



# Lenovo ThinkAgile CP Administrator's Guide



**Models:** CP 4000, CP 6000

**Note**

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at the following address:

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# Contents

<b>Contents</b> . . . . .	<b>i</b>
---------------------------	----------

<b>Figures</b> . . . . .	<b>.iii</b>
--------------------------	-------------

## **Chapter 1. ThinkAgile CP Overview . . . . . 1**

ThinkAgile CP4000 series overview . . . . .	3
ThinkAgile CP6000 series overview . . . . .	6

## **Chapter 2. Administration . . . . . 9**

Log in to the ThinkAgile CP Cloud Controller . . . . .	9
Manage resources . . . . .	12
Monitor resources in the Dashboard . . . . .	12
View hardware . . . . .	14
Register hardware . . . . .	19
View hardware and software version numbers . . . . .	22
Manage a stack . . . . .	26
Working with application instances . . . . .	28
Create and deploy applications . . . . .	28
Manage application instances . . . . .	42
Manage instance modes and guest agents . . . . .	67
Clone and attach a vDisk . . . . .	70
View instances . . . . .	75
Manage application domains . . . . .	88
Application templates . . . . .	95
Use the Lenovo Cloud Marketplace . . . . .	110
Networking . . . . .	112
Add a VLAN . . . . .	114
VNET Overview . . . . .	115
View Networks . . . . .	127
Manage networks . . . . .	133
Manage firewall profiles . . . . .	156
Manage interconnect switches . . . . .	164
Storage blocks and storage pools . . . . .	167
View storage pools . . . . .	168
Manage storage . . . . .	183
Compute nodes . . . . .	188
View compute nodes . . . . .	188
Manage compute nodes . . . . .	192
Migration zones . . . . .	196
Working with virtual datacenters . . . . .	204
Creating Virtual Datacenters . . . . .	204
Viewing virtual datacenter information . . . . .	209
Viewing virtual datacenter instances . . . . .	213
Viewing virtual datacenter templates . . . . .	218
Creating a firewall override . . . . .	218
Registering an external backup repository . . . . .	220

Viewing virtual datacenter users . . . . .	223
Managing virtual datacenters . . . . .	225
Managing application groups . . . . .	232
Manage your infrastructure . . . . .	242
View events . . . . .	242
Manage notifications . . . . .	242
Manage categories and tags . . . . .	243
Manage self-service . . . . .	248
Manage developer options . . . . .	254
Manage organizations . . . . .	258
Manage your ThinkAgile CP account . . . . .	261
System reporting . . . . .	265
Backups and disaster recovery . . . . .	267
Application-consistent backups . . . . .	268
Manage local backups for an application instance . . . . .	269
Manage quick DR backups . . . . .	288
Manage external backups . . . . .	305
Third-party backup . . . . .	319
Manage Encryption . . . . .	341
Understanding Encryption . . . . .	341
Understanding KMIP Compatibility . . . . .	342
Configure KMIP . . . . .	342
Configure Vormetric DSM . . . . .	343
Configure SafeNet KeySecure . . . . .	344
Configure the KMIP client . . . . .	346

## **Chapter 3. Troubleshooting . . . . . 349**

Application instances . . . . .	349
Multiple Windows disks offline . . . . .	349
Windows Disks Offline after Adding vNIC . . . . .	349
Issues with bringing a cloned disk online . . . . .	350
Cannot update Windows Guest Agent . . . . .	351
Cannot boot in Compatibility Mode for Windows . . . . .	352
Spectre and Meltdown fixes . . . . .	352
Restart Guest Agent . . . . .	353
Cannot shut down or restart Linux instances . . . . .	353
Hot-Plug CPU and Memory – Linux . . . . .	354
Hot-Plug CPU and RAM failure – Windows 2008 . . . . .	354
Hot-Plug CPU and RAM Windows 2016 server issues . . . . .	354
Hot-Plug memory failure on CentOS 7 . . . . .	355
CentOS 7 - Hot-Adding CPU Might Cause Intermittent Reboot . . . . .	355

CentOS 7 instance incorrect time . . . . .	356	Troubleshooting the ThinkAgile CP interconnect switch . . . . .	371
Actions unavailable - Windows setup . . . . .	356	Networking . . . . .	371
Disks missing in Windows installer. . . . .	356	Cannot SSH to an NFV internal IP Address . . . . .	371
Windows 10 VNC performance . . . . .	356	IPv6 network protocol compatibility . . . . .	372
Ubuntu server 16.04 boot issue . . . . .	357	Windows instance gets a private IP address . . . . .	372
Disks reordered . . . . .	357	Application instance does not get an IP address . . . . .	372
Cannot enable nested virtualization . . . . .	357	Interconnect switch does not boot - out of disk space . . . . .	372
ESXi install - no disks found . . . . .	358	Connecting to the console port of an interconnect switch . . . . .	373
Migrated VM with firewall profile disconnects . . . . .	358	System hardware and software. . . . .	374
Instance NIC speed . . . . .	358	Pulling a drive to test RAID. . . . .	374
Enable or disable memory oversubscription. . . . .	359	New compute controller does not receive an IP address . . . . .	375
Windows VMs Will Not Shut Down. . . . .	364	Compute or storage controllers do not receive IP when v2 switch reboots. . . . .	376
Issues when migrating Windows VMs . . . . .	365	Configure 1 Gbps Link Speed in the ThinkAgile CP Cloud Controller . . . . .	376
Networking is not enabled for Red Hat, version 8. . . . .	367	Power down hardware . . . . .	377
Application templates . . . . .	368	Forward logs to a remote server . . . . .	378
Cannot create a FreeNAS or Netscaler template. . . . .	368	L1TF mitigation in ThinkAgile CP . . . . .	379
Windows 10 sysprep template creation. . . . .	368	Browsers . . . . .	381
Cannot mount CIFS shares . . . . .	368	Blank web page - Firefox 38 . . . . .	381
Cannot create a template with Full SysPrep from a Windows ISO image . . . . .	369	Instance console does not open in Firefox. . . . .	381
Backup and disaster recovery . . . . .	370		
Unable to take a Windows VM backup . . . . .	370		
Backups of ZFS (FreeNAS). . . . .	370		

# Figures

1. Storage block . . . . .	2	46. New vDisk option . . . . .	49
2. Compute block . . . . .	2	47. Add vDisk dialog box . . . . .	50
3. CP Interconnect . . . . .	3	48. New vDisk added to application instance . . . . .	50
4. Management switch . . . . .	3	49. VDC instances page . . . . .	51
5. Log in to the ThinkAgile CP Cloud Controller . . . . .	10	50. Profile tab . . . . .	52
6. Two-factor authentication – send code . . . . .	10	51. Add vDisk clone option. . . . .	52
7. Dashboard - infrastructure admin and infrastructure viewer users . . . . .	11	52. Add vDisk Clone dialog . . . . .	53
8. Dashboard - VDC manager and VDC viewer users. . . . .	11	53. Select a vDisk . . . . .	53
9. Choosing a time frame for which to view resources . . . . .	12	54. Select a vDisk . . . . .	54
10. Hardware resources - Properties . . . . .	13	55. Adding a vDisk . . . . .	54
11. Virtual Resources . . . . .	13	56. Select a vDisk . . . . .	55
12. View the Hardware Stack page . . . . .	14	57. VDC instances page . . . . .	55
13. Interconnect switches section . . . . .	15	58. Profile tab . . . . .	56
14. Expanded network settings example . . . . .	16	59. Actions menu . . . . .	56
15. Compute block section . . . . .	17	60. VDC instances page . . . . .	59
16. Storage block . . . . .	18	61. Profile tab . . . . .	59
17. View the Hardware Stack page . . . . .	20	62. Actions menu . . . . .	60
18. View the Hardware Stack page . . . . .	21	63. Edit IOPS Limit dialog box . . . . .	60
19. View the Hardware Stack page . . . . .	23	64. Edit Bandwidth Limit dialog box . . . . .	60
20. Interconnect switch version number . . . . .	23	65. VDC instances page . . . . .	61
21. The Nodes page . . . . .	24	66. Add instance to an application group . . . . .	61
22. Compute node version number . . . . .	24	67. Application group page . . . . .	62
23. View the Hardware Stack page . . . . .	25	68. VDC Instances page . . . . .	63
24. Storage controller version number . . . . .	25	69. Shutting down an instance . . . . .	63
25. View the Hardware Stack page . . . . .	26	70. Add vNIC option . . . . .	64
26. Stack Actions menu . . . . .	26	71. Newly added vNIC . . . . .	64
27. Reset Hardware Management Password dialog . . . . .	27	72. Updated ifcfg-eth0 file . . . . .	65
28. New instance from Template dialog. . . . .	30	73. Updated ifcfg-eth1 file . . . . .	66
29. New Instance from Template - instance settings. . . . .	31	74. Insert guest tools option . . . . .	68
30. VDC instances page . . . . .	32	75. CDRom folder displayed in a Windows instance . . . . .	69
31. VDC instances page . . . . .	33	76. Eject guest tools option . . . . .	70
32. Import VM page . . . . .	35	77. View vDisks option from backup Actions menu. . . . .	71
33. Select Virtual Disk Files page . . . . .	36	78. Clone and attach to this instance option . . . . .	71
34. New instance from installer dialog - Properties, Virtual Datacenter settings, Resource settings. . . . .	38	79. Clone and Attach to this Instance confirmation dialog . . . . .	72
35. Edit vDisk . . . . .	39	80. Select a vDisk . . . . .	72
36. New Instance from Installer page - Installer settings. . . . .	40	81. View vDisks option from backup Actions menu. . . . .	73
37. Select Installer dialog box . . . . .	40	82. Clone and attach to option . . . . .	73
38. New instance from installer page - Instance settings. . . . .	41	83. Select Application Instance dialog . . . . .	73
39. Application instance Actions menu . . . . .	43	84. vDisk clone from one instance added to another instance . . . . .	74
40. Resources section of the Backups page . . . . .	47	85. Delete vDisk option from vDisk Actions menu. . . . .	74
41. Delete application instance dialog . . . . .	47	86. Delete vDisk confirmation dialog . . . . .	75
42. Deleted application instance details. . . . .	47	87. List of vDisks after deleting vDisk clone . . . . .	75
43. Deleted application instance details. . . . .	47	88. Application Instances page in ThinkAgile CP Cloud Controller . . . . .	76
44. VDC instances page. . . . .	48	89. Application instance details . . . . .	81
45. Profile tab . . . . .	49	90. Application instance CPU, memory and storage charts . . . . .	82
		91. Application instance activity charts on an application instance page . . . . .	83



174.	Storage pool properties on Dashboard	172
175.	Select storage pool from navigation menu.	172
176.	Activity section of the storage pool details page	173
177.	Example of running rw_test.fio	176
178.	Storage pool properties on Dashboard	177
179.	Select storage pool from navigation menu.	177
180.	Storage pool Allocations tab	

193.	Select storage pool from navigation menu.	188
194.	Compute nodes within a compute block.	188
195.	Compute node properties on the Hardware Stack page	189
196.	Information tab on compute node details page	190
197.	Compute node properties on the Hardware Stack page	191
198.	Activity tab on compute node details page	191
199.	Compute node metrics timeframes	192
200.	Compute node Actions menu on Hardware page	193
201.	Migration zone details page	197
202.	Allocation tab on migration zone details page	198
203.	Resources & Connectivity tab on migration zone details page	198
204.	Migration zone details page	199
205.	Activity tab on migration zone details page	199
206.	Compute node metrics timeframes	200
207.	Migration zone details page	200
208.	Compute node Actions menu on Hardware page	201
209.	Infrastructure mappings page	202
210.	Connect to migration zone option	202
211.	Storage pool connected to the migration zone	202
212.	Migration zone details page	203
213.	Resources & Connectivity tab on migration zone details page	203
214.	Disconnect from storage pool dialog	204
215.	Create new virtual datacenter option	205
216.	New Virtual Datacenter button	205
217.	New Virtual Datacenter Name	205
218.	Resources Summary	206
219.	CPU cores and memory allocation	206
220.	Storage allocation.	206
221.	Enable Chat Support widget	207
222.	New VDC resources page	207
223.	Assign virtual datacenters option on Networks page	208
224.	VDC Network Resources	209
225.	The VDC Overview page	209
226.	VDC resource utilization	210
227.	VDC application instances	210
228.	VDC activity details	211
229.	Example of Resource Summary section	212
230.	Example Virtual Datacenter Allocations	212
231.	Resources page for a VDC	213
232.	The VDC Overview page	214
233.	VDC Templates store	218
234.	Firewall Overrides page	219
235.	New Firewall Overrides dialog	219
236.	Firewall override added	220
237.	Firewall override Actions menu	220
238.	VDC Backups page	221

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**Storage Overview**

**Physical Storage**

Total Physical Capacity	4.34 TiB
Metadata Overhead	90.9 GiB
Physical Used*	123.4 GiB
Available Capacity	4.22 TiB

**Virtual Storage**

Current Projected Capacity	43.37 TiB
Allocated to VDCs	24 TiB
Allocated %	55%
Used	288 GiB

Application Instances: 5 Running, 0 Paused, 0 Shut Down, 0 Unresponsive, 0 Unreachable

Activity: **Allocations**, DR Backups, Resources & Connectivity

**Allocations to Virtual Datacenters**

Name	Storage		STBW (MB/s)	IOPS
	Allocated	Usage*		
5.1.6 Test VDC	5 TiB	1.7 GiB	0	0
149.1 VDC	4 TiB	13.1 GiB	0	0
AP Test VDC	5 TiB	12.5 GiB	0	0
MyVDC	10 TiB	3.6 GiB	0	0

181.	Storage pool properties on Dashboard	179
182.	Select storage pool from navigation menu.	179
183.	DR Backups tab	180
184.	Storage pool properties on Dashboard	181
185.	Select storage pool from navigation menu.	181
186.	Resources and Connectivity tab	182
187.	IOPS and bandwidth limits on the New Instance from Installer page	183
188.	Storage node Actions menu on Hardware page	184
189.	Storage node Actions button on compute node profile page	184
190.	Storage block Actions menu on Hardware page	185
191.	Storage pool properties on the Dashboard	187
192.	Select storage pool from navigation menu.	187

239.	VDC Backups page . . . . .	222	291.	Edit Access Level dialog box . . . . .	253
240.	Backup repositories listing . . . . .	223	292.	Select Remove from Organization on the Action menu . . . . .	254
241.	VDC user access – VDC manager or VDC viewer user . . . . .	224	293.	Example Developer Options page . . . . .	255
242.	VDC user access – infrastructure viewer user . . . . .	224	294.	Issue API Token . . . . .	256
243.	VDC user access – infrastructure admin user . . . . .	225	295.	Save Token dialog . . . . .	256
244.	VDC Overview page . . . . .	226	296.	Copy API Token . . . . .	257
245.	Rename VDC option. . . . .	226	297.	Edit API Token . . . . .	257
246.	Rename Virtual Datacenter dialog . . . . .	226	298.	Enter a new API Token description . . . . .	258
247.	Renamed Virtual Datacenter. . . . .	227	299.	Delete API Token . . . . .	258
248.	VDC Overview page . . . . .	228	300.	Organization Settings . . . . .	259
249.	Edit VDC allocations option . . . . .	228	301.	Select Manage Organizations . . . . .	260
250.	CPU cores and memory allocation . . . . .	229	302.	Manage Organizations . . . . .	260
251.	Storage allocation. . . . .	229	303.	Select Manage Organizations . . . . .	260
252.	VDC Overview page . . . . .	230	304.	Select Create Organization . . . . .	261
253.	Delete VDC option . . . . .	230	305.	Create New Organization . . . . .	261
254.	Delete VDC confirmation dialog . . . . .	231	306.	Select User Account. . . . .	262
255.	Enabling chat support for an existing datacenter . . . . .	231	307.	User Account page . . . . .	262
256.	Enabling chat support when creating a new virtual datacenter . . . . .	232	308.	Select User Account. . . . .	264
257.	VDC Overview page . . . . .	233	309.	Delete User Account. . . . .	264
258.	New application group option . . . . .	233	310.	Select User Account. . . . .	264
259.	New Application Group dialog box . . . . .	234	311.	Active Sessions . . . . .	265
260.	New application group . . . . .	234	312.	Options for VM instance backups . . . . .	267
261.	Application group page . . . . .	235	313.	Set up backups button. . . . .	270
262.	Rename Application Group action . . . . .	235	314.	Backup Setting Overview . . . . .	271
263.	Rename Application Group dialog box. . . . .	236	315.	Local Backups . . . . .	272
264.	Renamed application group . . . . .	236	316.	Local Backups configuration completed . . . . .	273
265.	Application group in the left menu . . . . .	237	317.	Back Up Now button . . . . .	274
266.	Delete Application Group action . . . . .	237	318.	Backing Up dialog . . . . .	274
267.	Remove Application Group dialog box. . . . .	237	319.	Backups list with manual backup added . . . . .	275
268.	Deleted application group . . . . .	238	320.	Restore option on the backup Actions menu. . . . .	276
269.	VDC Instances page. . . . .	238	321.	Restore backup instance dialog . . . . .	276
270.	Selecting an application instance. . . . .	239	322.	Backup created before restore begins. . . . .	276
271.	Choosing an application group . . . . .	239	323.	Restore backup instance dialog . . . . .	277
272.	Application added to application group . . . . .	240	324.	Return to Latest Backup dialog . . . . .	277
273.	Application group page . . . . .	240	325.	Restore Backup Instance dialog . . . . .	278
274.	Selecting an application instance to remove . . . . .	241	326.	New application instance option on the backup Actions menu . . . . .	278
275.	Remove from application group option . . . . .	241	327.	New Instance from Local Backup dialog . . . . .	279
276.	Application group page with group removed . . . . .	241	328.	New instance from local backup - Virtual Datacenter . . . . .	279
277.	View Infrastructure Events . . . . .	242	329.	New instance from local backup - Resources . . . . .	280
278.	Select Notification Category. . . . .	243	330.	New instance from local backup - Instance Settings . . . . .	281
279.	Add a Compute Category. . . . .	244	331.	VDC Instances page. . . . .	282
280.	Select Rename . . . . .	245	332.	Copy backup to external repository option on the backup Actions menu. . . . .	282
281.	Rename Compute Category. . . . .	245	333.	Copy backup to external repository dialog . . . . .	283
282.	Select Delete . . . . .	246	334.	Results of a manual copy to an external repository . . . . .	283
283.	Add a Compute Tag . . . . .	247	335.	Properties option on the backup Actions menu. . . . .	284
284.	Select Rename . . . . .	247	336.	Backup properties dialog . . . . .	284
285.	Rename Compute Tag . . . . .	248	337.	View vDisks option on the backup Actions menu. . . . .	285
286.	Select Delete . . . . .	248	338.	Backups vDisks dialog . . . . .	285
287.	Invite User. . . . .	249			
288.	Invite User. . . . .	250			
289.	User Management Page . . . . .	251			
290.	Select Edit Access Level from the Action menu. . . . .	252			



