

Oracle Cloud Infrastructure Cloud Operations Professional: Hands-on Workshop

Student Guide – Volume I
D1111263GC10

Learn more from Oracle University at education.oracle.com



Copyright © 2025, Oracle and/or its affiliates.

Disclaimer

This document contains proprietary information and is protected by copyright and other intellectual property laws. The document may not be modified or altered in any way. Except where your use constitutes "fair use" under copyright law, you may not use, share, download, upload, copy, print, display, perform, reproduce, publish, license, post, transmit, or distribute this document in whole or in part without the express authorization of Oracle.

The information contained in this document is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

Restricted Rights Notice

If this documentation is delivered to the United States Government or anyone using the documentation on behalf of the United States Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software" or "commercial computer software documentation" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

Trademark Notice

Oracle®, Java, MySQL, and NetSuite are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

Third-Party Content, Products, and Services Disclaimer

This documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Table of Contents

Module 01: Course Overview	11
Oracle Cloud Infrastructure Cloud Operations Professional	12
Day 0: Tenancy Administration	15
Day 1: Environment Deployment	16
Day 2: Scaling, Optimization, and Business Continuity	
Module 02: Identity and Access Management Overview	18
Introduction	19
What is OCI IAM?	20
OCI IAM: Authentication (AuthN)	22
OCI IAM: Authorization (AuthZ)	24
OCI IAM Components	26
OCI IAM Identity Domains	31
What are OCI IAM identity domains?	32
Identity Domains	33
Identity Domains: Use Cases	34
Identity Domains: Identity Lifecycle Management	35
OCI IAM with Identity Domains	40
Identity Domain Types	41
Identity Domain Types	42
Module 03: Identity and Access Management Basics	47
Managing OCI IAM Identity Domains	48
Default Identity Domain	50
Default Domain	51
Dos and Don'ts for the Administrator Users	53
Creating Identity Domains	54
Why do we need multiple identity domains?	55
Creating Identity Domains	56
Demo: Creating Identity Domains	58

Creating Identity Domains	59
Demo: Creating Groups	60
Creating Groups	61
Managing Groups	63
Groups	64
Default Groups in Identity Domains	66
Demo: Creating Users	67
Creating Groups	68
Creating Users	69
Managing Users	70
Stages of the IAM User Life Cycle	71
User Lifecycle Management	72
Creating Groups	73
Understanding the Administrator Role	74
Administrator Roles: Key Points	75
Types of Administrator Roles	76
Assigning Administrative Roles	77
Policies	78
Policies	79
Subjects Clause	80
Actions Clause	83
Placement	85
Compartments	86
Compartments	87
Resource Compartments	89
Compartments Access	90
Interaction of Resources	91
Movement of Resources	92
Multiple Regions	93
Nested Compartments	94
Compartment Quotas	95

Scenario	96
Quota Syntax	97
Quota Examples	103
Types of Quota Policy Statement	104
Quota Examples	105
Budgets	106
Demo: Policies	107
Demo: Understanding Administrator Role	108
Module 04: Identity and Access Management-Advanced	109
Demo: Policy Inheritance and Attachment	110
Tenancy	111
Policy Inheritance and Attachment	112
Policy Inheritance	113
Policy Attachment	115
Conditional Policies	117
Conditions	120
Examples	122
Demo: Creating Users	123
Oracle Cloud Infrastructure (Region)	124
Enforce Least Privileged: Advanced Policies	125
Permissions	126
Example	127
Tag Based Access Control	131
Example	135
Demo: Dynamic Groups	137
Scenario: Dynamic Groups	138
Network Sources	139
Demo: Tag Based Access Control	143
Demo: Network Sources	144
Scenario	145

