

Contents

| | |
|--|------------|
| Introduction | xxi |
| Chapter 1: Getting Started with Geronimo | 1 |
| Where to Find Geronimo | 1 |
| Geronimo Build and Releases | 3 |
| Binary versus Source Download | 5 |
| Jetty versus Tomcat Binary Downloads | 5 |
| Full Installation versus Minimal Little-G Server | 6 |
| Before Installing Geronimo | 6 |
| Hardware Platform Requirements | 6 |
| JVM Requirement | 7 |
| Installing the Geronimo Server | 8 |
| Customizing Geronimo after Installation | 8 |
| The config.xml File | 8 |
| Running the Geronimo Server | 10 |
| Verifying Your Installation of Geronimo | 11 |
| Summary | 12 |
| Chapter 2: Basic Geronimo Configuration | 15 |
| Deploying Your First Geronimo Application | 16 |
| Deploying Applications with the Geronimo Deployer Tool | 17 |
| Application Deployment Using the Geronimo Web Console | 20 |
| Geronimo and J2EE Software Components | 23 |
| Standard Deployment Descriptors | 24 |
| Geronimo-Specific Deployment Descriptors | 25 |
| External Deployment Plan | 26 |
| Loading, Starting, and Stopping Components | 26 |
| The Geronimo Component Lifecycle | 28 |
| Making Basic Configuration Changes to Modules | 30 |
| Summary | 37 |

| | |
|---|-----------|
| Chapter 3: Apache and Geronimo | 39 |
| The Organization behind Geronimo | 39 |
| Founded on World's Most Popular Web Server | 40 |
| Apache Software Foundation | 41 |
| Geronimo Has Inherited the Apache Spirit | 42 |
| Geronimo As a Top-Level ASF Project | 43 |
| Understanding Open Source Software Licenses | 48 |
| The MIT License | 49 |
| The BSD License | 49 |
| The New BSD License | 49 |
| GNU's General Public License | 50 |
| LGPL | 50 |
| Apache License 2.0 | 50 |
| Interpreting the Licenses | 51 |
| Summary | 51 |
| Chapter 4: Geronimo's J2EE 1.4 Components | 53 |
| Geronimo and the J2EE Tiered Architecture | 54 |
| Geronimo's Web Tier | 55 |
| Components Deployable at the Web Tier | 56 |
| Tomcat and Jetty — Web-Tier Containers | 57 |
| The Business Tier | 58 |
| Components Deployable at the Business Tier | 58 |
| Deployable Module at Geronimo's Business Tier | 59 |
| Deploying EJBs As Part of an Enterprise Application | 60 |
| OpenEJB at the Business Tier | 60 |
| ActiveMQ at the Business Tier | 60 |
| The EIS Tier | 61 |
| ActiveMQ at the EIS Tier | 62 |
| Derby at the EIS Tier | 63 |
| JavaMail for Integration to Email Systems | 63 |
| Web Services | 63 |
| AXIS and Web Services | 64 |
| Geronimo Web Services Integration | 64 |
| UDDI Support | 66 |
| Interoperability Features | 66 |
| Difference between J2EE EIS Tier and Interoperability | 67 |
| CORBA Interoperability | 67 |
| Support for Application Clients | 68 |

