
J2EE™ Technology in Practice

Building Business Applications with the
Java™ 2 Platform, Enterprise Edition

Rick Cattell
Jim Inscore
Enterprise Partners



ADDISON-WESLEY

Boston • San Francisco • New York • Toronto • Montreal
London • Munich • Paris • Madrid
Capetown • Sydney • Tokyo • Singapore • Mexico City

Copyright © 2001 Sun Microsystems, Inc.
901 San Antonio Road, Palo Alto, California 94303 U.S.A.
All rights reserved.

Sun Microsystems, Inc., has intellectual property rights relating to implementations of the technology described in this publication. In particular, and without limitation, these intellectual property rights may include one or more U.S. patents, foreign patents, or pending applications. Sun, Sun Microsystems, the Sun Logo, Java, J2EE, Enterprise JavaBeans, EJB, Forte, iPlanet, JavaBeans, JDBC, JavaIDL, JavaServer Pages, and JSP are trademarks or registered trademarks of Sun Microsystems, Inc., in the United States and other countries. UNIX is a registered trademark in the United States and other countries, exclusively licensed through X/Open Company, Ltd.

THIS PUBLICATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

THIS PUBLICATION COULD INCLUDE TECHNICAL INACCURACIES OR TYPOGRAPHICAL ERRORS. CHANGES ARE PERIODICALLY ADDED TO THE INFORMATION HEREIN; THESE CHANGES WILL BE INCORPORATED IN NEW EDITIONS OF THE PUBLICATION. SUN MICROSYSTEMS, INC., MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCTS(S) AND/OR THE PROGRAMS(S) DESCRIBED IN THIS PUBLICATION AT ANY TIME.

Brokat is a registered trademark of Brokat Technologies; Brokat Technology and the Brokat logo are trademarks of, and are used courtesy of, Brokat Technologies.

All Borland brand and products names and logos are trademarks or registered trademarks of Borland Software Corporation in the United States and other countries.

The publisher offers discounts on this book when ordered in quantity for special sales. For more information, please contact:

Pearson Education Corporate Sales Division
One Lake Street
Upper Saddle River, NJ 07458
(800) 382-3419
corpsales@pearsontechgroup.com

Visit us on the Web at www.awl.com/cseng/

Library of Congress Cataloging-in-Publication Data

Cattell, R. G. G. (Roderic Geoffrey Galton)

J2EE technology in practice : building business applications with the Java 2 Platform, Enterprise edition / Rick Cattell and Jim Inscore.

p. cm. -- (The Java series)

ISBN 0-201-74622-0

1. Java (Computer program language) 2. Business--Data processing. I. Inscore, Jim. II. Title. III. Series.

QA76.73.J38 C38 2001
005.2762--dc21

2001022848

ISBN 0-201-74622-0

Text printed on recycled paper.

1 2 3 4 5 6 7 8 9 10—MA—05 04 03 02 01

First printing, June 2001

RMI-IIOP is a simpler alternative to JavaIDL. It allows interfaces to be defined in the Java programming language instead of in IDL. The remote interface can be converted to IDL and implemented or invoked in another language, since RMI-IIOP uses the same on-the-wire protocol as JavaIDL (IIOP). RMI-IIOP thus provides interoperability with CORBA objects implemented in any programming language. J2EE allows Enterprise JavaBeans to be invoked via RMI-IIOP.

In contrast to JavaIDL and RMI-IIOP, the Java Message Service (JMS) provides an API for asynchronous messaging. Rather than invoke a service and wait for a response, a JMS message is queued for delivery, and control returns to the invoker. In addition to supporting specific message queues—for example, for a specific EJB, JMS supports publish-and-subscribe messaging in which any number of clients can subscribe to (request messages on) well-known *topics* in a hierarchy of topics, and any number of clients can publish to (send messages to subscribers of) a specific topic. JMS supports reliable, guaranteed delivery of messages. JMS support is optional in J2EE 1.2 and required in J2EE 1.3.

The JavaMail API supports a different kind of asynchronous messaging: electronic mail. The JavaMail implementation supports widely used Internet mail protocols, allowing J2EE components to send mail to users—for example, to confirm an on-line order. JavaMail abstract classes may be subclassed to support new protocols and functionality.

Enterprise Services

For access to database management systems and other existing enterprise computing resources, J2EE provides support for JDBC, JTA, JNDI, and connectors.

JDBC provides J2EE's database connectivity. Standard Query Language (SQL) commands or queries can be issued to a relational database, and the results returned to any Java application. The JDBC API supports stored procedures, transactions, connections, and user authentication. JDBC drivers may support connection pooling, distributed transactions, and caching of rows from the database.

JTA is the transaction API for J2EE. It provides the transactional integrity support used by EJB containers. It can also be used directly by Enterprise JavaBeans that choose to implement bean-managed transactions. JTA allows transactions to be started and completed, or aborted and rolled back. JTA also allows coordinated distributed transactions across multiple resources, such as two or more separate database management systems. When EJBs use container-managed transactions, the bean programmer does not have to make JTA calls; they are made automatically via the container.

JNDI provides access to a naming environment. It provides methods for performing directory operations, such as associating attributes with objects and searching for objects using their attributes.