339. Delete a local backup . . . . .	286	365. Set up backups . . . . .	306
340. Backup delete options . . . . .	286	366. Backup Setting Overview . . . . .	307
341. Backups table with local backup icon removed . . . . .	287	367. External Backups page . . . . .	308
342. Delete all local backups option from the Backups Actions menu. . . . .	287	368. External Backups page . . . . .	309
343. Backups table with local backup icons removed. . . . .	288	369. Set up backups . . . . .	311
344. Resources page, Storage Usage section . . . . .	289	370. Backup Setting Overview . . . . .	312
345. Edit allocations . . . . .	290	371. Backups action menu - new application instance option. . . . .	313
346. Edit Storage Allocation. . . . .	290	372. Create application instance from backup dialog . . . . .	314
347. Saving changes to the Allocations page . . . . .	291	373. New Instance from External Backup dialog - Properties section . . . . .	314
348. Set up backups . . . . .	292	374. New Instance from External Backup dialog - Virtual Datacenter section . . . . .	314
349. Backup Setting Overview . . . . .	293	375. New Instance from External Backup dialog - Resources section . . . . .	315
350. Quick DR Backups page . . . . .	294	376. New Instance from External Backup dialog - Instance Settings section . . . . .	316
351. Set up backups . . . . .	296	377. VDC Instances page displaying new instance . . . . .	317
352. Backup Setting Overview . . . . .	297	378. Backup actions menu - Delete external backup option . . . . .	317
353. Quick DR Backups page . . . . .	297	379. External backup deletion in progress. . . . .	318
354. Backups action menu - new application instance option. . . . .	299	380. Backups actions menu - Delete all external backups option. . . . .	318
355. Create application instance from backup dialog . . . . .	299	381. Backups page with all external backup icons removed. . . . .	319
356. New Instance from DR Backup dialog - Properties section . . . . .	300	382. Disk Management. . . . .	351
357. New Instance from DR Backup dialog - Virtual Datacenter section . . . . .	300	383. Verifying the memory oversubscription service is running . . . . .	359
358. New Instance from DR Backup dialog - Resources section . . . . .	301	384. Verifying the memory oversubscription service is not running . . . . .	360
359. New Instance from DR Backup dialog - Instance Settings section . . . . .	302	385. Windows Run window . . . . .	370
360. VDC Instances page displaying new instance . . . . .	303	386. IOIOI console port location on the ThinkAgile CP Interconnect . . . . .	373
361. Backup actions menu - Delete Quick DR Backups option . . . . .	303	387. Power off a compute node . . . . .	377
362. Backups table with quick DR backup icon removed. . . . .	304	388. Power off a storage block. . . . .	377
363. Backups actions menu - Delete all quick DR backups option. . . . .	304	389. Restart the interconnect switch . . . . .	378
364. Backups page with all quick DR backup icons removed.. . . . .	305	390. L1TF Mitigation Status for a Node . . . . .	381



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## Chapter 1. ThinkAgile CP Overview

This product overview provides technical information on the Lenovo ThinkAgile CP Series cloud platform, its key features and specifications, components and options, and configuration guidelines.

Lenovo ThinkAgile CP Series is an all-in-one, composable cloud with an integrated application marketplace (Lenovo Cloud Marketplace) and end-to-end automation, delivering a turn-key cloud experience in your own data center. The ThinkAgile CP Series uses modular compute, storage, and networking components paired with the cloud virtualization software to create pools of IT resources, independently scaling and allocating capacity, and automatically configuring resources to fulfill application requirements.

Due to its software-defined modular architecture, the ThinkAgile CP Series platform can be scaled easily by adding more compute and storage resources independently of each other as your needs grow. Suggested workloads for the ThinkAgile CP Series include web services, virtual desktop infrastructure (VDI), enterprise applications, OLTP and OLAP databases, data analytics, application development, cost-optimized virtualization, containers, and other back-office applications.

### Key Features

Lenovo ThinkAgile CP Series offers the following key features:

- Modular and scalable ThinkAgile CP Series configurations of an on-premises cloud platform featuring the second generation of the Intel Xeon Processor Scalable Family that are designed to optimize your workload's performance and provide the IT agility for your business demands.
- Factory-preloaded ready-to-go cloud platform that is delivered with all the infrastructure you need for your workloads: Modular and scalable physical and virtual compute, network, and storage resources, and the cloud software.
- Lenovo deployment services that are included with the platform help get customers up and running quickly.
- The cloud software provides a scalable software-defined infrastructure (SDI) that simplifies cloud deployments with integrated compute, storage, networking, security, and management services that manage application infrastructure and automate and orchestrate workload provisioning.
- Extensive security features, such as data at rest encryption, virtualized network and VM-level firewalls, and two-factor authentication help customers meet the most stringent security requirements.
- Centralized cloud-based management automates discovery, deployment, and configuration of cloud resources, and provides automated, non-disruptive software updates.
- Lenovo ThinkAgile Advantage provides a single point of contact for all support issues and integrates support chat and virtual technical assistance into your management interface.

## Components

The ThinkAgile CP Series consists of the following components:

- **Storage Blocks**

A Storage Block is a 2U storage enclosure with up to 24 PCIe NVMe SSDs and two controllers for high availability and redundancy. A storage block runs the cloud software that delivers data storage layer to the cloud. It simplifies storage management, provides enterprise-class storage functionality, and enables linear performance and capacity scaling.



Figure 1. Storage block

- **Compute Blocks**

A Compute Block is a modular 2U enclosure that contains up to four nodes, and it delivers processor and memory resources to the cloud. The compute nodes run the cloud hypervisor that combines open KVM-based virtualization software, hardware integration, and automation to orchestrate and deliver an end-to-end compute platform.

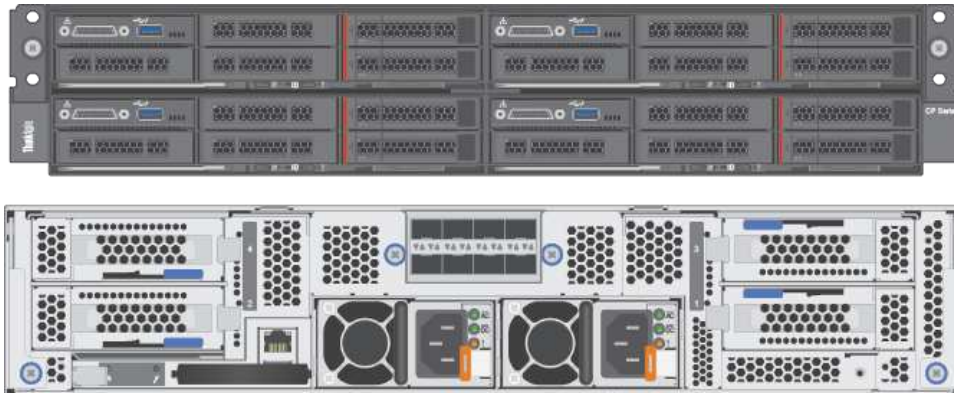


Figure 2. Compute block

- **CP Interconnect**

The Interconnect centralizes connectivity of your on-premises infrastructure to the Cloud Controller and acts as the entry point into your existing network, which connects the Cloud Controller to your environment. The CP Interconnect consists of one or two high-density, ultra-low-latency 10/40 GbE network devices and use specialized cloud software which provides the fabric for your composable environment, automating discovery, onboarding, and device management. Integrated network virtualization secures virtual data center and applications.

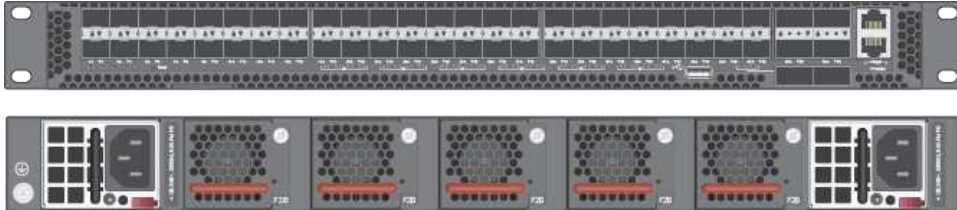


Figure 3. CP Interconnect

- **Management Switch**

The 1 GbE management switch is required to provide out-of-band (OOB) management for the Interconnect, Compute Blocks, and Storage Blocks. The switch can be supplied by Lenovo (ThinkSystem NE0152T RackSwitch), or customers may provide their own switch.



Figure 4. Management switch

- **Cloud Controller**

Cloud Controller orchestrates and manages the on-premises infrastructure and workloads; however, it resides in the cloud. It automates and orchestrates infrastructure provisioning in real time to achieve complete and secure vertical hardware, software and workload integration. It federates and abstracts all physical hardware into a private cloud service.

Cloud Controller provides a single point of management across an unlimited number of ThinkAgile CP stacks with role-based access control, two-factor authentication, and secure HTML and RESTful API interfaces.

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## ThinkAgile CP4000 series overview

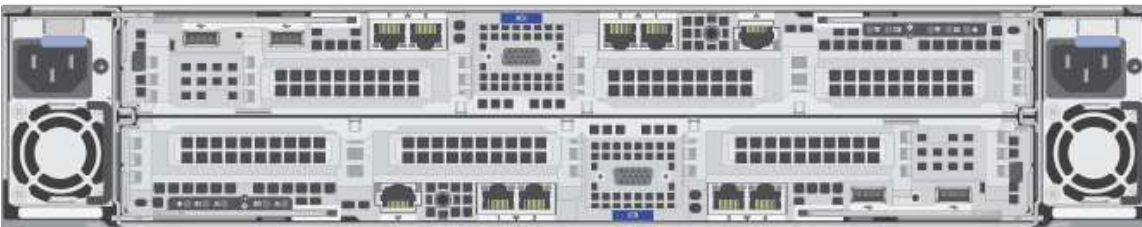
The Lenovo ThinkAgile CP4000 series scales as an initial data-management footprint for managed service provider and cloud service provider environments that start on a smaller scale but are poised for growth. The CP4000 series also supports business continuity when deployed remotely as an off-site backup for disaster recovery.

The Lenovo ThinkAgile CP4000 series consists of the following components:

- [“Storage block” on page 4](#)
- [“Compute block” on page 4](#)

- “Interconnect switch” on page 5
- “Management switch” on page 5
- “Services” on page 5
- “Software” on page 5

### Storage block



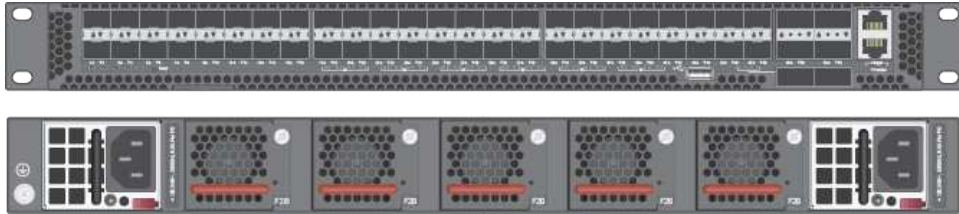
- 1 Storage Block (SB-S10)
- Dual controller - single CPU per controller
- 8x SFP Base-T SFP+ transceivers
- 8x CAT6 cables, 1.5m and other lengths permitted
- 2x CAT5e cables, 1.5m and other lengths permitted
- 32 GB RAM per controller
- 8, 16, 24 drives (8 drives per drive pack)
- 800 GB, 1.6 TB NVMe drives per controller
- Drives must be consistent within a storage block
- Dimensions: 87.6 x 446.4 x 857.2 mm (3.4 x 17.6 x 33.7 inches)
- Maximum weight: 42.0 kg (92.6 lb)

### Compute block



- 1 D2 enclosure, fully populated PSU, fan, 220V with 10Gb SFP+ network module
- Minimum 2 SD530 nodes, maximum 4 nodes
- 128 GB, 256 GB RAM per node
- 8+ cores per CPU, 1-2 sockets filled AXQT, and others
- 2x SFP+ DAC cables per node, 1.5m and other lengths permitted
- Boot: 1x SATA 240 GB
- Dimensions: 41.0 x 562.0 x 222.0 mm (1.7 x 22.2 x 8.8 inches)
- Maximum weight: 55 kg (121.2 lb)

### Interconnect switch



- 1 or 2 CP-I-10 interconnect switches
- 48x 10 Gb SFP+ fabric ports
- 6x 40 Gb QSFP+ fabric ports
- Dimensions: 438.4 x 473 x 43.4 mm (17.26 x 18.62 x 1.71 inches)
- Maximum weight: 8.95 kg (19.73 lb), with two installed PSUs

### Management switch

Lenovo ThinkSystem NE0152T RackSwitch



**Note:** A dedicated out-of-band (OOB) management switch is required for this solution. If the Lenovo NE0152T is not used, you must provide an OOB management switch with the correct configuration.

### Services

Lenovo Deployment Services are mandatory

Lenovo Hardware Installation Service is optional

### Software

Software is preloaded on compute, storage, and switch.

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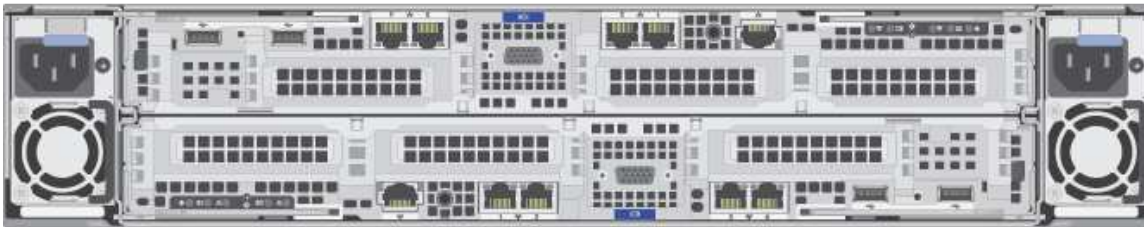
## ThinkAgile CP6000 series overview

The Lenovo ThinkAgile CP6000 series offering can be scaled up to 40 compute nodes to support mainstream enterprise workloads and mixed-workload environments.

The Lenovo ThinkAgile CP6000 series consists of the following components:

- “Storage block” on page 6
- “Compute block” on page 7
- “Interconnect switch” on page 7
- “Management switch” on page 7
- “Services” on page 8
- “Software” on page 8

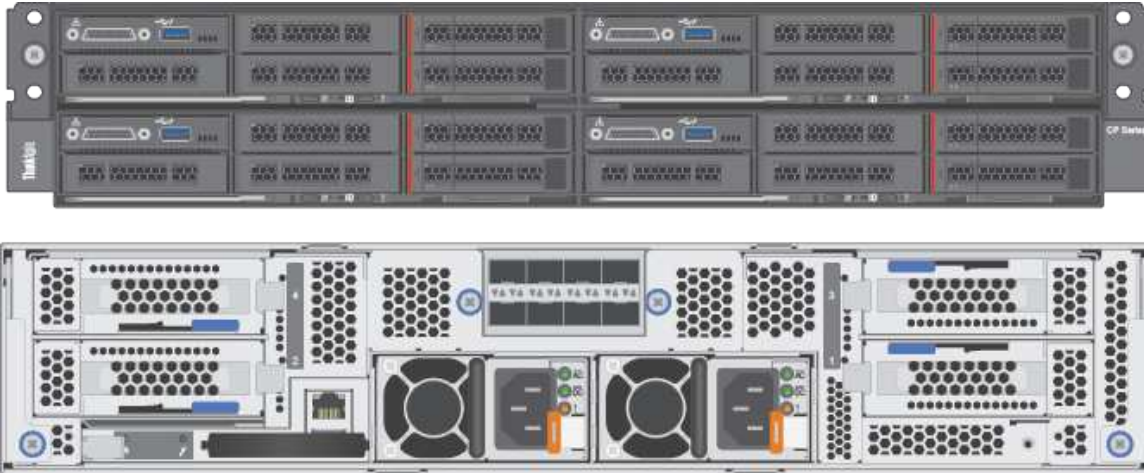
### Storage block



- 1 Storage Block - a maximum 5 blocks (SB-D20)
- Dual controller - 2CPU per controller
- 8x SFP Base-T SFP+ adapters
- 8x CAT6 cables per storage block, 1.5m and other lengths permitted
- 64 GB RAM per controller
- 8, 16, 24 drives (8 drives per drive pack)
- 1.6 TB, 3.2 TB, 6.4 TB NVMe drives per controller
- Drives must be consistent within a controller
- Dimensions: 87.6 x 446.4 x 857.2 mm (3.4 x 17.6 x 33.7 inches)
- Maximum weight: 42.0 kg (92.6 lb)

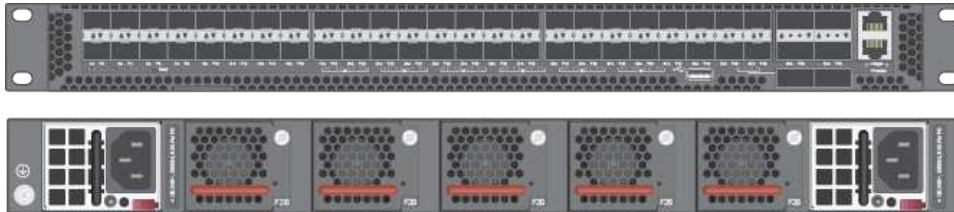


## Compute block



- 1 D2 enclosure, fully populated PSU, fan, 220V with 10Gb SFP+ network module — maximum 10 enclosure
- Minimum 2 SD530 nodes, default 4, maximum 40 nodes
- 128 GB, 256 GB, 384 GB, 512 GB, 768 GB, 1024 GB RAM
- 8+ cores per CPU, 1-2 sockets filled AXQT, and others
- 2x SFP+ DAC cables per node, 1.5m and other lengths permitted
- Boot: 1x SATA 240 GB
- Dimensions: 41.0 x 562.0 x 222.0 mm (1.7 x 22.2 x 8.8 inches)
- Maximum weight: 55 kg (121.2 lbs)

## Interconnect switch



- 2 CP-I-10 Interconnect switches
- 48x 10 Gb SFP+ fabric ports
- 6x 40 Gb QSFP+ fabric ports
- Dimensions: 438.4 x 473 x 43.4 mm (17.26 x 18.62 x 1.71 inches)
- Maximum weight: 8.95 kg (19.73 lb), with two installed PSUs

## Management switch

Lenovo ThinkSystem NE0152T RackSwitch



**Note:** A dedicated out-of-band (OOB) management switch is required for this solution. If the Lenovo NE0152T is not used, you must provide an OOB management switch with the correct configuration.

