

Migrating VMs from VMware vSphere to Oracle Private Cloud Appliance 2.3.1

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Table of Contents

Introduction	2
Environment	3
Install Coriolis VM on Oracle PCA	3
Edit the Network Settings for the VM	3
Connect to Coriolis VM	4
Configuration for VMware vSphere: Enable Changed Block Tracking	5
Oracle Linux Worker VM Template	6
Oracle VM Configuration on Coriolis VM	8
Restart Services	9
Coriolis GUI	10
Create Endpoints for Oracle PCA and vSphere	11
Create cloud endpoint for PCA	11
Create cloud endpoint for VMware vSphere	13
Perform the Replica Creation	14
Migrate the VM from the Replica	20
Conclusion	22

Introduction

Oracle Private Cloud Appliance is a cloud-ready, highly available and scalable compute laaS platform. The integrated converged infrastructure solution is designed for rapid and cost-effective deployment of application and database workloads in a secure multi-tenant private cloud. Whether running any Linux, Oracle Solaris, or Microsoft Windows application, Oracle Private Cloud Appliance supports a large range of OS versions hosted in a converged server, network, and storage environment to enable fast application deployments in minutes rather than days. High performance, low-latency Oracle Fabric Interconnect and Oracle SDN software, allow automated configuration of the server and storage networks. The embedded Oracle Private Cloud Appliance controller software automates the installation, configuration, and management of all the infrastructure components at the push of a button.

Cloudbase is a company committed to cloud computing and interoperability that, in 2016, announced the release of their product Coriolis - Cloud Migration as a Service. Migrating existing Windows and Linux workloads between clouds is a necessity for a large number of use cases, especially while moving from traditional high-costs virtualization technologies like VMware vSphere to new modern virtualization technologies like Oracle VM Server, both on premises and in the cloud. Cloudbase Solutions ensures a seamless and fully automated migration of workloads between VMware and Oracle PCA with Coriolis. The emphasis is also on scalability and fault tolerance thanks to a well thought microservices architecture as shown in Figure 1.



Figure 1. Architecture of Coriolis Cloud Migration Service

Environment

To migrate a running VM from VMware vSphere to Oracle PCA, you need:

- » Source of the VM. VMware vSphere 4+
- » Target host for VM. Oracle Private Cloud Appliance 2.3.1
- » Coriolis cloud migration solution VM. Available from Cloudbase Solutions website

Install Coriolis VM on Oracle PCA

The first step is to set up the Coriolis cloud migration VM obtained as a Virtual Appliance (.ova file) from Cloudbase. To install it on PCA, follow these steps:

- » Login to the OVM manager on PCA and select Repositories tab
- » Select the desired repository and click on Virtual Appliances
- » Click the Import Virtual Appliance button and provide the URL for the location of the Coriolis ova.
- » Check the Create VM box and select the Server Pool location for creation of the VM.

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Figure 2. Creating the VM on PCA from the Coriolis Virtual Appliance

Edit the Network Settings for the VM

After the VM is created from the coriolis_ovm.ova, we need to edit its network settings to assign two network interfaces on the VM – one public and one private as shown in Figure 3.

- » Click the Servers and VMs tab. In the navigation view, select the server pool where the coriolis VM was created.
- » Select the VM and click Edit Virtual Machine. Edit the VM name in Configuration tab.
- » Click **Networks** tab and assign one network interface to a public VLAN with DHCP. Assign the second network interface to a private network within the PCA.
- » Click OK.

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Figure 3. Edit Network Settings for Virtual Machine

Connect to Coriolis VM

Power on the VM and connect to the console using Launch Console button (🕎) in the PCA OVM Manager GUI or

by using ssh from a terminal. The public IP of the VM can be obtained from the OVM Manager GUI by clicking on the Expand button next to the VM name as shown in Figure 4.

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Figure 4. Retrieve public IP for Coriolis VM

Configuration for VMware vSphere: Enable Changed Block Tracking

Coriolis implements replicas to perform incremental copies of the content of the source VM disks on the target environment, which can be performed while the source VM is running. A replicated VM can then be migrated anytime, without any further access to the source infrastructure. In the case of VMware, replicas require that Change Block Tracking (CBT) is enabled on the VM configuration. CBT is used to perform incremental backups on VMware ESXi. CBT identifies and tracks block changes since the last backup and stores these changes in log form, thus reducing the backup times.