| | |
|---|------------|
| Geronimo Container Services | 70 |
| Naming and Directory Service | 70 |
| Transaction | 71 |
| Security | 71 |
| Manageability | 72 |
| Configuration Management | 72 |
| Summary | 73 |
| | |
| Chapter 5: Geronimo Architecture and Directory Structure | 75 |
| | |
| GBeans in Geronimo | 76 |
| GBeans and Modules | 77 |
| GBeans and Manageability | 78 |
| Geronimo Modules and Assemblies | 78 |
| Geronimo Directory Structure | 80 |
| The Installation Directory | 80 |
| The bin Directory | 80 |
| The deploy Directory | 81 |
| The docs Directory | 81 |
| The lib Directory | 81 |
| The repository Directory | 83 |
| The schema Directory | 90 |
| The var Directory | 93 |
| Summary | 98 |
| | |
| Chapter 6: The Geronimo Deployer | 99 |
| | |
| Getting Acquainted with the Deployer | 100 |
| Deploying Modules to a Geronimo Server Instance | 100 |
| The JSR-88 Personality of the Command-Line Deployer | 101 |
| The Benefits of JSR-88 | 102 |
| Support for Offline Installation Mode | 103 |
| Using the Deployer | 104 |
| Deployer General Options | 105 |
| Deployer Commands | 106 |
| The Maven Deployment Plug-In | 111 |
| Summary | 115 |
| | |
| Chapter 7: Using the Geronimo Debug Console and jconsole | 117 |
| | |
| Debug Console Architecture | 118 |
| JMX Overview | 118 |
| The JMX Levels | 119 |
| Instrumentation Level | 119 |

Contents

| | |
|--|------------|
| Agent Level | 120 |
| Distributed Services Level | 121 |
| JSR-77 Overview | 121 |
| Management EJB | 121 |
| Object Names in JSR-77 | 123 |
| JSR-77 Manageable States | 127 |
| Installing the Debug Console | 128 |
| Starting the Debug Console | 128 |
| Starting the jconsole JMX Console | 129 |
| Accessing the Debug Console | 132 |
| Filtering the Components That Are Displayed | 133 |
| Troubleshooting a Deployment — An Example | 135 |
| Checking Console Output | 136 |
| Examining the Geronimo Log File | 137 |
| Correcting the Deployment Plan | 139 |
| Querying Components from a Deployed Application on the Debug Console | 140 |
| Viewing the Attributes of a Geronimo Managed Object | 142 |
| Summary | 144 |
| | |
| Chapter 8: Geronimo Web Console | 147 |
| | |
| Using the Web Console | 148 |
| Web Console Architecture | 148 |
| Logging on to the Web Console | 148 |
| Adding More Console Users | 149 |
| Navigating the Server's Functional Menus | 150 |
| Obtaining System Information on the Geronimo Server | 150 |
| Viewing Java Virtual Machine Properties | 151 |
| Viewing and Searching Log Files | 151 |
| Shutting Down the Server | 153 |
| Configuring Web Server Connectors | 154 |
| Configuring and Controlling the ActiveMQ JMS Server | 156 |
| Monitoring Thread Pools | 157 |
| Exposing Geronimo Applications via a Web Server | 158 |
| Navigating the Services Functional Menus | 159 |
| Installing Artifacts into the Geronimo Repository | 159 |
| Installing Database Pools | 162 |
| Creating JMS Resource Groups | 163 |
| Deploying and Managing Applications | 164 |
| Deploying Applications | 164 |
| Managing Deployed Modules | 166 |
| Working with Geronimo Plug-Ins | 168 |

| | |
|--|------------|
| Security Configuration | 170 |
| Configuration of Console Realm | 170 |
| Security Realm Configuration | 170 |
| Keystore Configuration | 171 |
| Embedded Database | 172 |
| Obtaining Database Information | 172 |
| Database Manager Portlet | 173 |
| Summary | 174 |
| | |
| Chapter 9: Geronimo Deployment Plans | 175 |
| | |
| Deployment Descriptors and Plans | 175 |
| The Geronimo Deployable Modules | 176 |
| Standard J2EE Deployment Descriptors | 176 |
| Deployment Plans Naming | 178 |
| Deployment Plan Internal to the Module | 179 |
| The Geronimo Deployment Architecture | 180 |
| Deployed Module in the Repository | 180 |
| Assignment of Module IDs | 181 |
| Summary | 182 |
| | |
| Chapter 10: Web Container Configuration and Jetty | 183 |
| | |
| Web Container — Jetty or Tomcat | 184 |
| Running Both Jetty and Tomcat at the Same Time? | 184 |
| Configuring Web Applications | 190 |
| Geronimo-Specific Web App Deployment Plan | 190 |
| Deploying/Undeploying/Starting/Stopping Applications | 191 |
| Web Descriptor Namespace Versions | 193 |
| Jetty GBeans | 200 |
| Summary | 206 |
| | |
| Chapter 11: Tomcat Web Container Configuration | 207 |
| | |
| Using Tomcat in Geronimo | 208 |
| Running and Verifying Tomcat | 208 |
| Configuring Tomcat | 209 |
| Tomcat Architecture Overview | 210 |
| Geronimo Tomcat Configuration | 211 |
| Summary | 239 |