### **Services**

Lenovo Deployment Services are mandatory

Lenovo Hardware Installation Service is optional

### **Software**

Software is preloaded on compute, storage, and switch.

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## Chapter 2. Administration

This section covers the procedures for the administration of the ThinkAgile CP solution.

### Download PDF

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/pdf\\_files.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/pdf_files.html)

This guide provides information about using the ThinkAgile CP Cloud Controller Web-based management console to manage the compute, storage, network and virtualization resources in your environment.

If you are new to ThinkAgile CP, you should start with the [https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/getting-started-what-is-thinkagile-cp.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-what-is-thinkagile-cp.html) for an introduction to key product concepts.

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## Log in to the ThinkAgile CP Cloud Controller

Users with a ThinkAgile CP account can log in to access the Cloud Controller management portal.

### Supported web browsers

The ThinkAgile CP Cloud Controller works best on the two most recent versions of following web browsers:

- [Chrome](#)
- [Firefox](#)
- [Microsoft Edge](#)

**Note:** Older versions of these browsers or browsers not listed above might not be fully compatible.

Complete the following steps to log in to the Cloud Controller.

Step 1. Point your browser to the URL for the Cloud Controller that was provided in your user invitation.

If this is the first time that you have accessed the Cloud Controller, you are prompted to create your account.

Step 2. On the Login page, enter your user account (which is your e-mail address).

Step 3. Enter your account password.

**Note:** If you have forgotten your account information, click the link **Forgot your Password**. Enter the e-mail address that is associated with your account, click the checkbox to confirm that you are not a robot, and click **Reset Password**. You will receive an e-mail with instructions to change your password. Password resets require two-factor authentication. You will receive a security code via phone or e-mail that you need to enter to confirm your password reset.

Step 4. Click **Log in**.

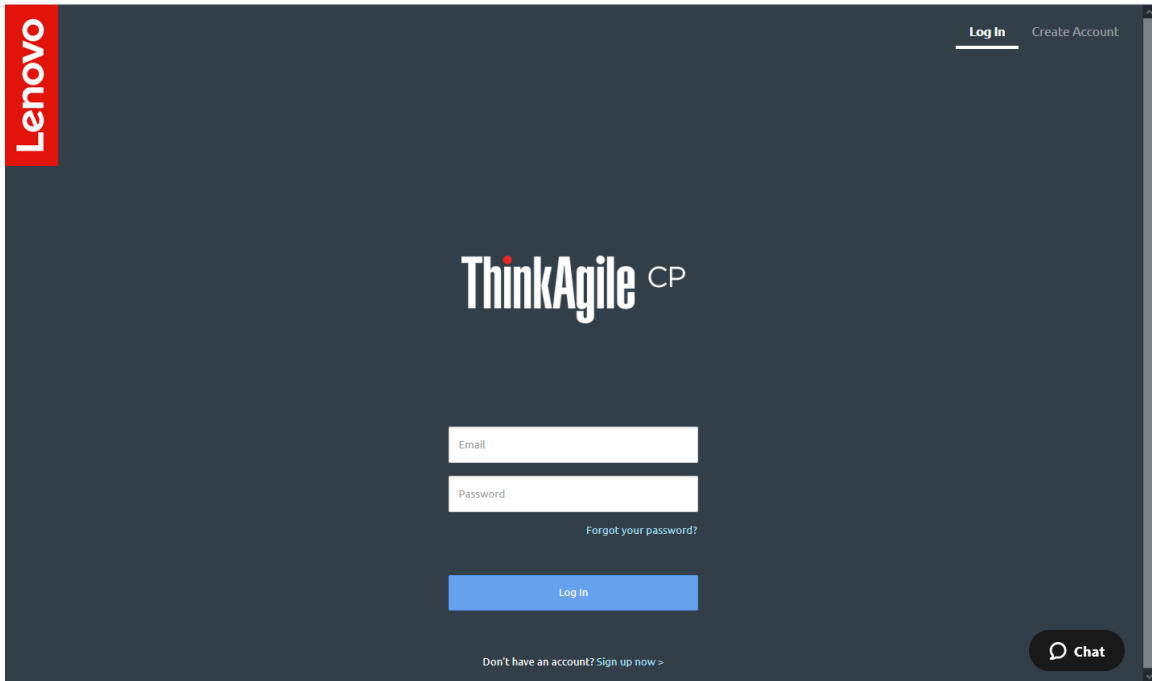


Figure 5. Log in to the ThinkAgile CP Cloud Controller

- Step 5. If the device that you are using to access the Cloud Controller is new or unauthorized, you must verify the device.

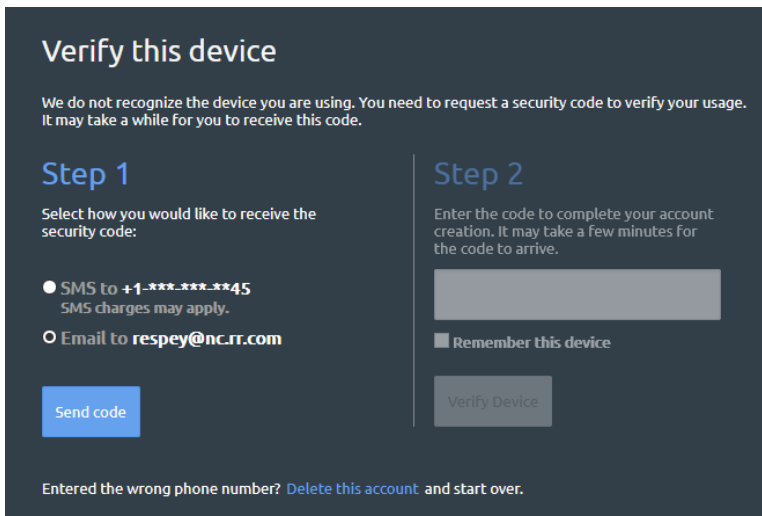


Figure 6. Two-factor authentication – send code

- a. Choose to receive the code via the phone number attached to this account or via the e-mail address attached to this account.
- b. Click **Send Code** to receive the security code.
- c. Enter the security code.
- d. Optionally, click **Remember this device** to bypass two-factor authentication from this device in the future.
- e. Click **Verify Device**.

Step 6. If this is the first time that you are accessing the Cloud Controller, click **Accept Invite**. Then click **Go to Organization**.

The Dashboard is displayed. The Dashboard that you see depends on the user role assigned to your account.

- **Infrastructure admin** and **infrastructure viewer** users see the physical and virtual resources for the entire organization, including all virtual datacenters created for the organization.

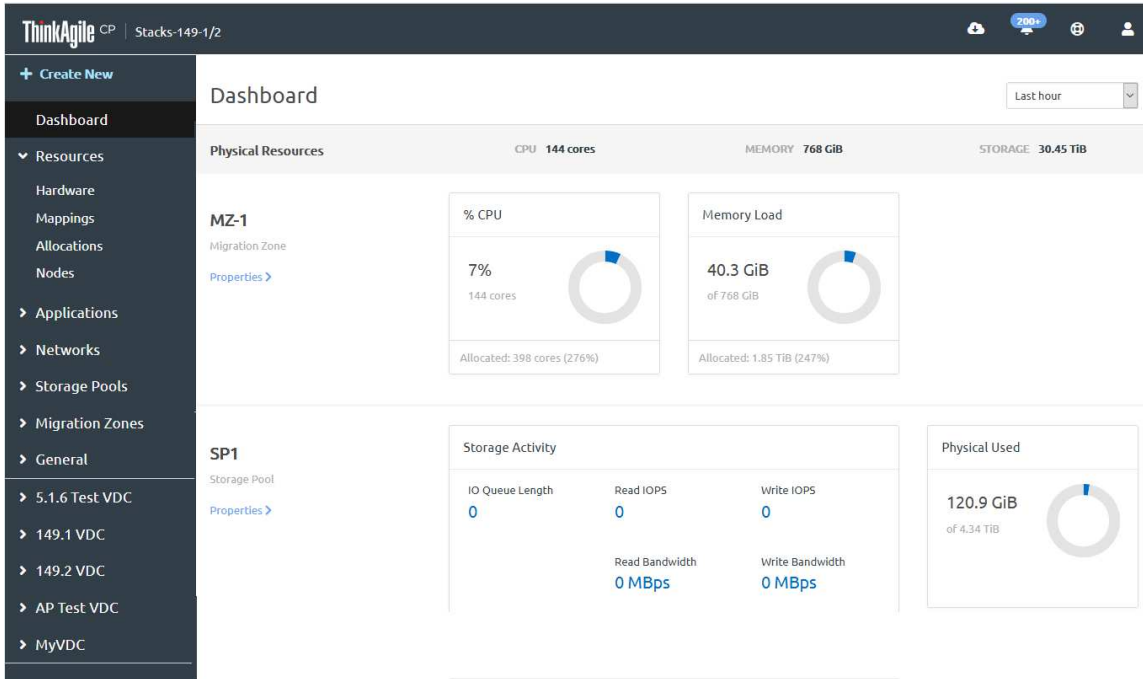


Figure 7. Dashboard - infrastructure admin and infrastructure viewer users

- **VDC manager** and **VDC viewer** users see the virtual resources for the virtual datacenter to which they have access

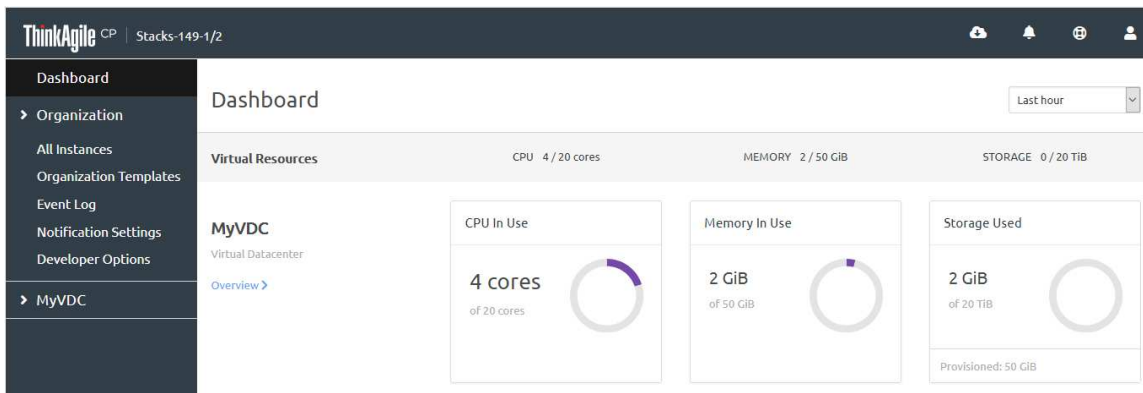


Figure 8. Dashboard - VDC manager and VDC viewer users

For more information about user roles, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

## Manage resources

Through the ThinkAgile CP Cloud Controller, **infrastructure admin** users can add, register, monitor, and modify settings for the network, compute, and storage hardware resources associated with an organization.

**Note:** **Infrastructure viewer** users can monitor hardware resources, but they cannot make any changes to those resources.

For more information about user roles in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

Refer to the following topics for details about managing resources.

- “Monitor resources in the Dashboard” on page 12
- “View hardware” on page 14
- “Register hardware” on page 19
- “View hardware and software version numbers” on page 22

## Monitor resources in the Dashboard

The Dashboard page in the Cloud Controller shows the resources that are available to VDCs or to the entire organization, depending on the user role of the account that is accessing the Cloud Controller.

- When **infrastructure admin** or **infrastructure viewer** users log in to the Cloud Controller, the Dashboard displays the physical and virtual resources for the entire organization.
- When **VDC manager** or **VDC viewer** users log in to the Cloud Controller, the Dashboard displays the virtual resources for the VDCs to which users have access.

Complete the following steps to monitor resources.

Step 1. Choose the time frame over which you want to view the resources.

You can choose to view information about resources for a specific time frame, such as the last hour or the last year:

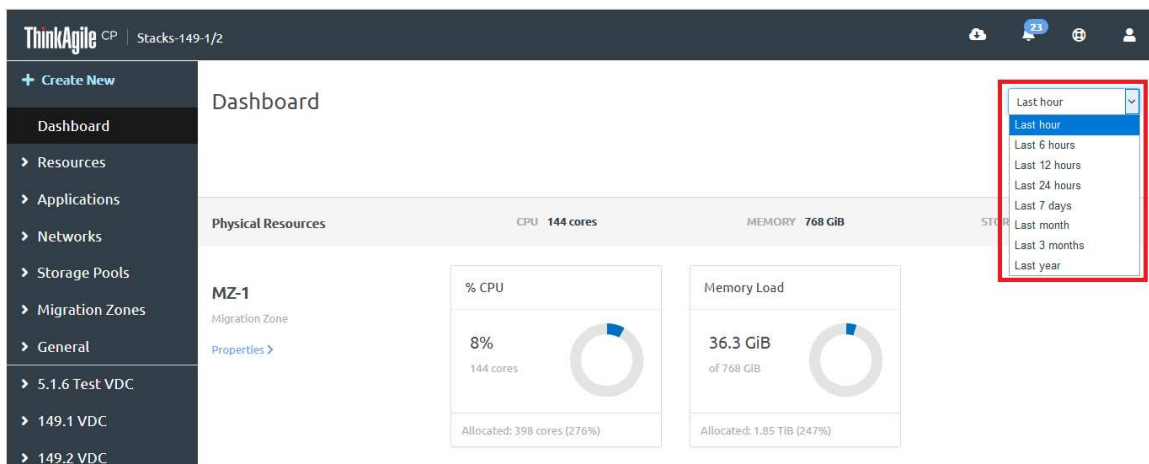


Figure 9. Choosing a time frame for which to view resources

Step 2. View the physical resources for migration zones and storage pools (**infrastructure admin** and **infrastructure viewer** users).

To obtain more detailed information about the physical resources for migration zones or storage pools, click **Properties** to display the Details page.

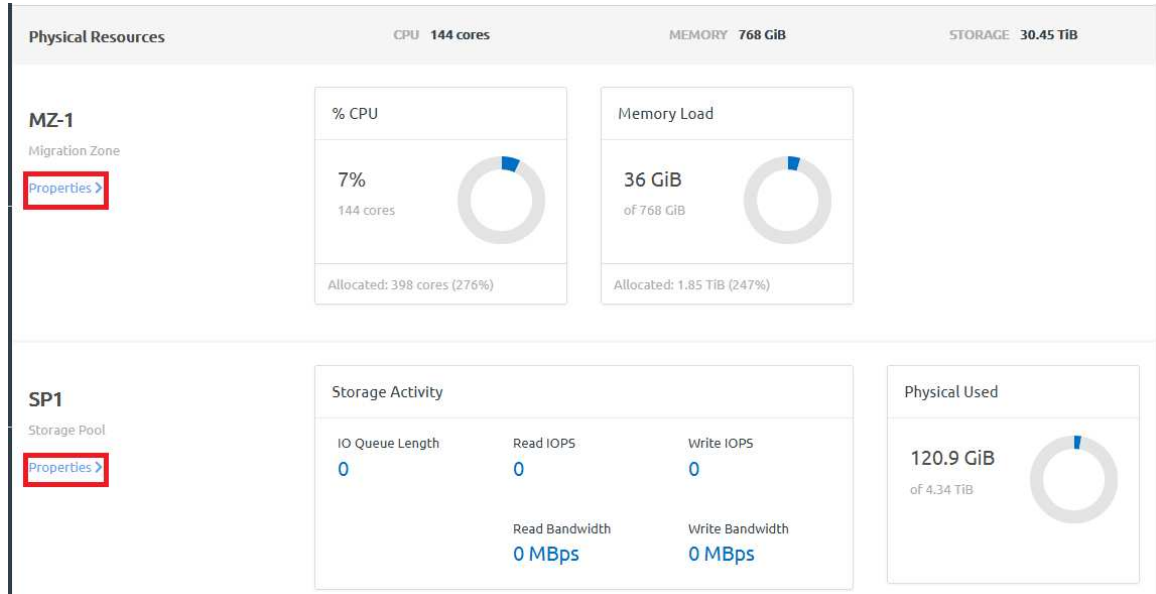


Figure 10. Hardware resources - Properties

For more information about the Details page, see the following topics:

- [“View migration zones” on page 197](#)
- [“View storage pool details” on page 168](#)

Step 3. Scroll down to view the virtual resources allocated to the VDCs to which you have access.

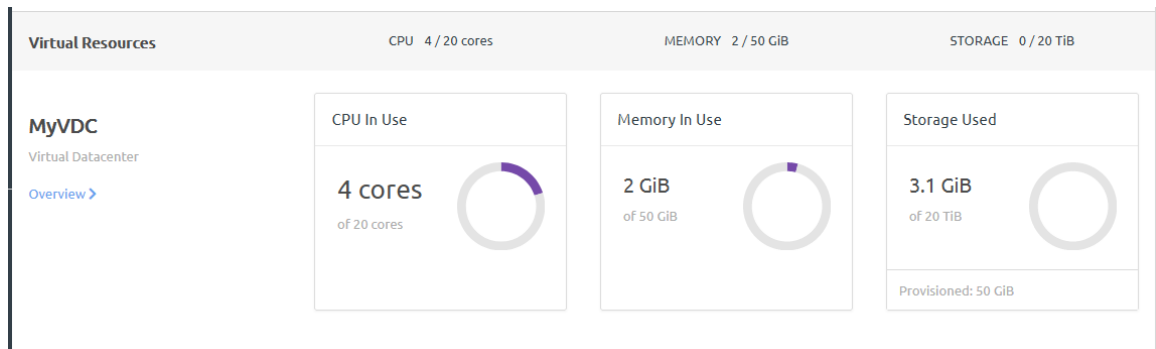


Figure 11. Virtual Resources

**Note:** For **infrastructure admin** or **infrastructure viewer** users, virtual datacenters are shown for the organization, and values shown under Virtual Resources are calculated based on all virtual datacenters in the organization. For **VDC manager** or **VDC viewer** users, the virtual datacenters and values shown for the virtual resources are calculated based on the virtual datacenters to which the user has access.

- **CPU in-use** is the number of virtual cores that are allocated to applications that are currently running.
- **Memory in-use** is the amount of memory that is allocated to applications that are currently running.
- **Storage used** is the amount of storage that is allocated to applications that are currently running.