- » Select the VM in vSphere host and click on Edit Settings
- » Select 'VM Options' tab and then click on Advanced
- » Click on 'Edit Configuration' button under Configuration parameters

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8	Edit settings - OL7U3_test (ESXi 6.5 vi	rtual machine)	
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_	 General Options 	VM Name: OL7U3_test	
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00 00 00 00 00 00 00 00 00 00 00 00 00		Datastore specified by host Store the swap files in the datastore specified by the host to be used for swap files. If not possible, store the swap files in the same directory as the virtual machine. Using a datastore that is not visible to both hosts during vMotion might affect the vMotion performance for the affected virtual machines.	4
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Figure 5. Edit Configuration for VM on VMware vSphere

- » In an empty key field, type in ctkEnabled and set the value to TRUE
- » In another empty Key field, type scsi0:0.ctkEnabled and set the value to TRUE

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Figure 6. Enable Change Block Tracking on VMware

Oracle Linux Worker VM Template

Coriolis needs a VM template with a vanilla Oracle Linux 7 installation that will be used for instantiating temporary workers involved during the replica and migration steps. The template needs ovmd (Linux) installed in order for Coriolis to retrieve the assigned IP address via API. For the same purpose, a DHCP service is required in order to assign IPs to the temporary VMs, so modify the template settings to have an interface on the public network.

- » Download the Oracle Linux 7 VM Template from https://cloudbase.it/downloads/OL7_template.tgz
- » Click the Repositories tab and then choose the desired repository and select VM Template
- » Click Import VM Template button (🔄) and enter the URL for VM Template location as shown in Figure 7.
- » Click OK

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Figure 7. Import Worker VM Template to PCA

After importing the template to the desired repository, edit it to attach the template to a public network with DHCP access by following these steps:

- » Click the **Repositories tab**. In the navigation tree, select the repository in which the template resides, then **VM Templates**. Select the template in the management pane and click **Edit VM Template**.
- » Click on the **Networks tab** in Edit VM Template dialog box. Select the public VLAN to attach to the template, so that Coriolis is able to reach the temporary worker VMs created by cloning this VM template.
- » Click OK

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Figure 8. Edit Network Settings for Worker VM Template

Oracle VM Configuration on Coriolis VM

A few configuration changes are needed when using Oracle PCA as the target for VM migration with Coriolis.

- » Connect to the Coriolis VM CLI using Console button in PCA OVM Manager console or ssh into the VM using credentials root/Coriolis
- » Use an editor like vi to edit /etc/coriolis/coriolis.conf and replace the settings for oracle_vm_migration_provider section accordingly as shown in Figure 9.

The parameters refer to the VM templates location and login information, along with the network, pool and repository to be used when spawning the temporary VMs from VM template.

Note: The network specified in **migr_network_name** needs to be reachable by Coriolis and the temporary VMs cloned from the templates during a migration need to be able to access Internet resources via HTTP/HTTPS (e.g. yum repositories). You can specify the proxy settings in coriolis.conf file.

E root@coriolis:~	×
<pre>[keystone_authtoken] auth_type = password auth_uri = http://127.0.0.1:5000 auth_uri = http://127.0.0.1:35357 username = coriolis password = xroqD+00SwByyfNSFa2ENrp7 user_domain_id = default project_domain_id = default</pre>	~
<pre>[trustee] auth_type = password auth_url = http://127.0.0.1:35357/v3 username = coriolis password = xroqD+00SwByyfNSFa2ENrp7 user_domain_id = default</pre>	
[keystone] auth_url = http://127.0.0.1:5000	
[worker] export_base_path = /opt/coriolis/export	
[openstack_migration_provider] migr_image_name_map = linux: Ubuntu 15.10, windows: Nano	
migr_flavor_name = coriolis-demo-migr	
<pre>[oracle_vm_migration_provider] migr_template_name_map = linux: OracleLinux7_template, windows: WS2016_template migr_template_password = Passw0rd migr_network_name = vm_public_318 server_pool_name = Rack1_ServerPool repository_name = Rack1_Repository # virtual_disk_clone_type can be: THIN_CLONE, SPARSE_COPY, NON_SPARSE_COPY virtual_disk_clone_type = THIN_CLONE windows_pv_drivers_url = https://cloudbase.it/downloads/ovm_win_pv_drivers_all_323.zip</pre>	
[serialization]	
temp_keypair_password = Z/rhudZU601D6pyUkOCtI6Tn	
<pre>[proxy] url = http://www-proxy.us.oracle.com:80 # Optional proxy credentials # username = # password = # Optional comma separated list of proxy exclusions # no_proxy =</pre>	

Figure 9. Edit /etc/coriolis/coriolis.conf file on the Coriolis VM

Restart Services

For ease of deployment, all Coriolis services are provided as Docker containers. We need to restart the services impacted by above configuration changes. Figure 10 shows the Docker containers that need to be restarted.



