Oracle Coherence 12c: Administer and Troubleshoot Clusters Ed 2.1

JAVA

DURATION	MODULES	COURSE CODE
5 Days	**2 Lectures**	**—**

Course Overview

This Oracle Coherence 12c training teaches you to administer Coherence in both stand-alone and WebLogic Clusters. All major aspects of Coherence administration are covered from installation and provisioning to Grid Archive deployment.

What You Will Learn

Introduction

- Audience
- Class Introductions
- Goals
- Objectives
- Prerequisites
- Course Environment
- Font Conventions
- Schedule
- Additional Resources
- Practice 1-1 Overview: Understanding the Practice Structure

Introduction to Coherence

- Objectives
- Agenda
- Coherence: Overview
- Coherence Approach
- What Is Coherence?
- Coherence: Principles
- Coherence: Features
- Role of the Coherence Administrator
- Coherence Cluster: Concepts
- What Is a Coherence Cluster?

- Coherence Data Grids and Fault Tolerance
- Coherence Cluster Member
- Coherence and TCMP
- Coherence and WebLogic Server
- Quiz
- Coherence Caches
- Coherence Services
- Coherence Partitions
- Local Storage
- Coherence Backing Map
- Supported Platforms and Integrations
- Coherence*Extend
- Coherence*Web
- Coherence Data Grid Solution Set
- Coherence Standard Edition
- Coherence Enterprise Edition
- Coherence Grid Edition
- WebLogic Server: Three Editions
- Oracle Fusion Middleware
- Quiz
- Practice 2-1 Overview: Coherence Concepts and Principles
- Summary

Coherence Basics

- Objectives
- Agenda
- What Coherence Provides to WebLogic Server
- Coherence and WebLogic Server
- What WebLogic Server Provides to Coherence
- Managed Coherence Server
- Grid ARchive (GAR)
- GAR Deployment Options
- Quiz
- Agenda
- Installing Oracle Coherence Server
- Oracle Universal Installer
- Coherence Quick Installer
- Coherence Directory Structure
- Other Directories
- Coherence Script Basics
- Starting Coherence
- Understanding Startup
- Shutting Down Coherence Instances
- Coherence Configuration
- Default Configuration

- Command-Line Properties
- Coherence Port Use
- Coherence Start Sequence
- Example: tangosol-coherence-override.xml
- Coherence Console
- Some Console Commands
- Summary
- Practice 3-1 Overview: Installing and Configuring Coherence
- Practice 3-2 Overview: Working with the Coherence Console

Cluster Management

- Objectives
- Agenda
- Cluster Membership
- Example of a Cluster
- Example of a Coherence Instance: First Instance Started
- Example of a Coherence Instance: Second Instance Started on a
- Separate Machine
- Example of a Coherence Instance: Third Instance Started on the
- Original Machine
- Common Cluster Settings
- Quiz
- Agenda
- Common Ports and Addresses
- Connectivity and Performance
- Datagrams and Coherence
- Datagram Test: Example
- Datagram Test Statistics: Sender
- Datagram Sender Interval Statistics
- Datagram Receiver Statistics
- Datagram Test: Usage and Parameters
- Datagram Test: Examples
- Datagram Testing: Next Steps
- Quiz
- Multicast and Coherence
- Multicast Failure
- Multicast Test: Usage and Parameters
- Multicast Example: Multiple Machines
- Multicast Test: Examples
- Multicast Testing: Next Steps
- Multicast and Well Known Addresses
- Configuring Well Known Addresses
- WKA and Multiple Addresses
- Packets and Packet Buffers
- Packet Publishing

- Service Guardian: General Settings
- Service Guardian: Per-Service Settings
- Service Guardian: Per-Cache Instance
- Coherence Quorum
- Cluster Quorum
- Quiz
- Practice 4-1 Overview: Validating a Local Network
- Summary