ThinkAgile CP Cloud Controller uses Base 2 to calculate memory and storage capacity. When you are viewing statistics, it may appear that you have less memory or storage capacity than you expect. With Base 2, capacity is technically measured in kibibytes, mebibytes, gibibytes, and tebibytes, where the “-bi-” refers to binary. (In short these measurements are KiB, MiB, GiB, TiB. Most users do not think in terms of Base 2 and, therefore, hardware manufacturers typically rate drive capacities using standard base 10 numbers with KB, MB, GB, and TB measurements.)

To calculate capacity measured in KB using Base 2, total bytes are divided by 1024, which results in a slightly lower KB measurement than using Base 10. This reduction in bytes seems higher when measuring in TB. For example, if you have a 16TB disk, instead of seeing an expected 16,000 GB of capacity, you would see 14,896. However, there is technically no loss of capacity. The reported size appears smaller in gibibytes than when measured in gigabytes because the larger unit of measure results in a smaller total number.

## View hardware

From the ThinkAgile CP Cloud Controller, **infrastructure admin** and **infrastructure viewer** users can view the hardware resources for an organization.

Complete the following steps to view the hardware for an organization.

- Step 1. In the left navigation of the Cloud Controller, expand Resources and click **Hardware** to display the Hardware Stack page.

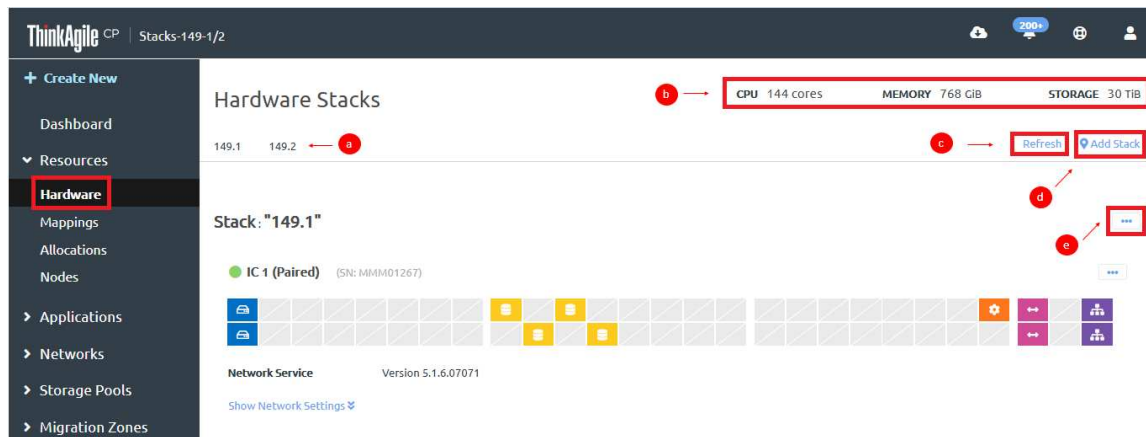



Figure 12. View the Hardware Stack page

- If you have multiple stacks, click the stack name to view information for that stack.
- A summary of CPU, memory, and storage usage for the stack is displayed.
- Click **Refresh** to update the view.
- Click **Add Stack** in the top right of the page to add a stack to this organization.
- Click the Actions menu (  ) to manage the stack.



For more information about the Actions menu, see “[Manage a stack](#)” on page 26.

Step 2. The interconnect switches handle the networking infrastructure.

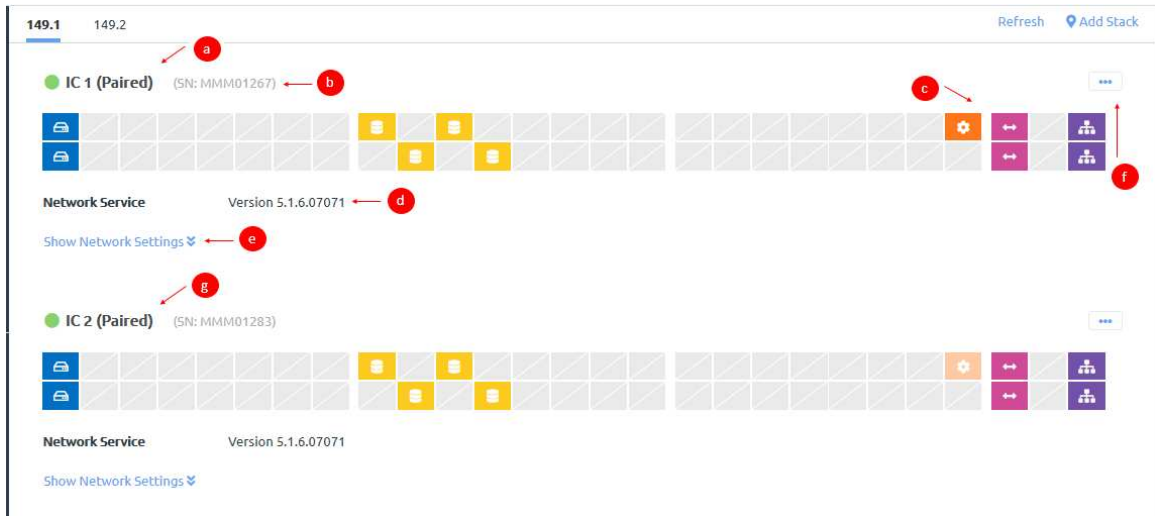


Figure 13. Interconnect switches section

- View identifying information for the interconnect switch, including the name and the current power state. You can mouse over the status icon to get more detailed information. If the icon is green, the interconnect switch is running; if the icon is gray, the interconnect switch is not running.
- View the serial number associated with the interconnect switch.
- View the ports for the interconnect switch. Mouse over the ports for more information, including port number, current status, and information about where the port is connected.

Icon	Description
	Connected to node.
	Connected to storage controller.
	Connected to management network.
	Connected to data uplink/gateway.
	Connected to ISL network (for control traffic between the ThinkAgile CP interconnect switches).

- View the current version of the interconnect switch software.
- Click **Show Network Settings** to view network details for the interconnect switch.

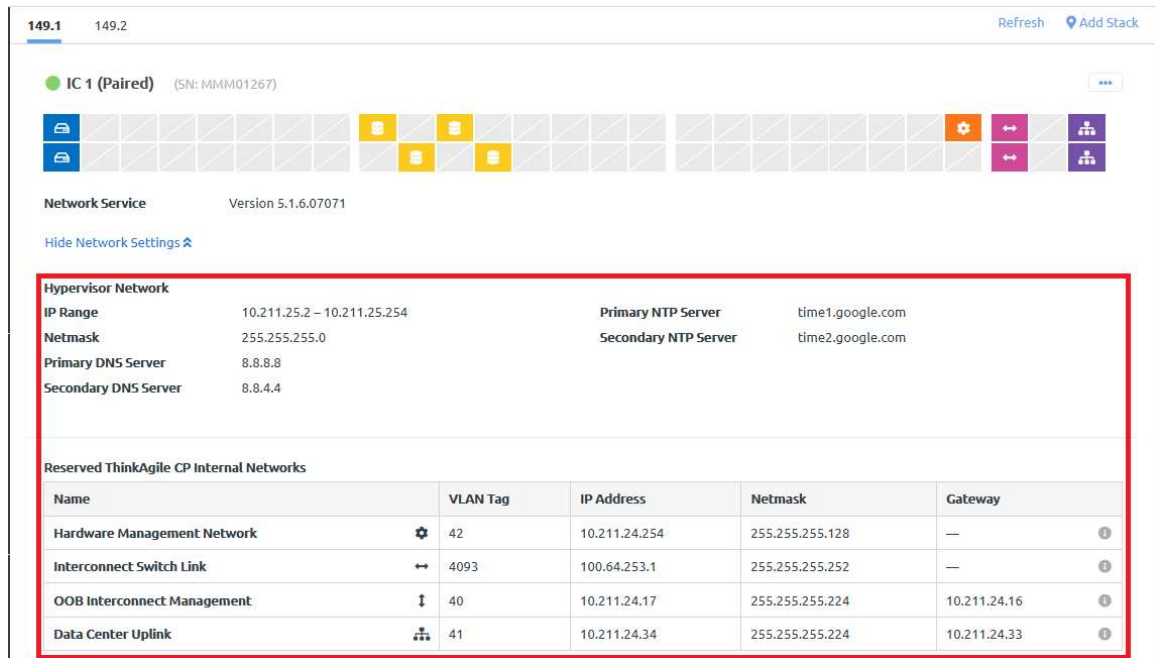



Figure 14. Expanded network settings example

Details are provided for the hypervisor network. In addition, details about the reserved internal networks are displayed.

- **Hardware Management Network.** The network traffic for hardware monitoring and the out-of-band (OOB) management of the compute and storage chassis.
- **Interconnect Switch Link (ISL).** In a dual-interconnect configuration, the network for control traffic between the primary and secondary interconnect switches.
- **OOB Interconnect Management.** The network for control traffic between the interconnect switches and the ThinkAgile CP Cloud Controller.
- **Data Center Uplink.** The network for traffic between the interconnect switches and the customer network.

- f. Click the Actions menu (  ) to manage the interconnect switch.

For more information about the interconnect switch Actions menu, see [“Manage interconnect switches” on page 164](#).

- g. If you have dual interconnect switches for high availability, you can view a representation of the secondary interconnect switch.

For more information about high availability, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/high-availability-architecture.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/high-availability-architecture.html)

- Step 3. Compute hardware consists of a set of discrete compute resources (nodes) housed in a compute enclosure (block). Each node provides CPU and memory resources for use by applications.

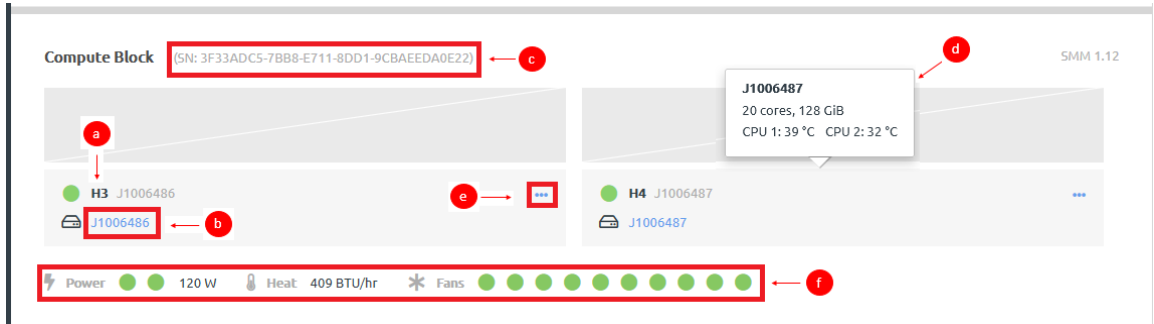







Figure 15. Compute block section

**Note:** If a compute node has not been registered, you will see a Register link before the node name. Unregistered compute nodes cannot be used to run applications. For more information about registering compute nodes, see the following topic:

[“Register a compute node” on page 20](#)

- a. View identifying information about the compute node, including the name and the current power state. You can mouse over the power state to get more information.


Nodes can have the following power states:

State	Description
Powered on 	The compute node is reachable and able to run application instances.
Powered off 	The compute node has been powered off by the user (for example, for maintenance).
Unreachable 	The compute node does not respond to the ThinkAgile CP management console and was not powered off by the user. If a compute node in your cloud infrastructure is unreachable, check your network connectivity or contact Lenovo Support.
Updating 	The firmware running on the node is updating.
Maintenance Mode 	The compute node has been registered and assigned to a compute category. Maintenance mode is a feature that allows you to keep a compute node online, registered, and assigned to a migration zone while simultaneously preventing any application instances from running on the compute node. This is useful when performing certain maintenance activities (for example, changing a compute node migration zone or compute category). When viewing the compute node profile page, a yellow Maintenance Mode indicator appears inline with the compute node category and tag(s).

- b. Click the compute node name to see details about that node, such as CPU and memory usage.

For more information about compute node details, see the following topic:

[“View compute nodes” on page 188](#)

- c. The serial number for the compute block (D2 enclosure (which can include up to 4 compute nodes)).
- d. Mouse over a node to view detailed information about that node, such as the name of the node, the number of CPU cores, the amount of memory, and the running temperature of each CPU.
- e. Click the Actions menu (  ) to perform actions on the compute node, such as restarting a compute node or turning on maintenance mode.

For more information about actions that can be taken for a compute node, see the following topic:

[“Manage compute nodes” on page 192](#)

- f. View power status, the heat load (in BTU per hour), and the status of the associated fans. Mouse over a fan to see the fan speed (RPM).

Step 4. The storage block hardware consists of a set of two storage controllers and one or two storage sleds housed in a storage enclosure.

**Note:** If a storage block has not been registered, you will see a Register link below the storage block name. For more information about registering storage controllers, see the following topic:

[“Register a storage block” on page 21](#)

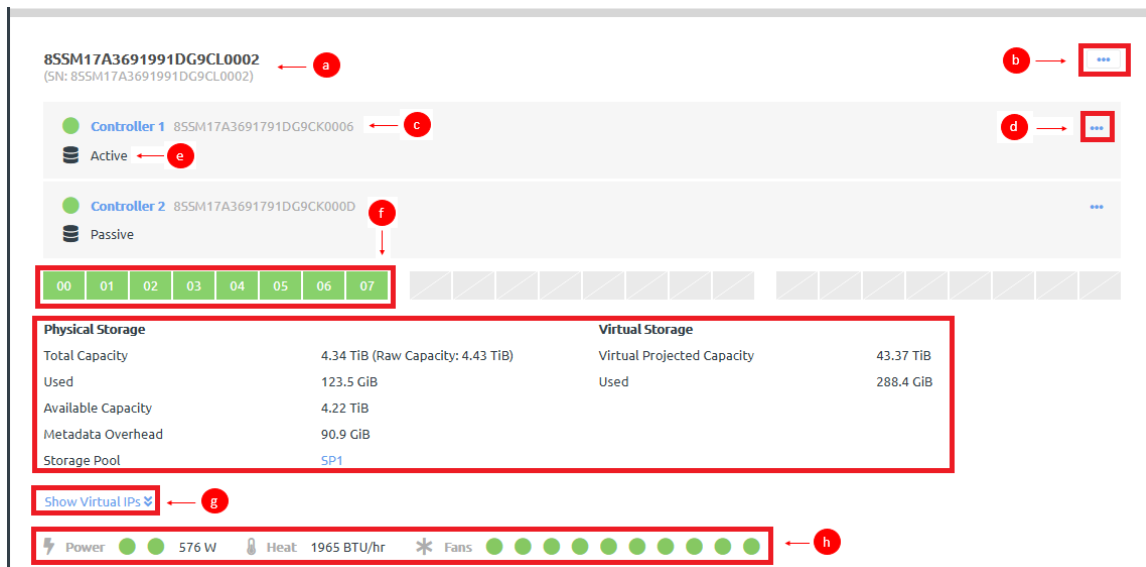



Figure 16. Storage block




- a. View the name and serial number for the storage block.
- b. Click the storage block Actions menu (  ) to perform actions on the control block, such as restarting the storage block or removing the storage block from a storage pool.


For more information about actions that can be taken for a storage block, see the following topic:

[“Manage storage blocks” on page 185](#)

- c. View identifying information for the storage controller, including the name and the current power state. You can mouse over the power state to get more information.

Storage controllers can have the following power states:

State	Description
Powered on 	The compute node is reachable and able to run application instances.
Powered off 	The compute node has been powered off by the user (for example, for maintenance).
Unreachable 	The compute node does not respond to the ThinkAgile CP management console and was not powered off by the user. If a compute node in your cloud infrastructure is unreachable, check your network connectivity or contact Lenovo Support.

- d. Click the storage controller Actions menu (  ) to restart the storage service.

For more information about the storage controller Actions menu, see the following topic:

[“Manage storage controllers” on page 183](#)

- e. View the mode in which the controller is current acting.

The two storage controllers in a storage block operate in active-passive mode with automatic failover when the failure of the active storage controller is detected. For more information about storage high availability, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/storage-high-availability.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/storage-high-availability.html)

- f. View the disks that are currently installed in each storage sled. Each sled can contain up to 8 disks. Mouse over a disk to see the disk number, size, and current state.
- g. View details about the storage pool to which this storage block is assigned.

For more information about storage pool metrics, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/storage-high-availability.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/storage-high-availability.html)

- h. Click **Show Virtual IPs** to see the IP addresses associated with the storage block.
- i. View power status, the heat load (in BTU per hour), and the status of the associated fans. Mouse over a fan to see the fan speed (RPM).

## Register hardware

When you add new hardware to your environment you must register it in the ThinkAgile CP Cloud Controller management portal. If you are adding hardware or setting up ThinkAgile CP for the first time and have not already registered your compute and storage hardware, as described in the *ThinkAgile CP Deployment Guide*, you should do so now.

To register hardware, you must log in to the ThinkAgile CP Cloud Controller management console as an **infrastructure admin** user. For more information about the **infrastructure admin** user role, see the following topic:

## Register a compute node

New compute hardware that is connected to the interconnect switch is automatically detected and displayed on the Hardware page in the ThinkAgile CP Cloud Controller and is ready for registration. **Infrastructure admin** users can register the new hardware.

The ThinkAgile CP Cloud Controller displays a representation of the compute enclosure with two to four host nodes, depending on the number of nodes that are connected.

Complete the following steps for each node that you need to register:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation of the Cloud Controller, expand Resources and click **Hardware** to display the Hardware Stack page.

