name="use-fast-fail" type="xs:boolean" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Whether fail a connection allocation on the first connection if it is invalid (true) or keep trying until the pool is exhausted of all potential connections (false) default false, e.g. <use-fast-fail>true</use-fast-fail>
    ]]>"
  </xs:annotation>
</xs:element>

<xs:element name="stale-connection-checker" type="extensionType">
  <xs:annotation>
    <xs:documentation><![CDATA[
      
    ]]>"
  </xs:annotation>
</xs:element>
```
An org.jboss.jca.adapters.jdbc.StaleConnectionChecker that provides a boolean isStaleConnection(SQLException e) method which if it returns true will wrap the exception in an org.jboss.jca.adapters.jdbc.StaleConnectionException which is a subclass of SQLException. Ex:

```xml
<stale-connection-checker class-name="org.jboss.jca.adapters.jdbc.vendor.OracleStaleConnectionChecker"/>
```

An org.jboss.jca.adapters.jdbc.ExceptionSorter that provides a boolean isExceptionFatal(SQLException e) method to validate is an exception should be broadcast to all javax.resource.spi.ConnectionEventListener as a connectionErrorOccurred message. Ex:

```xml
<exception-sorter class-name="org.jboss.jca.adapters.jdbc.vendor.OracleExceptionSorter"/>
```

The blocking-timeout-millis element indicates the maximum time in milliseconds to block while waiting for a connection before throwing an exception. Note that this blocks only while waiting for a permit for a connection, and will never throw an exception if creating a new connection takes an inordinately long time. The default is 30000 (30 seconds).

```xml
<blocking-timeout-millis type="xs:nonNegativeInteger" minOccurs="0"/>
```

The idle-timeout-minutes elements indicates the maximum time a connection may be idle before being closed. The actual maximum time depends also on the IdleRemover scan time, which is 1/2 the smallest idle-timeout-minutes of any pool.

```xml
<idle-timeout-minutes type="xs:nonNegativeInteger" minOccurs="0"/>
```

Whether to set the query timeout based on the time remaining until
transaction timeout, any configured query timeout will be used if there is no transaction. The default is false. e.g. <set-tx-query-timeout/>

</xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="query-timeout" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation>[
      Any configured query timeout in seconds The default is no timeout e.g. 5 minutes <query-timeout>300</query-timeout>
    ]
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="use-try-lock" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation>[
      Any configured timeout for internal locks on the resource adapter objects in seconds The default is a 60 second timeout e.g. 5 minutes <use-try-lock>300</use-try-lock>
    ]
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="allocation-retry" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation>[
      The allocation retry element indicates the number of times that allocating a connection should be tried before throwing an exception. The default is 0.
    ]
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="allocation-retry-wait-millis" type="xs:nonNegativeInteger" minOccurs="0">
  <xs:annotation>
    <xs:documentation>[
      The allocation retry wait millis element indicates the time in milliseconds to wait between retrying to allocate a connection. The default is 5000 (5 seconds).
    ]
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="xa-resource-timeout" type="xs:token" minOccurs="0">
  <xs:annotation>
    <xs:documentation>[
      Passed to XAResource.setTransactionTimeout() Default is zero which does not invoke the setter. In seconds e.g. 5 minutes <xa-resource-timeout>300</xa-resource-timeout>
    ]
  </xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
Datasources 1.2

<xs:complexType name="track-statementsType">
  <xs:restriction base="xs:token">
    <xs:enumeration value="true"/>
    <xs:enumeration value="false"/>
    <xs:enumeration value="nowarn"/>
  </xs:restriction>
</xs:simpleType>

<xs:complexType name="statementType">
  <xs:sequence>
    <xs:element name="track-statements" type="track-statementsType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
Whether to check for unclosed statements when a connection is returned to the pool and result sets are closed when a statement is closed/return to the prepared statement cache. valid values are: false - do not track statements and results true - track statements and result sets and warn when they are not closed nowarn - track statements but do no warn about them being unclosed (the default) e.g. <track-statements>nowarn</track-statements>]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="prepared-statement-cache-size" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
The number of prepared statements per connection in an LRU cache]]></xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="share-prepared-statements" type="boolean-presenceType" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
Whether to share prepare statements, i.e. whether asking for same statement twice without closing uses the same underlying prepared statement. The default is false. e.g. <share-prepared-statements/>]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="poolType">
  <xs:sequence>
    <xs:element name="min-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
      <xs:annotation>
        <xs:documentation><![CDATA[
The min-pool-size element indicates the minimum number of connections a pool should hold. This default to 0. Ex: <min-pool-size>1</min-pool-size>]]></xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
Appendix A. Schemas

```xml
<x:schema>
  <xs:element name="initial-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[
The initial-pool-size element indicates the initial number of connections a pool should hold. This default to 0. Ex: <initial-pool-size>1</initial-pool-size>]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="max-pool-size" type="xs:nonNegativeInteger" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[
The max-pool-size element indicates the maximum number of connections for a pool. No more connections will be created in each sub-pool. This defaults to 20.]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="prefill" type="xs:boolean" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[Whether to attempt to prefill the connection pool. Empty element denotes a true value. e.g. <prefill>true</prefill>. Default is false]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="use-strict-min" type="xs:boolean" minOccurs="0" maxOccurs="1">
    <xs:annotation>
      <xs:documentation><![CDATA[Define if the min-pool-size should be considered strictly. Default false]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="flush-strategy" type="xs:token" minOccurs="0" maxOccurs="1">
    <xs:annotation>
      <xs:documentation><![CDATA[Specifies how the pool should be flush in case of an error. Valid values are: FailingConnectionOnly (default), InvalidIdleConnections, IdleConnections, Gracefully, EntirePool, AllInvalidIdleConnections, AllIdleConnections, AllGracefully, AllConnections]]><![CDATA[]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="allow-multiple-users" type="boolean-presentationType" minOccurs="0" maxOccurs="1">
    <xs:annotation>
      <xs:documentation></xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:schema>
```
<xs:element name="datasources" type="datasourceType" minOccurs="0" maxOccurs="1">
  <xs:documentation><![CDATA[
Specifies if multiple users will access the datasource through the getConnection(user, password) method and hence if the internal pool type should account for that
]]></xs:documentation>
  <xs:annotation>
    <xs:documentation><![CDATA[
Specifies the capacity policies for the pool
]]></xs:documentation>
  </xs:annotation>
  <xs:element name="capacity" type="capacityType" minOccurs="0" maxOccurs="1">
    <xs:annotation>
      <xs:documentation><![CDATA[
Specifies the capacity policies for the pool
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="connection-listener" type="extensionType" minOccurs="0">
    <xs:annotation>
      <xs:documentation><![CDATA[
An org.jboss.jca.adapters.jdbc.spi.listener.ConnectionListener that provides a possible to listen for connection activation and passivation in order to perform actions before the connection is returned to the application or returned to the pool. Ex:
<connection-listener class-name="com.acme.jdbc.OracleConnectionListener"/>
]]></xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:complexType>
<xs:complexType name="xa-poolType">
  <xs:complexContent>
    <xs:extension base="poolType">
      <xs:sequence>
        <xs:element name="is-same-rm-override" type="xs:boolean" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
The is-same-rm-override element allows one to unconditionally set whether the javax.transaction.xa.XAResource.isSameRM(XAResource) returns true or false. Ex: <is-same-rm-override>true</is-same-rm-override>
]]></xs:documentation>
        </xs:annotation>
      </xs:element>
        <xs:element name="interleaving" type="boolean-presenceType" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
An element to enable interleaving for XA connection factories
Ex: <interleaving/>
]]></xs:documentation>
        </xs:annotation>
      </xs:element>
        <xs:element name="no-tx-separate-pools" type="boolean-presenceType" minOccurs="0">
          <xs:annotation>
            <xs:documentation><![CDATA[
An element to enable interleaving for XA connection factories
Ex: <interleaving/>
]]></xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:extension>
</xs:complexType>
Oracle does not like XA connections getting used both inside and outside a JTA transaction. To workaround the problem you can create separate sub-pools for the different contexts using `<no-tx-separate-pools/>` Ex: `<no-tx-separate-pools/>`
Datasources 1.2

<xs:element name="security-domain" type="xs:token" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Indicates Subject (from security domain) are used to distinguish connections in the pool. 
      The content of the security-domain is the name of the JAAS security manager that will handle authentication. This name correlates to the JAAS login-config.xml descriptor application-policy/name attribute.
      Ex: 
      <security-domain>HsqlDbRealm</security-domain> ]]> 
  </xs:documentation>
</xs:annotation>
</xs:element>

<xs:element name="reauth-plugin" type="extensionType" minOccurs="0" maxOccurs="1"/>
</xs:sequence>
</xs:complexType>

<xs:complexType name="extensionType">
  <xs:sequence>
    <xs:element name="config-property" type="config-propertyType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="class-name" type="xs:token" use="required"/>
</xs:complexType>

<xs:complexType name="config-propertyType" mixed="true"/>
<xs:annotation>
  <xs:documentation><![CDATA[
    Specifies a Java bean property value ]]> 
</xs:documentation>
<xs:simpleContent>
  <xs:extension base="xs:token">
    <xs:attribute use="required" name="name" type="xs:token"/>
  </xs:extension>
  <xs:simpleContent>
    <xs:extension base="*">
      <xs:attribute use="required" name="name" type="xs:token"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<xs:complexType name="recoverType">
  <xs:sequence>
    <xs:element name="recover-credential" type="dsSecurityType" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:annotation>
  <xs:documentation><![CDATA[
    Specifies the security options used when creating a connection during recovery. ]]> 
</xs:documentation>
</xs:annotation>
</xs:complexType>
Appendix A. Schemas

Note: if this credential are not specified the security credential are used for recover too.

```xml
<xs:element name="recover-plugin" type="extensionType" minOccurs="0" maxOccurs="1">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Specifies the extension plugin used in spi (core.spi.xa) which can be implemented by various plugins to provide better feedback to the XA recovery system.
    ]]>]]>
  </xs:annotation>
</xs:element>

<xs:attribute name="no-recovery" type="xs:boolean" default="false" use="optional">
  <xs:documentation><![CDATA[
    Specify if the xa-datasource should be excluded from recovery. Default false.
  ]]>]]>
</xs:attribute>

<xs:complexType name="driverType">
  <xs:sequence>
    <xs:element name="driver-class" type="xs:token" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
  <xs:annotation>
    <xs:documentation><![CDATA[
      The fully qualified name of the JDBC driver class Ex: <driver-class>org.hsqldb.jdbcDriver</driver-class>
    ]]>]]>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="datasource-class">
  <xs:sequence>
    <xs:element name="datasource-class" type="xs:token" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
  <xs:annotation>
    <xs:documentation><![CDATA[
      The fully qualified name of the javax.sql.DataSource implementation class.
    ]]>]]>
  </xs:annotation>
</xs:complexType>

<xs:complexType name="xa-datasource-class">
  <xs:sequence>
    <xs:element name="xa-datasource-class" type="xs:token" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
  <xs:annotation>
    <xs:documentation><![CDATA[
      The fully qualified name of the javax.sql.XADataSource implementation class. Ex: <xa-datasource-class>oracle.jdbc.xa.client.OracleXADatasource</xa-datasource-class>
    ]]>]]>
  </xs:annotation>
</xs:complexType>
```
<xs:attribute name="name" type="xs:token" use="required">
   <!--[CDATA[
   Specifies the symbolic name of this driver used to reference this driver
   ]]>-->
</xs:attribute>

<xs:attribute name="module" type="xs:token" use="optional">
   <!--[CDATA[
   Specifies the name of AS7 module providing this driver. This tag is not used in IronJacamar standalone container.
   ]]>-->
</xs:attribute>

<xs:attribute name="major-version" type="xs:int" use="optional">
   <!--[CDATA[
   Specifies the major version of this driver. If the major and minor version is omitted the first available Driver in module will be used.
   ]]>-->
</xs:attribute>

<xs:attribute name="minor-version" type="xs:int" use="optional">
   <!--[CDATA[
   Specifies the minor version of this driver. If the major and minor version is omitted the first available Driver in module will be used.
   ]]>-->
</xs:attribute>

<xs:complexType name="driversType">
   <xs:sequence>
      <xs:element name="driver" type="driverType" maxOccurs="unbounded" minOccurs="1"></xs:element>
   </xs:sequence>
</xs:complexType>

<xs:complexType name="capacityType">
   <xs:sequence>
      <xs:element name="incrementer" type="extensionType" minOccurs="0"></xs:element>
   </xs:sequence>
</xs:complexType>
Defines the policy for incrementing connections in the pool

</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="decrementer" type="extensionType" minOccurs="0">
  <xs:annotation>
    <xs:documentation><![CDATA[
      Defines the policy for decrementing connections in the pool
    ]]>]
  </xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:schema>
Appendix B. Samples

B.1. HelloWorld example

B.1.1. Introduction

The HelloWorld resource adapter example shows a simple example of how to use and implement the interfaces in the Java EE Connector Architecture specification.

The HelloWorld examples exposes the HelloWorldConnection interface where developers can invoke the exposed methods.

The example shows how to build and test a resource adapter.

B.1.1.1. Setup

The build environment needs various libraries in order to being able to build and test the resource adapter. The setup is done by

```bash
cd doc/samples/helloworld
cp -R ../..../lib .
cp ../..../bin/ironjacamar-sjc.jar lib/
```

B.1.1.2. Building

Building the resource adapter is done by

```bash
ant
```

B.1.1.3. Testing

Testing the resource adapter is done by

```bash
ant test
```
Appendix B. Samples

B.1.2. HelloWorld Resource Adapter

/*
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 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */

package org.jboss.jca.samples.helloworld;

import java.util.logging.Logger;
import javax.resource.ResourceException;
import javax.resource.spi.ActivationSpec;
import javax.resource.spi.BootstrapContext;
import javax.resource.spi.ConfigProperty;
import javax.resource.spi.Connector;
import javax.resource.spi.ResourceAdapter;
import javax.resource.spi.ResourceAdapterInternalException;
import javax.resource.spi.TransactionSupport;
import javax.resource.spi.endpoint.MessageEndpointFactory;
import javax.transaction.xa.XAResource;

/**
 * HelloWorldResourceAdapter
 *
 * @version $Revision: $
 */
@Connector(
    reauthenticationSupport = false,
public class HelloWorldResourceAdapter implements ResourceAdapter {

    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldResourceAdapter");

    /** Name property */
    @ConfigProperty(defaultValue = "AS 7", supportsDynamicUpdates = true)
    private String name;
/**
 * Default constructor
 */
public HelloWorldResourceAdapter()
{
}

/**
 * Set name
 * @param name The value
 */
public void setName(String name)
{
    this.name = name;
}

/**
 * Get name
 * @return The value
 */
public String getName()
{
    return name;
}

/**
 * This is called during the activation of a message endpoint.
 * @param endpointFactory A message endpoint factory instance.
 * @param spec An activation spec JavaBean instance.
 * @throws ResourceException generic exception
 */
public void endpointActivation(MessageEndpointFactory endpointFactory,
                                ActivationSpec spec) throws ResourceException
{
}

/**
 * This is called when a message endpoint is deactivated.
 * @param endpointFactory A message endpoint factory instance.
 * @param spec An activation spec JavaBean instance.
 */
public void endpointDeactivation(MessageEndpointFactory endpointFactory,
                                 ActivationSpec spec)
{
}

/**
 * This is called when a resource adapter instance is bootstrapped.
 * @param ctx A bootstrap context containing references
 * @throws ResourceAdapterInternalException indicates bootstrap failure.
 */
public void start(BootstrapContext ctx)
    throws ResourceAdapterInternalException
{
}
/**
 * This is called when a resource adapter instance is undeployed or
 * during application server shutdown.
 */
public void stop()
{
}

/**
 * This method is called by the application server during crash recovery.
 *
 * @param specs an array of ActivationSpec JavaBeans
 * @throws ResourceException generic exception
 * @return an array of XAResource objects
 */
public XAResource[] getXAResources(ActivationSpec[] specs)
  throws ResourceException
{
  return null;
}

/**
 * Returns a hash code value for the object.
 *
 * @return A hash code value for this object.
 */
@Override
public int hashCode()
{
  int result = 17;
  if (name != null)
    result += 31 * result + 7 * name.hashCode();
  else
    result += 31 * result + 7;
  return result;
}

/**
 * Indicates whether some other object is equal to this one.
 *
 * @param other The reference object with which to compare.
 * @return true if this object is the same as the obj argument, false otherwise.
 */
@Override
public boolean equals(Object other)
{
  if (other == null)
    return false;
  if (other == this)
    return true;
  if (! (other instanceof HelloWorldResourceAdapter))
    return false;
  HelloWorldResourceAdapter obj = (HelloWorldResourceAdapter)other;
  boolean result = true;
  if (result)
  {
    if (name == null)
      result = obj.getName() == null;
    else
      result = name.equals(obj.getName());
  }
return result;
}
}

B.1.3. HelloWorld Managed Connection Factory

/*
 * IronJacamar, a Java EE Connector Architecture implementation
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 * License along with this software; if not, write to the Free
 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;

import java.io.PrintWriter;
import java.util.Iterator;
import java.util.Set;
import java.util.logging.Logger;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionDefinition;
import javax.resource.spi.ConnectionManager;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.ManagedConnection;
import javax.resource.spi.ManagedConnectionFactory;
import javax.resource.spi.ResourceAdapter;
import javax.resource.spi.ResourceAdapterAssociation;
import javax.security.auth.Subject;

/**
 * HelloWorldManagedConnectionFactory
 *
 * @version $Revision: $
 */
@ConnectionDefinition(connectionFactory = HelloWorldConnectionFactory.class,
        connectionFactoryImpl = HelloWorldConnectionFactoryImpl.class,
        connection = HelloWorldConnection.class,
Appendix B. Samples