Cluster Provisioning

- Objectives
- Agenda
- Coherence Configuration Files: Review
- Coherence Configuration Management
- Serialization
- Portable Object Format
- Defining POF Serializers
- Associating Serialization with Caches
- POF Configuration Generation
- POF Configuration Generator
- POF Automatic Indexing
- POF Serializer Configuration
- Coherence and Logging
- Logging and Coherence
- Configuring Coherence for log4j
- Example: log4j.properties
- Quiz
- Practice 5-1 Overview: Coherence Provisioning
- Agenda
- Scripting Coherence
- Arguments for Running DefaultCacheServer
- Possible Directory Structure
- Suggested Scripts
- setenv.sh
- setjvmoptions Function
- Example: start-cache-server.sh
- Example: start-all.sh
- Example: stop-cache-servers.sh
- Practice 5-2 Overview: Creating a Multi-Machine Cluster
- Summary

Configuring Coherence Caches

- Objectives
- Agenda
- What Happens to Cached Data?

- Cache Configurations
- Configuring Caches
- Topologies
- Local Cache
- Replicated Cache
- Partitioned Cache
- Near Cache
- Overflow Cache
- Other Cache Types
- Agenda
- Cache Configuration: Overview
- Cache Mappings
- Fixed Versus Wildcard
- Concepts: Cache Scheme
- Scheme Composition
- Understanding Schemes
- Schemes: Basic Structure
- Local Scheme: Example
- Commonly Used Elements
- Distributed Scheme: Example
- Quiz
- Practice 6-1 Overview: Configuring a Local Cache
- Replicated Cache: Example
- Commonly Used Elements
- Quiz
- Practice 6-2 Overview: Configuring a Replicated Cache
- Configuring a Partitioned Cache
- Commonly Used Elements
- Partitioned Cache Quorum
- Partitioned Cache Quorum: Example
- Quiz
- Near Cache: Example
- Defining Near Cache Parameters
- Configuring an Overflow Cache
- Defining Overflow Cache Parameters
- Common Scheme Elements
- Map Listeners
- Backing Maps and Backing Map Listeners
- Registering Event Interceptor Declaratively
- Registering Interceptors for Specific Caches
- Cache Loaders and Stores
- Service Guardian and Cache Schemes
- Practice 6-3 Overview: Configuring a Partitioned Cache
- Agenda
- Elastic Data: Overview
- Benefits of Elastic Data

- Elastic Data and Journaling
- Journals: RAM Versus Flash
- Configuring a Journaling Backing Map
- Controlling Journal Behavior
- Considerations for Elastic Data
- Quiz
- Summary
- Practice 6-4 Overview: Configuring an Elastic Data Cache

Introduction to Coherence Monitoring

- Objectives
- Agenda
- JMX
- JMX Interaction
- Java Console (jconsole)
- Java VisualVM (visualvm)
- Java Mission Control (jmc)
- JMX Reporter
- Oracle Enterprise Manager 12c: Overview
- Quiz
- Agenda
- Coherence and JMX Management
- Coherence Management: Architecture
- Configuring Coherence JMX
- Accessing the Coherence MBean by Using HTTP and JMX RI
- System MBeans to Watch
- Disabling JMX Management
- Accessing MBeans by Using jvisualvm
- Accessing MBeans by Using jconsole
- Practice 7-1 Overview: Examining a Running Cluster by Using JMC
- Agenda
- Why Rolling Upgrade?
- What is Rolling Upgrade?
- Rolling Upgrade: Process Considerations
- Typical Rolling Upgrade
- What can be updated: Binaries
- What can be updated: Configuration
- Rolling Upgrade: Final Considerations
- Agenda
- JMX Reporter
- Configuring Basic Reporter Settings
- Managing Reporter MBean Attributes
- Managing Reporter MBean Operations
- Finding Reporter Log Data
- Viewing Reporter Data

- Creating Custom Reports
- Running the Reporter in a Distributed Environment
- Custom Report Definition
- file-name Element
- filters Element
- query Element
- rows and column Elements
- rows Element: Example
- Registering Reports
- Quiz
- Summary
- Practice 7-2 Overview: Configuring and Using JMX and the Reporter
- Practice 7-3 Overview: Creating, Registering, and Running Custom Reports