Figure 10. Restart Docker Containers affected by OVM configuration changes

Coriolis GUI

To begin working with the Coriolis UI, point a web browser to the IP address of your Coriolis VM. Login using the 'admin' Username with password randomly generated during deployment.

To retrieve the password, SSH into the Coriolis VM (default: root/Coriolis) and run:



Figure 11. Retrieve admin password for Coriolis VM

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Figure 12. Login screen for Coriolis VM GUI

Create Endpoints for Oracle PCA and vSphere

Endpoints contain the cloud connection details (hostname, credentials, etc) that Coriolis stores in order to access the source and target cloud environments. Credentials are encrypted and managed by Barbican for security purposes. For VM migration, we need an endpoint for Oracle PCA and one endpoint for VMware vSphere.

Create cloud endpoint for PCA

- » Click on Cloud Endpoints.
- » Click on New. All the cloud endpoint options currently installed are displayed as shown in Figure 13.
- » Choose Oracle VM Server from the list. Select or enter the following in the Add Cloud Endpoint dialog box shown in Figure 14.
 - » Endpoint name. A name to identify the cloud endpoint
 - » Description. A description for the endpoint
 - » Username: The username for Oracle VM Manager on PCA
 - » Password: The password for logging into the Oracle VM Manager on PCA
 - » Host: The Virtual IP between the two management nodes on PCA
 - » Port: 7002 is the default port for accessing Oracle VM Manager
 - » Allow Untrusted: Yes



Figure 13. Add Cloud Endpoint dialog box

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0	CORIOLIS	Cloud Endpoints	Cloud Endpoints					
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	Projects	VMS	Server	Usage 0 migrations, 0 replicas				
				Usage 1 migrations, 1 replicas				
		PCA	OVM on PCA					
		USERNAME *	PASSWORD*					
and the		admin						
		HOST*	PORT					
		10.147.1.23	7002					
		ALLOW UNTRUSTED						
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		Dist.						
		Back	Save					
-	A CONTRACTOR OF THE OWNER							

Figure 14. Create Oracle VM Server endpoint for PCA

» Click **Save.** This will create the endpoint and trigger an endpoint validation by attempting a connection to the Oracle VM Manager as shown in Figure 15.

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Migrations Cloud Endpoints Projects		Endpoint is valid Dismiss		Usage 1 migrations, 1 replicas Usage 0 migrations, 0 replicas Usage 1 migrations, 1 replicas Usage 0 migrations, 0 replicas	

Figure 15. Validation of the cloud endpoint for PCA

Create cloud endpoint for VMware vSphere

Repeat the above procedure, this time choosing **VMware** from the Add Cloud Endpoint list. Then provide the required information in the Add Cloud Endpoint dialog box as shown in Figure 16. Click **Save** to create the endpoint and trigger the connection validation.

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Figure 16. Add cloud endpoint for VMware vSphere

Perform the Replica Creation

A Coriolis replica is obtained by incrementally copying the VM data from source to the target without affecting any running workloads. A replica can then be migrated to the target cloud. To create a replica, follow these steps:

- » Click on the Replicas tab and select New.
- » Choose Coriolis Replica under Migration Options and click Next.

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	A Concils® Migration is a full instance migration between two cloud endpoints.		The Coriolis Replica is obtained by copying (replicating) incrementally the virtual machines data from the source environment to the target, without interfering with any running workload. A migration replica can then be finalized by automatically applying the required changes to adapt it to the target environment (migration phase).	
	Back		Next	
	Migration Type > Source Cloud > Target Cloud > Mig	rate instances > Op	tions > Network Mapping > Schedule > Summary	
Figure 17. Creating a Replica				

» In Select your source cloud screen, choose your vSphere cloud endpoint from the VMware drop down list as shown in Figure 18. Click Next.

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Figure 18. Select the source cloud as VMware

» In Select Your Target Cloud, choose the PCA endpoint from Oracle VM Server drop down list as shown in Figure 19. Click Next

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Figure 19. Select the endpoint for PCA as the target cloud

» All the VMs present at the source cloud (VMware) are displayed. Select the VM(s) that you want to migrate to Oracle PCA and click **Next**.

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	Back VMWare - 😓 > ORACLE M	Next	
Figure 20. Select the VMs to b	e migrated from VMware to PCA	ur wabbing > ocuramia > orquigitA	

» Select the PCA specific options starting with the **Server Pool** where the selected VM(s) are to be migrated. Click **Next**.