```java
public class HelloWorldManagedConnectionFactory
        implements ManagedConnectionFactory, ResourceAdapterAssociation {

    /** The serialVersionUID */
    private static final long serialVersionUID = 1L;

    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldManagedConnectionFactory");

    /** The resource adapter */
    private ResourceAdapter ra;

    /** The logwriter */
    private PrintWriter logwriter;

    /**
     * Default constructor
     */
    public HelloWorldManagedConnectionFactory() {
        this.ra = null;
        this.logwriter = null;
    }

    /**
     * Creates a Connection Factory instance.
     * @return EIS-specific Connection Factory instance or javax.resource.cci.ConnectionFactory instance
     * @throws ResourceException Generic exception
     */
    public Object createConnectionFactory() throws ResourceException {
        throw new ResourceException("This resource adapter doesn't support non-managed environments");
    }

    /**
     * Creates a Connection Factory instance.
     * @param cxManager ConnectionManager to be associated with created EIS connection factory instance
     * @return EIS-specific Connection Factory instance or javax.resource.cci.ConnectionFactory instance
     * @throws ResourceException Generic exception
     */
    public Object createConnectionFactory(ConnectionManager cxManager) throws ResourceException {
        return new HelloWorldConnectionFactoryImpl(this, cxManager);
    }

    /**
     * Creates a new physical connection to the underlying EIS resource manager.
     * @param subject Caller's security information
     * @param cxRequestInfo Additional resource adapter specific connection request information
     */
```
* @throws ResourceException generic exception
* @return ManagedConnection instance
*/
public ManagedConnection createManagedConnection(Subject subject,
                                              ConnectionRequestInfo cxRequestInfo)  
    throws ResourceException
{
    return new HelloWorldManagedConnection(this);
}

/**
* Returns a matched connection from the candidate set of connections.
* @param connectionSet Candidate connection set
* @param subject Caller's security information
* @param cxRequestInfo Additional resource adapter specific connection request information
* @throws ResourceException generic exception
* @return ManagedConnection if resource adapter finds an acceptable match otherwise null
*/
public ManagedConnection matchManagedConnections(Set connectionSet,
                                                  Subject subject, ConnectionRequestInfo cxRequestInfo)  
    throws ResourceException
{
    ManagedConnection result = null;
    Iterator it = connectionSet.iterator();
    while (result == null & & it.hasNext())
    {
        ManagedConnection mc = (ManagedConnection)it.next();
        if (mc instanceof HelloWorldManagedConnection)
        {
            HelloWorldManagedConnection hwmc = (HelloWorldManagedConnection)mc;
            result = hwmc;
        }
    }
    return result;
}

/**
* Get the log writer for this ManagedConnectionFactory instance.
* @return PrintWriter
* @throws ResourceException generic exception
*/
public PrintWriter getLogWriter() throws ResourceException
{
    return logwriter;
}

/**
* Set the log writer for this ManagedConnectionFactory instance.
* @param out PrintWriter - an out stream for error logging and tracing
* @throws ResourceException generic exception
*/
public void setLogWriter(PrintWriter out) throws ResourceException
{
    logwriter = out;
/**
 * Get the resource adapter
 *
 * @return The handle
 */
public ResourceAdapter getResourceAdapter()
{
    return ra;
}

/**
 * Set the resource adapter
 *
 * @param ra The handle
 */
public void setResourceAdapter(ResourceAdapter ra)
{
    this.ra = ra;
}

/**
 * Returns a hash code value for the object.
 *
 * @return A hash code value for this object.
 */
@Override
public int hashCode()
{
    int result = 17;
    return result;
}

/**
 * Indicates whether some other object is equal to this one.
 *
 * @param other The reference object with which to compare.
 *
 * @return true if this object is the same as the obj argument, false otherwise.
 */
@Override
public boolean equals(Object other)
{
    if (other == null)
        return false;
    if (other == this)
        return true;
    if (! (other instanceof HelloWorldManagedConnectionFactory))
        return false;
    HelloWorldManagedConnectionFactory obj = (HelloWorldManagedConnectionFactory)other;
    boolean result = true;
    return result;
}
}
B.1.4. HelloWorld Managed Connection

/*
 * IronJacamar, a Java EE Connector Architecture implementation
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 * License along with this software; if not, write to the Free
 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;

import java.io.PrintWriter;
import java.util.ArrayList;
import java.util.List;
import java.util.logging.Logger;
import javax.resource.NotSupportedException;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionEvent;
import javax.resource.spi.ConnectionEventListener;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.LocalTransaction;
import javax.resource.spi.ManagedConnection;
import javax.resource.spi.ManagedConnectionMetaData;
import javax.security.auth.Subject;
import javax.transaction.xa.XAResource;

/**
 * HelloWorldManagedConnection
 *
 * @version $Revision: $
 */
public class HelloWorldManagedConnection implements ManagedConnection {
    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldManagedConnection");

    /** MCF */
    private HelloWorldManagedConnectionFactory mcf;

    /** Log writer */
private PrintWriter logWriter;

/** Listeners */
private List<ConnectionEventListener> listeners;

/** Connection */
private Object connection;

/**
 * default constructor
 * @param mcf mcf
 */
public HelloWorldManagedConnection(HelloWorldManagedConnectionFactory mcf)
{
    \this.mcf = mcf;
    \this.logWriter = null;
    \this.listeners = new ArrayList<ConnectionEventListener>(1);
    \this.connection = null;
}

/**
 * Creates a new connection handle for the underlying physical connection
 * represented by the ManagedConnection instance.
 * @param subject Security context as JAAS subject
 * @param cxRequestInfo ConnectionRequestInfo instance
 * @return generic Object instance representing the connection handle.
 * @throws ResourceException generic exception if operation fails
 */
public Object getConnection(Subject subject,
        ConnectionRequestInfo cxRequestInfo)
        throws ResourceException
{
    connection = new HelloWorldConnectionImpl(\this, mcf);

    return connection;
}

/**
 * Used by the container to change the association of an
 * application-level connection handle with a ManagedConnection instance.
 * @param connection Application-level connection handle
 * @throws ResourceException generic exception if operation fails
 */
public void associateConnection(Object connection) throws ResourceException
{
    \this.connection = connection;
}

/**
 * Application server calls this method to force any cleanup on
 * the ManagedConnection instance.
 * @throws ResourceException generic exception if operation fails
 */
public void cleanup() throws ResourceException
{ /* */}
/**
* Destroys the physical connection to the underlying resource manager.
* @throws ResourceException generic exception if operation fails
*/
public void destroy() throws ResourceException {
    this.connection = null;
}

/**
* Adds a connection event listener to the ManagedConnection instance.
* @param listener A new ConnectionEventListener to be registered
*/
public void addConnectionEventListener(ConnectionEventListener listener) {
    if (listener == null)
        throw new IllegalArgumentException("Listener is null");
    listeners.add(listener);
}

/**
* Removes an already registered connection event listener from the ManagedConnection instance.
* @param listener Already registered connection event listener to be removed
*/
public void removeConnectionEventListener(ConnectionEventListener listener) {
    if (listener == null)
        throw new IllegalArgumentException("Listener is null");
    listeners.remove(listener);
}

/**
* Gets the log writer for this ManagedConnection instance.
* @return Character output stream associated with this Managed-Connection instance
* @throws ResourceException generic exception if operation fails
*/
public PrintWriter getLogWriter() throws ResourceException {
    return logWriter;
}

/**
* Sets the log writer for this ManagedConnection instance.
* @param out Character Output stream to be associated
* @throws ResourceException generic exception if operation fails
*/
public void setLogWriter(PrintWriter out) throws ResourceException {
    this.logWriter = out;
}
/**
 * Returns a <code>javax.resource.spi.LocalTransaction</code> instance.
 * @return LocalTransaction instance
 * @throws ResourceException generic exception if operation fails
 */
public LocalTransaction getLocalTransaction() throws ResourceException {
    throw new NotSupportedException("LocalTransaction not supported");
}

/**
 * Returns an <code>javax.transaction.xa.XAResource</code> instance.
 * @return XAResource instance
 * @throws ResourceException generic exception if operation fails
 */
public XAResource getXAResource() throws ResourceException {
    throw new NotSupportedException("GetXAResource not supported");
}

/**
 * Gets the metadata information for this connection's underlying
 * EIS resource manager instance.
 * @return ManagedConnectionMetaData instance
 * @throws ResourceException generic exception if operation fails
 */
public ManagedConnectionMetaData getMetaData() throws ResourceException {
    return new HelloWorldManagedConnectionMetaData();
}

/**
 * Call helloWorld
 * @param name String name
 * @return String helloworld
 */
String helloWorld(String name) {
    return "Hello World, " + name + "!";
}

/**
 * Close handle
 * @param handle The handle
 */
void closeHandle(HelloWorldConnection handle) {

    ConnectionEvent event = new ConnectionEvent(this, ConnectionEvent.CONNECTION_CLOSED);
    event.setConnectionHandle(handle);
    for (ConnectionEventListener cel : listeners) {
        cel.connectionClosed(event);
    }
}
B.1.5. HelloWorld Connection Factory

package org.jboss.jca.samples.helloworld;

import java.io.Serializable;
import javax.resource.Referenceable;
import javax.resource.ResourceException;

/**
 * HelloWorldConnectionFactory
 *
 * @version $Revision:
 */
public interface HelloWorldConnectionFactory extends Serializable, Referenceable {
    /**
     * Get connection from factory
     * @return HelloWorldConnection instance
     * @exception ResourceException Thrown if a connection can’t be obtained
     */
    public HelloWorldConnection getConnection() throws ResourceException;
}
B.1.6. HelloWorld Connection Factory Implementation

```java
package org.jboss.jca.samples.helloworld;

import javax.naming.NamingException;
import javax.naming.Reference;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionManager;

/**
 * HelloWorldConnectionFactoryImpl
 *
 * @version $Revision: $
 */
public class HelloWorldConnectionFactoryImpl implements HelloWorldConnectionFactory {

    /** The serialVersionUID */
    private static final long serialVersionUID = 1L;

    private Reference reference;
    private HelloWorldManagedConnectionFactory mcf;
    private ConnectionManager connectionManager;

    /**
     * Default constructor
     *
     * @param mcf ManagedConnectionFactory
     * @param cxManager ConnectionManager
     */
    public HelloWorldConnectionFactoryImpl(HelloWorldManagedConnectionFactory mcf, ConnectionManager cxManager) {
        this.mcf = mcf;
        this.connectionManager = cxManager;
    }
```
B.1.7. HelloWorld Connection

```java
/**
 * Get connection from factory
 */
@override
public HelloWorldConnection getConnection() throws ResourceException {
    return (HelloWorldConnection) connectionManager.allocateConnection(mcf, null);
}

/**
 * Get the Reference instance.
 */
@override
public Reference getReference() throws NamingException {
    return reference;
}

/**
 * Set the Reference instance.
 *
 * @param reference A Reference instance
 */
@override
public void setReference(Reference reference) {
    this.reference = reference;
}
```
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/* but WITHOUT ANY WARRANTY; without even the implied warranty of */
/* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU */
/* Lesser General Public License for more details. */
package org.jboss.jca.samples.helloworld;

import java.util.logging.Logger;

/**
 * H e l l o W o r l d C o n n e c t i o n I m p l
 *
 * @version $Revision: $
 */

public class HelloWorldConnectionImpl implements HelloWorldConnection {

    /**  T h e  l o g g e r  */
    private static Logger log = Logger.getLogger("HelloWorldConnectionImpl");

    /**  M a n a g e d C o n n e c t i o n  */
    private HelloWorldManagedConnection mc;

    /**  M a n a g e d C o n n e c t i o n F a c t o r y  */
    private HelloWorldManagedConnectionFactory mcf;

    /**
     *  D e f a u l t  c o n s t r u c t o r
     *
     * @param mc HelloWorldManagedConnection
     * @param mcf HelloWorldManagedConnectionFactory
     */
    public HelloWorldConnectionImpl(HelloWorldManagedConnection mc, HelloWorldManagedConnectionFactory mcf) {
        this.mc = mc;
        this.mcf = mcf;
    }

    /**
     *  C a l l  h e l l o W o r l d
     *
     * @return String helloworld
     */
    public String helloWorld() {
        return helloWorld(((HelloWorldResourceAdapter)mcf.getResourceAdapter()).getName());
    }

    /**
     *  C a l l  h e l l o W o r l d
     *
     * @param name String name
     * @return String helloworld
     */
    public String helloWorld(String name) {
        return mc.helloworld(name);
    }

    /**
     *  C l o s e
     */
B.1.9. HelloWorld Managed Connection MetaData

```java
package org.jboss.jca.samples.helloworld;

import javax.resource.ResourceException;
import javax.resource.spi.ManagedConnectionMetaData;

/**
 * HelloWorld Managed Connection MetaData
 */
public class HelloWorldManagedConnectionMetaData implements ManagedConnectionMetaData {
    /**
     * Default constructor
     */
    public HelloWorldManagedConnectionMetaData() {
    }

    /**
     * Returns Product name of the underlying EIS instance connected
     * through the ManagedConnection.
     */
}
* @return Product name of the EIS instance
* @throws ResourceException Thrown if an error occurs
*/
@Override
public String getEISProductName() throws ResourceException
{
    return "HelloWorld Resource Adapter";
}
/**
 * Returns Product version of the underlying EIS instance connected through the ManagedConnection.
 *
 * @return Product version of the EIS instance
 * @throws ResourceException Thrown if an error occurs
 */
@Override
public String getEISProductVersion() throws ResourceException
{
    return "1.0";
}
/**
 * Returns maximum limit on number of active concurrent connections
 *
 * @return Maximum limit for number of active concurrent connections
 * @throws ResourceException Thrown if an error occurs
 */
@Override
public int getMaxConnections() throws ResourceException
{
    return 0;
}
/**
 * Returns name of the user associated with the ManagedConnection instance
 *
 * @return Name of the user
 * @throws ResourceException Thrown if an error occurs
 */
@Override
public String getUsername() throws ResourceException
{
    return null;
}
}

B.1.10. HelloWorld ironjacamar.xml

<?xml version="1.0" encoding="UTF-8"?>
<ironjacamar>
    <connection-definitions>
<connection-definition>
  class-name="org.jboss.jca.samples.helloworld.HelloWorldManagedConnectionFactory"
  jndi-name="java:/eis/HelloWorld"/>
</connection-definitions>
</ironjacamar>

B.1.11. HelloWorld Connection Test Case

/**
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 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;

import java.util.UUID;
import java.util.logging.Logger;
import javax.annotation.Resource;
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.api.spec.ResourceAdapterArchive;
import org.junit.Test;
import org.junit.runner.RunWith;
import static org.junit.Assert.*;

/**
 * ConnectorTestCase
 *
 * @version $Revision: $
 */
@RunWith(Arquillian.class)
public class ConnectorTestCase
{
    private static Logger log = Logger.getLogger("ConnectorTestCase");

    private static String deploymentName = "ConnectorTestCase";

    /**
     * Define the deployment
     * @return The deployment archive
     */
    @Deployment
    public static ResourceAdapterArchive createDeployment()
    {
        ResourceAdapterArchive raa = 
            ShrinkWrap.create(ResourceAdapterArchive.class, deploymentName + ".rar");
        JavaArchive ja = ShrinkWrap.create(JavaArchive.class,
            UUID.randomUUID().toString() + ".jar");
        ja.addClasses(HelloWorldResourceAdapter.class,
            HelloWorldManagedConnectionFactory.class,
            HelloWorldManagedConnection.class,
            HelloWorldManagedConnectionMetaData.class,
            HelloWorldConnectionFactory.class,
            HelloWorldConnectionFactoryImpl.class,
            HelloWorldConnection.class,
            HelloWorldConnectionImpl.class);
        raa.addAsLibrary(ja);
        raa.addAsManifestResource("META-INF/ironjacamar.xml", "ironjacamar.xml");

        return raa;
    }

    /** resource */
    @Resource(mappedName = "java:/eis/HelloWorld")
    private HelloWorldConnectionFactory connectionFactory;

    /**
     * Test helloWorld
     * @exception Throwable Thrown if case of an error
     */
    @Test
    public void testHelloWorldNoArgs() throws Throwable{
        assertNotNull(connectionFactory);
        HelloWorldConnection connection = connectionFactory.getConnection();
        assertNotNull(connection);
        String result = connection.helloWorld();
        connection.close();
    }