Coherence Cluster Monitoring

- Objectives
- Agenda
- Coherence Cluster Health Concepts
- Coherence MBeans: Unconditional
- Coherence MBeans: Conditional
- General Cluster Health
- Agenda
- What Is Stability?
- Stability and Clusters
- Stability and Nodes
- Stability and Services
- Stability and Storage Managers
- What Can Be Done with Unstable Members?
- Quiz
- Agenda
- What Is Performance?
- How Is Performance Measured?
- Performance: Next Steps
- Agenda
- What Is Balance?
- How Is Balance Measured?
- Balance-Related MBeans
- What Can Be Done When a Cluster Is Unbalanced?
- Quiz
- Agenda
- What Is Capacity?
- How Is Capacity Measured?
- Capacity-Related MBeans
- What Can Be Done to Improve Capacity?
- Summary
- Practice 8-1 Overview: Examining Stability and Balance

Coherence Troubleshooting and Performance Tuning

- Objectives
- Top Coherence Issues
- Agenda
- Un-Indexed Query
- Characteristics of Un-Indexed Data
- Query Optimization: Explain Plans and Trace
- Explain Plan Output
- Trace Output
- What Is a Stack Trace?
- What Is a Thread Dump?
- Analyzing a Thread Dump
- Lessons Learned: Un-Indexed Queries
- Agenda
- Heap Exhaustion
- Characteristics of Exhausted Heap
- What Is a Heap Dump?
- Java Heap Analysis Tool (jhat)
- Sizing a Coherence Cluster
- Sizing Considerations
- Size-Limiting Cache Configurations
- high-units by Cache
- Binary Calculator: Example
- Lessons Learned: Heap Exhaustion
- Quiz
- Agenda
- Unresponsive Services
- Characteristics of Unresponsive Services
- thread-count by Cache
- Cluster Element Thread Priorities
- Specifying Cluster Communications Priority
- Specifying Service Priority
- Lessons Learned: Unresponsive Services
- Quiz
- Agenda
- Coherence and Swapping
- Lessons Learned: Swapping
- Quiz
- Agenda
- Coherence and Network Issues
- Potential Bandwidth Messages
- Potential Disconnect Messages
- Lessons Learned: Network
- Agenda
- What Is Split Brain?

- What Is at Risk with Split Brain?
- Causes of Split Brain
- Correcting Split Brain
- Detecting Split Brain
- Avoiding Split Brain
- Quiz
- Practice 9-1 Overview: Troubleshooting Practice
- Agenda
- Performance Tuning
- Network Readiness
- MTU and Packet Fragmentation
- Configuring Coherence Packet Size
- Network Readiness: Other Considerations
- Network Readiness Testing
- Coherence Network Validation
- Agenda
- JVM Best Practices: General
- JVM Best Practices: Flags
- JVM Best Practices: Heap Size
- JVM Best Practices: GC Tuning
- Agenda
- Operating System Monitoring
- top: Example
- vmstat: Example
- sar and kSar
- kSar CPU Report: Example
- Practice 9-2 Overview: Monitoring with kSar
- Summary

Coherence*Extend

- Objectives
- Agenda
- What Is Coherence*Extend?
- Coherence*Extend Architecture
- What Is Coherence*Extend?
- Coherence*Extend Clients
- Coherence*Extend Architecture
- Coherence*Extend Capabilities
- Coherence*Extend Advantages
- Coherence*Extend Disadvantages
- When to Use Coherence*Extend
- Data Replication
- Agenda
- Configuring Coherence*Extend
- Cluster-Side Cache Configuration Descriptor