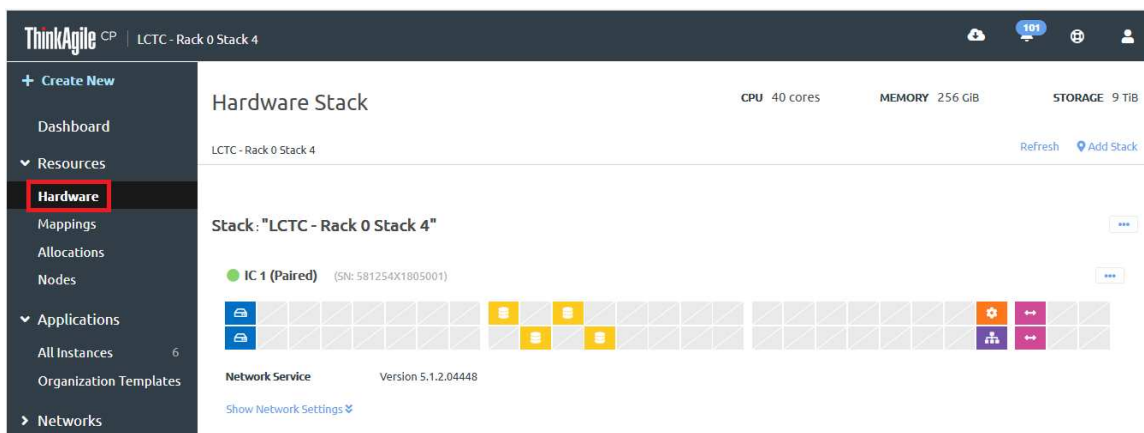


Figure 17. View the Hardware Stack page

- Step 3. Scroll down to the Compute Block section. Click **Register** for the compute node to be registered.
- Step 4. On the Register Node page, enter the required properties for the node. Each node must belong to exactly one compute category. If you do not intend to create multiple compute categories, consider using the default category for all hosts. Tags are additional metadata that can be applied to compute nodes. While each node must belong to exactly one category, a node can have any number of tags.

**Note:** Each node name must be unique across all nodes in your cloud infrastructure. The administrator password is only used to allow physical access to the node in the event that it loses connectivity to the ThinkAgile CP Cloud Controller management console. The administrator password will be configured as the SSH password for the manager user on the compute node. ThinkAgile CP does not store a copy of the administrator password.

- Step 5. Assign the node to a migration zone. To create a migration zone, select **New migration zone...** from the drop-down list, enter a name for the migration zone, and click **Create**.

**Note:** Compute nodes are organized into migration zones, which act as boundaries around a set of nodes. A node must be added to a migration zone before it can host application instances (VMs). Applications can migrate among nodes within a migration zone, but cannot migrate to nodes outside of the migration zone.

For more information about migration zones, see the following topic:

## Migration zones

Step 6. Click **Register Node**.

The compute node is registered. You can click the link to view details about the node. For more information about viewing compute node details, see the following topic:

[“View compute node details” on page 189](#)

**Note:** If the compute node is running ThinkAgile CP, Version 5.1.2 or later

When you register a compute node with the ThinkAgile CP Cloud Controller, the hardware management credentials of the compute blocks (XCC), compute chassis (SMM), and storage blocks (Athena) in the stack are also propagated on the hardware management (XCC) component of the new compute node. All XCCs, SMMs and Athenas (BMCs) should have the same hardware management password.

## Register a storage block

New storage hardware that is connected to the interconnect switch is automatically detected and displayed on the Hardware page and is ready for registration. **Infrastructure admin** users can register the new hardware.

Complete the following steps for each storage block that you need to register:

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. In the left navigation of the Cloud Controller, expand Resources and click **Hardware** to display the Hardware Stack page.

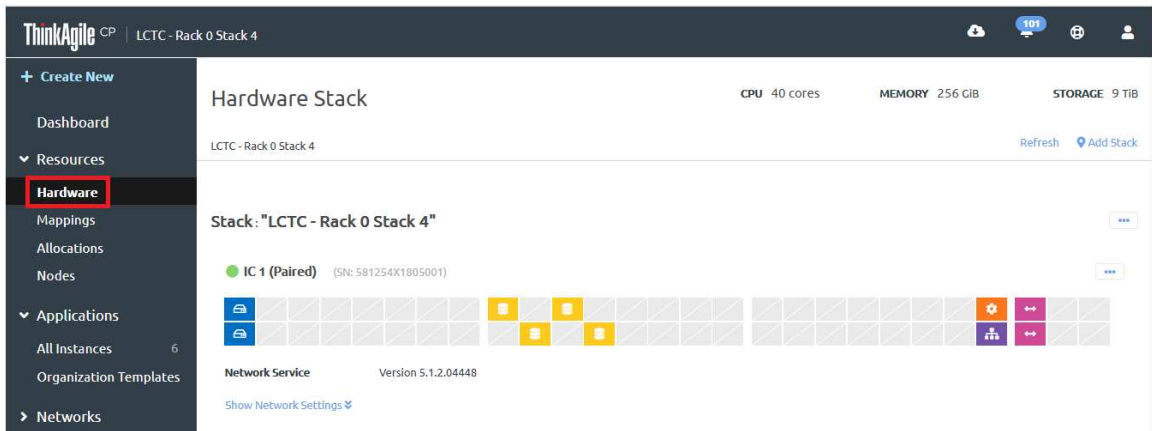


Figure 18. View the Hardware Stack page

Step 3. Scroll down to the Storage Block section. Click **Register** for the storage block to be registered..

Step 4. On the Register Storage Block page, enter the required information about the storage block.

**Note:** The name must be unique across all storage resources in your cloud infrastructure. The administrator password is only used to allow physical access to storage in the event that it loses connectivity to the ThinkAgile CP Cloud Controller management console. The administrator password will be configured as the SSH password for the manager user on the storage block. ThinkAgile CP Cloud Controller does not store a copy of the administrator password.

Step 5. Assign the storage block to a storage pool. To create a storage pool, select **New storage pool...** from the drop-down list, enter a name for the storage pool, and click **Create**.

**Note:** Storage resources (storage blocks) are organized into storage pools. A storage block must be added to a storage pool to be able to store application instances.

Step 6. Click **Register Storage Block**.

The storage block is registered. You can click the name of the controller to obtain more information about the controller, such as the firmware version, hardware details, and networking details.

**Note:** If the storage node is running **ThinkAgile CP, Version 5.1.2 or later**

When you register a storage node with the ThinkAgile CP Cloud Controller, the hardware management credentials of the compute blocks (XCC), compute chassis (SMM), and storage blocks (Athena) in the stack are also propagated on the hardware management (BMC) component of the new storage node. All XCCs, SMMs and Athenas (BMCs) should have the same hardware management password.

## View hardware and software version numbers

You can view the version of software running on the ThinkAgile CP Cloud Controller cloud controller. **Infrastructure admin** and **infrastructure viewer** users can also view the version of software running on the interconnect switches, compute nodes, and storage blocks.

Refer to the following topics:


- [“View the Cloud Controller version” on page 22](#)
- [“View hardware versions” on page 22](#)

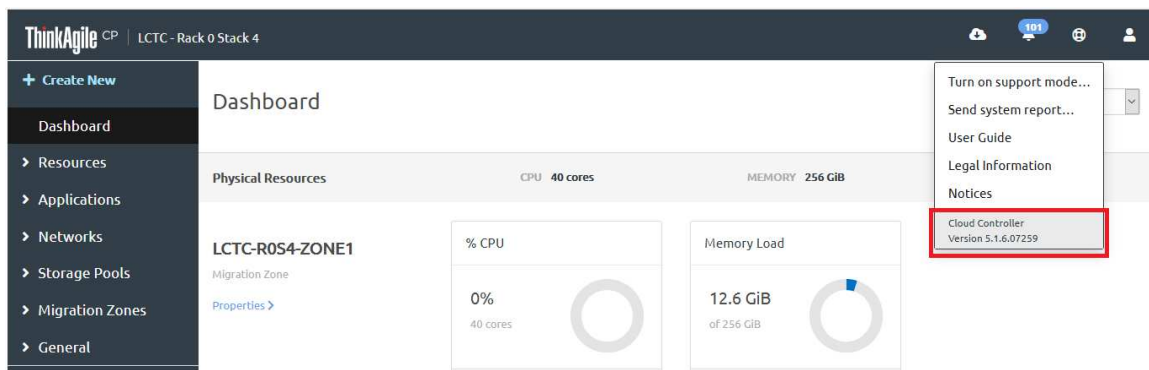
### View the Cloud Controller version

The version of the ThinkAgile CP Cloud Controller is available from the Support menu.

Complete the following steps to view the version of software that is running on the ThinkAgile CP Cloud Controller:

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. Click the Support icon () at the top of the page. The version number is listed at the bottom of the drop-down menu.



### View hardware versions

**Infrastructure admin** and **infrastructure viewer** users can view the version of software running on the interconnect switches, compute nodes, and storage blocks from the ThinkAgile CP Cloud Controller user interface or by logging into the node itself.



### View the interconnect switch version

The interconnect switch version is displayed on the Hardware Stack page in ThinkAgile CP Cloud Controller.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.
- Step 2. In the left navigation of the Cloud Controller, expand Resources and click **Hardware** to display the Hardware Stack page.

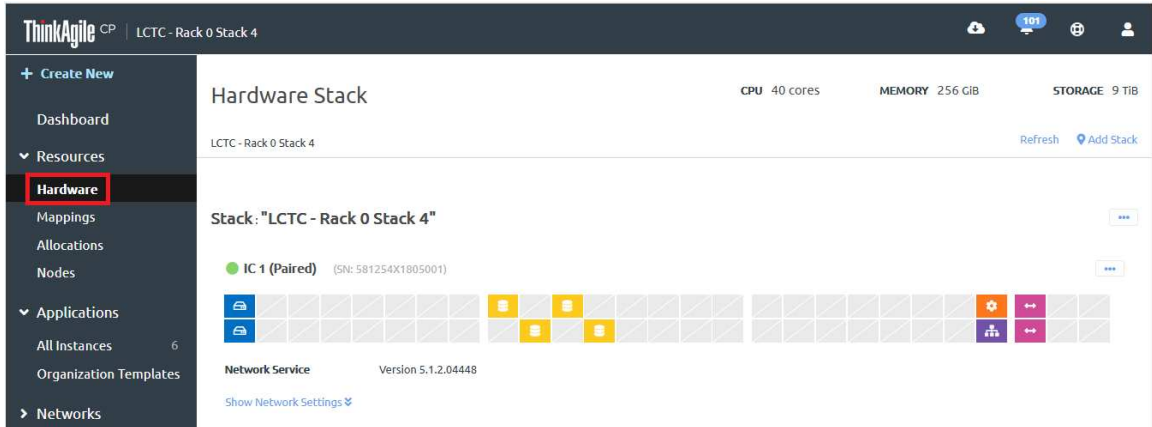


Figure 19. View the Hardware Stack page

- Step 3. The version number is listed next the **Network Service**.

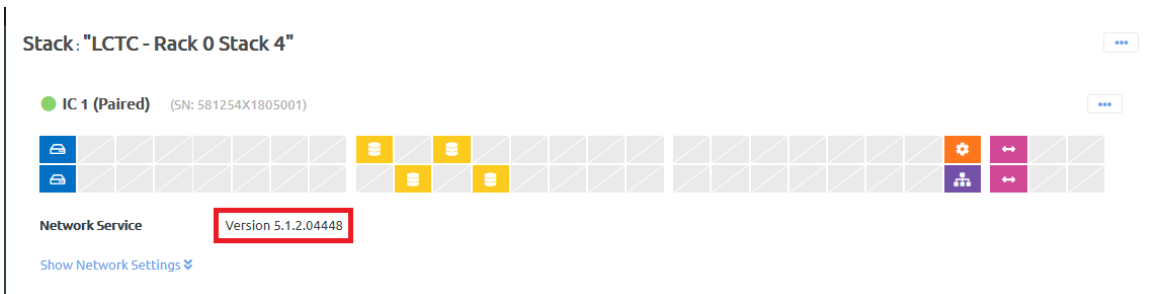


Figure 20. Interconnect switch version number

Alternatively, you can establish an SSH session with the interconnect switch and run the following command:

```
$ dpkg -s tacp-network-controller | grep -i version
```

Result:

```
Version: 5.1.2.04448-1
```

### View the compute controller version

The compute controller version is displayed on the compute node Details page in the ThinkAgile CP Cloud Controller.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.
- Step 2. In the left navigation menu, expand Resources and click **Nodes**.

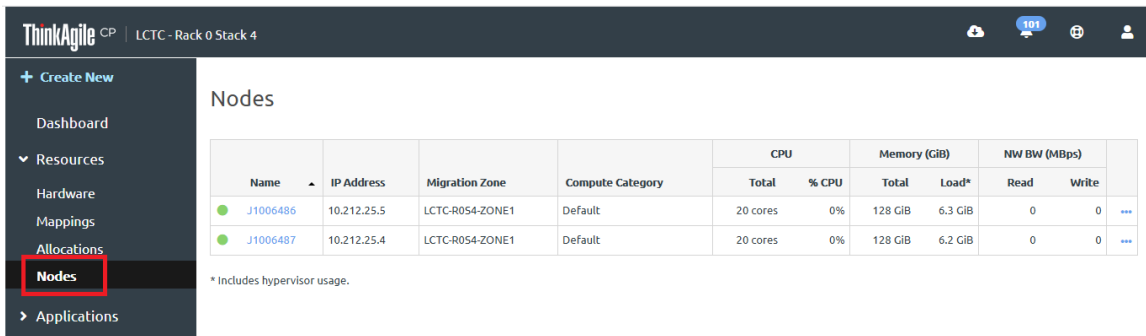


Figure 21. The Nodes page

- Step 3. Click the name of the node to display the Details page for that node.
- Step 4. Click the **Information** tab.
- Step 5. In the Properties section, you can view the version number next to **Compute Service**.

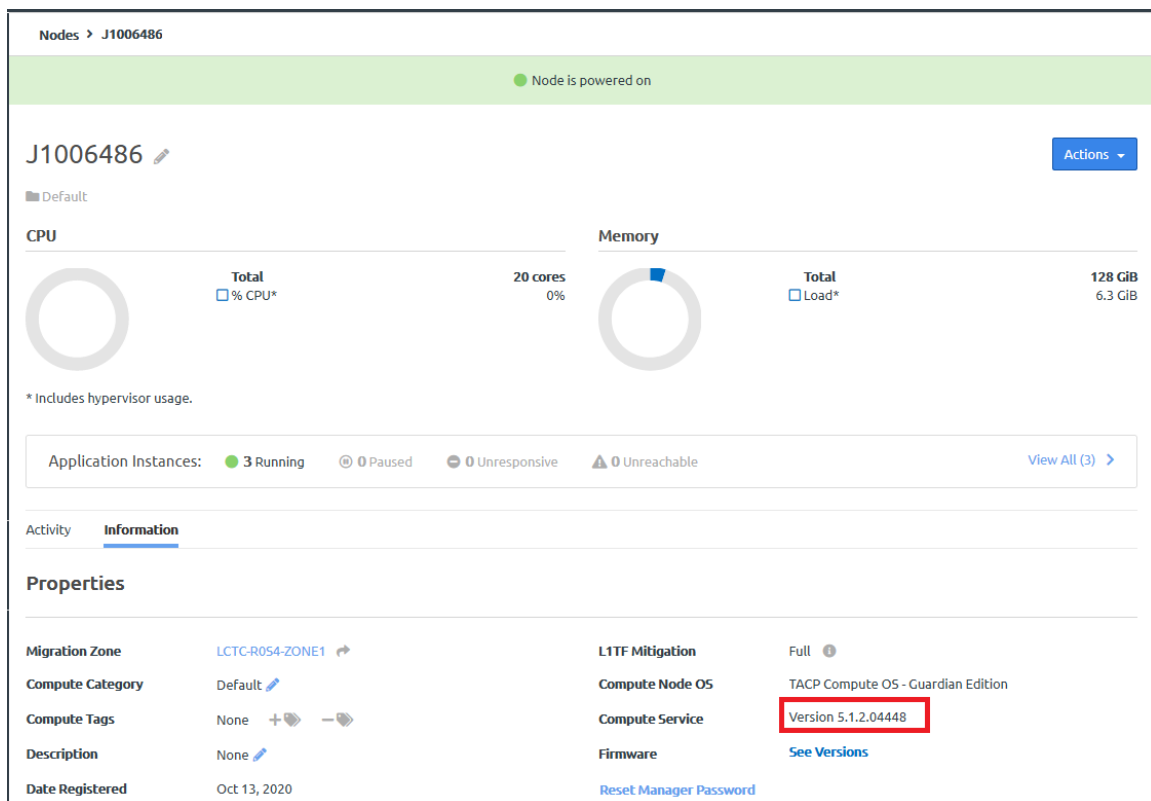


Figure 22. Compute node version number

Alternatively, you can establish an SSH session with the compute node and enter the following command:

```
$ rpm -qa | grep tacp-compute-controller
```

Result:

```
tacp-compute-controller-5.1.2.04448-1.el7.tacp.x86_64
```

## View the storage controller version

The version number is displayed on the storage controller Properties page in the ThinkAgile CP Cloud Controller.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.
- Step 2. In the left navigation of the Cloud Controller, expand Resources and click **Hardware** to display the Hardware Stack page.

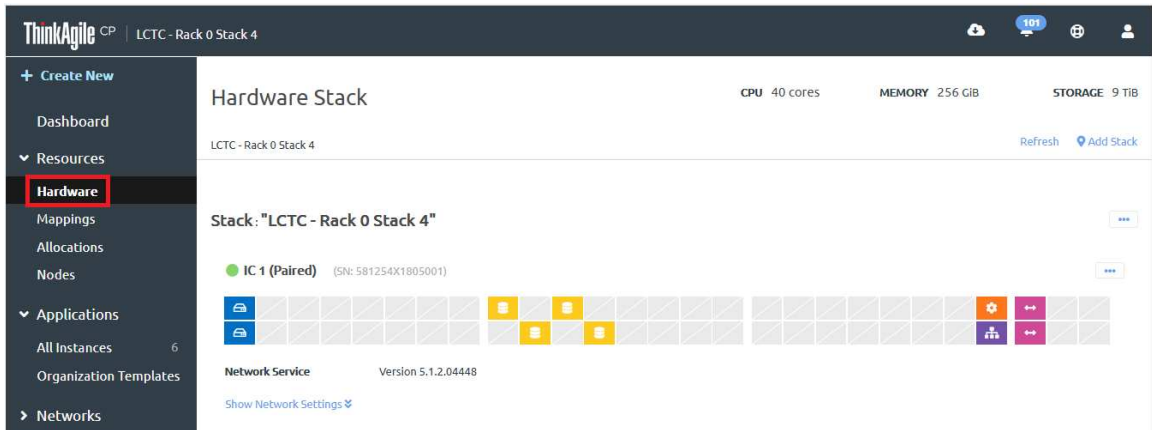


Figure 23. View the Hardware Stack page

- Step 3. Scroll down to the Storage section, and click the storage controller to display the storage controller Properties page.
- Step 4. The version number is displayed next to **Storage Service**.