    /**
     * Test helloWorld
     * @exception Throwable Thrown if case of an error
     */
    @Test
    public void testHelloWorldNameString() throws Throwable
Appendix B. Samples

```java
{  
    assertNotNull(connectionFactory);
    HelloWorldConnection connection = connectionFactory.getConnection();
    assertNotNull(connection);
    String result = connection.helloWorld(null);
    connection.close();
}
```

B.1.12. HelloWorld Ant build.xml

```xml
<project name="helloworld" basedir="." default="rar">
  
  <!-- ================================= Properties ================================= -->
  
  <property name="build.dir" value="${basedir}/build" />
  <property name="target.dir" value="${basedir}/target" />
  <property name="lib.dir" value="${basedir}/lib" />

  <property name="javac.debug" value="on" />
  <property name="javac.deprecation" value="on" />
  <property name="javac.optimize" value="off" />
  <property name="javac.encoding" value="utf-8" />

  <property name="junit.printsummary" value="yes" />
  <property name="junit.haltonerror" value="no" />
  <property name="junit.haltonfailure" value="no" />
  <property name="junit.fork" value="yes" />
```
<property name="junit.timeout" value="60000" />
<property name="junit.jvm" value="" />
<property name="junit.jvm.options" value="-Xms128m -Xmx512m -XX:MaxPermSize=256m" />
<property name="junit.batchtest.haltonerror" value="no" />
<property name="junit.batchtest.haltonfailure" value="no" />
<property name="junit.batchtest.fork" value="yes" />

<path id="lib.path.id">
    <fileset dir="${lib.dir}">
        <include name="**/*.jar"/>
    </fileset>
</path>

<path id="test.lib.path.id">
    <fileset dir="${lib.dir}">
        <include name="**/*.jar"/>
    </fileset>
    <fileset dir="${build.dir}">
        <include name="**/*.jar"/>
    </fileset>
</path>

<!-- =====================================================================-->
Target: init
 ===================================================================== -->
<target name="init">
    <mkdir dir="${lib.dir}" />
</target>

<!-- =====================================================================-->
Target: compile
 ===================================================================== -->
<target name="compile" depends="init">
    <mkdir dir="${build.dir}" />
    
    <javac srcdir="${basedir}/src/main/java"
        destdir="${build.dir}"
        classpathref="lib.path.id"
        debug="${javac.debug}"
        deprecation="${javac.deprecation}"
        encoding="${javac.encoding}"
        optimize="${javac.optimize}"
    />
</target>

<!-- =====================================================================-->
Target: rar
 ===================================================================== -->
<target name="rar" depends="compile">
    <mkdir dir="${target.dir}" />
    <mkdir dir="${basedir}/src/main/resources" />
    <jar destfile="${build.dir}/helloworld.jar"
        basedir="${build.dir}"
        includes="**/*.class"/>
    <jar destfile="${target.dir}/helloworld.rar">
        <fileset dir="${basedir}/src/main/resources" includes="META-INF/**"/>
        <fileset dir="${build.dir}" includes="**/*.jar"/>
    </jar>
</target>
Appendix B. Samples

```xml
<!--  =================================
Target: prepare-test
================================= -->
<target name="prepare-test" depends="init">
  <mkdir dir="${build.dir}/test" />
  <javac srcdir="src/test"
      destdir="${build.dir}/test"
      classpathref="test.lib.path.id"
      debug="${javac.debug}" 
      deprecation="${javac.deprecation}"
      encoding="${javac.encoding}"
      optimize="${javac.optimize}" >
    <compilerarg value="-Xlint" />
  </javac>

  <copy todir="${build.dir}/test"> 
    <fileset dir="src/main/resources" />
    <fileset dir="src/test/resources" />
  </copy>
</target>

<!--  =================================
Target: test
================================= -->
<target name="test" depends="rar, prepare-test">
  <mkdir dir="${basedir}/reports" />
  <junit dir="src/test"
      printsummary="${junit.printsummary}" 
      haltonerror="${junit.haltonerror}"
      haltonfailure="${junit.haltonfailure}" 
      fork="${junit.fork}" 
      timeout="${junit.timeout}" >
    <jvmarg line="${junit.jvm.options}" />
    <sysproperty key="archives.dir" value="${target.dir}" />
    <sysproperty key="reports.dir" value="${basedir}/reports" />
    <sysproperty key="java.util.logging.manager" value="org.jboss.logmanager.LogManager" />
    <sysproperty key="log4j.defaultInitOverride" value="true" />
    <sysproperty key="org.jboss.logging.Logger.pluginClass" value="org.jboss.logging.logmanager.LoggerPluginImpl" />
    <sysproperty key="test.dir" value="${build.dir}/test" />
    <sysproperty key="xb.builder.useUnorderedSequence" value="true" />
  </junit>

  <classpath>
    <fileset dir="${lib.dir}" includes="**/*.jar" />
    <fileset dir="${build.dir}" includes="**/*.jar" />
    <pathelement location="${build.dir}/test" />
  </classpath>

  <formatter type="plain" />
  <formatter type="xml" />

  <batchtest todir="${basedir}/reports"
    haltonerror="${junit.batchtest.haltonerror}" 
    haltonfailure="${junit.batchtest.haltonfailure}" >
</target>
```
<target name="fork">
  <fork>
    <fileset dir="${build.dir}/test">
      <include name="**/*Test*Case.class"/>
    </fileset>
  </fork>
</target>

<!--  =================================
Target: docs
================================= -->
<target name="docs" depends="compile">
  <mkdir dir="${target.dir}/docs"/>
  <javadoc packagenames="*">
    <sourcepath>src/main/java</sourcepath>
    <destdir>${target.dir}/docs</destdir>
    <classpathref>lib.path.id</classpathref>
  </javadoc>
</target>

<!--  =================================
Target: clean
================================= -->
<target name="clean">
  <delete>
    <fileset dir="${basedir}" defaultexcludes="no">
      <include name="**/*~"/>
      <include name="**/*.bak"/>
    </fileset>
  </delete>
  <delete dir="${build.dir}"/>
  <delete dir="${target.dir}"/>
  <delete dir="${basedir}/reports"/>
</target>

<!--  =================================
Target: dist-clean
================================= -->
<target name="dist-clean" depends="init,clean">
  <delete includeemptydirs="true">
    <fileset dir="${lib.dir}" includes="**/*"/>
  </delete>
</target>
</project>
Appendix B. Samples

B.2. HelloWorld/Native example

B.2.1. Introduction

The HelloWorld/Native resource adapter sample shows a simple example of how to use and implement the interfaces in the Java EE Connector Architecture specification which calls a native library.

The HelloWorld/Native sample exposes the HelloWorldConnection interface where developers can invoke the exposed methods.

The sample shows how to build and test a resource adapter.

B.2.1.1. Setup

The build environment needs various libraries in order to being able to build and test the resource adapter. The setup is done by

```
cd doc/samples/helloworld-native
cp -R ../../../lib .
cp ../../../bin/ironjacamar-sjc.jar lib/
```

B.2.1.2. Building

Building the resource adapter is done by

```
ant native
make
ant rar
```

B.2.1.3. Testing

Testing the resource adapter is done by

```
ant test
```
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 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */

package org.jboss.jca.samples.helloworld;

import java.util.logging.Logger;
import javax.resource.ResourceException;
import javax.resource.spi.ActivationSpec;
import javax.resource.spi.BootstrapContext;
import javax.resource.spi.ConfigProperty;
import javax.resource.spi.Connector;
import javax.resource.spi.ResourceAdapter;
import javax.resource.spi.ResourceAdapterInternalException;
import javax.resource.spi.TransactionSupport;
import javax.resource.spi.endpoint.MessageEndpointFactory;
import javax.transaction.xa.XAResource;

/**
 * HelloWorldResourceAdapter
 *
 * @version $Revision: $
 */
@Connector(
    reauthenticationSupport = false,
public class HelloWorldResourceAdapter implements ResourceAdapter {
    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldResourceAdapter");

    /** Name property */
    @ConfigProperty(defaultValue = "AS 7", supportsDynamicUpdates = true)
    private String name;
/**
 * Default constructor
 */
public HelloWorldResourceAdapter()
{
}

/**
 * Set name
 * @param name The value
 */
public void setName(String name)
{
    this.name = name;
}

/**
 * Get name
 * @return The value
 */
public String getName()
{
    return name;
}

/**
 * This is called during the activation of a message endpoint.
 * @param endpointFactory A message endpoint factory instance.
 * @param spec An activation spec JavaBean instance.
 * @throws ResourceException generic exception
 */
public void endpointActivation(MessageEndpointFactory endpointFactory,
                               ActivationSpec spec) throws ResourceException
{
}

/**
 * This is called when a message endpoint is deactivated.
 * @param endpointFactory A message endpoint factory instance.
 * @param spec An activation spec JavaBean instance.
 */
public void endpointDeactivation(MessageEndpointFactory endpointFactory,
                                 ActivationSpec spec)
{
}

/**
 * This is called when a resource adapter instance is bootstrapped.
 * @param ctx A bootstrap context containing references
 * @throws ResourceAdapterInternalException indicates bootstrap failure.
 */
public void start(BootstrapContext ctx)
    throws ResourceAdapterInternalException
{
}
```java
/**
 * This is called when a resource adapter instance is undeployed or
 * during application server shutdown.
 */
public void stop()
{
}

/**
 * This method is called by the application server during crash recovery.
 * @param specs an array of ActivationSpec JavaBeans
 * @throws ResourceException generic exception
 * @return an array of XAResource objects
 */
public XAResource[] getXAResources(ActivationSpec[] specs)
    throws ResourceException
{
    return null;
}

/**
 * Returns a hash code value for the object.
 * @param other The reference object with which to compare.
 * @return true If this object is the same as the obj argument, false otherwise.
 */
@override
public int hashCode()
{
    int result = 17;
    if (name != null)
        result += 31 * result + 7 * name.hashCode();
    else
        result += 31 * result + 7;
    return result;
}

/**
 * Indicates whether some other object is equal to this one.
 * @param other The reference object which to compare.
 * @return true If this object is the same as the obj argument, false otherwise.
 */
@override
public boolean equals(Object other)
{
    if (other == null)
        return false;
    if (other == this)
        return true;
    if (! (other instanceof HelloWorldResourceAdapter))
        return false;
    HelloWorldResourceAdapter obj = (HelloWorldResourceAdapter)other;
    boolean result = true;
    if (result)
    {
        if (name == null)
            result = obj.getName() == null;
        else
            result = name.equals(obj.getName());
    }
```
B.2.3. HelloWorld/Native Managed Connection Factory

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 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;

import java.io.PrintWriter;
import java.util.Iterator;
import java.util.Set;
import java.util.logging.Logger;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionDefinition;
import javax.resource.spi.ConnectionManager;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.ManagedConnection;
import javax.resource.spi.ManagedConnectionFactory;
import javax.resource.spi.ResourceAdapter;
import javax.resource.spi.ResourceAdapterAssociation;
import javax.security.auth.Subject;

/**
 * HelloWorldManagedConnectionFactory
 *
 * @version $Revision: $
 */
@ConnectionDefinition(connectionFactory = HelloWorldConnectionFactory.class,
 connectionFactoryImpl = HelloWorldConnectionFactoryImpl.class,
 connection = HelloWorldConnection.class,
public class HelloWorldManagedConnectionFactory implements ManagedConnectionFactory, ResourceAdapterAssociation {

    /** The serial UID */
    private static final long serialVersionUID = 1L;

    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldManagedConnectionFactory");

    /** The resource adapter */
    private ResourceAdapter ra;

    /** The logwriter */
    private PrintWriter logwriter;

    /* Default constructor */
    public HelloWorldManagedConnectionFactory() {
        this.ra = null;
        this.logwriter = null;
    }

    /**
     * Creates a Connection Factory instance.
     *
     * @return EIS-specific Connection Factory instance or
     * javax.resource.cci.ConnectionFactory instance
     * @throws ResourceException Generic exception
     */
    public Object createConnectionFactory() throws ResourceException {
        throw new ResourceException("This resource adapter doesn't support non-managed
        environments");
    }

    /**
     * Creates a new physical connection to the underlying EIS resource manager.
     *
     * @param subject Caller's security information
     * @param cxRequestInfo Additional resource adapter specific connection request information
     */
    public Object createConnectionFactory(ConnectionManager cxManager) throws ResourceException {
        return new HelloWorldConnectionFactoryImpl(this, cxManager);
    }
}
public ManagedConnection createManagedConnection(Subject subject, ConnectionRequestInfo cxRequestInfo) throws ResourceException {
    return new HelloWorldManagedConnection(this);
}

/**
 * Returns a matched connection from the candidate set of connections.
 *
 * @param connectionSet Candidate connection set
 * @param subject Caller's security information
 * @param cxRequestInfo Additional resource adapter specific connection request information
 * @throws ResourceException generic exception
 * @return ManagedConnection if resource adapter finds an acceptable match otherwise null
 */
public ManagedConnection matchManagedConnections(Set connectionSet, Subject subject, ConnectionRequestInfo cxRequestInfo) throws ResourceException {
    ManagedConnection result = null;
    Iterator it = connectionSet.iterator();
    while (result == null && it.hasNext()) {
        ManagedConnection mc = (ManagedConnection) it.next();
        if (mc instanceof HelloWorldManagedConnection) {
            HelloWorldManagedConnection hwmc = (HelloWorldManagedConnection) mc;
            result = hwmc;
        }
    }
    return result;
}

/**
 * Get the log writer for this ManagedConnectionFactory instance.
 *
 * @return PrintWriter
 * @throws ResourceException generic exception
 */
public PrintWriter getLogWriter() throws ResourceException {
    return logwriter;
}

/**
 * Set the log writer for this ManagedConnectionFactory instance.
 *
 * @param out PrintWriter - an out stream for error logging and tracing
 * @throws ResourceException generic exception
 */
public void setLogWriter(PrintWriter out) throws ResourceException {
    logwriter = out;
}
```java
/**
 * Get the resource adapter
 * 
 * @return The handle
 */
public ResourceAdapter getResourceAdapter() {
    return ra;
}

/**
 * Set the resource adapter
 * 
 * @param ra The handle
 */
public void setResourceAdapter(ResourceAdapter ra) {
    this.ra = ra;
}

/**
 * Returns a hash code value for the object.
 * 
 * @return A hash code value for this object.
 */
@Override
public int hashCode() {
    int result = 17;
    return result;
}

/**
 * Indicates whether some other object is equal to this one.
 * 
 * @param other The reference object with which to compare.
 * 
 * @return true if this object is the same as the obj argument, false otherwise.
 */
@Override
public boolean equals(Object other) {
    if (other == null)
        return false;
    if (other == this)
        return true;
    if (! (other instanceof HelloWorldManagedConnectionFactory))
        return false;
    HelloWorldManagedConnectionFactory obj = (HelloWorldManagedConnectionFactory)other;
    boolean result = true;
    return result;
}
```
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 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */

package org.jboss.jca.samples.helloworld;

import java.io.PrintWriter;
import java.util.ArrayList;
import java.util.List;
import java.util.logging.Logger;
import javax.resource.NotSupportedException;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionEvent;
import javax.resource.spi.ConnectionEventListener;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.LocalTransaction;
import javax.resource.spi.ManagedConnection;
import javax.resource.spi.ManagedConnectionMetaData;
import javax.security.auth.Subject;
import javax.transaction.xa.XAResource;

/**
 * HelloWorldManagedConnection
 *
 * @version $Revision: $
 */

public class HelloWorldManagedConnection implements ManagedConnection
{
    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldManagedConnection");

    /** MCF */
    private HelloWorldManagedConnectionFactory mcf;

    /** Log writer */
```java
private PrintWriter logWriter;

/** Listeners */
private List<ConnectionEventListener> listeners;

/** Connection */
private Object connection;

/**
 * Constructor
 * @param mcf mcf
 */
public HelloWorldManagedConnection(HelloWorldManagedConnectionFactory mcf)
{
    this.mcf = mcf;
    this.logWriter = null;
    this.listeners = new ArrayList<ConnectionEventListener>(1);
    this.connection = null;
}

/**
 * Creates a new connection handle for the underlying physical connection
 * represented by the ManagedConnection instance.
 * @param subject Security context as JAAS subject
 * @param cxRequestInfo ConnectionRequestInfo instance
 * @return generic Object instance representing the connection handle.
 * @throws ResourceException generic exception if operation fails
 */
public Object getConnection(Subject subject,
                                      ConnectionRequestInfo cxRequestInfo)
    throws ResourceException
{
    connection = new HelloWorldConnectionImpl(this, mcf);

    return connection;
}

/**
 * Used by the container to change the association of an
 * application-level connection handle with a ManagedConnection instance.
 * @param connection Application-level connection handle
 * @throws ResourceException generic exception if operation fails
 */
public void associateConnection(Object connection) throws ResourceException
{
    this.connection = connection;
}

/**
 * Application server calls this method to force any cleanup on
 * the ManagedConnection instance.
 * @throws ResourceException generic exception if operation fails
 */
public void cleanup() throws ResourceException
{
}
```
/**
 * Destroys the physical connection to the underlying resource manager.
 * @throws ResourceException generic exception if operation fails
 */
public void destroy() throws ResourceException {
    this.connection = null;
}