| | |
|---|------------|
| Chapter 12: Deploying Enterprise Applications (EAR) with OpenEJB | 241 |
| The J2EE Model for EJB Access | 242 |
| Web-Tier EJB and Resource References | 243 |
| External References in EJB JAR Files | 244 |
| Resolving Local References within an EAR Module | 245 |
| Mapping External References | 246 |
| Example of Deploying Session and Entity EJBs | 247 |
| Deploying Session and CMP Entity Beans | 248 |
| The openejb-jar.xml Deployment Plan | 254 |
| Resolving EJB References in Geronimo | 257 |
| Mapping Internal EJB References | 258 |
| Mapping External EJB References | 258 |
| General Configuration Concerns | 259 |
| Informing the Container of Components to Deploy | 259 |
| Creating Derby Databases for the CMP Entity Bean | 260 |
| Configuring Transactions | 262 |
| JavaMail Support | 265 |
| JavaMail Transports | 265 |
| MailSession GBean | 266 |
| Enabling JavaMail System Module via config.xml | 266 |
| Reference to the Container-Managed JavaMail Session | 267 |
| Linking to the Container-Managed JavaMail Session | 267 |
| Working with the Database Connections Pool | 268 |
| Trying Out the Example | 272 |
| The Geronimo Client Container | 274 |
| Summary | 275 |
| Chapter 13: Configuring and Deploying JDBC Resources with PostgreSQL | 277 |
| Architecture | 278 |
| Starting PostgreSQL | 279 |
| J2EE Connector Architecture and JDBC Resources | 280 |
| The Resource Adapter Archive | 280 |
| Configuring JDBC Resources | 281 |
| Creating a JDBC Deployment Plan for PostgreSQL | 288 |
| Deploying JDBC Resources | 289 |
| Using the Geronimo Deployer | 290 |
| Using the Geronimo Console | 291 |
| Additional Functionality in the Geronimo Console | 297 |

| | |
|--|------------|
| Highly Available PostgreSQL with Sequoia | 297 |
| Configuring a Clustered PostgreSQL | 299 |
| The Sequoia Configuration | 300 |
| Deploying the Clustered PostgreSQL Deployment Plan | 303 |
| Summary | 303 |

Chapter 14: Deploying Web Services and CORBA Interoperation **305**

| | |
|--|------------|
| Web Services Fundamentals | 306 |
| Anatomy of a Web Service | 306 |
| XML, SOAP, and JAX-RPC | 307 |
| Service Endpoint Interface (SEI) | 309 |
| Web Services and Geronimo | 310 |
| Example 1: Deploying a Web Service WAR on Geronimo | 311 |
| The webservices.xml Web Service Deployment Descriptor | 312 |
| The web.xml Deployment Descriptor for JAX-RPC Web Service | 315 |
| Optional <service-ref> for Client Access to External Web Services | 316 |
| Creating a Cross-Server-Compatible Web Service WAR | 316 |
| Specifying the Context Root for the Web Service | 317 |
| Deploying the Web Service | 318 |
| Trying Out the Example with a Standalone Web Service Client | 319 |
| Example 2: Deploying a Stateless Session EJB As a Web Service | 320 |
| Adding the WSDL and JAX-RPC Mapping Files | 321 |
| Configuring for EJB-Based Web Service Implementation | 321 |
| Mapping a Session Bean to a Service Endpoint | 322 |
| Providing a Deployment Context for the Web Service | 323 |
| Trying Out the Example | 323 |
| CORBA Concepts | 324 |
| CORBA versus Web Services: Similar Yet Different | 324 |
| Interface Definition Language | 325 |
| ORB and CORBA Services | 326 |
| GIOP and IIOP | 327 |
| Simplifying Java-Based CORBA Interoperation | 327 |
| Example 3: Exposing a Session EJB As a CORBA Component | 329 |
| CORBA 2.3 Security | 329 |
| Geronimo Support for CSrv2 Security | 329 |
| Configuring Server-Side CSrv2 Security | 330 |
| Configuring Client-Side CSrv2 Security | 331 |
| CORBA Client Support | 332 |
| Specifying Dependency on Parent Modules | 334 |
| Configuring ORB Parameters via config.xml | 335 |
| Trying Out the Example | 335 |
| Summary | 336 |