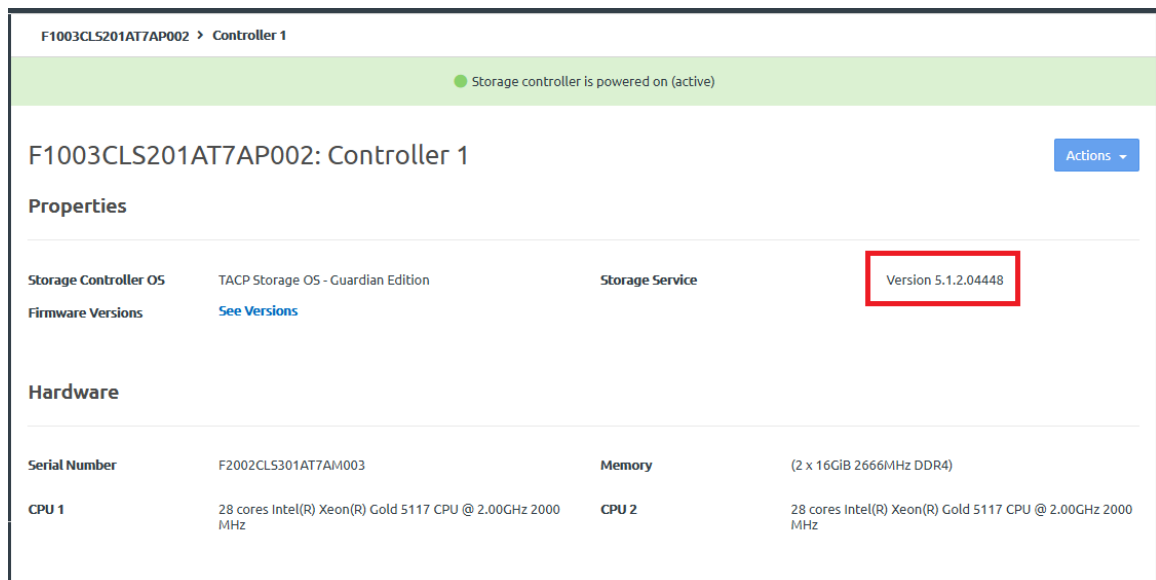


Figure 24. Storage controller version number

Alternatively, you can establish an SSH session with the storage controller and enter the following command:

```
$ rpm -qa | grep tacp-storage-controller
```

Result:

tacp-storage-controller-5.1.2.04448-1.el7.tacp.x86\_64

## Manage a stack

In ThinkAgile CP, a stack consists of up to two interconnect switches, one or more compute blocks, and one or more storage blocks. **Infrastructure admin** users can choose to rename a stack or to set the hardware management password for the compute blocks and the storage blocks in the stack.

Complete the following steps to manage a stack:

1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user.
2. In the left navigation of the Cloud Controller, expand Resources and click **Hardware** to display the Hardware Stack page.

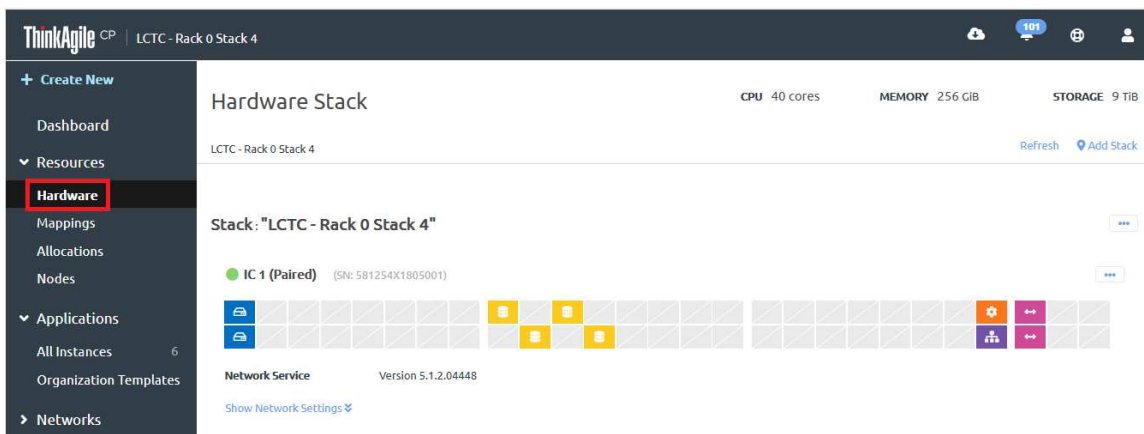


Figure 25. View the Hardware Stack page

3. Click the stack Actions menu (  ) to display the management options that are available.

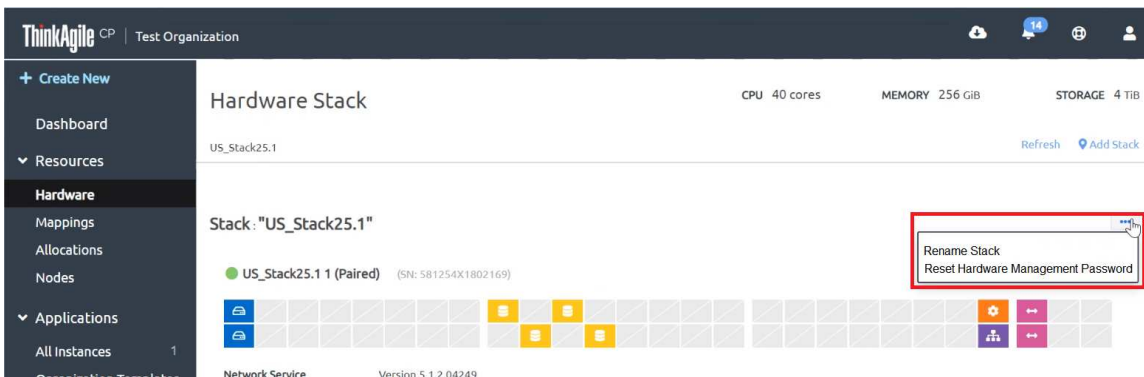


Figure 26. Stack Actions menu

You can perform the following actions.

Action	Description
Rename Stack	<p>Complete the following steps to rename the stack:</p> <ol style="list-style-type: none"> <li>1. Click <b>Rename Stack</b> from the <b>Actions</b> menu.</li> <li>2. Enter a new name for the stack. The name must be unique across all stacks in our organization.</li> <li>3. Click <b>Update</b>.</li> </ol>
<p>Reset Hardware Management Password</p> <p><b>Note:</b> This option is available only for ThinkAgile CP, version 5.1.2 or later.</p>	<p>The hardware management (BMC) password is synchronized for all compute blocks (SMM and XCC) and storage blocks (Athena) in the stack. Complete the following steps to reset the hardware management password for the stack:</p> <ol style="list-style-type: none"> <li>1. Click <b>Reset hardware management password</b> to change the hardware management (BMC) password for all compute blocks (SMM and XCC) and storage blocks (Athena) in the stack.</li> <li>2. In the Reset Hardware Management Password dialog, enter and confirm the new password.</li> </ol> <div> </div> <p>3. Click <b>Reset Hardware Management Password</b>. The option is greyed out until the management password has been reset on all devices in the stack.</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Make sure that all compute nodes, compute blocks, and storage blocks are available to the portal and operating normally before attempting to reset the hardware management password.</li> <li>• Do <b>not</b> attempt to reset the hardware management password directly through the BMC interface. Doing so might adversely affect the operation of the device, and you will need to contact Lenovo Support.</li> <li>• The following rules apply to the password: <ul style="list-style-type: none"> <li>– Passwords must be between 12 and 20 characters.</li> <li>– Passwords must contain at least 1 lowercase letter (e.g. abcdefgh).</li> </ul> </li> </ul>

Figure 27. Reset Hardware Management Password dialog

Action	Description
	<ul style="list-style-type: none"> <li>- Passwords must contain at least 1 uppercase letter (e.g. ABCDEFGH).</li> <li>- Passwords must contain at least 1 number (e.g. 0123456789).</li> <li>- Passwords must contain at least 1 special character/symbol from the set (inclusive of all symbols): (!@#\$%^*_+ =().:;'?").</li> <li>- Passwords may contain at most 2 consecutive occurrences of the same character.</li> <li>- Passwords may not be a repeat or the reverse of the user name.</li> <li>- Passwords may not contain any whitespace characters (spaces, tabs, or line breaks).</li> <li>- Passwords are case-sensitive.</li> </ul>

## Working with application instances

In ThinkAgile CP, an application instance refers to one or more virtual machines (VMs) grouped together to provide a specific set of software capabilities for an end user. For example, an application instance might be a simple VM running Windows 10; and another application instance might be a VM running CentOS 7 with Docker.

### Supported Operating Systems

ThinkAgile CP currently supports application instances running the following Operating Systems:

- Red Hat (CentOS/RHEL/Scientific Linux) 6/7/8 (64-bit)

**Note:** When manually installing Red Hat, version 8, the networking is not enabled by default. To enable networking, see the following topic: [“Networking is not enabled for Red Hat, version 8” on page 367](#)

- Ubuntu 16.04 LTS Desktop/Server (64-bit)
- Microsoft Windows 7/8/8.1/10 (32-bit/64-bit)
- Microsoft Windows Server 2008R2/2012/2012R2/2016 (64-bit)
- FreeBSD 10.3

**Note:** FreeBSD does not support the guest agent. For more information about guest agents, see the following topic:

[“Manage instance modes and guest agents” on page 67](#)

## Create and deploy applications

In the ThinkAgile CP Cloud Controller, **infrastructure admin** users and **VDC manager** users can create an application instance.

Application instances can be created using the following methods:

- Download a template from the Lenovo Cloud Marketplace, customize the template as needed, and deploy a new instance.
- Import a VM from a .VMDK, .VHD, .VHDx, .IMG, .OVA, .QCOW2, .QED, or .RAW as a template, and then use the template to create a new instance.
- Install a new instance from an ISO image or custom installer.

**Note:** Live DVDs are not supported.

- Create a new instance from an existing local or quick DR backup.

For more information refer to the following topics:

- [“Create an instance from a template” on page 29](#). Use a pre-defined template to quickly create and deploy an application instance. These instances function as thin-provisioned clones that share a common base image, reducing storage usage across a virtual datacenter.
- [“Import a VM to create a template” on page 33](#). Import a .VMDK, .VHD, .VHDx, .IMG, .OVA, .QCOW2, .QED, .or RAW file as a template and then use the template to create a new application instance.
- [“Create an instance from an installer” on page 37](#). Use an ISO file to create a new application instance.
- [“Create an instance from a backup” on page 42](#). Use an existing local or DR backup of an application to create a new instance.

## Create an instance from a template

**Infrastructure admin** users and **VDC manager** users can use a pre-defined template to quickly create and deploy an application instance. These instances function as thin-provisioned clones that share a common base image, reducing storage usage across a virtual datacenter.

**Note:** A number of pre-defined templates are offered in ThinkAgile CP Cloud Controller. You can use one of those templates to create a new application instance, or you can download more templates from the Lenovo Cloud Marketplace. For more information about the Lenovo Cloud Marketplace, see the following topic:

Complete the following steps to create an application instance from a template:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Download a template from the Lenovo Cloud Marketplace to the Organization Templates or the VDC Templates page.

For more information about the Lenovo Cloud Marketplace, see the following topic:

[“Use the Lenovo Cloud Marketplace” on page 110](#)

- Step 3. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps, depending on where the template was downloaded:
  - Expand **Applications** and click **Organization Templates** to view a list of the application templates in your organization. Then select the template you want, and click **New Instance**.
  - Expand a virtual datacenter to which you have access. Click **VDC Templates** and select the template you want. Then click **New Instance**.
- Step 4. In the New instance from Template dialog, enter the instance properties, virtual datacenter settings, and resource settings for deploying this application instance.

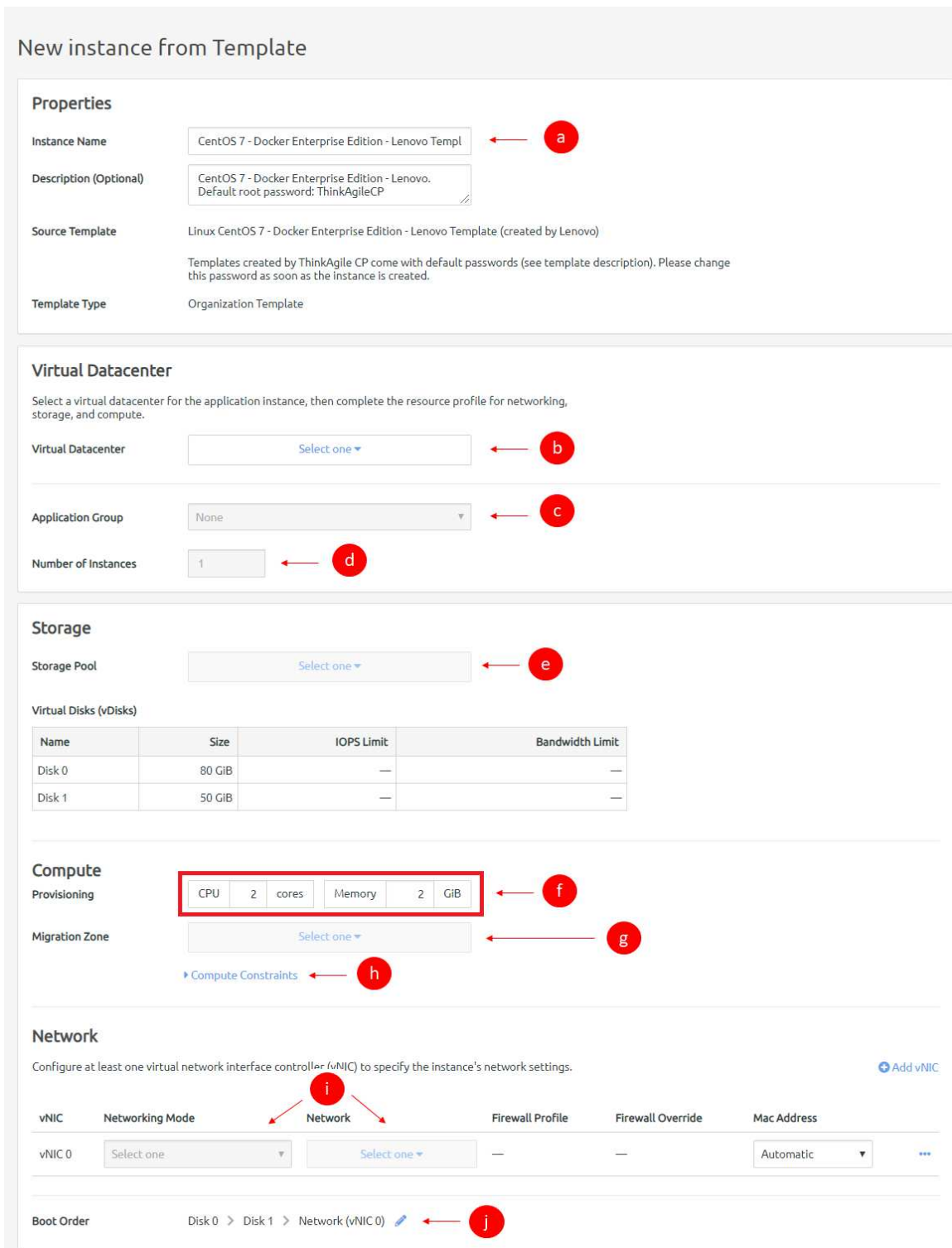


Figure 28. New instance from Template dialog

- a. Enter a name (required) and a description (optional) for the new application instance. The new name must be unique across all application instances in the associated virtual datacenter.



- b. Select the virtual datacenter where the instance should reside and get its resources. The virtual datacenter selection determines the migration zone and storage pool resources available for the application instance.
- c. You can select an application group (which are used to organize application instances in a virtual datacenter) and then specify the number of instantiations you want to include in this group.

For more information about application groups, see the following topic:

[“Managing application groups” on page 232](#)

- d. If you want to create more than one instance, enter the number of instances to be created.
- e. Select a storage pool for the application instance resources. (Note that virtual disk information as defined by the template is shown but cannot be modified during instance creation from a template. You may view IOPS and bandwidth limits from the instance vDisk, but you may not edit the values.)
- f. Select the VM provisioning for this instance by specifying the CPU (number of cores) and memory in GB.
- g. Select the migration zone from which the application instance will get its compute resources.
- h. If the instance requires a specific compute category or tag, expand compute constraints and add the category and tags.
- i. Select a networking mode for the instance as either VNET or VLAN for each vNIC and select a virtual network from the drop-down menu.
- j. Edit the boot order if needed. The application instance will attempt to boot in the sequence you define.

Step 5. In the Instance Settings section, configure the settings:

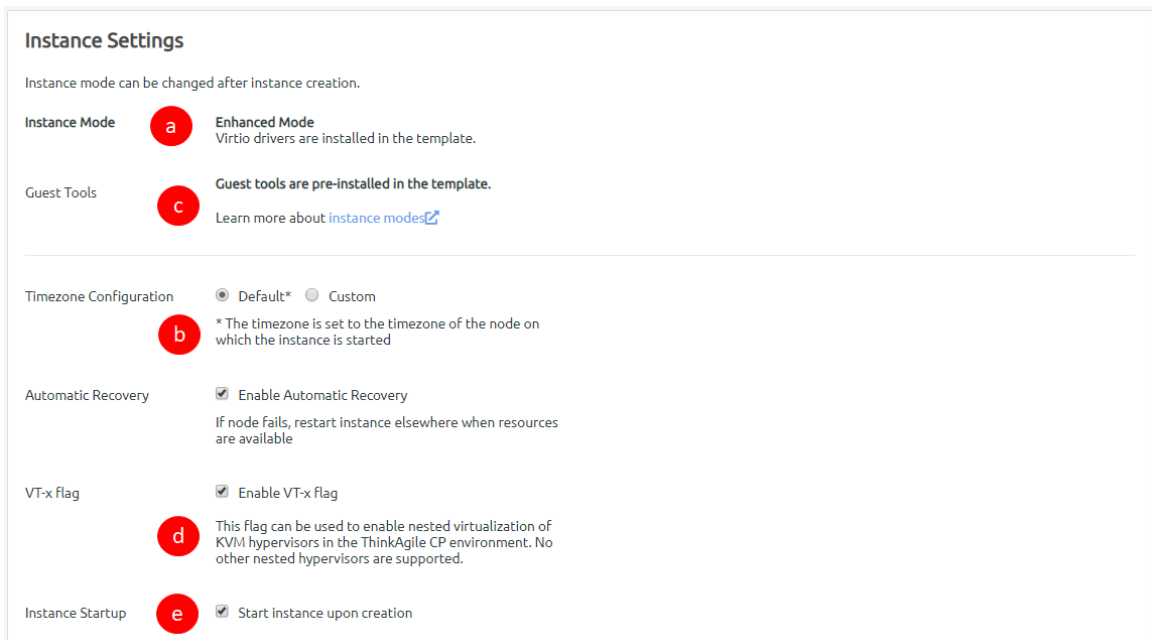


Figure 29. New Instance from Template - instance settings

- a. Guest tools may be installed in some application instances, and you can define related settings here. Select one of the following modes.