/**
 * Adds a connection event listener to the ManagedConnection instance.
 * @param listener A new ConnectionEventListener to be registered
 */
public void addConnectionEventListener(ConnectionEventListener listener) {
    if (listener == null)
        throw new IllegalArgumentException("Listener is null");

    listeners.add(listener);
}

/**
 * Removes an already registered connection event listener
 * from the ManagedConnection instance.
 * @param listener Already registered connection event listener to be removed
 */
public void removeConnectionEventListener(ConnectionEventListener listener) {
    if (listener == null)
        throw new IllegalArgumentException("Listener is null");

    listeners.remove(listener);
}

/**
 * Gets the log writer for this ManagedConnection instance.
 * @return Character output stream associated with this Managed-Connection instance
 * @throws ResourceException generic exception if operation fails
 */
public PrintWriter getLogWriter() throws ResourceException {
    return logWriter;
}

/**
 * Sets the log writer for this ManagedConnection instance.
 * @param out Character Output stream to be associated
 * @throws ResourceException generic exception if operation fails
 */
public void setLogWriter(PrintWriter out) throws ResourceException {
    this.logWriter = out;
}
/**
 * Returns a <code>javax.resource.spi.LocalTransaction</code> instance.
 * @return LocalTransaction instance
 * @throws ResourceException generic exception if operation fails
 */
public LocalTransaction getLocalTransaction() throws ResourceException {
    throw new NotSupportedException("LocalTransaction not supported");
}

/**
 * Returns a <code>javax.transaction.xa.XAResource</code> instance.
 * @return XAResource instance
 * @throws ResourceException generic exception if operation fails
 */
public XAResource getXAResource() throws ResourceException {
    throw new NotSupportedException("GetXAResource not supported");
}

/**
 * Gets the metadata information for this connection's underlying EIS resource manager instance.
 * @return ManagedConnectionMetaData instance
 * @throws ResourceException generic exception if operation fails
 */
public ManagedConnectionMetaData getMetaData() throws ResourceException {
    return new HelloWorldManagedConnectionMetaData();
}

/**
 * Call helloWorld
 * @param name String name
 * @return String helloworld
 */
public native String helloWorld(String name);

/**
 * Close handle
 * @param handle The handle
 */
void closeHandle(HelloWorldConnection handle) {
    ConnectionEvent event = new ConnectionEvent(this, ConnectionEvent.CONNECTION_CLOSED);
    event.setConnectionHandle(handle);
    for (ConnectionEventListener cel : listeners) {
        cel.connectionClosed(event);
    }
}
}
B.2.5. HelloWorld/Native Connection Factory

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 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1231 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;
import java.io.Serializable;
import javax.resource.Referenceable;
import javax.resource.ResourceException;
/**
 * HelloWorldConnectionFactory
 */
public interface HelloWorldConnectionFactory extends Serializable, Referenceable {
    /**
     * Get connection from factory
     * @return HelloWorldConnection instance
     * @exception ResourceException Thrown if a connection can’t be obtained
     */
    public HelloWorldConnection getConnection() throws ResourceException;
}
B.2.6. HelloWorld/Native Connection Factory Implementation

```java
package org.jboss.jca.samples.helloworld;

import javax.naming.NamingException;
import javax.naming.Reference;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionManager;

/**
 * HelloWorldConnectionFactoryImpl
 *
 */
public class HelloWorldConnectionFactoryImpl implements HelloWorldConnectionFactory {

    /** The serialVersionUID */
    private static final long serialVersionUID = 1L;

    private Reference reference;
    private HelloWorldManagedConnectionFactory mcf;
    private ConnectionManager connectionManager;

    /**
     * Default constructor
     * @param mcf ManagedConnectionFactory
     * @param cxManager ConnectionManager
     */
    public HelloWorldConnectionFactoryImpl(HelloWorldManagedConnectionFactory mcf,
                                           ConnectionManager cxManager) {
        this.mcf = mcf;
        this.connectionManager = cxManager;
    }
```
Appendix B. Samples

/**
 * Get connection from factory
 *
 * @return HelloWorldConnection instance
 * @exception ResourceException Thrown if a connection can't be obtained
 */
@Override
public HelloWorldConnection getConnection() throws ResourceException {
    return (HelloWorldConnection) connectionManager.allocateConnection(mcf, null);
}

/**
 * Get the Reference instance.
 *
 * @return Reference instance
 * @exception NamingException Thrown if a reference can't be obtained
 */
@Override
public Reference getReference() throws NamingException {
    return reference;
}

/**
 * Set the Reference instance.
 *
 * @param reference A Reference instance
 */
@Override
public void setReference(Reference reference) {
    this.reference = reference;

B.2.7. HelloWorld/Native Connection

/*
 * IronJacamar, a Java EE Connector Architecture implementation
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 * the License, or (at your option) any later version.
 *
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 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 */

package org.jboss.jca.samples.helloworld;

public interface HelloWorldConnection {

    /**
     * HelloWorld
     * @return String
     */
    public String helloWorld();

    /**
     * HelloWorld
     * @param name A name
     * @return String
     */
    public String helloWorld(String name);

    /**
     * Close
     */
    public void close();
}
Appendix B. Samples

```java
package org.jboss.jca.samples.helloworld;

import java.util.logging.Logger;

/**
 * HelloWorldConnectionImpl
 *
 * @version $Revision: $
 */
public class HelloWorldConnectionImpl implements HelloWorldConnection {

    /**
     * The logger
     */
    private static Logger log = Logger.getLogger("HelloWorldConnectionImpl");

    /**
     * ManagedConnection */
    private HelloWorldManagedConnection mc;

    /**
     * ManagedConnectionFactory */
    private HelloWorldManagedConnectionFactory mcf;

    /**
     * Default constructor
     * @param mc HelloWorldManagedConnection
     * @param mcf HelloWorldManagedConnectionFactory
     */
    public HelloWorldConnectionImpl(HelloWorldManagedConnection mc,
                                    HelloWorldManagedConnectionFactory mcf) {
        this.mc = mc;
        this.mcf = mcf;
    }

    /**
     * Call helloWorld
     * @return String helloworld
     */
    public String helloWorld() {
        return helloWorld(((HelloWorldResourceAdapter)mcf.getResourceAdapter()).getName());
    }

    /**
     * Call helloWorld
     * @param name String name
     * @return String helloworld
     */
    public String helloWorld(String name) {
        return mc.helloWorld(name);
    }

    /**
     * Close
     */
}
public void close()
{
    mc.closeHandle(this);
}

B.2.9. HelloWorld/Native Managed Connection MetaData

/**
 * HelloWorldManagedConnectionMetaData
 * @version $Revision: $
 */
public class HelloWorldManagedConnectionMetaData implements ManagedConnectionMetaData
{
    /**
     * Default constructor
     */
    public HelloWorldManagedConnectionMetaData()
    {
    }

    /**
     * Returns Product name of the underlying EIS instance connected
     * through the ManagedConnection.
Appendix B. Samples

B.2.10. HelloWorld/Native ironjacamar.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ironjacamar>
  <connection-definitions>
```

```java
/*
* @return Product name of the EIS instance
* @throws ResourceException Thrown if an error occurs
*/
@Override
public String getEISProductName() throws ResourceException
{
    return "HelloWorld Resource Adapter";
}

/**
* Returns Product version of the underlying EIS instance connected
* through the ManagedConnection.
* @return Product version of the EIS instance
* @throws ResourceException Thrown if an error occurs
*/
@Override
public String getEISProductVersion() throws ResourceException
{
    return "1.0";
}

/**
* Returns maximum limit on number of active concurrent connections
* @return Maximum limit for number of active concurrent connections
* @throws ResourceException Thrown if an error occurs
*/
@Override
public int getMaxConnections() throws ResourceException
{
    return 0;
}

/**
* Returns name of the user associated with the ManagedConnection instance
* @return Name of the user
* @throws ResourceException Thrown if an error occurs
*/
@Override
public String getUserName() throws ResourceException
{
    return null;
}
}
```
B.2.11. HelloWorld/Native C

```c
#include <jni.h>
#include <string.h>
#include <stdlib.h>
#include "build/c/HelloWorld.h"

/*
 * Class:     org_jboss_jca_samples_helloworld_HelloWorldManagedConnectionFactory
 * Method:    helloWorld
 * Signature: (Ljava/lang/String;)Ljava/lang/String;
 */
JNIEXPORT jstring JNICALL Java_org_jboss_jca_samples_helloworld_HelloWorldManagedConnectionFactory_helloWorld(JNIEnv *env,
    jobject o, jstring s)
{
    int length = 0;
    if (s != NULL)
        length = (*env)->GetStringLength(env, s);
    char *buf = (char*)malloc(16 + length);
    strcpy(buf, "Hello world, ");
    if (s != NULL)
        strcat(buf, (*env)->GetStringUTFChars(env, s, 0));
    strcat(buf, "!");
    jstring result = (*env)->NewStringUTF(env, buf);
    free(buf);
    return result;
}
```

B.2.12. HelloWorld/Native Connection Test Case

```c
/*
 * IronJacamar, a Java EE Connector Architecture implementation
*/
```
Appendix B. Samples

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*
*
*
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*
*
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* License along with this software; if not, write to the Free
* Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
* 02110-1301 USA, or see the FSF site: http://www.fsf.org.
*/
package org.jboss.jca.samples.helloworld;
import java.io.File;
import java.util.UUID;
import java.util.logging.Logger;
import javax.annotation.Resource;
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.api.spec.ResourceAdapterArchive;
import org.junit.Test;
import org.junit.runner.RunWith;
import static org.junit.Assert.*;
/**
* Test case for the HelloWorld/Native resource adapter
*/
@RunWith(Arquillian.class)
public class ConnectorTestCase
{
private static Logger log = Logger.getLogger("ConnectorTestCase");
/**
* Define the deployment
*
* @return The deployment archive
*/
@Deployment
public static ResourceAdapterArchive createDeployment()
{
String deploymentName = "ConnectorTestCase.rar";
ResourceAdapterArchive raa =
ShrinkWrap.create(ResourceAdapterArchive.class, deploymentName);
JavaArchive ja = ShrinkWrap.create(JavaArchive.class,

338


UUID.randomUUID().toString() + ".jar";

ja.addClass(HelloWorldResourceAdapter.class,
    HelloWorldManagedConnectionFactory.class,
    HelloWorldManagedConnection.class,
    HelloWorldManagedConnectionMetaData.class,
    HelloWorldConnectionFactory.class,
    HelloWorldConnectionFactoryImpl.class,
    HelloWorldConnection.class,
    HelloWorldConnectionFactoryImpl.class);

raa.addAsLibrary(ja);
raa.addAsManifestResource("META-INF/ironjacamar.xml", "ironjacamar.xml");

String rootPath =
    System.getProperty("test.dir") + File.separator + "..") + File.separator;

File root = new File(rootPath);
for (File f : root.listFiles())
{
    if (f.getName().contains("HelloWorld"))
        raa.addAsLibrary(f);
}

log.info(raa.toString(true));
return raa;

/** Resource */
@Resource(mappedName = "java:/eis/HelloWorld")
private HelloWorldConnectionFactory connectionFactory;

/**
 * Test helloWorld
 */
@Test
public void testHelloWorldNoArgs() throws Throwable
{
    assertNotNull(connectionFactory);
    HelloWorldConnection connection = connectionFactory.getConnection();
    assertNotNull(connection);
    String result = connection.helloWorld();
    assertNotNull(result);
    connection.close();
}

/**
 * Test helloWorld
 */
@Test
public void testHelloWorldNameString() throws Throwable
{
    assertNotNull(connectionFactory);
    HelloWorldConnection connection = connectionFactory.getConnection();
    assertNotNull(connection);
    String result = connection.helloWorld(null);
assertNotNull(result);
connection.close();
}
}

B.2.13. HelloWorld/Native Ant build.xml

<!--
/*
 * IronJacamar, a Java EE Connector Architecture implementation
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 * published by the Free Software Foundation; either version 2.1 of
 * the License, or (at your option) any later version.
 * This software is distributed in the hope that it will be useful,
 * but WITHOUT ANY WARRANTY; without even the implied warranty of
 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
 * Lesser General Public License for more details.
 * You should have received a copy of the GNU Lesser General Public
 * License along with this software; if not, write to the Free
 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
-->

<project name="helloworld-native" basedir="." default="jar">

<!--  ===========================================================
Properties
  =========================================================== -->
<property name="build.dir" value="${basedir}/build" />
<property name="target.dir" value="${basedir}/target" />
<property name="lib.dir" value="${basedir}/lib" />
<property name="javac.debug" value="on" />
<property name="javac.deprecation" value="on" />
<property name="javac.optimize" value="off" />
<property name="javac.encoding" value="utf-8" />
<property name="junit.printsummary" value="yes" />
<property name="junit.haltonerror" value="no" />
<property name="junit.haltonfailure" value="no" />
<property name="junit.fork" value="yes" />
<property name="junit.timeout" value="60000" />
<property name="junit.jvm" value="" />
<property name="junit.jvm.options" value="-Xms128m -Xmx512m -XX:MaxPermSize=256m" />
<property name="junit.batchtest.haltonerror" value="no" />

340
<property name="junit.batchtest.haltonfailure" value="no" />
<property name="junit.batchtest.fork" value="yes" />

<path id="lib.path.id">
   <fileset dir="${lib.dir}">
      <include name="**/*.jar"/>
   </fileset>
</path>

<path id="native.path.id">
   <fileset dir="${lib.dir}">
      <include name="**/*.jar"/>
   </fileset>
   <pathbelement path="${build.dir}"/>
</path>

<path id="test.lib.path.id">
   <fileset dir="${lib.dir}">
      <include name="**/*.jar"/>
   </fileset>
   <fileset dir="${build.dir}">
      <include name="**/*.jar"/>
   </fileset>
</path>

<!--  =================================
Target: init
================================= -->
<target name="init">
   <mkdir dir="${build.dir}"/>
   <mkdir dir="${build.dir}/c"/>
   <mkdir dir="${lib.dir}"/>
</target>

<!--  =================================
Target: compile
================================= -->
<target name="compile" depends="init">
   <javac srcdir="${basedir}/src/main/java"
      destdir="${build.dir}" classpathref="lib.path.id"
      debug="${javac.debug}" deprecation="${javac.deprecation}"
      encoding="${javac.encoding}" optimize="${javac.optimize}"/>
</target>

<!--  =================================
Target: native
================================= -->
<target name="native" depends="compile">
   <javah class="org.jboss.jca.samples.helloworld.HelloWorldManagedConnection" outputFile="${build.dir}/c/HelloWorld.h" force="true" classpathref="native.path.id"/>
</target>
<!--  =========================================================
  Target: rar
  ========================================================= -->
<target name="rar">
  <mkdir dir="${target.dir}" />
  <mkdir dir="${basedir}/src/main/resources" />
  <jar destfile="${build.dir}/helloworld.jar"
      basedir="${build.dir}" includes="**/*.class" />
  <jar destfile="${target.dir}/helloworld.rar">
    <fileset dir="${basedir}/src/main/resources" includes="META-INF/**"/>
    <fileset dir="${build.dir}" includes="*.jar"/>
    <fileset dir="${build.dir}" includes="*.so"/>
    <fileset dir="${build.dir}" includes="*.a"/>
    <fileset dir="${build.dir}" includes="*.dll"/>
  </jar>
</target>

<!--  =========================================================
  Target: prepare-test
  ========================================================= -->
<target name="prepare-test" depends="init">
  <mkdir dir="${build.dir}/test" />  
  <javac srcdir="src/test"
       destdir="${build.dir}/test"
       classpathref="test.lib.path.id"
       debug="${javac.debug}"  
       deprecation="${javac.deprecation}"  
       encoding="${javac.encoding}"  
       optimize="${javac.optimize}"  
       compilerarg value="-Xlint"/>
  </javac>

  <copy todir="${build.dir}/test">
    <fileset dir="src/main/resources"/>
    <fileset dir="src/test/resources"/>
  </copy>
</target>

<!--  =========================================================
  Target: test
  ========================================================= -->
<target name="test" depends="rar, prepare-test">
  <mkdir dir="${basedir}/reports"/>

  <junit dir="src/test"
      printsummary="${junit.printsummary}"  
      haltonerror="${junit.haltonerror}"  
      haltonfailure="${junit.haltonfailure}"  
      fork="${junit.fork}"  
      timeout="${junit.timeout}"/>

  <jvmarg line="${junit.jvm.options}"/>
  <sysproperty key="archives.dir" value="${target.dir}"/>
  <sysproperty key="reports.dir" value="${basedir}/reports"/>
  <sysproperty key="java.util.logging.manager" value="org.jboss.logmanager.LogManager"/>
  <sysproperty key="log4j.defaultInitOverride" value="true"/>
  <sysproperty key="org.jboss.logging.Logger.pluginClass"/>
<sysproperty key="test.dir" value="${build.dir}/test"/>
<sysproperty key="xb.builder.useUnorderedSequence" value="true"/>

<classpath>
  <fileset dir="${lib.dir}" includes="**/*.jar"/>
  <fileset dir="${build.dir}" includes="**.jar"/>
  <pathelement location="${build.dir}/test"/>
</classpath>