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Server Pool Name * Rackt_ServerPool Show Advanced Options	
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Migration Type > Source Cloud > Target Cloud > Migrate instances > Options > Network Mapping > Schedule > Summary	
igure 21. Select the Server Pool on PCA for migrating the VM	

In the Network Mapping, for each network used by the VM(s) on VMware, you need to select a matching network on the PCA target. This is where the VMs will be connected after being migrated. Click Next.

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• 🗄 VM Network	14	Select 1911,197000,176,300 1911,1970,395 1911,1970,395 1911,1970,595 1911,1970,595 1911,1970,595 1911,1970,595 1911,1970,595 1911,1970,595	3 / 1	

Figure 22. Select networks on PCA corresponding to each network used by the VM on VMware

» Select Execute Now and Click Next.

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	Schedule	
	Execute Now v 09/12/2017 12 v 00 v EET v	
	Migration Type > Source Cloud > Target Cloud > Migrate instances > Options > Network Mapping > Schedule > Summary	
Figure 23. Schedule the Replica	a creation process	

» Review the Summary and Click Finish to start Replica creation process.

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			• @
	Summ	nary	
Overvi	ew	Instances	i i
Source:	VSphere VHNARE	OL7U3_test 1vCPU 2048 MB RAM	
Target:	PCA ORACLE_VM		
		Networks	
Option	S	VM Network	
Type	🛱 Coriolis Replica		
Server Poo Name	Rack1_ServerPool		
Sched	ule		
Execute N	W		
_	iack Vmware – 🤤		•
Migration	Type > Source Cloud > Target Cloud > Migrate instan	ces > Options > Network Mapping > Schedule > Summary	у
Figure 24. View summary of all settin	gs for Replica creation		



Coriolis begins executing the replica as shown in Figure 25.

Figure 25. Executing the Replica

To view the progress of replica creation process, click on the **Replica name** and select **Executions** as shown in Figure 26.

← → C A Not secure bttp5://10.147.27.173/replica/execution	ons/a6065ac2-afe9-4c03-9cac-923012	d6f18b/			\$ ®
					e 🔮 🕐
< 😂	OL7U3_test	2		Execute Now	1
Replica	s	13 Se	p 2017		
Schedule	Execution #1 Sep 12	2th 2017 17:41		Cancel execution	
	Task	Instance	Latest Message	Timestamp	
	🥥 Get instance info	0L7U3_test	Retrieving virtual	2017-09-12 17:41:27	
	O Deploy replica disks	OL7U3_test	Creating virtual disk	2017-09-12 17:41:27	
	S Deploy replica	OL7U3_test		2017-09-12 17:41:27	
	Oeploy replica target	0L7U3_test	Retrieving the worker	2017-09-12 17:41:27	
	O Replicate disks	0L7U3_test	Disk [datastore1]	2017-09-12 17:41:27	^
	STATUS	ю c73e5df0-9b75-4fab	-800a-c2314b61dc1a		
	EXCEPTION DETAILS N/A	DEPENDS ON d6f82036-5603-4c7	8-882b-#98e6e75bec		
	PROORESS UPDATES 2017-09-12 17:43:05	Disk [datastore1] OL7	U3_test/0L7U3_test_0.vmdk replic	a progress: 3%	
	2017-09-12 17:42:39	Performing full CBT n OL7U3_test/OL7U3_ size: 1.653.604.352	eplica for disk: [datastore1] test_0.vmdk. Disk size: 17.179.869.18	4. Written blocks	
	2017-09-12 17:42:37	Creating snapshot			
	O Delete replica source	0L7U3_test		2017-09-12 17:41:27	
	O Delete replica target	0L7U3_test	-	2017-09-12 17:41:27	

Figure 26. Executions tab shows the progress of Replica creation process

C A Not secure bttps://10.14	7.27.173/	replica/executions/a	a6065ac2-afe9-4c03-9cac-923012	16f18b/			\$ 0
							• @
	<		OL7U3_test			Execute Now	1
		Replica			0 13 Sep 2017		
		Schedule	Execution #1 Sep 12	th 2017 17:41	ETED	Delete	
			Task	instance	Latest Message	Timestamp	
			🥝 Get instance info	0L7U3_test	Retrieving virtual	2017-09-12 17:41:27	
			Oeploy replica disks	0L7U3_test	Creating virtual disk	2017-09-12 17:41:27	
			Deploy replica	OL7U3_test		2017-09-12 17:41:27	
			Oeploy replica target	OL7U3_test	Retrieving the worker	2017-09-12 17:41:27	
			Replicate disks	OL7U3_test	Removing snapshot	2017-09-12 17:41:27	
			📀 Delete replica source	OL7U3_test		2017-09-12 17:41:27	
			📀 Delete replica target	OL7U3_test	Removing worker instance	2017-09-12 17:41:27	

Figure 27. Replica creation complete

Note: Once completed, the replica can be executed incrementally multiple times to update the replicated content.