**Note:** Most users should select Compatibility mode. You should only select Enhanced mode if the template was created with VirtIO drivers installed. The instance mode is read-only for a new instance created from a ThinkAgile CP template. For more information about these modes, see the following topic:

[“Understand instance modes” on page 67](#)

1. **Compatibility Mode** - All instances can boot in this mode.
  2. **Enhanced Mode** - Virtio drivers must be installed to boot in this mode.
- b. For Timezone Configuration, select one of the following.
1. **Default** - The time zone is set to the time zone of the node on which the instance starts.
  2. **Custom** - You can set the time zone for the application instance by selecting the time zone area and location.

**Note:** Linux instances should use Default or the UTC time zone, rather than a custom local time zone.

- c. Select the **Enable Automatic Recovery** checkbox to enable automatic recovery, which specifies to restart the instance where resources are available if the node fails.
- d. Select the **Enable VT-x flag** checkbox to enable nested virtualization of KVM hypervisors in your ThinkAgile CP environment.
- e. If you do not want the instance to start upon creation, clear the checkbox near the bottom of this page (Start instance upon creation is enabled by default).

Step 6. Click **Create Instance**.

Step 7. To view the application instance, expand your VDC in the left navigation and click VDC Instances. The instance will appear in the list.

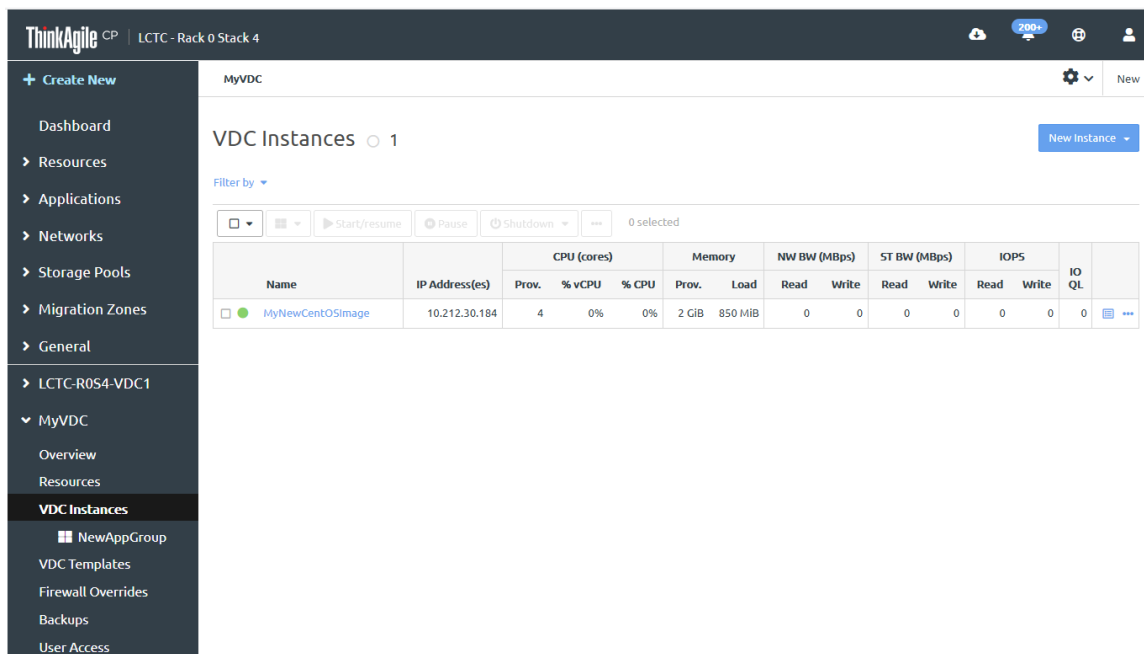


Figure 30. VDC instances page

Step 8. Click the instance to display the details about the instance, such as the CPU and memory usage.

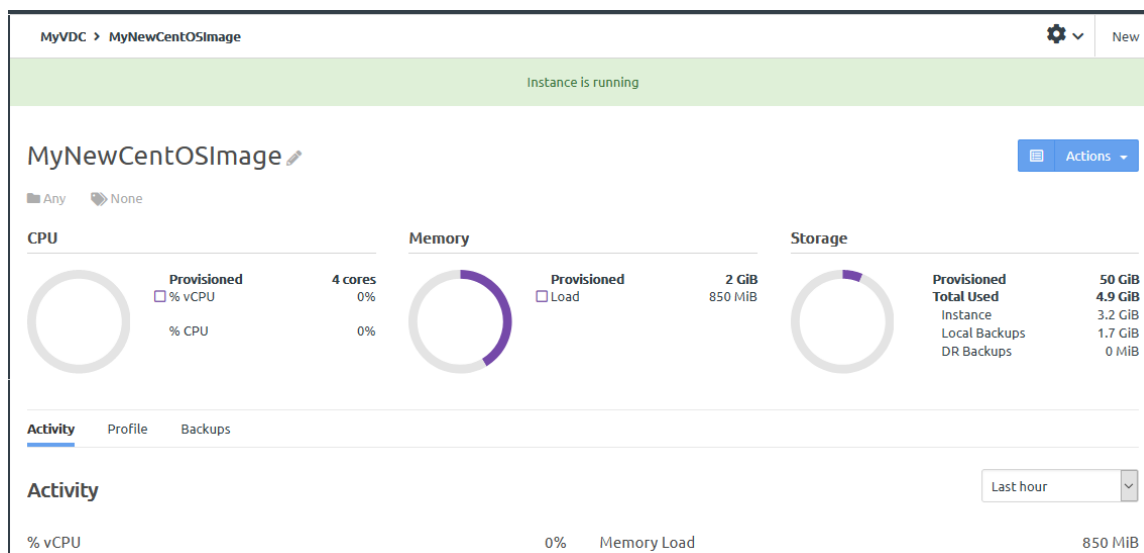


Figure 31. VDC instances page

For more information about the application instance details page and the Activity tab, see the following topic:

[“View application instance details” on page 80](#)

**Important:** Before ThinkAgile CP, Release 5.1.4, some Microsoft Windows templates in the Lenovo Cloud Marketplace included drivers that could cause issues when migrating VMs that were created from those templates. If you create an instance from the Microsoft Windows 10 template (Pro or Enterprise), Microsoft Windows Server 2016 template, or Microsoft Windows Server 2019 template that was dated before September, 2020, you need to delete some drivers to avoid having issues during migration. For details about deleting the relevant drivers, see [“Issues when migrating Windows VMs” on page 365](#).

## Import a VM to create a template

Infrastructure admin users and VDC manager users can import a VM in several formats: VMDK, .VHD, .VHDx, .IMG, .OVA, .QCOW2, .QED, .or RAW files for import. The VM files must be located on an NFS or CIFS share.

**Note:** Imported VMs are saved as templates in ThinkAgile CP.

For more information about setting up a share so that a VM can be imported, see the following topic:

[“Allow share access for importing a VM” on page 107](#)

Complete the following steps to create a new application template by importing a VM:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps, depending on your user role:
  - Expand **Applications** and click **All Instances**. On the top right of the Application Instances page, click **New Instance** → **Import VM**.
  - Expand **Applications** and click **Organization Templates**. AT the top right of the Organization Templates page, click **Import VM**.
  - Under a selected virtual datacenter, click **VDC Instances** At the top right of the page, click **New Instance** → **Import VM**.

- Under a selected virtual datacenter, click **VDC Templates**. At the top right of the page, click **Import VM**.

Step 3. Fill in the details on the Import VM page.

ThinkAgile CP | 201.1 - BLR Dev Lab - QA Production

200+

+ Create New

- Dashboard
- Resources
  - Hardware
  - Mappings
  - Allocations
  - Nodes
- Applications
  - All Instances 17
  - Organization Templates
- Networks
- Storage Pools
- Migration Zones
- General
  - Event Log
  - Notification Settings
  - Compute Categories
  - Compute Tags
  - User Management
  - Developer Options
  - Organization Settings

## Import VM

Save to: Select one ← a

### Template Properties

Template Name:  ← b

Description (Optional):

Provisioning: CPU 2 cores Memory 2 GiB ← c

### VM Properties

VM OS Type: Select one ← d

VM OS Version: Select one

### Virtual Disks

Select the root virtual disk files (vmdk, vhd, vhdx, ova, img, raw, vdi, qed or qcow2) of the VM you wish to import.

**NOTE:** The external share must be accessible by compute nodes and storage controllers on the hypervisor network. Please contact your Infrastructure administrator for more information about your hypervisor IP range.

← e

**Examples:**

- ✓ Select VM <VM disk name>.vmdk (root file)
- ✗ Do not select <VM disk name>-FXXX.vmdk
- ✗ Do not select <VM disk name>-sXXX.vmdk

### VM Settings

Virtio Drivers

VM does not have virtio drivers installed  
Application Template will be set to compatibility mode. ← f

VM has virtio drivers installed  
Application Template will be set to enhanced mode.

Virtio drivers are required for an instance to boot in enhanced mode.

**NOTE:** If virtio drivers are available for this VM's OS, they can be installed using ThinkAgile CP guest tools after instance creation.

[View full instructions](#)

Sysprep

Partial Sysprep  
Resets the hostname and resets the network to DHCP. ← g

Full Sysprep  
Resets hostname and other identifiable information of the VM. Network mode will be set to DHCP.

Figure 32. Import VM page

- a. From the drop-down list, select the location to which to save the template. You can select **Organization Templates** or a virtual datacenter template store to which you have access.
- b. Enter a name for this new template. You can also enter an optional description.
- c. Enter the number of CPU cores and the amount of memory in GB to allocate to this template.
- d. Select the operating system for the VM, as well as the version and edition as required.
  - You can select the VM OS Type as either BSD, Linux, Other, or Windows.
  - For BSD VM OS type, choose FreeBSD 10.3 or Other for VM OS Version.
  - For Linux VM OS type, choose Enterprise Linux 6/7, Ubuntu 16.04, or Other.
  - For Other VM OS type, choose FreeNAS 9.10, Netscaler, or Other.
  - For Windows VM OS type, choose Other, Windows 7, Windows 8, Windows 8.1, Windows 10, Windows Server 2008R2, Windows Server 2012, Windows Server 2012R2, Windows Server 2016, or Windows Server 2019 for the VM OS Version
- e. Click **Select Virtual Disk Files** to select the root virtual disk files (vmdk, vhd, vhdx, ova, img, raw, vdi, qed or qcow2) of the VM you want to import.
  1. In the Select Virtual Disk Files dialog box, select NFS or CIFS, as appropriate, enter the required information so that ThinkAgile CP Cloud Controller can connect to the external store where the VMs are located, and click **Connect**. A list of files at this location will be displayed.

Figure 33. Select Virtual Disk Files page

2. Select the root disk files to import; then click **Add Selected**.
- f. Under VM Settings, select one of the following options to configure virtio drivers.
    - **VM does not have virtio drivers installed.** The application template will be set to Compatibility mode.
    - **VM has virtio drivers installed.** The application template will be set to Enhanced mode.

**Note:** Virtio drivers are required for Enhanced mode. If virtio drivers are available for the VM OS, they can be installed using ThinkAgile CP guest tools after instance creation. The instance mode defaults to compatibility mode (no virtio drivers) when importing a VM. For more information about guest tools and instance modes, see the topic, [“Manage instance modes and guest agents” on page 67](#).

- g. Select one of the following options to configure sysprep.
- **Partial Sysprep.** Resets the host name and resets the network to DHCP.
  - **Full Sysprep.** Resets the host name and other identifiable information of the VM. The network mode is set to DHCP.

Step 4. Click **Save As Application Template** to create an application template from the imported file. Select the template store where the template is to be made available (Organization template or VDC template store).

After the application template is created, you can view it in your list of templates in the selected template store. To create an application instance from the template, see the following topic:

[“Create an instance from a template” on page 29](#)

**Note:** When creating an instance from a VMDK template, the machine name, domain membership, and drive mapping might change.

## Create an instance from an installer

**Infrastructure admin** users and **VDC manager** users can create an application instance from an ISO image.

Complete the following steps to create an application instance from an ISO image:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user or a **VDC manager** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps, depending on your user role:
- Expand **Applications** and click **All Instances**. At the top right of the Application Instances page, click **New Instance → New instance from installer**.
  - Under a selected virtual datacenter, click **VDC Instances**. At the top right of the page, click **New Instance → New instance from installer**.
- Step 3. Fill in the information for properties, VDC, and resources in the New instance from installer dialog.

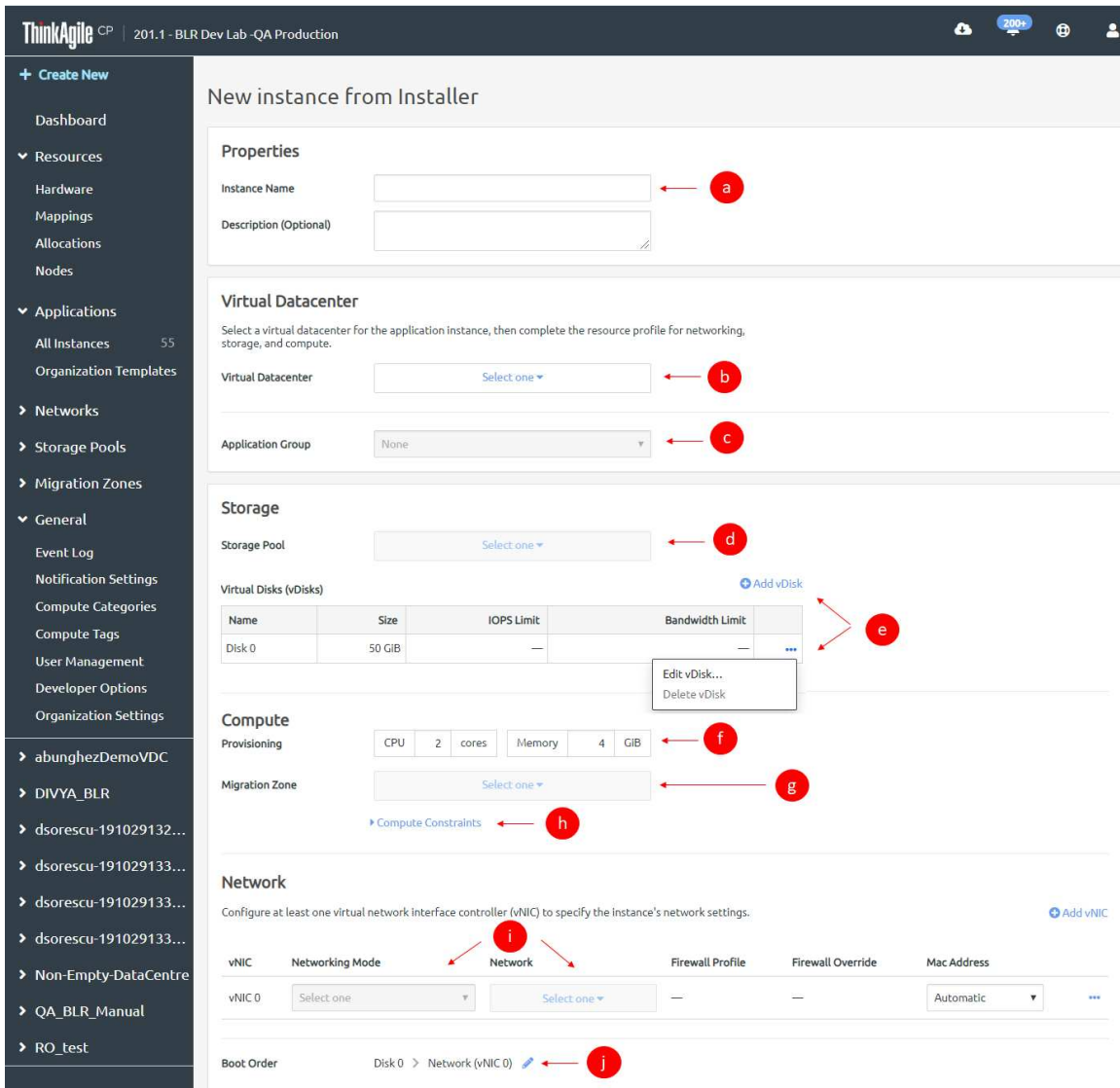


Figure 34. New instance from installer dialog - Properties, Virtual Datacenter settings, Resource settings

- a. In the Properties section, enter a name for your instance (required), and add a description (optional) for the new instance. The new name must be unique across all application instances in the associated virtual datacenter.
- b. In the Virtual Datacenter section, select the virtual datacenter where the instance should reside and get resources. The virtual datacenter selection determines the migration zone and storage pool resources available for the application instance.
- c. Optionally, select an application group (which is used to organize application instances in a virtual datacenter) and then specify the number of instances that you want to include in this group.

For more information about application groups, see the following topic:

[“Managing application groups” on page 232](#)

- d. In the Storage section, select a storage pool to be used by the application instance.



- e. Add a vDisk or modify vDisk settings as needed. Click **Edit vDisk** to display the Edit vDisk dialog.

For more information about adding a vDisk to an instance, see the following topic:

[“Add a vDisk” on page 48](#)

The screenshot shows the 'Edit vDisk' dialog box. The title bar reads 'Edit vDisk'. Below the title bar, the subtitle is 'Enter details for the vDisk'. The dialog contains the following fields and controls:

- vDisk Name:** A text input field containing the text 'Disk 0'.
- vDisk Size:** A text input field containing the number '50' and a unit dropdown menu set to 'GIB'.
- IOPS Limit:** A dropdown menu with 'None' selected.
- Bandwidth Limit:** A dropdown menu with 'None' selected.

At the bottom right of the dialog, there are two buttons: 'Cancel' and 'Save'.

Figure 35. Edit vDisk

In the Edit vDisk dialog, modify the vDisk name if needed, and enter a size in GiB. Optionally, set the IOPS and bandwidth limits:

1. In the IOPS Limit drop-down, click **Custom**, and then enter a value for IO per sec. (The minimum value is 50.)
2. In the Bandwidth Limit drop-down, click **Custom**, and then enter a value for MBps. (The minimum value is 5.)