<formatter type="plain"/>
<formatter type="xml"/>

<batchtest todir="${basedir}/reports"
  haltonerror="${junit.batchtest.haltonerror}"
  haltonfailure="${junit.batchtest.haltonfailure}"
  fork="${junit.batchtest.fork}">
  <fileset dir="${build.dir}/test">
    <include name="**/*TestCase.class"/>
  </fileset>
</batchtest>
</junit>

</target>

<!--  =================================
Target: docs
================================= -->
<target name="docs" depends="compile">
  <mkdir dir="${target.dir}/docs"/>
  <javadoc packagenames="*"
    sourcepath="src/main/java"
    destdir="${target.dir}/docs"
    classpathref="lib.path.id">
  </javadoc>
</target>

<!--  =================================
Target: clean
================================= -->
<target name="clean">
  <delete>
    <fileset dir="${basedir}" defaultexcludes="no">
      <include name="**/*.~"/>
      <include name="**/*.bak"/>
    </fileset>
  </delete>
  <delete dir="${build.dir}"/>
  <delete dir="${target.dir}"/>
  <delete dir="${basedir}/reports"/>
  <delete file="${basedir}/Makefile"/>
  <delete file="${basedir}/cmake_install.cmake"/>
  <delete dir="${basedir}/CMakeFiles"/>
  <delete file="${basedir}/CMakeCache.txt"/>
</target>
Appendix B. Samples

```xml
<target name="dist-clean">
  <delete includeemptydirs="true">
    <fileset dir="${lib.dir}" includes="**/*"/>
  </delete>
</target>
</project>
```

### B.2.14. HelloWorld/Native cmake

```csharp
PROJECT(helloworld-native)

CMAKE_MINIMUM_REQUIRED (VERSION 2.8)
SET(CMAKE_VERBOSE_MAKEFILE 1)

SET(LIBRARY_OUTPUT_PATH build)
SET(BUILD_SHARED_LIBS ON)
SET(CMAKE_INCLUDE_CURRENT_DIR ON)

FIND_PACKAGE(Java COMPONENTS Development)
FIND_PACKAGE(JNI)

INCLUDE_DIRECTORIES(${JAVA_INCLUDE_PATH})
INCLUDE_DIRECTORIES(${JAVA_INCLUDE_PATH2})

ADD_LIBRARY(HelloWorld helloworld.c)
```

### B.3. HelloWorld/Lazy example

#### B.3.1. Introduction

The HelloWorld/Lazy resource adapter example shows a simple example of how to use and implement the interfaces in the Java EE Connector Architecture specification which takes advantage of the lazy association mechanism to reestablish the relationship between the logical (HelloWorldConnectionImpl) and the physical connection (HelloWorldManagedConnection).

The HelloWorld/Lazy sample exposes the HelloWorldConnection interface where developers can invoke the exposed methods.

The sample shows how to build and test a resource adapter.
B.3.1.1. Setup

The build environment needs various libraries in order to being able to build and test the resource adapter. The setup is done by

```bash
cd doc/samples/helloworld-lazy
cp -R ../../../lib .
cp ../../../bin/ironjacamar-sjc.jar lib/
```

B.3.1.2. Building

Building the resource adapter is done by

```bash
ant rar
```

B.3.1.3. Testing

Testing the resource adapter is done by

```bash
ant test
```

B.3.2. HelloWorld/Lazy Resource Adapter

/*
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* License along with this software; if not, write to the Free
* Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
* 02110-1301 USA, or see the FSF site: http://www.fsf.org.
*/

package org.jboss.jca.samples.helloworld;

import java.util.logging.Logger;
import javax.resource.ResourceException;
import javax.resource.spi.ActivationSpec;
import javax.resource.spi.BootstrapContext;
import javax.resource.spi.ConfigProperty;
import javax.resource.spi.Connector;
import javax.resource.spi.ResourceAdapter;
import javax.resource.spi.ResourceAdapterInternalException;
import javax.resource.spi.TransactionSupport;
import javax.resource.spi.endpoint.MessageEndpointFactory;
import javax.transaction.xa.XAResource;

/**
 * HelloWorldResourceAdapter
 */
@Connector(
    reauthenticationSupport = false,
    transactionSupport = TransactionSupportLevel.NoTransaction)
public class HelloWorldResourceAdapter implements ResourceAdapter {

    /**
     * The logger
     */
    private static Logger log = Logger.getLogger("HelloWorldResourceAdapter");

    /**
     * Name property
     */
    @ConfigProperty(defaultValue = "AS 7", supportsDynamicUpdates = true)
    private String name;

    /**
     * Default constructor
     */
    public HelloWorldResourceAdapter()
    {
    }

    /**
     * Set name
     */
    @param name The value
    
    public void setName(String name)
    {
        this.name = name;
    }

    /**
     * Get name
     */
    @return The value
    
    public String getName()
public void endpointActivation(MessageEndpointFactory endpointFactory, ActivationSpec spec) throws ResourceException
{
  return name;
}

/**
 * This is called during the activation of a message endpoint.
 */
public void endpointActivation(MessageEndpointFactory endpointFactory, ActivationSpec spec) throws ResourceException
{
  return name;
}

/**
 * This is called when a message endpoint is deactivated.
 */
public void endpointDeactivation(MessageEndpointFactory endpointFactory, ActivationSpec spec)
{
}

/**
 * This is called when a resource adapter instance is bootstrapped.
 */
public void start(BootstrapContext ctx) throws ResourceAdapterInternalException
{
  return null;
}

/**
 * This is called when a resource adapter instance is undeployed or during application server shutdown.
 */
public void stop()
{
}

/**
 * This method is called by the application server during crash recovery.
 */
public XAResource[] getXAResources(ActivationSpec[] specs) throws ResourceException
{
  return null;
}

/**

HelloWorld/Lazy Resource Adapter

347
* Returns a hash code value for the object.
* @return A hash code value for this object.
*/
@override
public int hashCode()
{
    int result = 17;
    if (name != null)
        result += 31 * result + 7 * name.hashCode();
    else
        result += 31 * result + 7;
    return result;
}

/**
* Indicates whether some other object is equal to this one.
* @param other The reference object with which to compare.
* @return true If this object is the same as the obj argument, false otherwise.
*/
@override
public boolean equals(Object other)
{
    if (other == null)
        return false;
    if (other == this)
        return true;
    if (! (other instanceof HelloWorldResourceAdapter))
        return false;
    HelloWorldResourceAdapter obj = (HelloWorldResourceAdapter)other;
    boolean result = true;
    if (result)
    {
        if (name == null)
            result = obj.getName() == null;
        else
            result = name.equals(obj.getName());
    }
    return result;
}
/*
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 * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
 * Lesser General Public License for more details.
 *
 * You should have received a copy of the GNU Lesser General Public
 * License along with this software; if not, write to the Free
 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;

import java.io.PrintWriter;
import java.util.Iterator;
import java.util.Set;
import java.util.logging.Logger;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionDefinition;
import javax.resource.spi.ConnectionManager;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.ManagedConnection;
import javax.resource.spi.ManagedConnectionFactory;
import javax.resource.spi.ResourceAdapter;
import javax.resource.spi.ResourceAdapterAssociation;

import javax.security.auth.Subject;

/**
 * HelloWorld Managed Connection Factory
 *
 * @version $Revision: $
 */
@ConnectionDefinition (connectionFactory = HelloWorldConnectionFactory.class,
 connectionFactoryImpl = HelloWorldConnectionFactoryImpl.class,
 connection = HelloWorldConnection.class,
 connectionImpl = HelloWorldConnectionImpl.class)
public class HelloWorldManagedConnectionFactory
    implements ManagedConnectionFactory, ResourceAdapterAssociation
{
    /** The serialVersionUID */
    private static final long serialVersionUID = 1L;

    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldManagedConnectionFactory");

    /** The resource adapter */
    private ResourceAdapter ra;

    /** The connection manager */
    private ConnectionManager cm;

    /** The logwriter */
    private PrintWriter logwriter;

    /** Default constructor

    */
*/
public HelloWorldManagedConnectionFactory()
{
    this.ra = null;
    this.cm = null;
    this.logwriter = null;
}

/**
 * Creates a Connection Factory instance.
 * @return EIS-specific Connection Factory instance or
 *         javax.resource.cci.ConnectionFactory instance
 * @throws ResourceException Generic exception
 */
public Object createConnectionFactory() throws ResourceException
{
    throw new ResourceException("This resource adapter doesn't support non-managed
environments");
}

/**
 * Creates a Connection Factory instance.
 * @param cxManager ConnectionManager to be associated with created EIS
 *         connection factory instance
 * @return EIS-specific Connection Factory instance or
 *         javax.resource.cci.ConnectionFactory instance
 * @throws ResourceException Generic exception
 */
public Object createConnectionFactory(ConnectionManager cxManager) throws ResourceException
{
    this.cm = cxManager;

    return new HelloWorldConnectionFactoryImpl(this, cxManager);
}

/**
 * Creates a new physical connection to the underlying EIS resource manager.
 * @param subject Caller's security information
 * @param cxRequestInfo Additional resource adapter specific connection
 *         request information
 * @throws ResourceException generic exception
 */
public ManagedConnection createManagedConnection(Subject subject,
                                                  ConnectionRequestInfo cxRequestInfo)
    throws ResourceException
{
    return new HelloWorldManagedConnection(cm, this);
}

/**
 * Returns a matched connection from the candidate set of connections.
 * @param connectionSet Candidate connection set
 * @param subject Caller's security information
 * @param cxRequestInfo Additional resource adapter specific connection request information
 * @return
public ManagedConnection matchManagedConnections(Set connectionSet, Subject subject, ConnectionRequestInfo cxRequestInfo) throws ResourceException {
    Iterator it = connectionSet.iterator();
    while (it.hasNext()) {
        ManagedConnection mc = (ManagedConnection) it.next();
        if (mc instanceof HelloWorldManagedConnection) {
            return (HelloWorldManagedConnection) mc;
        }
    }
    return null;
}

/**
 * Get the log writer for this ManagedConnectionFactory instance.
 *
 * @return PrintWriter
 * @throws ResourceException generic exception
 */
public PrintWriter getLogWriter() throws ResourceException {
    return logwriter;
}

/**
 * Set the log writer for this ManagedConnectionFactory instance.
 *
 * @param out PrintWriter - an out stream for error logging and tracing
 * @throws ResourceException generic exception
 */
public void setLogWriter(PrintWriter out) throws ResourceException {
    logwriter = out;
}

/**
 * Get the resource adapter
 *
 * @return The handle
 */
public ResourceAdapter getResourceAdapter() {
    return ra;
}

/**
 * Set the resource adapter
 *
 * @param ra The handle
 */
public void setResourceAdapter(ResourceAdapter ra) {

this.ra = ra;
}

/**
 * Returns a hash code value for the object.
 * @return A hash code value for this object.
 */
@override
public int hashCode()
{
    int result = 17;
    return result;
}

/**
 * Indicates whether some other object is equal to this one.
 * @param other The reference object with which to compare.
 * @return true if this object is the same as the obj argument, false otherwise.
 */
@override
public boolean equals(Object other)
{
    if (other == null)
        return false;
    if (other == this)
        return true;
    if (!(other instanceof HelloWorldManagedConnectionFactory))
        return false;
    HelloWorldManagedConnectionFactory obj = (HelloWorldManagedConnectionFactory)other;
    boolean result = true;
    return result;
}

B.3.4. HelloWorld/Lazy Managed Connection

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*/

package org.jboss.jca.samples.helloworld;

import java.io.PrintWriter;
import java.util.ArrayList;
import java.util.Collections;
import java.util.List;
import java.util.logging.Logger;
import javax.resource.NotSupportedException;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionEvent;
import javax.resource.spi.ConnectionEventListener;
import javax.resource.spi.ConnectionManager;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.DissociatableManagedConnection;
import javax.resource.spi.LocalTransaction;
import javax.resource.spi.ManagedConnection;
import javax.resource.spi.ManagedConnectionMetaData;
import javax.security.auth.Subject;
import javax.transaction.xa.XAResource;

/**
* HelloWorldManagedConnection
*
* @version $Revision: $
*/

public class HelloWorldManagedConnection implements ManagedConnection,
    DissociatableManagedConnection
{
    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldManagedConnection");

    /** Connection manager */
    private ConnectionManager cm;

    /** MCF */
    private HelloWorldManagedConnectionFactory mcf;

    /** Log writer */
    private PrintWriter logWriter;

    /** Listeners */
    private List<ConnectionEventListener> listeners;

    /** Connection */
    private HelloWorldConnectionImpl connection;

    /**
    * Constructor
    * @param cm The connection manager
    * @param mcf The managed connection factory
    */
public HelloWorldManagedConnection(ConnectionManager cm,
    HelloWorldManagedConnectionFactory mcf) {
    this.cm = cm;
    this.mcf = mcf;
    this.logWriter = null;
    this.listeners = Collections.synchronizedList(
        new ArrayList<ConnectionEventListener>(1));
    this.connection = null;
}

/**
 * Creates a new connection handle for the underlying physical connection
 * represented by the ManagedConnection instance.
 * @param subject Security context as JAAS subject
 * @param cxRequestInfo ConnectionRequestInfo instance
 * @return generic Object instance representing the connection handle.
 * @throws ResourceException generic exception if operation fails
 */
public Object getConnection(Subject subject,
    ConnectionRequestInfo cxRequestInfo)
    throws ResourceException {
    if (connection != null) {
        connection.setManagedConnection(null);
    }
    connection = new HelloWorldConnectionImpl(this, mcf, cm, cxRequestInfo);
    return connection;
}

/**
 * Used by the container to change the association of an
 * application-level connection handle with a ManagedConnection instance.
 * @param connection Application-level connection handle
 * @throws ResourceException generic exception if operation fails
 */
public void associateConnection(Object connection)
    throws ResourceException {
    if (connection == null) {
        throw new ResourceException("Null connection handle");
    }
    if (! (connection instanceof HelloWorldConnectionImpl)) {
        throw new ResourceException("Wrong connection handle");
    }
    if (this.connection != null) {
        this.connection.setManagedConnection(null);
    }
    this.connection = (HelloWorldConnectionImpl)connection;
    this.connection.setManagedConnection(this);
}

/**
 * This method is called by an application server (that is capable of lazy
public void dissociateConnections() throws ResourceException
{
    if (connection != null)
    {
        connection.setManagedConnection(null);
        connection = null;
    }
}

/**
 * Application server calls this method to force any cleanup on
 * the ManagedConnection instance.
 *
 * @throws ResourceException generic exception if operation fails
 */
public void cleanup() throws ResourceException
{
    if (connection != null)
    {
        connection.setManagedConnection(null);
        connection = null;
    }
}

/**
 * Destroys the physical connection to the underlying resource manager.
 *
 * @throws ResourceException generic exception if operation fails
 */
public void destroy() throws ResourceException
{
    if (connection != null)
    {
        connection.setManagedConnection(null);
        connection = null;
    }
}

/**
 * Adds a connection event listener to the ManagedConnection instance.
 *
 * @param listener A new ConnectionEventListener to be registered
 */
public void addConnectionEventListener(ConnectionEventListener listener)
{
    if (listener == null)
        throw new IllegalArgumentException("Listener is null");

    listeners.add(listener);
}

/**
 * Removes an already registered connection event listener
 * from the ManagedConnection instance.
 *
* @param listener Already registered connection event listener to be removed
 */
public void removeConnectionEventListener(ConnectionEventListener listener) {
    if (listener == null)
        throw new IllegalArgumentException("Listener is null");

    listeners.remove(listener);
}

/**
* Gets the log writer for this ManagedConnection instance.
* @return Character output stream associated with this Managed-Connection instance
* @throws ResourceException generic exception if operation fails
*/
public PrintWriter getLogWriter() throws ResourceException {
    return logWriter;
}

/**
* Sets the log writer for this ManagedConnection instance.
* @param out Character Output stream to be associated
* @throws ResourceException generic exception if operation fails
*/
public void setLogWriter(PrintWriter out) throws ResourceException {
    this.logWriter = out;
}

/**
* Returns an <code>javax.resource.spi.LocalTransaction</code> instance.
* @return LocalTransaction instance
* @throws ResourceException generic exception if operation fails
*/
public LocalTransaction getLocalTransaction() throws ResourceException {
    throw new NotSupportedException("LocalTransaction not supported");
}

/**
* Returns an <code>javax.transaction.xa.XAresource</code> instance.
* @return XAResource instance
* @throws ResourceException generic exception if operation fails
*/
public XAResource getXAResource() throws ResourceException {
    throw new NotSupportedException("GetXAResource not supported");
}

/**
* Gets the metadata information for this connection's underlying EIS resource manager instance.
*
public ManagedConnectionMetaData getMetaData() throws ResourceException {
    return new HelloWorldManagedConnectionMetaData();
}

/**
 * Call helloWorld
 * @param name String name
 * @return String helloworld
 */
String helloWorld(String name) {
    return "Hello World, " + name + "!";
}

/**
 * Close handle
 * @param handle The handle
 */
void closeHandle(HelloWorldConnection handle) {
    ConnectionEvent event = new ConnectionEvent(this, ConnectionEvent.CONNECTION_CLOSED);
    event.setConnectionHandle(handle);
    for (ConnectionEventListener cel : listeners) {
        cel.connectionClosed(event);
    }
}
Appendix B. Samples