Migrate the VM from the Replica

» Once the replica creation is complete, click on Migrate Replica in Replica details tab to begin the migration process to PCA, as shown in Fig 28.

1457141107	replication on and an	63-4C02-3C8C-3X201X00110				¥ 0
						P @
<	Ø		St		Execute Now	
	Replica Executions	SOURCE VSphere		TARDET PCA		
	Schedule	vm wa	re° $ ightarrow$	ORACLE VM Server		
		TYPE Coriolis Migration		CREATED 09/12/2017 17:41		
		NOTES		1d a6065ac2-afe9-4c03-9cac-9230	112d6f18b	
		Source Network	Connected VMs	Destination Network	Destination Type	
		VM Network	OL7U3_test	vm_private_78_SC	Existing network	
		Migrate Replica			Delete	

Figure 28. Start the migration process by clicking Migrate Replica button

» Click on View Migration Status button in the popup on the right. Click Tasks to view the progress of migration process to PCA as shown in Figure 29.

← → C ▲ Not secure bttps://10	147.27.173/migration/tasks/080ed612-65d5-43df	-a095-82982cdd2df	1/		☆ 🗉
					? ()
< 😂	OL7U3_test			Cancel	
Migration	Task	Instance	Latest Message	Timestamp	
Tasks	📀 Create replica disk snapshots	0L7U3_test	Cloning replica virtual disks	2017-09-13 11:45:58	
	Deploy replica instance	0L7U3_test	-	2017-09-13 11:45:58	
	Deploy os morphing resources	0L7U3_test	Retrieving the worker instance IP addr	2017-09-13 11:45:58	
	 Os morphing 	0L7U3_test	OS being migrated: ('Oracle Linux	2017-09-13 11:45:58	^
	STATUS RUNNING EXCEPTION DETAILS N/A	ID 4a59f26e-97f6-4 DEPENDS ON 1018df9b-a6f9-4	77c-b3e6-7faf7145264f 5cc-8129-27e6f49bed66		
	PROORESS UPDATES 2017-09-13 11:49:17 2017-09-13 11:49:17 2017-09-13 11:46:59 2017-09-13 11:46:55 2017-09-13 11:46:54 2017-09-13 11:46:54	OS being migrate Removing packag Discovering and r Connecting to SS Connecting to SS Preparing instand	d: ('Oracle Linux Server, '7.3') Jes: ['open-vm-tools'] nounting 05 partitions H host: 10.147.271.22 H host: 10.147.271.22 e for target platform		
	O Delete os morphing resources	0L7U3_test	-	2017-09-13 11:45:58	
	Sinalize replica instance deploy	0L7U3_test	-	2017-09-13 11:45:58	
	O Delete replica disk snapshots	0L7U3_test	-	2017-09-13 11:45:58	

Figure 29. View progress of Migration process in the Tasks tab



Figure 30. VM Migration complete

Upon completion of the migration process, we can see that the migrated VM 'OL7U3_test' is running in the desired tenant group on Oracle PCA as shown in Figure 31.

Medit Servers and VMs Repositories Networkling Storage Reports and Resources Jobs Image: Ima	ogged in as: adm	imin <u>Logout</u> Sett <u>i</u>	ngs + <u>H</u> elp +
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reate virtual NIC on VM: OL/O3_test Success Sep 13, 2017 6/57/13 pm	n 97ms	Abort	Details

Figure 31. OVM Manager on PCA shows the new VM 'OL7U3_test' running on PCA

Conclusion

Private Cloud Appliance is an Oracle Engineered System designed to provide a private cloud infrastructure for Oracle and non-Oracle workloads. The Oracle private cloud model is simple: it's the exact same technology on-premises and in the public cloud, providing you with choice and flexibility.

Cloudbase Coriolis provides a scalable and fault tolerant cloud migration solution based on a microservices architecture. Migrating hundreds of VMs with multiple tenants in parallel is no problem. This solution reliably solves the use case of moving from traditional high-costs virtualization technologies like VMware vSphere to new modern virtualization technologies like Oracle VM Server.

More Information

Find out more about Cloudbase Coriolis here.



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Integrated Cloud Applications & Platform Services

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