Dynamic Groups	146
Terms	147
Resource Principals Patterns	148
Infrastructure Principals	149
Stacked Principals	150
Ephemeral Principals	151
Dynamic Groups	152
Policies	154
Module 05: Security Posture	155
What is Cloud Security Posture Management?	156
Problem with Cloud Security	157
Cloud Security Posture Management (CSPM) capabilities	158
DevSecOps	159
Cloud Security Posture Management Outcomes	160
Cloud Security Posture Management Benefits	161
Cloud Guard Introduction	162
Cloud Guard	163
Supported Services	165
CIS OCI Foundations Benchmark	166
Reporting Region	167
Cloud Guard Concepts	168
Cloud Guard: Overview	169
Cloud Guard Concepts: Targets and Detectors	170
Cloud Guard Concepts: Detector Rules and Recipes	171
Cloud Guard Concepts: Problems and Responders	172
Cloud Guard Concepts: Responder Rules and Recipes	173
Cloud Guard Problems	174
Scenario: Public Bucket	175
Cloud Guard Concepts: Problems	176
Processing Reported Problems	177
Cloud Guard – Manage Detector Recipes	179

Detector Rules and Recipes	180
Configuration Detector Rules (Oracle-Managed)	181
Activity Detector Rules (Oracle-managed)	182
Compartment Inheritance	183
Cloud Guard Responder Recipes	184
Managing Responder Recipes	185
Managed Lists	187
Cloud Guard Notifications	189
Cloud Guard Notifications	190
Integration with Events and Notification Services	191
Security Zones and Security Advisor	192
Security Zones	193
Security Zone Concepts	195
Security Zone Policies	196
Security Advisor	197
Module 06: Billing and Licensing	198
Manage Cost with Budgets and Budget Alerts	199
Overview Course Big Picture	200
Module 8 Billing & Cost Management	201
Budgets	202
Understand Cost with Cost Analysis	206
Module 8 Billing & Cost Management	207
Cost Analysis	208
Calculate and Optimize Cost: Compute	224
Compute Pricing	225
Cost Optimization for Compute	238
Scaling	239
Autoscaling	240
Calculate and Optimize Cost: Block Storage	249
Block Storage Cost	250
Volume Performance Units (VPUs)	255

Auto-tuning	258
Calculate and Optimize Cost: File Storage	260
File Storage Cost	261
Calculate and Optimize Cost: Object Storage	277
Object Storage Tiers	278
Object Storage Costs	279
Optimize Cost: Object Storage	289
Life Cycle Management	290
Auto-Tiering	295
Calculate and Optimize Cost: Networking	298
Ingress & Egress Cost	299
VPN Connect vs FastConnect Pricing	301
FastConnect Pricing	302
Software Licensing on OCI	303
Licensing Models	304
Licensing Mobility through Software Assurance	311
Module 07: Service Limits and Compartment Quotas	313
Governance & Administration	314
View and Manage Service Limits	315
Service Limit	316
View Service Limits and Usage	317
When You Reach a Service Limit	318
Demo	319
Request a Service Limit Increase	320
Governance & Administration	321
Set Resource Caps with Quotas	322
Compartment Quotas	323
Types of Quota Policy Statements	324
Demo	325
Create a Quota Policy	326
Cloud Advisor	327

In this Lesson...	328
What Is Cloud Advisor?	329
How Cloud Advisor Works	330
Benefits of Using Cloud Advisor	331
Recommendation Categories & Statuses	332
Cloud Advisor Calculations	333
High Availability Recommendation Calculations	334
Performance Recommendation Calculations	335
Cost Management Recommendations	336
Recommendation Profiles	337
Recommendation Profile: Load Balancers	338
Recommendation Profile: Compute Instances	339
Organization Management	340
Organization Management: Overview	341
Why choose multitenancy approach?	342
Manage Multitenancy	343
Cost Reporting Integration	344
Module 08: OCI Command Line Interface (CLI) and Software Development Kit (SDK)	345
Interacting with OCI	346
Interacting with OCI	347
REST API	348
Cloud Console	350
Command Line Interface (CLI)	352
Software Development Kit (SDK)	354
OCI CLI Authentication	356
Recall	357
Authentication	358
API Key	361
Security Token	362
Instance and Resource Principles	364
Cloud Shell	365