*/
package org.jboss.jca.samples.helloworld;

import java.io.Serializable;
import javax.resource.Referenceable;
import javax.resource.ResourceException;

/**
  * HelloWorldConnectionFactory
  *
  * @version $Revision: $
  */
public interface HelloWorldConnectionFactory extends Serializable, Referenceable {
    /**
     * Get connection from factory
     *
     * @return HelloWorldConnection instance
     * @exception ResourceException Thrown if a connection can't be obtained
     */
    public HelloWorldConnection getConnection() throws ResourceException;
}

B.3.6. HelloWorld/Lazy Connection Factory Implementation

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 * Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA
 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;
import javax.naming.NamingException;
import javax.naming.Reference;
import javax.resource.ResourceException;
import javax.resource.spi.ConnectionManager;

/**
 * HelloWorldConnectionFactoryImpl
 *
 * @version $Revision: $
 */
public class HelloWorldConnectionFactoryImpl implements HelloWorldConnectionFactory {

    /** The serialVersionUID */
    private static final long serialVersionUID = 1L;

    private Reference reference;
    private HelloWorldManagedConnectionFactory mcf;
    private ConnectionManager connectionManager;

    /**
     * Default constructor
     *
     * @param mcf ManagedConnectionFactory
     * @param cxManager ConnectionManager
     */
    public HelloWorldConnectionFactoryImpl(HelloWorldManagedConnectionFactory mcf,
            ConnectionManager cxManager) {
        this.mcf = mcf;
        this.connectionManager = cxManager;
    }

    /**
     * Get connection from factory
     *
     * @return HelloWorldConnection instance
     * @exception ResourceException Thrown if a connection can't be obtained
     */
    @Override
    public HelloWorldConnection getConnection() throws ResourceException {
        return (HelloWorldConnection) connectionManager.allocateConnection(mcf, null);
    }

    /**
     * Get the Reference instance.
     *
     * @return Reference instance
     * @exception NamingException Thrown if a reference can't be obtained
     */
    @Override
    public Reference getReference() throws NamingException {
        return reference;
    }

    /**
     * Set the Reference instance.
     */
B.3.7. HelloWorld/Lazy Connection

```java
package org.jboss.jca.samples.helloworld;

/**
 * HelloWorldConnection
 *
 * @version $Revision: $
 */

public interface HelloWorldConnection {
    /**
     * HelloWorld
     * @return String
     */
    String helloWorld();

    /**
     * HelloWorld
     * @param name A name
     * @return String
     */
    String helloWorld(String name);
}
```
public String helloWorld(String name);
/**
 * Close
 */
public void close();
}

B.3.8. HelloWorld/Lazy Connection Implementation

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 * 02110-1301 USA, or see the FSF site: http://www.fsf.org.
 */
package org.jboss.jca.samples.helloworld;

import java.util.logging.Logger;
import javax.resource.spi.ConnectionManager;
import javax.resource.spi.ConnectionRequestInfo;
import javax.resource.spi.LazyAssociatableConnectionManager;

/**
 * HelloWorldConnectionImpl
 *
 */
public class HelloWorldConnectionImpl implements HelloWorldConnection
{
    /** The logger */
    private static Logger log = Logger.getLogger("HelloWorldConnectionImpl");

    /** Connection Manager */
    private ConnectionManager cm;

    /** ManagedConnection */
private HelloWorldManagedConnection mc;

/** ManagedConnectionFactory */
private HelloWorldManagedConnectionFactory mcf;

/** ConnectionRequestInfo */
private ConnectionRequestInfo cri;

/**
 * Default constructor
 * @param mc HelloWorldManagedConnection
 * @param mcf HelloWorldManagedConnectionFactory
 * @param cm The connection manager
 * @param cri The connection request info
 */
public HelloWorldConnectionImpl (HelloWorldManagedConnection mc,
                                 HelloWorldManagedConnectionFactory mcf,
                                 ConnectionManager cm,
                                 ConnectionRequestInfo cri)
{
    this.mc = mc;
    this.mcf = mcf;
    this.cm = cm;
    this.cri = cri;
}

/**
 * Call helloWorld
 * @return String helloworld
 */
public String helloWorld()
{
    return helloWorld(((HelloWorldResourceAdapter)mcf.getResourceAdapter()).getName());
}

/**
 * Call helloWorld
 * @param name String name
 * @return String helloworld
 */
public String helloWorld(String name)
{
    if (mc == null)
        associate();

    return mc.helloWorld(name);
}

/**
 * Close
 */
public void close()
{
    if (mc != null)
    {
        mc.closeHandle(this);
    }
    else
    {

}
if (cm instanceof LazyAssociatableConnectionManager)
{
    LazyAssociatableConnectionManager lacm = (LazyAssociatableConnectionManager) cm;
    lacm.inactiveConnectionClosed(this, mcf);
}
}

/**
 * Set the managed connection
 * @param mc The managed connection
 */
void setManagedConnection(HelloWorldManagedConnection mc)
{
    this.mc = mc;
}

/**
 * Associate
 */
private void associate()
{
    if (cm instanceof LazyAssociatableConnectionManager)
    {
        try
        {
            LazyAssociatableConnectionManager lacm = (LazyAssociatableConnectionManager) cm;
            lacm.associateConnection(this, mcf, cri);
        }
        catch (Throwable t)
        {
            log.severe("Associate" + t.getMessage());
        }
    }
}

B.3.9. HelloWorld/Lazy Managed Connection MetaData

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Appendix B. Samples

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/*
package org.jboss.jca.samples.helloworld;

import javax.resource.ResourceException;
import javax.resource.spi.ManagedConnectionMetaData;

/**
* HelloWorldManagedConnectionMetaData
*
* @version $Revision: $
*/
public class HelloWorldManagedConnectionMetaData implements ManagedConnectionMetaData {

/**
* Default constructor
*/
public HelloWorldManagedConnectionMetaData() {
}

/**
* Returns Product name of the underlying EIS instance connected through the ManagedConnection.
* @return Product name of the EIS instance
* @throws ResourceException Thrown if an error occurs
*/
@Override
public String getEISProductName() throws ResourceException {
    return "HelloWorld Resource Adapter";
}

/**
* Returns Product version of the underlying EIS instance connected through the ManagedConnection.
* @return Product version of the EIS instance
* @throws ResourceException Thrown if an error occurs
*/
@Override
public String getEISProductVersion() throws ResourceException {
    return "1.0";
}

/**
* Returns maximum limit on number of active concurrent connections
* @return Maximum limit for number of active concurrent connections
* @throws ResourceException Thrown if an error occurs
*/
@Override
public int getMaxConnections() throws ResourceException
{
    return 0;
}
/**
 * Returns name of the user associated with the ManagedConnection instance
 *
 * @return Name of the user
 * @throws ResourceException Thrown if an error occurs
 */
@Override
public String getUserName() throws ResourceException
{
    return null;
}

B.3.10. HelloWorld/Lazy ironjacamar.xml

<ironjacamar>
<connection-definitions>
<connection-definition
    class-name="org.jboss.jca.samples.helloworld.HelloWorldManagedConnectionFactory"
    jndi-name="java:/eis/HelloWorld">
    <pool>
        <min-pool-size>0</min-pool-size>
        <max-pool-size>1</max-pool-size>
    </pool>
</connection-definition>
</connection-definitions>
</ironjacamar>

B.3.11. HelloWorld/Lazy Connection Test Case

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02110-1301 USA, or see the FSF site: http://www.fsf.org.

package org.jboss.jca.samples.helloworld;

import java.util.UUID;
import java.util.logging.Logger;

import javax.annotation.Resource;
import org.jboss.arquillian.container.test.api.Deployment;
import org.jboss.arquillian.junit.Arquillian;
import org.jboss.shrinkwrap.api.ShrinkWrap;
import org.jboss.shrinkwrap.api.spec.JavaArchive;
import org.jboss.shrinkwrap.api.spec.ResourceAdapterArchive;
import org.junit.Test;
import org.junit.runner.RunWith;
import static org.junit.Assert.*;

/**
 * ConnectorTestCase
 *
 */
@RunWith(Arquillian.class)
public class ConnectorTestCase {

    private static Logger log = Logger.getLogger("ConnectorTestCase");

    private static String deploymentName = "ConnectorTestCase";

    /**
     * Define the deployment
     *
     * @return The deployment archive
     */
    @Deployment
    public static ResourceAdapterArchive createDeployment() {
        ResourceAdapterArchive raa = ShrinkWrap.create(ResourceAdapterArchive.class,
                deploymentName + ".rar");
        JavaArchive ja = ShrinkWrap.create(JavaArchive.class,
                UUID.randomUUID().toString() + ".jar");
        ja.addClasses(HelloWorldResourceAdapter.class,
                HelloWorldManagedConnectionFactory.class,
                HelloWorldManagedConnection.class,
                HelloWorldManagedConnectionMetaData.class,
                HelloWorldConnectionFactory.class,
                HelloWorldManagedConnectionFactory.class,
                HelloWorldManagedConnectionMetaData.class,
                HelloWorldConnectionFactory.class,
                HelloWorldManagedConnectionFactory.class,
                HelloWorldManagedConnectionMetaData.class,
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                HelloWorldManagedConnectionFactory.class,
                HelloWorldManagedConnectionMetaData.class,
                HelloWorldConnectionFactory.class,
                HelloWorldManagedConnectionFactory.class,
                HelloWorldManagedConnectionMetaData.class,
                HelloWorldConnectionFactory.class,
HelloWorld/Lazy Connection Test Case

```java
HelloWorldConnectionFactoryImpl.class,
HelloWorldConnection.class,
HelloWorldConnectionImpl.class);
raa.addAsLibrary(ja);
raa.addAsManifestResource("META-INF/ironjacamar.xml", "ironjacamar.xml");

    return raa;
}

/** resource */
@Resource(mappedName = "java:/eis/HelloWorld")
private HelloWorldConnectionFactory connectionFactory;

/**
 * Test helloWorld
 *
 * @exception Throwable Thrown if case of an error
 */
@Test
public void testHelloWorldNoArgs() throws Throwable {
    assertNotNull(connectionFactory);
    HelloWorldConnection connection = connectionFactory.getConnection();
    assertNotNull(connection);
    String result = connection.helloWorld();
    connection.close();
}

/**
 * Test helloWorld
 *
 * @exception Throwable Thrown if case of an error
 */
@Test
public void testHelloWorldNameString() throws Throwable {
    assertNotNull(connectionFactory);
    HelloWorldConnection connection = connectionFactory.getConnection();
    assertNotNull(connection);
    String result = connection.helloWorld(null);
    connection.close();
}

/**
 * Test helloWorld with two connections
 *
 * max-pool-size is 1, so once getConnection() is called
 * the second time, the managed connection for connection1
 * is dissociated.
 *
 * @exception Throwable Thrown if case of an error
 */
@Test
public void testHelloWorldTwoConnections() throws Throwable {
    assertNotNull(connectionFactory);

    HelloWorldConnection connection1 = connectionFactory.getConnection();
    assertNotNull(connection1);
```

367
Appendix B. Samples

```java
String result1 = connection1.helloWorld(null);
assertNotNull(result1);

HelloWorldConnection connection2 = connectionFactory.getConnection();
assertNotNull(connection2);
String result2 = connection2.helloWorld(null);
assertNotNull(result2);

connection1.close();
connection2.close();
```

B.3.12. HelloWorld/Lazy Ant build.xml

```xml
<project name="helloworld-lazy" basedir="." default="rar">

<!--  =================================
Properties
================================= -->
<property name="build.dir" value="${basedir}/build" />
<property name="target.dir" value="${basedir}/target" />
<property name="lib.dir" value="${basedir}/lib" />
<property name="javac.debug" value="on" />
<property name="javac.deprecation" value="on" />
<property name="javac.optimize" value="off" />
<property name="javac.encoding" value="utf-8" />
```
<property name="junit.printsummary" value="yes" />
<property name="junit.haltonerror" value="no" />
<property name="junit.haltonfailure" value="no" />
<property name="junit.fork" value="yes" />
<property name="junit.timeout" value="60000" />
<property name="junit.jvm" value="" />
<property name="junit.jvm.options" value="-Xms128m -Xmx512m -XX:MaxPermSize=256m" />
<property name="junit.batchtest.haltonerror" value="no" />
<property name="junit.batchtest.haltonfailure" value="no" />
<property name="junit.batchtest.fork" value="yes" />

<path id="lib.path.id">
  <fileset dir="${lib.dir}">
    <include name="**/*.jar"/>
  </fileset>
</path>

<path id="test.lib.path.id">
  <fileset dir="${lib.dir}">
    <include name="**/*.jar"/>
  </fileset>
  <fileset dir="${build.dir}">
    <include name="**/*.jar"/>
  </fileset>
</path>

<!--  =================================
Target: init
================================= -->
<target name="init">
  <mkdir dir="${lib.dir}"/>
</target>

<!--  =================================
Target: compile
================================= -->
<target name="compile" depends="init">
  <mkdir dir="${build.dir}"/>
  <javac srcdir="${basedir}/src/main/java"
    destdir="${build.dir}" classpathref="lib.path.id"
    debug="${javac.debug}" deprecation="${javac.deprecation}" encoding="${javac.encoding}" optimize="${javac.optimize}"
  />
</target>

<!--  =================================
Target: rar
================================= -->
<target name="rar" depends="compile">
  <mkdir dir="${target.dir}"/>

  <jar destfile="${build.dir}/helloworld.jar" basedir="${build.dir}"
    includes="**/*.class"/>

  <jar destfile="${target.dir}/helloworld.rar">

</jar>
</target>
<fileset dir="$\{basedir\}/src/main/resources" includes="META-INF/**"/>
<fileset dir="$\{build.dir\}" includes="**/*.jar"/>
</jar>
</target>

<!--  ===========================
Target: prepare-test
================================-->
<target name="prepare-test" depends="init">
  <mkdir dir="$\{build.dir\}/test"/>
  <javac srcdir="src/test" destdir="$\{build.dir\}/test" classpathref="test.lib.path.id" debug="$\{javac.debug\}" deprecation="$\{javac.deprecation\}" encoding="$\{javac.encoding\}" optimize="$\{javac.optimize\}"
    <compilerarg value="-Xlint"/>
  </javac>
  <copy todir="$\{build.dir\}/test">
    <fileset dir="src/main/resources"/>
    <fileset dir="src/test/resources"/>
  </copy>
</target>

<!--  ===========================
Target: test
================================-->
<target name="test" depends="rar, prepare-test">
  <mkdir dir="$\{basedir\}/reports"/>
  <junit dir="src/test" printsummary="$\{junit.printsummary\}" haltonerror="$\{junit.haltenerror\}" haltonfailure="$\{junit.haltenfailure\}" fork="$\{junit.fork\}" timeout="$\{junit.timeout\}"
    <jvmarg line="$\{junit.jvm.options\}"/>
    <sysproperty key="archives.dir" value="$\{target.dir\}"/>
    <sysproperty key="reports.dir" value="$\{basedir\}/reports"/>
    <sysproperty key="java.util.logging.manager" value="org.jboss.logmanager.LogManager"/>
    <sysproperty key="log4j.defaultInitOverride" value="true"/>
    <sysproperty key="org.jboss.logging.Logger.pluginClass" value="org.jboss.logging.logmanager.LoggerPluginImpl"/>
    <sysproperty key="test.dir" value="$\{build.dir\}/test"/>
    <sysproperty key="xb.builder.useUnorderedSequence" value="true"/>
  </junit>
  <classpath>
    <fileset dir="$\{lib.dir\}" includes="**/*.jar"/>
    <pathelement location="$\{build.dir\}/test"/>
  </classpath>
  <formatter type="plain"/>
  <formatter type="xml"/>
<batchtest todir="${basedir}/reports">
  haltonerror="${junit.batchtest.haltonerror}"
  haltonfailure="${junit.batchtest.haltonfailure}"
  fork="${junit.batchtest.fork}"
</batchtest>

<fileset dir="${build.dir}/test">
  <include name="**/*Test*Case.class"/>
</fileset>
</batchtest>

</junit>
</target>

<!--  =================================
Target: docs
================================= -->
<target name="docs" depends="compile">
  <mkdir dir="${target.dir}/docs"/>
  <javadoc packagenames="*
  sourcepath="src/main/java"
  destdir="${target.dir}/docs"
  classpathref="lib.path.id"
  />
</javadoc>
</target>

<!--  =================================
Target: clean
================================= -->
<target name="clean">
  <delete>
    <fileset dir="${basedir}" defaultexcludes="no">
      <include name="**/*~"/>
      <include name="**/*.bak"/>
    </fileset>
  </delete>
  <delete dir="${build.dir}"/>
  <delete dir="${target.dir}"/>
  <delete dir="${basedir}/reports"/>
</target>

<!--  =================================
Target: dist - clean
================================= -->
<target name="dist-clean" depends="init,clean">
  <delete includeemptydirs="true">
    <fileset dir="${lib.dir}" includes="**/*"/>
  </delete>
</target>
</project>
Appendix C. Datasources

The datasource schema can be found at http://www.ironjacamar.org/schema/datasources_1_0.xsd.