- Client-Side Cache Configuration Descriptor
- Launching a Coherence*Extend-Enabled DefaultCacheServer Process and Java
- Client Application
- Quiz
- Agenda
- Tuning the Coherence*Extend Client
- Always Run Proxy Server with Storage Disabled
- Never Run Near Cache on Proxy Servers
- Running Multiple Proxies
- Configuring POF Serializers
- Configuring Address Provider References
- Step 1: Override File
- Step 2: Cluster Configuration
- Step 3: Client Configuration
- Configuring a Naming Service
- Step 1: Cluster Configuration
- Step 2: Client Configuration
- Dynamic Proxy Thread Pooling
- Configuring Thread Counts
- F5 BIG-IP Local Traffic Manager
- Dynamic Load Balancing for Coherence*Extend
- Proxy-Based Load Balancing
- Connection Load Balancing
- Client-Based Load Balancing: Per Proxy
- Client-Based Load Balancing: System-Wide
- Proxy-Based Load Balancing Algorithm
- Custom Load Balancing
- Agenda
- Supported Environments
- Installing the C++ Distribution
- C++ Distribution Structure
- Installing the .NET Distribution
- .NET Distribution Structure
- C++ Extend Clients
- Summary
- Practice 10-1 Overview: Configuring and Running a Coherence*
- Extend Gateway

REpresentational State Transfer (REST)

- Objectives
- Agenda
- What Is REST?
- Coherence REST
- Coherence REST Requirements
- Supported Representations

- Developer Requirements
- Quiz
- Agenda
- REST Configuration
- Registering Objects
- REST Resources
- Key Converters
- REST and POF
- Serving Coherence REST Requests
- Configuring REST Proxies
- Configuration: Example
- Starting a REST Proxy
- REST Configuration: Best Practices
- WebLogic Server Deployment (Prior to Version 12c)
- REST Web Application Structure
- web.xml Deployment Descriptor
- weblogic.xml Deployment Descriptor
- Deploying the Web Application
- Agenda
- Single-Object Operations
- Multiple-Object Operations
- Partial Results
- Queries
- Named Queries
- Named Query: Example
- Queries with Parameters
- Entry Processors and REST
- Custom Entry Processors
- Quiz
- Agenda
- Coherence REST Security
- Configuring HTTP Basic Security
- HTTP Basic Authentication
- Login Module
- Specifying a Login Module
- SSL Authentication
- Well Known Addresses and SSL
- HTTP Basic Authentication and SSL
- Summary
- Practice 11-1 Overview: Exposing Objects Using REST

Coherence and GoldenGate HotCache

- Objectives
- Agenda
- Coherence and Databases

- Database-Backed Coherence
- Shared Database as System of Record
- GoldenGate HotCache
- Oracle GoldenGate
- Oracle TopLink
- Coherence GoldenGate HotCache: Overview
- Agenda
- Coherence and JPA
- JPA Approach
- Integrating JPA and Coherence
- What Are JPA Entities?
- Mapping a Cache to a Database
- Configuring JPA
- Agenda
- Configuring the GoldenGate HotCache Adapter
- Provisioning the Database
- Prerequisite: Installing GoldenGate
- Provisioning the Database: Users
- Provisioning the Database: Example
- Provisioning the Database: Monitoring Tables
- GGSCI
- Provisioning the Database: Extract from Table – Parameter File Example
- Provisioning the Database: Extract from Table – Script Example
- HotCache Adapter Configuration: Overview
- Configuring the HotCache Adapter: Creating a Properties File
- Configuring the HotCache Adapter: Java Writer Boot Options – Classpath
- Configuring the HotCache Adapter: Java Writer Boot Options – Coherence
- Configuring the Hot Cache Adapter: Java Writer Boot
- Options – Miscellaneous
- GoldenGate Java Client
- GoldenGate Java Client: Example
- Coherence Configuration
- Configuring persistence.xml
- Coherence Cache Configuration
- Coherence GoldenGate Adapter: Topology
- Coherence*Extend Connection
- (Optional) Practice 12-1 Overview: Configuring GoldenGate HotCache
- Agenda
- Java Persistence Architecture
- Entity Class Requirements
- Obtaining a JPA Implementation
- Persistent Object: Entities
- What Is a JPA Persistence Unit?
- Summary