OCI CLI Syntax	367
Recall	368
Syntax	370
Example	375
Option Types	380
Generating Examples	381
Advanced Examples	382

Oracle Cloud Infrastructure Cloud Operations Professional: Hands-on Workshop

Student Guide – Volume II
D1111263GC10

Learn more from Oracle University at education.oracle.com



Copyright © 2025, Oracle and/or its affiliates.

Disclaimer

This document contains proprietary information and is protected by copyright and other intellectual property laws. The document may not be modified or altered in any way. Except where your use constitutes "fair use" under copyright law, you may not use, share, download, upload, copy, print, display, perform, reproduce, publish, license, post, transmit, or distribute this document in whole or in part without the express authorization of Oracle.

The information contained in this document is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

Restricted Rights Notice

If this documentation is delivered to the United States Government or anyone using the documentation on behalf of the United States Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software" or "commercial computer software documentation" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

Trademark Notice

Oracle®, Java, MySQL, and NetSuite are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

Third-Party Content, Products, and Services Disclaimer

This documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Table of Contents

Module 09: Terraform - Infrastructure as Code	14
Infrastructure as Code	15
What is Infrastructure as Code?	16
Why Use Infrastructure as Code?	17
Objectives	18
Benefits and Overview	19
Terraform	20
Terraform Concepts	21
Terraform Commands	22
Terraform Commands	23
Variables	25
Variables	26
terraform.tfvars	28
Provider	29
Provider	30
Resources	34
Resources	35
Outputs	37
Outputs	38
Modules	41
Modules	42
State	44
State	45
Preparing The Environment	47
Terraform Setup	48
Parameters Evaluation Order	50
Provider Configuration	51
Environment Variables Linux	52

Environment Variables Windows	53
Security Token	54
Terraform Workflow	55
Your First Terraform Configuration	56
Terraform Configuration File Structure	57
main.tf	58
Change Infrastructure - Updating Your Configuration Files	59
Modifying Terraform Files	60
Splitting the Configuration	61
Incorporating Modules	62
Creating the Module	63
Creating the Module - Continued	64
Incorporating Modules	65
Module 10: OCI Resource Manager	66
Introduction and Concepts	67
Resource Manager Concepts	68
Configuration Source Providers	69
Configuration	71
Stacks	73
Actions	75
Jobs	77
Templates	79
All Together	81
Creating Your First Stack	82
Creating Your First Stack	83
Using Source Providers	84
Configuration Source Providers	85
Using a Configuration Source Provider	86
Importing Existing Infrastructure	87
Importing Existing Infrastructure	88
Drift Detection	89

Drift	90
Using Drift Detection	91
Templates	92
Templates	93
Creating Private Templates	94
Remote Exec and Endpoints	95
Resource Manager Endpoints	96
Creating the Endpoint with Terraform	97
Module 11: Deploy a Monolithic Architecture	98
Case Study Architecture	99
Case Study: Mastodon	100
Instance Architecture	104
Mastodon Architecture	112
VCN Deep Dive: Gateways and Routing	113
Virtual Networking	114
Conceptual Design	115
CIDR Blocks	116
Conceptual Design	118
VCN Gateways	123
VCN Layout and Gateways	131
Demo: Setting up a VCN	132
Demo: Stack Creation	133
Demo: VCN Creation Terraform	134
VCN Deep Dive: Access Control	135
Virtual Networking	136
VCN Access Control	137
Stateful rules allow responses	150
Demo: Securing a VCN	153
Compute Deep Dive: The Instance Life Cycle	154
Recap...	155
Next...	156