C.1. PostgreSQL

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <datasource jndi-name="java:/PostgresDS" pool-name="PostgresDS">
    <connection-url>jdbc:postgresql://[servername]:[port]/[database name]</connection-url>
    <driver-class>org.postgresql.Driver</driver-class>
    <security>
      <user-name>x</user-name>
      <password>y</password>
    </security>
    <validation>
      <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.postgres.PostgreSQLValidConnectionChecker"/>
    </validation>
  </datasource>
</datasources>
```

C.2. PostgreSQL XA

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <xa-datasource jndi-name="java:/PostgresDS" pool-name="PostgresDS">
    <xa-datasource-property name="ServerName" server_name/></xa-datasource-property>
    <xa-datasource-property name="PortNumber">5432</xa-datasource-property>
    <xa-datasource-property name="DatabaseName" database_name></xa-datasource-property>
    <xa-datasource-class>org.postgresql.xa.PGXADataSource</xa-datasource-class>
    <security>
      <user-name>x</user-name>
      <password>y</password>
    </security>
  </xa-datasource>
</datasources>
```
C.3. MySQL

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <datasource jndi-name="java:/MySqlDS" pool-name="MySqlDS">
    <connection-url>jdbc:mysql://mysql-hostname:3306/jbossdb</connection-url>
    <driver-class>com.mysql.jdbc.Driver</driver-class>
    <security>
      <user-name>x</user-name>
      <password>y</password>
    </security>
    <validation>
      <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLValidConnectionChecker"/>
      <exception-sorter class-name="org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLExceptionSorter"/>
    </validation>
  </datasource>
</datasources>
```

C.4. MySQL XA

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <xa-datasource jndi-name="java:/MysqlXADS" pool-name="MysqlXADS">
    <validation>
      <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLValidConnectionChecker"/>
      <exception-sorter class-name="org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLExceptionSorter"/>
    </validation>
  </xa-datasource>
</datasources>
```
C.5. H2

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <datasource jndi-name="java:/H2DS" pool-name="H2DS">
    <connection-url>jdbc:h2:mem:test;DB_CLOSE_DELAY=-1</connection-url>
    <driver-class>org.h2.Driver</driver-class>
    <security>
      <user-name>sa</user-name>
      <password>sa</password>
    </security>
  </datasource>
</datasources>
```

C.6. H2 XA

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <xa-datasource jndi-name="java:/H2XADS" pool-name="H2XADS">
    <xa-datasource-property name="ServerName">server_name</xa-datasource-property>
    <xa-datasource-property name="DatabaseName">database_name</xa-datasource-property>
    <xa-datasource-class>com.mysql.jdbc.jdbc2.optional.MysqlXDataSource</xa-datasource-class>
    <security>
      <user-name>s</user-name>
      <password>y</password>
    </security>
    <validation>
      <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLValidConnectionChecker"></valid-connection-checker>
      <exception-sorter class-name="org.jboss.jca.adapters.jdbc.extensions.mysql.MySQLExceptionSorter"></exception-sorter>
    </validation>
  </xa-datasource>
</datasources>
```
Appendix C. Datasources

C.7. Derby

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <datasource jndi-name="java:/DerbyDS" pool-name="DerbyDS">
    <connection-url>jdbc:derby:${ironjacamar.home}/${data}/derby/localDB;create=true</connection-url>
    <driver-class>org.apache.derby.jdbc.EmbeddedDriver</driver-class>
    <security>
      <user-name>sa</user-name>
      <password></password>
    </security>
  </datasource>
</datasources>
```

C.8. Derby XA

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <xa-datasource jndi-name="java:/XADerbyDS" pool-name="XADerbyDS">
    <xa-datasource-property name="DatabaseName">derby/default</xa-datasource-property>
    <xa-datasource-property name="CreateDatabase">create</xa-datasource-property>
    <xa-datasource-class>org.apache.derby.jdbc.EmbeddedXADatasource</xa-datasource-class>
    <xa-pool>
      <is-same-rm-override>false</is-same-rm-override>
    </xa-pool>
  </xa-datasource>
</datasources>
```
C.9. Oracle

<? xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">  
<datasource jndi-name="java:j OracleDS" pool-name="OracleDS">
  <!-- Here are a couple of the possible OCI configurations. For more information, see http://otn.oracle.com/docs/products/oracle9i/doc_library/release2/java.920/a96654/toc.htm -->
  <connection-url>jdbc:oracle:oci:@youroracle-host:1521:yoursid</connection-url>
  <!-- you don't need this but it helps DBAs identify the application associated with a connection -->
  <connection-property name="v$session.program">IronJacamar</connection-property>
  <driver-class>oracle.jdbc.driver.OracleDriver</driver-class>
  <security>
    <user-name>sa</user-name>
    <password></password>
  </security>
  <validation>
    <valid-connection-checker class="org.jboss.jca.adapters.jdbc.extensions.oracle.OracleValidConnectionChecker"></valid-connection-checker>
    <stale-connection-checker class="org.jboss.jca.adapters.jdbc.extensions.oracle.OracleStaleConnectionChecker"></stale-connection-checker>
    <exception-sorter class="org.jboss.jca.adapters.jdbc.extensions.oracle.OracleExceptionSorter"></exception-sorter>
  </validation>
</datasource>
</datasources>
C.10. Oracle XA

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- ATTENTION: DO NOT FORGET TO SET Pad=true IN transaction.xml -->
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <xa-datasource jndi-name="java:/XAOracleDS" pool-name="XAOracleDS">
    <!-- you don't need this but it helps DBAs identify the application associated with a connection -->
    <xa-datasource-property name="connectionProperties">$session.program=IronJacamar</xa-datasource-property>
    <xa-datasource-class>oracle.jdbc.xa.client.OracleXADataSource</xa-datasource-class>
    <xa-pool>
      <!-- Uncomment to enable interleaving <interleaving/> -->
      <is-same-rm-override>false</is-same-rm-override>
      <no-tx-separate-pools/>
    </xa-pool>
    <security>
      <user-name>x</user-name>
      <password>y</password>
    </security>
    <validation>
      <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.oracle.OracleValidConnectionChecker"></valid-connection-checker>
      <stale-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.oracle.OracleStaleConnectionChecker"></stale-connection-checker>
      <exception-sorter class-name="org.jboss.jca.adapters.jdbc.extensions.oracle.OracleExceptionSorter"></exception-sorter>
    </validation>
  </xa-datasource>
</datasources>
```

C.11. Microsoft SQLServer

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <datasource jndi-name="java:/MSSQLDS" pool-name="MSSQLDS">
    <connection-url>jdbc:microsoft:sqlserver://localhost:1433;DatabaseName=MyDatabase</connection-url>
    <driver-class>com.microsoft.sqlserver.jdbc.SQLServerDriver</driver-class>
  </datasource>
</datasources>
```
C.12. Microsoft SQLServer XA

```xml
<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <xa-datasource jndi-name="java:/MSSQLXADS" pool-name="MSSQLXADS">
    <xa-datasource-property name="ServerName">myserver</xa-datasource-property>
    <xa-datasource-property name="DatabaseName">mydatabase</xa-datasource-property>
    <xa-datasource-class>com.microsoft.sqlserver.jdbc.SQLServerXADataSource</xa-datasource-class>
  </xa-datasource>
</datasources>
```

C.13. IBM DB2

```xml
<security>
  <user-name>x</user-name>
  <password>y</password>
</security>
<validation>
  <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.mssql.MSSQLValidConnectionChecker"></valid-connection-checker>
</validation>
</datasources>
```
Appendix C. Datasources

C.14. IBM DB2 XA

<?xml version="1.0" encoding="UTF-8"?>
  <xa-datasource-name java:/DB2XADS" pool-name="DB2XADS">
    <xa-datasource-property name="DatabaseName">your_database_name</xa-datasource-property>
    <xa-datasource-class>COM.ibm.db2.jdbc.DB2XADatasource</xa-datasource-class>
    <xa-pool>
      <is-same-rm-override>false</is-same-rm-override>
    </xa-pool>
  </xa-datasource>
</xa-datasources>

<?xml version="1.0" encoding="UTF-8"?>
<datasources xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="http://www.ironjacamar.org/schema/datasources_1_0.xsd">
  <datasource jndi-name="java:/DB2DS" pool-name="DB2DS">
    <!-- DB2 Universal Driver Note: connection URL is in form of jdbc:db2://host:port:dbname
    Default port for Type 4 driver is 50000
    Note, host and port must be specified if using Type 4 driver. And be forewarned, no native
    XA support is provided with Type 4; you must set a DB property calling for Type 2 to get XA
    -->
    <connection-url>jdbc:db2://yourdatabase</connection-url>
    <driver-class>COM.ibm.db2.jdbc.app.DB2Driver</driver-class>
    <security>
      <user-name>x</user-name>
      <password>y</password>
    </security>
    <validation>
      <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.db2.DB2ValidConnectionChecker"></valid-connection-checker>
      <stale-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.db2.DB2StaleConnectionChecker"></stale-connection-checker>
      <exception-sorter class-name="org.jboss.jca.adapters.jdbc.extensions.db2.DB2ExceptionSorter"></exception-sorter>
    </validation>
  </datasource>
</datasources>
<!-- Uncomment to enable interleaving <interleaving/> -->
</xa-pool>
<security>
  <user-name>x</user-name>
  <password>y</password>
</security>
<validation>
  <valid-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.db2.DB2ValidConnectionChecker"></valid-connection-checker>
  <stale-connection-checker class-name="org.jboss.jca.adapters.jdbc.extensions.db2.DB2StaleConnectionChecker"></stale-connection-checker>
  <exception-sorter class-name="org.jboss.jca.adapters.jdbc.extensions.db2.DB2ExceptionSorter"></exception-sorter>
</validation>
<recovery>
  <recover-plugin class-name="org.jboss.jca.core.recovery.ConfigurableRecoveryPlugin">
    <config-property name="EnableIsValid">false</config-property>
    <config-property name="IsValidOverride">false</config-property>
    <config-property name="EnableClose">false</config-property>
  </recover-plugin>
</recovery>
</xa-datasource>
</datasources>
## Appendix D. Logging codes