Managed Coherence Servers for WLS

- Objectives
- Agenda
- Coherence and WebLogic Server
- WebLogic Managed Coherence Servers Operations
- Coherence Container: Benefits
- Agenda
- Installing WebLogic with Coherence
- Combined Installer Directory Structure
- Terminology: Review
- WebLogic Server Domain: Review
- Administration Server: Review
- Managed Servers: Review
- Managed Coherence Server
- Machines and WebLogic Server: Review
- WebLogic Cluster
- WebLogic Dynamic Clusters
- Server Templates and Dynamic Clusters
- Dynamic Server Calculated Attributes
- Coherence Cluster
- Coherence Deployment Tiers and Topologies
- Best Practice: Single Data with Web Cluster Topology
- Working with Coherence Clusters
- Coherence Cluster Configuration
- Default Coherence Cluster
- Coherence Cluster Settings
- Additional Coherence Cluster Settings
- WebLogic Cluster Coherence Settings
- Creating Managed Coherence Servers
- Configuring Managed Coherence Servers
- Additional Coherence Server Settings
- Stand-Alone Versus WebLogic MCS Overview
- Stand-Alone Versus WebLogic MCS General Configuration
- Stand-Alone Versus WebLogic MCS Discovery
- Debugging Configuration
- WebLogic Scripting Tool (WLST)
- Running WLST Scripts
- WLST: Creating Coherence Clusters
- Modifying Coherence Cluster Parameters
- Associating a Coherence Cluster with a WLS Cluster
- WLST: Creating Managed Coherence Servers
- Agenda
- What Is a Grid Archive (GAR)?
- GAR Structure
- Deployment Descriptor coherence-application.xml

- GAR Deployment Options
- Coherence Application Isolation
- Packaging GARs Inside EARs
- Application Isolation and EARs
- Deploying Coherence Applications
- DefaultCacheServer and GARs
- Practice 13-1 Overview: Coherence Applications and WebLogic Server
- Agenda
- Application Lifecycle Listeners
- Developing and Registering Lifecycle Listeners
- Overriding Configuration By Using JNDI
- Overriding Cache Configuration: Example
- Coherence Applications and Scope
- WebLogic and Deployment
- Agenda
- Coherence*Web: Overview
- In-Memory Session Replication: Review
- Coherence*Web and WebLogic Clusters
- Coherence*Web Architecture
- Coherence*Web Configuration
- Managed Coherence Server Coherence*Web Instance
- Quiz
- Summary

Oracle Enterprise Manager and Coherence

- Objectives
- Agenda
- Enterprise Manager Cloud Control
- Cloud Control Core Capabilities
- Application to Disk
- Multiple Domains
- Cloud Control Architecture
- Agents
- Agent Installation Options
- Targets
- Browser Interface
- Software Library
- Management Packs
- Agenda
- Coherence Administrator Challenges
- Oracle Coherence Management Pack
- Coherence Management Pack Key Functional Areas
- Oracle Coherence Management Pack Common Features
- Discovery
- Discovery Prerequisites
- Enterprise Manager, Coherence, and JMX

- Oracle Enterprise Manager Coherence Targets
- Creating a JMX-Enabled Enterprise Manager Node
- Create Enterprise Manager Script
- Add Required Enterprise Manager
- Adding Required Jar Files and EMIntegrationServer
- Managed Nodes
- Discovering Coherence Targets
- Enabling the Management Pack
- Summary
- A New Features Overview
- Objectives A-2
- JDK 8 Language Features A-3
- Asynchronous Named Cache and Entry Processors A-4
- Coherence Cluster Management A-5
- Security Enhancements A-6
- Elastic Data Improvements A-7
- Persistent Caching A-8
- Federated Caching A-9
- Coherence and WebLogic MT A-10
- Coherence As A Service A-11
- Summary A-12
- B Programming Enhancements
- Objectives B-2
- Coherence 12.2.1 Programming B-3
- Typing Caches B-4
- Typed Caches B-5
- Using Caches Asynchronously B-6
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- Coherence and Lambda Expressions B-9
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- Objectives C-2
- Persistent Caching C-3
- Persistence Dependencies C-4
- Persistence Modes C-5
- Persistence Operations C-6
- Creating Snapshots C-7
- Creating Archives C-8
- JVisualVM and Archives C-9
- Configuring Persistence C-10
- Configuring Archivers C-12
- When Snapshots fail C-13
- Configuring Persistence Quorum C-14
- Disabling Persistence Transient Caches C-15
- Persistence Planning C-16