Instance Life Cycle	157
Demo: Provision a compute instance with Terraform	158
Compute Deep Dive: Provisioning and Sourcing	159
Instance Lifecycle	160
Approach 1 Our example: Redis	165
Approach 2 Our example: PostgreSQL	166
Approach 3 Our example: Ruby on Rails	167
Approach 1 Our example: Redis	168
Example Workflow 1	169
Example Workflow 2	170
Example Workflow 3	171
Example Workflow 1	172
1 Provisioning	173
2 Source	178
Compute Deep Dive: Bootstrapping with Cloud-init	181
Instance Life Cycle	182
Approach 1 Our example: PostgreSQL123	185
Approach 2 Our example: Redis	186
Approach 3 Our example: Ruby on Rails	187
Example Workflow 1	188
Example Workflow 2	190
Bootstrapping	191
Compute Deep Dive:Fine-tuning with Ansible	193
Instance Life Cycle	194
Approach 1 Our example: PostgreSQL	197
Approach 2 Our example: Redis	198
Approach 3 Our example: Ruby on Rails	199
Example Workflow 2	200
Example Workflow 3	202
Fine-tuning	203
File Storage Deep Dive	208
Object Storage Deep Dive	218

Object Storage Bucket	221
Versioning	225
Lifecycle Management	235
Module 12: Secrets and Encryption	240
OCI Key Management Service (KMS)	241
OCI Encryption Options	242
OCI KMS encryption portfolio	245
Choosing the right OCI KMS offering	246
OCI KMS offers	247
Encryption Basics	248
Encryption at rest and in-transit	250
Symmetric Encryption	251
Asymmetric Encryption	252
Encryption Concepts	253
Hardware Security Module (HSM)	254
Vault Introduction	255
OCI Vault	256
Vaults	257
Keys	258
Master and Data Encryption Keys	259
Master Encryption Keys: Protection Modes	260
Wrapping Keys	261
Rotating Keys	262
Demo: Vault Basics Part 1	263
Demo: Vault Basics Part 2	264
Import and Export Keys	265
Cryptographic and Management Endpoints	266
Cryptographic and Management Endpoints	267
Crypto Operations	268
Importing Keys or Key Versions	269
Exporting Keys or Key Versions	270

OCI Services Integration with Vault	271
Encryption Using Oracle-Managed Keys	273
Encryption Using Customer-Managed Keys	274
OCI Object Storage Integration with Vault	275
Back up and Replicate Vaults and Keys	276
Backing Up Vaults and Keys	277
Restoring Vaults and Keys	279
Cross-Region Replication	280
Demo: OCI services integration with Vault	281
Secrets	282
What's a Secret?	283
Secrets	284
Secrets Rules	286
Demo: Secrets	287
Module 13: Disaster Recovery	288
High Availability	289
High Availability Concepts	290
Availability Domains	291
Fault Domains	292
Avoiding Single Points of Failure	293
Regional and AD-Specific Subnets	294
Load Balancer	295
Virtual IP	296
Compute	297
Compute: Autoscaling	299
Storage: Object Storage	300
Storage: Block Volume	301
Storage: File Storage	302
High Availability for OCI: Connectivity	303
IPSec VPN Redundancy Models (Multiple CPE)	304
Redundant FastConnect	305

Demo: Secrets	306
Demo: High Availability Workshop Part 02	307
Disaster Recovery	308
Disaster Recovery Terminology	309
Disaster Recovery RTO and RPO	310
Disaster Recovery Options	311
Backup and Restore Architecture	312
Standby Architecture	313
Active/Active Architecture	314
Disaster Recovery for OCI	315
Disaster Recovery Using Multiple Regions	316
Disaster Recovery Using Multiple Regions	317
Database Strategies for DR	318
Overview	319
Disaster Recovery Operational Challenges in OCI	320
How a typical DR runbook	321
Full Stack DR orchestrates recovery with a single click	323
Recovery made easy for many business systems	324
Capitalize on your existing effort	325
Flexible, highly scalable, highly extensible and customizable	326
Recovery point and recovery time objectives	327
Core Concepts	328
FSDR components and concepts	333
Sample Scenario	334
DR Protection Group	335
Peer Association	337
Members	338
DR Plans	340
DR Groups	342
DR Plan Groups	344
DR Plans	345