| | |
|---|------------|
| Chapter 15: Security | 337 |
| Importance of a Security Subsystem | 338 |
| Geronimo Security Architecture | 338 |
| Authentication | 339 |
| Authorization | 339 |
| Security Realms and Login Domains | 340 |
| JAAS Login Modules | 341 |
| The GenericSecurityRealm | 341 |
| Authorization and JACC | 344 |
| Configuring JAAS Login Modules | 345 |
| J2SE JAAS Login Modules Configuration | 345 |
| Configuration JAAS Login Modules in Geronimo | 346 |
| Login Modules | 352 |
| Simplifying LoginModule Configuration with the xml-reference login-config | 363 |
| Configuring Your Realm — The Really Easy Way | 368 |
| Deployment and the Server Security Plan | 373 |
| Using Security in Applications | 373 |
| Web Security | 374 |
| EJB Security | 376 |
| Security Descriptor and Declaration | 378 |
| Locking Down Geronimo | 388 |
| Summary | 389 |
| | |
| Chapter 16: Configuring, Deploying, and Using JMS Resources with Apache ActiveMQ | 391 |
| The ActiveMQ Message Broker Architecture | 391 |
| ActiveMQ Message Broker Configuration | 393 |
| Customizing the Message Broker | 397 |
| Deploying a Message Broker Configuration | 401 |
| Managing ActiveMQ from the Geronimo Console | 405 |
| The ActiveMQ Resource Adapter | 406 |
| JMS Resources | 406 |
| ActiveMQ Resource Adapter Configuration | 407 |
| Deploying JMS Resources | 413 |
| Creating JMS Resource Groups in the Geronimo Console | 415 |
| Deployment Scope | 422 |
| Summary | 422 |

| | |
|---|------------|
| Appendix A: Geronimo Deployment Plans Cross-Reference | 423 |
| Deploying Web-Tier Applications — geronimo-web.xml | 424 |
| Reference Namespaces | 424 |
| Top-Level Elements | 424 |
| Deploying Business-Tier EJBs — openejb-jar.xml | 426 |
| Reference Namespaces | 426 |
| Top-Level Elements | 426 |
| Deploying EIS-Tier JCA connectors — geronimo-ra.xml | 427 |
| Reference Namespaces | 428 |
| Top-Level Elements | 428 |
| Deploying Enterprise Applications — geronimo-application.xml | 429 |
| Reference Namespaces | 429 |
| Top-Level Elements | 429 |
| Deploying J2EE Application Clients — geronimo-application-client.xml | 430 |
| Reference Namespaces | 431 |
| J2EE Standard Specification Schemas for Deployment Descriptors | 432 |
| | |
| Appendix B: Run-Time Deployer Command Reference | 435 |
| The Command-Line Deployer | 436 |
| Available Options | 436 |
| Available Commands | 439 |
| Deployment Using GUI Web Console | 444 |
| Auto Deployment Using the Hot Deployer | 445 |
| | |
| Index | 447 |