### D.1. Core: 000000 - 009999

#### Table D.1. Logging codes for core

<table>
<thead>
<tr>
<th>Code</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>INFO</td>
<td>Closing a connection for you. Please close them yourself</td>
</tr>
<tr>
<td>102</td>
<td>INFO</td>
<td>Throwable trying to close a connection for you, please close it yourself</td>
</tr>
<tr>
<td>103</td>
<td>INFO</td>
<td>Could not find a close method on alleged connection object. Please close your own connections</td>
</tr>
<tr>
<td>151</td>
<td>EXCEPTION</td>
<td>Some connections were not closed, see the log for the allocation stacktraces</td>
</tr>
<tr>
<td>152</td>
<td>EXCEPTION</td>
<td>Trying to return an unknown connection</td>
</tr>
<tr>
<td>201</td>
<td>ERROR</td>
<td>SecurityContext setup failed</td>
</tr>
<tr>
<td>202</td>
<td>ERROR</td>
<td>SecurityContext setup failed since CallbackSecurity was null</td>
</tr>
<tr>
<td>251</td>
<td>EXCEPTION</td>
<td>SecurityContext setup failed</td>
</tr>
<tr>
<td>252</td>
<td>EXCEPTION</td>
<td>SecurityContext setup failed since CallbackSecurity was null</td>
</tr>
<tr>
<td>253</td>
<td>EXCEPTION</td>
<td>Work is null</td>
</tr>
<tr>
<td>254</td>
<td>EXCEPTION</td>
<td>StartTimeout is negative</td>
</tr>
<tr>
<td>255</td>
<td>EXCEPTION</td>
<td>Interrupted while requesting permit</td>
</tr>
<tr>
<td>256</td>
<td>EXCEPTION</td>
<td>Work execution context must be null because work instance implements WorkContextProviderStartTimeout is negative</td>
</tr>
<tr>
<td>257</td>
<td>EXCEPTION</td>
<td>Run method is synchronized</td>
</tr>
<tr>
<td>258</td>
<td>EXCEPTION</td>
<td>Release method is synchronized</td>
</tr>
<tr>
<td>259</td>
<td>EXCEPTION</td>
<td>Unsupported WorkContext class</td>
</tr>
<tr>
<td>260</td>
<td>EXCEPTION</td>
<td>Duplicate TransactionWorkContext class</td>
</tr>
<tr>
<td>261</td>
<td>EXCEPTION</td>
<td>Duplicate SecurityWorkContext class</td>
</tr>
<tr>
<td>262</td>
<td>EXCEPTION</td>
<td>Duplicate HintWorkContext class</td>
</tr>
<tr>
<td>263</td>
<td>EXCEPTION</td>
<td>WorkManager is shutting down</td>
</tr>
<tr>
<td>264</td>
<td>EXCEPTION</td>
<td>SecurityContext setup failed since CallbackSecurity::Domain was empty</td>
</tr>
<tr>
<td>265</td>
<td>EXCEPTION</td>
<td>ResourceAdapterAssociation failed</td>
</tr>
<tr>
<td>266</td>
<td>EXCEPTION</td>
<td>Invalid number of parameters</td>
</tr>
<tr>
<td>301</td>
<td>INFO</td>
<td>Registered a null handle for managed connection</td>
</tr>
<tr>
<td>Code</td>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>302</td>
<td>INFO</td>
<td>Unregistered handle that was not registered</td>
</tr>
<tr>
<td>303</td>
<td>INFO</td>
<td>Unregistered a null handle for managed connection</td>
</tr>
<tr>
<td>305</td>
<td>WARN</td>
<td>Connection error occurred</td>
</tr>
<tr>
<td>306</td>
<td>WARN</td>
<td>Unknown connection error occurred</td>
</tr>
<tr>
<td>307</td>
<td>WARN</td>
<td>Notified of error on a different managed connection</td>
</tr>
<tr>
<td>311</td>
<td>INFO</td>
<td>Throwable from unregister connection</td>
</tr>
<tr>
<td>312</td>
<td>ERROR</td>
<td>Error while closing connection handle</td>
</tr>
<tr>
<td>313</td>
<td>ERROR</td>
<td>There is something wrong with the pooling</td>
</tr>
<tr>
<td>351</td>
<td>EXCEPTION</td>
<td>Not correct type</td>
</tr>
<tr>
<td>352</td>
<td>EXCEPTION</td>
<td>Failure to delist resource</td>
</tr>
<tr>
<td>353</td>
<td>EXCEPTION</td>
<td>Error in delist</td>
</tr>
<tr>
<td>354</td>
<td>EXCEPTION</td>
<td>Unfinished local transaction - error getting local transaction</td>
</tr>
<tr>
<td>355</td>
<td>EXCEPTION</td>
<td>Unfinished local transaction but managed connection does not provide a local transaction</td>
</tr>
<tr>
<td>356</td>
<td>EXCEPTION</td>
<td>Failed to enlist</td>
</tr>
<tr>
<td>357</td>
<td>EXCEPTION</td>
<td>Error in dissociate</td>
</tr>
<tr>
<td>401</td>
<td>WARN</td>
<td>Error during tidy up connection</td>
</tr>
<tr>
<td>402</td>
<td>WARN</td>
<td>ResourceException in returning connection</td>
</tr>
<tr>
<td>403</td>
<td>WARN</td>
<td>Reconnecting a connection handle that still has a managed connection</td>
</tr>
<tr>
<td>404</td>
<td>WARN</td>
<td>Unchecked throwable in managedConnectionDisconnected()</td>
</tr>
<tr>
<td>405</td>
<td>WARN</td>
<td>Multiple LocalTransaction connection listeners enlisted</td>
</tr>
<tr>
<td>451</td>
<td>EXCEPTION</td>
<td>The connection manager is shutdown</td>
</tr>
<tr>
<td>452</td>
<td>EXCEPTION</td>
<td>Method getManagedConnection retry wait was interrupted</td>
</tr>
<tr>
<td>453</td>
<td>EXCEPTION</td>
<td>Unable to get managed connection</td>
</tr>
<tr>
<td>454</td>
<td>EXCEPTION</td>
<td>You are trying to use a connection factory that has been shut down:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ManagedConnectionFactory is null</td>
</tr>
<tr>
<td>455</td>
<td>EXCEPTION</td>
<td>Wrong ManagedConnectionFactory sent to allocateConnection</td>
</tr>
<tr>
<td>456</td>
<td>EXCEPTION</td>
<td>Unchecked throwable in ManagedConnection.getConnection()</td>
</tr>
<tr>
<td>457</td>
<td>EXCEPTION</td>
<td>Unchecked throwable in managedConnectionReconnected()</td>
</tr>
<tr>
<td>458</td>
<td>EXCEPTION</td>
<td>This method is not supported</td>
</tr>
<tr>
<td>459</td>
<td>EXCEPTION</td>
<td>Transaction is not active</td>
</tr>
<tr>
<td>460</td>
<td>EXCEPTION</td>
<td>Error checking for a transaction</td>
</tr>
<tr>
<td>461</td>
<td>EXCEPTION</td>
<td>Could not enlist in transaction on entering meta-aware object</td>
</tr>
<tr>
<td>Code</td>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>462</td>
<td>EXCEPTION</td>
<td>Could not delist resource, probably a transaction rollback</td>
</tr>
<tr>
<td>463</td>
<td>EXCEPTION</td>
<td>Unable to set XAResource transaction timeout</td>
</tr>
<tr>
<td>464</td>
<td>EXCEPTION</td>
<td>Unable to find connection listener</td>
</tr>
<tr>
<td>465</td>
<td>EXCEPTION</td>
<td>Connection is null</td>
</tr>
<tr>
<td>466</td>
<td>EXCEPTION</td>
<td>Enlistment not enabled</td>
</tr>
<tr>
<td>467</td>
<td>EXCEPTION</td>
<td>Managed connection not lazy enlistable</td>
</tr>
<tr>
<td>468</td>
<td>EXCEPTION</td>
<td>Connection listener already enlisted</td>
</tr>
<tr>
<td>469</td>
<td>EXCEPTION</td>
<td>Error during enlistment</td>
</tr>
<tr>
<td>501</td>
<td>WARN</td>
<td>Thread is not the enlisting thread</td>
</tr>
<tr>
<td>502</td>
<td>WARN</td>
<td>Transaction error in beforeCompletion</td>
</tr>
<tr>
<td>503</td>
<td>WARN</td>
<td>Transaction error in afterCompletion</td>
</tr>
<tr>
<td>504</td>
<td>WARN</td>
<td>Transaction not found</td>
</tr>
<tr>
<td>601</td>
<td>INFO</td>
<td>ConnectionValidator has been interrupted</td>
</tr>
<tr>
<td>602</td>
<td>WARN</td>
<td>ConnectionValidator ignored unexpected runtime exception</td>
</tr>
<tr>
<td>603</td>
<td>WARN</td>
<td>ConnectionValidator ignored unexpected error</td>
</tr>
<tr>
<td>604</td>
<td>WARN</td>
<td>Throwable while attempting to get a new connection</td>
</tr>
<tr>
<td>605</td>
<td>WARN</td>
<td>Destroying connection that could not be successfully matched</td>
</tr>
<tr>
<td>606</td>
<td>WARN</td>
<td>Throwable while trying to match managed connection, destroying connection</td>
</tr>
<tr>
<td>607</td>
<td>WARN</td>
<td>ResourceException cleaning up managed connection</td>
</tr>
<tr>
<td>608</td>
<td>WARN</td>
<td>Destroying returned connection, maximum pool size exceeded</td>
</tr>
<tr>
<td>609</td>
<td>WARN</td>
<td>Attempt to return connection twice</td>
</tr>
<tr>
<td>610</td>
<td>WARN</td>
<td>Unable to fill pool</td>
</tr>
<tr>
<td>611</td>
<td>WARN</td>
<td>Warning: Background validation was specified with a non compliant ManagedConnectionFactory interface</td>
</tr>
<tr>
<td>612</td>
<td>WARN</td>
<td>Destroying connection that could not be successfully matched</td>
</tr>
<tr>
<td>613</td>
<td>WARN</td>
<td>Throwable while trying to match managed connection, destroying connection</td>
</tr>
<tr>
<td>614</td>
<td>ERROR</td>
<td>Exception during createSubject()</td>
</tr>
<tr>
<td>615</td>
<td>WARN</td>
<td>Destroying active connection in pool</td>
</tr>
<tr>
<td>616</td>
<td>ERROR</td>
<td>Leak detected in pool</td>
</tr>
<tr>
<td>617</td>
<td>WARN</td>
<td>Invalid incremener capacity policy</td>
</tr>
<tr>
<td>618</td>
<td>WARN</td>
<td>Invalid decremener capacity policy</td>
</tr>
<tr>
<td>619</td>
<td>WARN</td>
<td>Invalid capacity property</td>
</tr>
<tr>
<td>Code</td>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>651</td>
<td>EXCEPTION</td>
<td>Unable to get managed connection pool</td>
</tr>
<tr>
<td>652</td>
<td>EXCEPTION</td>
<td>Unable to obtain lock</td>
</tr>
<tr>
<td>653</td>
<td>EXCEPTION</td>
<td>The pool has been shutdown</td>
</tr>
<tr>
<td>654</td>
<td>EXCEPTION</td>
<td>Interrupted while requesting connection</td>
</tr>
<tr>
<td>655</td>
<td>EXCEPTION</td>
<td>No managed connections available within configured blocking timeout</td>
</tr>
<tr>
<td>656</td>
<td>EXCEPTION</td>
<td>This should never happen</td>
</tr>
<tr>
<td>657</td>
<td>EXCEPTION</td>
<td>Interrupted while requesting permit</td>
</tr>
<tr>
<td>658</td>
<td>EXCEPTION</td>
<td>Unexpected throwable while trying to create a connection</td>
</tr>
<tr>
<td>659</td>
<td>EXCEPTION</td>
<td>Unable to get connection listener</td>
</tr>
<tr>
<td>701</td>
<td>WARN</td>
<td>Exception during unbind</td>
</tr>
<tr>
<td>751</td>
<td>EXCEPTION</td>
<td>Deployment failed</td>
</tr>
<tr>
<td>851</td>
<td>EXCEPTION</td>
<td>Resource adapter instance not active</td>
</tr>
<tr>
<td>852</td>
<td>EXCEPTION</td>
<td>Validation exception</td>
</tr>
<tr>
<td>853</td>
<td>EXCEPTION</td>
<td>The activation spec class is no longer available</td>
</tr>
<tr>
<td>854</td>
<td>EXCEPTION</td>
<td>The resource adapter is no longer available</td>
</tr>
<tr>
<td>855</td>
<td>EXCEPTION</td>
<td>Key isn't registered</td>
</tr>
<tr>
<td>856</td>
<td>EXCEPTION</td>
<td>Unable to lookup resource adapter in MDR</td>
</tr>
<tr>
<td>901</td>
<td>WARN</td>
<td>Error during connection close</td>
</tr>
<tr>
<td>902</td>
<td>ERROR</td>
<td>Error during inflow crash recovery</td>
</tr>
<tr>
<td>903</td>
<td>ERROR</td>
<td>Error creating Subject for crash recovery</td>
</tr>
<tr>
<td>904</td>
<td>WARN</td>
<td>No security domain defined for crash recovery</td>
</tr>
<tr>
<td>905</td>
<td>WARN</td>
<td>Subject for crash recovery was null</td>
</tr>
<tr>
<td>906</td>
<td>ERROR</td>
<td>Error during crash recovery</td>
</tr>
<tr>
<td>951</td>
<td>EXCEPTION</td>
<td>Error during connection close</td>
</tr>
<tr>
<td>1001</td>
<td>WARN</td>
<td>No users.properties were found</td>
</tr>
<tr>
<td>1002</td>
<td>ERROR</td>
<td>Error while loading users.properties</td>
</tr>
<tr>
<td>1003</td>
<td>WARN</td>
<td>No roles.properties were found</td>
</tr>
<tr>
<td>1004</td>
<td>ERROR</td>
<td>Error while loading roles.properties</td>
</tr>
<tr>
<td>1005</td>
<td>WARN</td>
<td>No callback.properties were found</td>
</tr>
<tr>
<td>1006</td>
<td>ERROR</td>
<td>Error while loading callback.properties</td>
</tr>
<tr>
<td>1011</td>
<td>WARN</td>
<td>Prepare called on a local tx. Use of local transactions on a JTA transaction with more than one branch may result in inconsistent data in some cases of failure</td>
</tr>
<tr>
<td>1151</td>
<td>EXCEPTION</td>
<td>Trying to start a new transaction when old is not complete</td>
</tr>
<tr>
<td>Code</td>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1152</td>
<td>EXCEPTION</td>
<td>Trying to start a new transaction with wrong flags</td>
</tr>
<tr>
<td>1153</td>
<td>EXCEPTION</td>
<td>Error trying to start local transaction</td>
</tr>
<tr>
<td>1154</td>
<td>EXCEPTION</td>
<td>Throwable trying to start local transaction</td>
</tr>
<tr>
<td>1155</td>
<td>EXCEPTION</td>
<td>Wrong xid in commit</td>
</tr>
<tr>
<td>1156</td>
<td>EXCEPTION</td>
<td>Could not commit local transaction</td>
</tr>
<tr>
<td>1157</td>
<td>EXCEPTION</td>
<td>Forget not supported in local transaction</td>
</tr>
<tr>
<td>1158</td>
<td>EXCEPTION</td>
<td>No recovery for LocalTransaction only resource manager</td>
</tr>
<tr>
<td>1159</td>
<td>EXCEPTION</td>
<td>Wrong xid in rollback</td>
</tr>
<tr>
<td>1160</td>
<td>EXCEPTION</td>
<td>Could not rollback local transaction</td>
</tr>
</tbody>
</table>

**D.2. Common: 010000 - 019999**

**Table D.2. Logging codes for common**

<table>
<thead>
<tr>
<th>Code</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10001</td>
<td>ERROR</td>
<td>Parsing error of ra.xml file</td>
</tr>
<tr>
<td>10002</td>
<td>ERROR</td>
<td>Parsing error of ironjacamar.xml file</td>
</tr>
<tr>
<td>10003</td>
<td>ERROR</td>
<td>No @Connector was found and no definition in the ra.xml metadata either</td>
</tr>
<tr>
<td>10004</td>
<td>ERROR</td>
<td>More than one @Connector was found but the correct one wasn't defined in the ra.xml metadata</td>
</tr>
<tr>
<td>10051</td>
<td>EXCEPTION</td>
<td>AnnotationRepository reference is null</td>
</tr>
<tr>
<td>10052</td>
<td>EXCEPTION</td>
<td>No @Connector defined</td>
</tr>
<tr>
<td>10053</td>
<td>EXCEPTION</td>
<td>More than @Connector defined</td>
</tr>
<tr>
<td>10054</td>
<td>EXCEPTION</td>
<td>More than one @ConnectionDefinitions defined</td>
</tr>
<tr>
<td>10055</td>
<td>EXCEPTION</td>
<td>Unknown annotation</td>
</tr>
<tr>
<td>10056</td>
<td>EXCEPTION</td>
<td>Element isn't a valid boolean</td>
</tr>
<tr>
<td>10057</td>
<td>EXCEPTION</td>
<td>Attribute isn't a valid boolean</td>
</tr>
<tr>
<td>10058</td>
<td>EXCEPTION</td>
<td>Element isn't a valid number</td>
</tr>
<tr>
<td>10059</td>
<td>EXCEPTION</td>
<td>Invalid flush strategy</td>
</tr>
<tr>
<td>10060</td>
<td>EXCEPTION</td>
<td>Unexpected end tag</td>
</tr>
<tr>
<td>10061</td>
<td>EXCEPTION</td>
<td>Unexpected element</td>
</tr>
<tr>
<td>10062</td>
<td>EXCEPTION</td>
<td>Reached end of xml document unexpectedly</td>
</tr>
<tr>
<td>10063</td>
<td>EXCEPTION</td>
<td>Mandatory class-name attribute missing</td>
</tr>
<tr>
<td>10064</td>
<td>EXCEPTION</td>
<td>Unexpected attribute</td>
</tr>
<tr>
<td>10065</td>
<td>EXCEPTION</td>
<td>Missing mandatory jndi-name attribute</td>
</tr>
</tbody>
</table>
## Appendix D. Logging codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10066</td>
<td>EXCEPTION</td>
<td>You cannot define more than one pool or xa-pool in same connection-definition</td>
</tr>
<tr>
<td>10067</td>
<td>EXCEPTION</td>
<td>Element cannot be set without an xa-pool</td>
</tr>
<tr>
<td>10068</td>
<td>EXCEPTION</td>
<td>Missing required attribute</td>
</tr>
<tr>
<td>10069</td>
<td>EXCEPTION</td>
<td>Missing required element</td>
</tr>
<tr>
<td>10070</td>
<td>EXCEPTION</td>
<td>Invalid negative value</td>
</tr>
<tr>
<td>10071</td>
<td>EXCEPTION</td>
<td>Tag is not valid</td>
</tr>
<tr>
<td>10072</td>
<td>EXCEPTION</td>
<td>Tag cannot be undefined</td>
</tr>
<tr>
<td>10073</td>
<td>EXCEPTION</td>
<td>Invalid &lt;security&gt; configuration</td>
</tr>
<tr>
<td>10074</td>
<td>EXCEPTION</td>
<td>The resource adapter metadata must be defined</td>
</tr>
<tr>
<td>10075</td>
<td>EXCEPTION</td>
<td>The resource adapter metadata must contain either an outbound or inbound configuration</td>
</tr>
<tr>
<td>10076</td>
<td>EXCEPTION</td>
<td>Tag must be defined</td>
</tr>
<tr>
<td>10077</td>
<td>EXCEPTION</td>
<td>Wrong annotation type</td>
</tr>
</tbody>
</table>

### D.3. Deployers: 020000 - 029999

#### Table D.3. Logging codes for deployers

<table>
<thead>
<tr>
<th>Code</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20001</td>
<td>INFO</td>
<td>Required license terms</td>
</tr>
<tr>
<td>20002</td>
<td>INFO</td>
<td>Deployed</td>
</tr>
<tr>
<td>20003</td>
<td>WARN</td>
<td>Failure during validation report generation</td>
</tr>
<tr>
<td>20004</td>
<td>WARN</td>
<td>Only one connection definition found with a mismatch in class-name</td>
</tr>
<tr>
<td>20005</td>
<td>WARN</td>
<td>Only one admin object found with a mismatch in class-name</td>
</tr>
<tr>
<td>20006</td>
<td>ERROR</td>
<td>ConnectionFactory is null</td>
</tr>
<tr>
<td>20007</td>
<td>ERROR</td>
<td>Exception during createSubject()</td>
</tr>
<tr>
<td>20008</td>
<td>WARN</td>
<td>Invalid config property</td>
</tr>
<tr>
<td>20009</td>
<td>WARN</td>
<td>Invalid connection definition</td>
</tr>
<tr>
<td>20010</td>
<td>ERROR</td>
<td>Connection definition with missing class-name</td>
</tr>
<tr>
<td>20011</td>
<td>ERROR</td>
<td>Admin object with missing class-name</td>
</tr>
<tr>
<td>20012</td>
<td>WARN</td>
<td>Admin object not bound</td>
</tr>
<tr>
<td>20013</td>
<td>WARN</td>
<td>Connection factory not bound</td>
</tr>
<tr>
<td>20014</td>
<td>INFO</td>
<td>Admin object not spec compliant</td>
</tr>
<tr>
<td>20015</td>
<td>INFO</td>
<td>Connection factory not spec compliant</td>
</tr>
<tr>
<td>20016</td>
<td>WARN</td>
<td>Missing &lt;recovery&gt; element. XA recovery disabled</td>
</tr>
<tr>
<td>Code</td>
<td>Level</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>20017</td>
<td>WARN</td>
<td>Invalid archive</td>
</tr>
<tr>
<td>20051</td>
<td>EXCEPTION</td>
<td>Unable to start</td>
</tr>
<tr>
<td>20052</td>
<td>EXCEPTION</td>
<td>Unable to associate</td>
</tr>
<tr>
<td>20053</td>
<td>EXCEPTION</td>
<td>ManagedConnectionFactory must be defined in class-name</td>
</tr>
<tr>
<td>20054</td>
<td>EXCEPTION</td>
<td>AdminObject must be defined in class-name</td>
</tr>
<tr>
<td>20055</td>
<td>EXCEPTION</td>
<td>Failed to bind admin object</td>
</tr>
<tr>
<td>20056</td>
<td>EXCEPTION</td>
<td>Deployment failed</td>
</tr>
<tr>
<td>20057</td>
<td>EXCEPTION</td>
<td>Invalid ManagedConnectionFactory class</td>
</tr>
<tr>
<td>20058</td>
<td>EXCEPTION</td>
<td>Invalid ActivationSpec class</td>
</tr>
<tr>
<td>20059</td>
<td>EXCEPTION</td>
<td>Invalid ResourceAdapter class</td>
</tr>
<tr>
<td>20060</td>
<td>EXCEPTION</td>
<td>Unable to inject</td>
</tr>
<tr>
<td>20061</td>
<td>EXCEPTION</td>
<td>Invalid required work context</td>
</tr>
<tr>
<td>20062</td>
<td>EXCEPTION</td>
<td>Invalid connection factory interface</td>
</tr>
<tr>
<td>20063</td>
<td>EXCEPTION</td>
<td>Invalid connection factory implementation</td>
</tr>
<tr>
<td>20064</td>
<td>EXCEPTION</td>
<td>Invalid connection interface</td>
</tr>
<tr>
<td>20065</td>
<td>EXCEPTION</td>
<td>Invalid connection implementation</td>
</tr>
<tr>
<td>20066</td>
<td>EXCEPTION</td>
<td>Connection factory implementation doesn't implement interface</td>
</tr>
<tr>
<td>20067</td>
<td>EXCEPTION</td>
<td>Connection implementation doesn't implement interface</td>
</tr>
</tbody>
</table>
Appendix E. Licenses

All licenses can be found in the `doc/licenses` directory.

E.1. GNU Lesser General Public License 2.1

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Version 2.1, February 1999

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