Failover in Action	346
Switchover in Action	347
Start Drill in Action	348
Stop Drill in Action	349
Requirements	350
Movable instance vs Non-movable instance	351
Preparing for Full Stack Disaster Recovery	352
Demo –Setup	359
Preparing MuShopfor Full Stack DR	360
MuShopScenario after deployment	361
Demo –DR plan Pre-Check and execution	362
MuShopScenario after plan setup	363
MuShopScenario after Switchover	364
Module 14: Troubleshooting	365
Troubleshooting	365
Oracle Cloud Infrastructure Troubleshooting	366
Objectives	367
SSH Connection	368
Instance Console Connections	369
Troubleshooting Performance	370
Oracle Cloud Infrastructure Troubleshooting	371
Objectives	372
IPSec connection testing	373
FastConnect Redundant Connections	374
Load Balancer Health Status	375
Health Check	376
Oracle Cloud Infrastructure Troubleshooting	377
Objectives	378
Block Storage Backup Copy – Common Errors	379
Block Storage Recovery steps	380
Block Storage Multi-Attach	381

Block Storage Volume Resize	382
Local NVMe Device Failures	383
Local NVMeDevice	384
RAID with Local NVMeDevice	385
When a Device Fails	386
What if the Availability Domain fails?	387
Backups to Block Storage/File Storage	388
Replicate to another Compute Instance	389
Troubleshoot and Attach Orphaned Mount Targets	390
Mount Target and File Systems	391
Troubleshoot File Systems	393
Module 15: Observability & Management	396
What is Observability	397
Traditional Monitoring	398
Challenges with Traditional Monitoring	399
Definition: Observability	400
Comparing Monitoring and Observability	401
Introducing Observability and Management Services	402
Observability & Management Services	403
Use Case: Observability and Management in DevOps	404
Monitoring Service Overview	405
OCI Monitoring Service: Getting Started	406
Monitoring Capabilities	407
Monitoring Service Workflow	408
Demo: Monitoring Concepts	409
Monitoring Concepts	410
Metrics	411
Intervals and Resolutions	412
Statistics	413
Alarms	414
Metric Query Components	415

Notifications Service	416
Overview	417
Notifications Service:Creating a Topic	418
Demo: Notifications Service	419
Alarms	420
Alarms Workflow	421
Best Practices	422
Demo: Alarms	423
Access and Limits	424
Ways to Access Monitoring	425
IAM Policies for Access	426
IAM Policies with Restricted Access	427
Limits of Monitoring Service	428
Metric Queries	429
Building Metric Queries	430
Sample Queries	431
Nested Queries	432
Demo: Metric Queries	433
Logging Service: Overview	434
OCI Logging Service	435
Types of Logs	436
Service Flow	437
Logging Concepts	438
Log Groups	439
Logging Concepts	440
Service Logs	441
Service Log Format	442
Object Storage Logs	443
Load Balancer Logs	444
VCN Flow Logs	445
Demo: Service Logs	446

Custom Logs	447
Custom Log Ingestion	448
Using Unified Monitoring Agent	449
Agent Communication Workflow	450
Agent Configuration	451
Demo: Custom Logs	452
Access & Explore Logs	453
IAM Policies	454
Searching Logs	455
Viewing Log Events	456
Logging Queries	457
Log Search	458
Logging Query Specification	459
Log Streams	460
Fields	461
Data Types	462
Tabular Operators	463
Scalar Operators	464
Demo: Logging Queries	465
Connector Hub	466
Overview and Key Concepts	467
Connectors Workflow	468
Take Actions for Use Cases	469