**Note:** Setting these limits is useful for Quality of Service (QoS) monitoring and maintaining performance predictability of running workloads. (IOPS and bandwidth limits are unlimited by default.) Storage QoS limits ensure that the application instance does not consume more than the specified limit of IOPS or bandwidth. Other factors, including your specific workload and other workloads running on the storage block, may prevent your application instance from reaching these limits.

- f. Define the VM provisioning for this instance by specifying the CPU (number of cores) and memory in GB.
- g. Select the migration zone from which the application instance will get its compute resources.
- h. If the instance requires a specific compute category or tag, expand Compute Constraints and add the category and tags.
- i. Select a networking mode for the instance and select a virtual network from the drop-down menu.
- j. Edit the boot order if needed. The application instance will attempt to boot in the sequence you define.

Step 4. In the Installer section, complete the following steps:

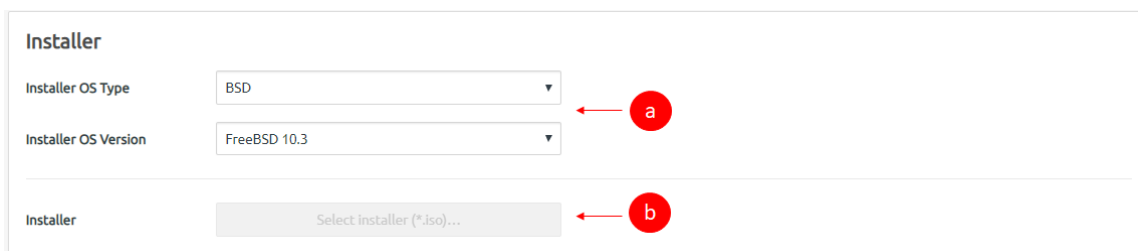


Figure 36. New Instance from Installer page - Installer settings

- a. Select the operating system for the VM, as well as the version and edition as required.
  - You can select the VM OS Type as either BSD, Linux, Other, or Windows.
  - For BSD VM OS type, choose FreeBSD 10.3 or Other for VM OS Version.
  - For Linux VM OS type, choose Enterprise Linux 6/7, Ubuntu 16.04, or Other.
  - For Other VM OS type, choose FreeNAS 9.10, Netscaler, or Other.
  - For Windows VM OS type, choose Other, Windows 7, Windows 8, Windows 8.1, Windows 10, Windows Server 2008R2, Windows Server 2012, Windows Server 2012R2, Windows Server 2016, or Windows Server 2019 for the VM OS Version.

**Note:** If you select Windows, you will have the option to also upload an answer (.xml) file to include in the instance for Windows OS full sysprep.
- b. Click **Select Installer**. In the Select Installer dialog, set up an NFS or CIFS share and copy the ISO to it. The share must be accessible by the compute nodes.

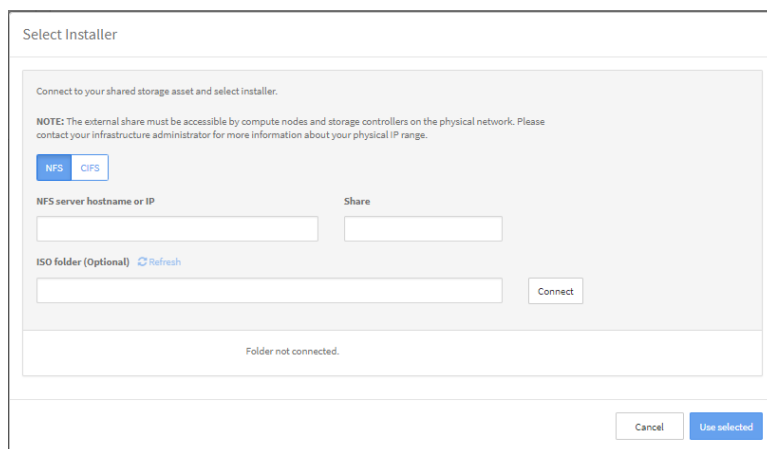


Figure 37. Select Installer dialog box

**Note:** Shares with special characters in the name are not currently supported. On the Nodes page, the compute node IPs will be listed. Since the compute node IPs are assigned via DHCP, and not statically, they are subject to change. If only those IPs are given access to the share, or if they change, additional access will have to be granted. Because of this, ThinkAgile CP recommends granting the whole subnet access to the share. On the Hardware page, you can click **Show Network Settings**. The IP range under Router Physical Network is the range of IPs that could be assigned to the compute nodes. Granting access to the share from this range will allow consistent access to the share from ThinkAgile CP Cloud Controller.

For more information about making a share accessible, see the following topic:

[“Allow share access for importing a VM” on page 107](#)

Step 5. In the Instance Settings section, configure the settings to be used for the instance.

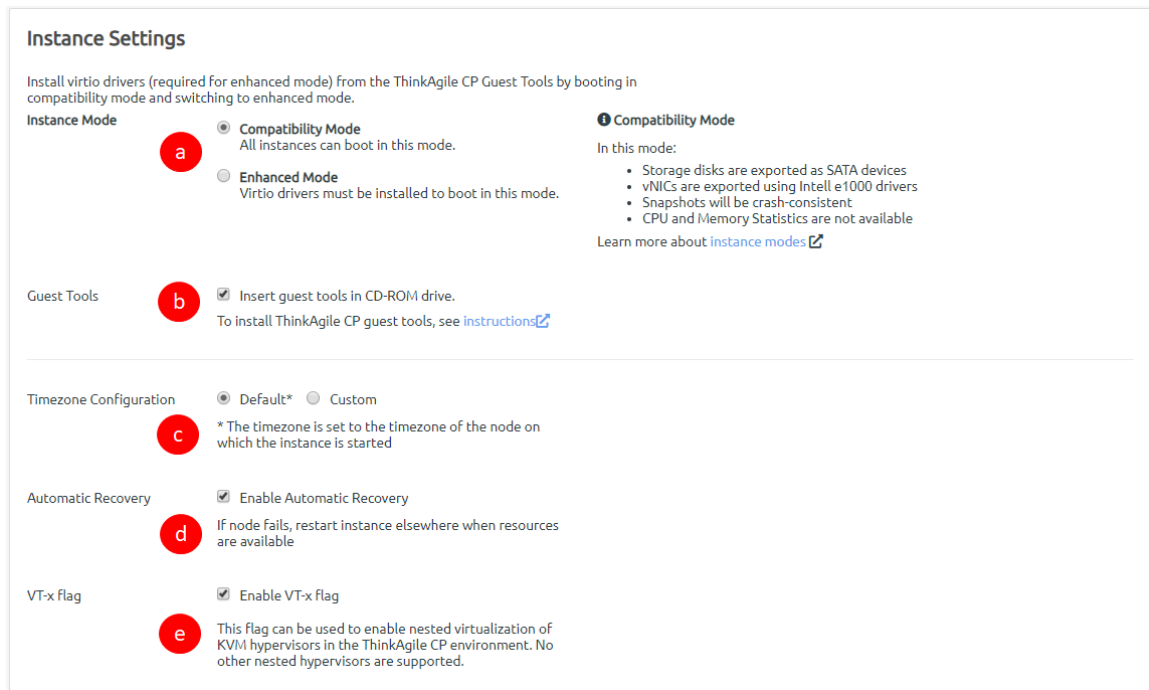


Figure 38. New instance from installer page - Instance settings

a. Choose one of the following instance modes.

**Note:** The instance mode defaults to compatibility mode (no virtio drivers) when creating an instance from an installer. Most users should select Compatibility mode. You should only select Enhanced mode if the ISO was created with VirtIO drivers installed. For more information about these modes, see the following topic:

[“Understand instance modes” on page 67](#)

1. **Compatibility Mode.** All instances can boot in this mode.
2. **Enhanced Mode.** Virtio drivers must be installed to boot in this mode.

b. Click **Insert guest tools in CD-ROM** to insert guest tools.

c. For Timezone Configuration, choose one of the following.

1. **Default.** The time zone is set to the time zone of the node on which the instance starts.
2. **Custom.** You can set the time zone for the application instance by selecting the time zone area and location.

**Note:** Linux instances should use Default or the UTC time zone, rather than a custom local time zone.

d. Click **Enable Automatic Recovery** to enable automatic recovery, which specifies to restart the instance where resources are available if the node fails.

e. Click **Enable VT-x flag** to enable nested virtualization of KVM hypervisors in your ThinkAgile CP environment.

- Step 6. Click **Create Instance**.
- Step 7. After the instance is created, open a console to it, and complete the installation wizard.
- Step 8. Force shut down the instance, or shut it down from within the instance OS. This will remove the installation ISO from the instance on the next boot.
- Step 9. Start the instance.
- Step 10. To install guest tools and switch to Enhanced mode, see the following topic:

[“Install guest agent tools” on page 68](#)

## Create an instance from a backup

ThinkAgile CP allows you to easily create an instance from an existing local backup, a quick DR backup, or an external backup. The newly created instance is in the same state as the original instance when the backup was taken.



For complete instructions about creating an instance from a backup, see the following topics:

- [“Create an instance from a local backup” on page 278](#)
- [“Restore or start an instance from a quick DR backup” on page 298](#)
- [“Restore an instance from an external backup” on page 313](#)

## Manage application instances

**VDC manager** users can manage the application instances in the virtual datacenters to which they have access. **Infrastructure admin** users can manage all application instances.

Complete the following steps to manage an application instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps:
  - Expand Applications and click **All Instances**. On the Application Instances page, go to the row for the instance, and click the Actions menu (  ).
  - Expand the virtual datacenter where the instance is located and click **VDC Instances**. On the VDC Instances page, go to the row for the instance, and click the Actions menu (  ).

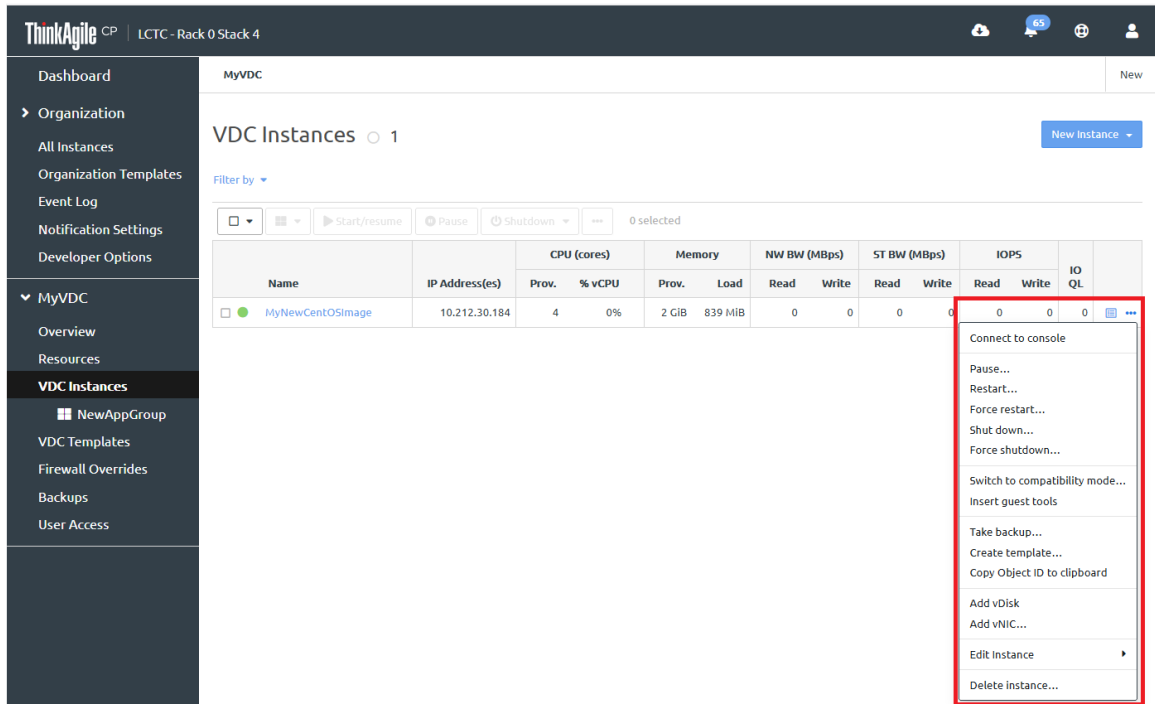


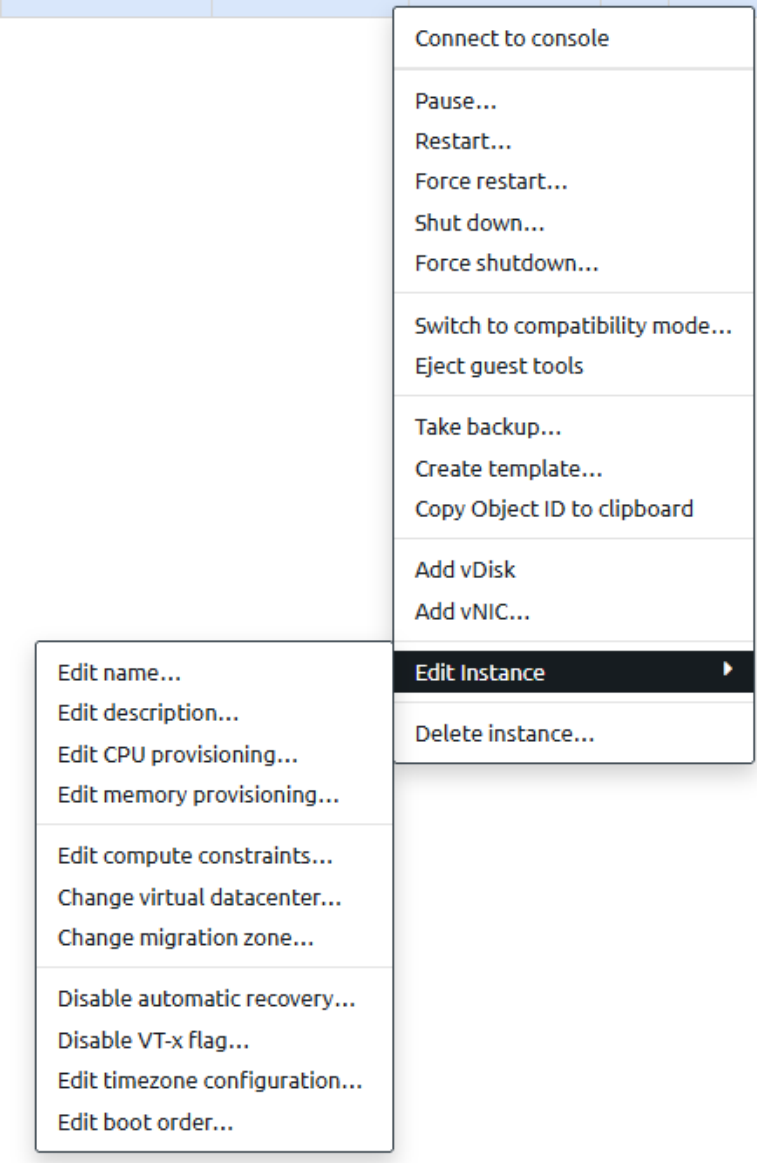
Figure 39. Application instance Actions menu

You can perform the following actions for a application instance:

Action	Description
Connect to console	<p>Click <b>Connect to console</b> to establish a session with the application instance console.</p> <p>The Cloud Controller will create a secure VNC connection to the instance and open the console in a new window. For the console to open, the firewall must allow incoming connections from the internal network to the compute node's (Router physical network) through ports TCP 1024-49151, inclusive.</p>
Pause	<ol style="list-style-type: none"> <li>1. Click <b>Pause</b> to stop an instance from running temporarily.</li> <li>2. In the Pause confirmation dialog, click <b>Pause instance</b>.</li> </ol> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, and clicking <b>Pause</b> at the top of the table.</p>
Resume	<p>Click <b>Resume</b> to resume an instance that had been paused previously.</p> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, and clicking <b>Start/Resume</b> at the top of the table.</p>
Start	<p>Click <b>Start</b> to start an instance.</p> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, and clicking <b>Start/Resume</b> at the top of the table.</p>

Action	Description
Restart	<ol style="list-style-type: none"> <li>1. Click <b>Restart</b> to stop and then restart an instance.</li> <li>2. In the Restart Instance confirmation dialog, click <b>Restart Instance</b>.</li> </ol> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, clicking <b>Shutdown</b> at the top of the table, and then clicking <b>Restart</b>.</p>
Force restart	<ol style="list-style-type: none"> <li>1. Click <b>Force Restart</b> to forcibly stop and then restart an instance.</li> <li>2. In the Force Restart Instance confirmation dialog, click <b>Force Restart Instance</b>.</li> </ol> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, clicking <b>Shutdown</b> at the top of the table, and then clicking <b>Force restart</b>.</p>
Shut down	<ol style="list-style-type: none"> <li>1. Click <b>Shut down</b> to stop an instance.</li> <li>2. In the Shut down confirmation dialog, click <b>Shut Down Instance</b>.</li> </ol> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, clicking <b>Shutdown</b> at the top of the table.</p>
Force shutdown	<ol style="list-style-type: none"> <li>1. Click <b>Shut down</b> to forcible stop an instance.</li> <li>2. In the Force shut down confirmation dialog, click <b>Force Shut Down Instance</b>.</li> </ol> <p><b>Note:</b> This can also be done as a bulk-action by selecting multiple instances from the Application Instances page, clicking <b>Shutdown</b> at the top of the table and then clicking <b>Force Shutdown</b></p>
Switch to compatibility mode	<ol style="list-style-type: none"> <li>1. Click <b>Switch to compatibility mode</b> to toggle the instance mode from enhanced mode to compatibility mode.</li> <li>2. In the Switch to Compatibility Mode dialog, click <b>Switch Mode</b>.</li> </ol> <p><b>Note:</b> The application instance must be shut down before switching the mode.</p> <p>For more information about application instance modes, see the following topic:  <a href="#">“Understand instance modes” on page 67</a></p>
Switch to enhanced mode	<ol style="list-style-type: none"> <li>1. Click <b>Switch to enhanced mode</b> to toggle the instance mode from enhanced mode to compatibility mode.</li> <li>2. In the Switch to Enhanced Mode dialog, click <b>Switch Mode</b>.</li> </ol> <p><b>Note:</b> The application instance must be shut down before switching the mode.</p> <p>For more information about application instance modes, see the following topic:  <a href="#">“Understand instance modes” on page 67</a></p>
Insert guest tools	<p>Click <b>Insert guest tools</b> to install the Guest Agent.</p> <p>For more information about guest tools, see the following topic:  <a href="#">“Install guest agent tools” on page 68</a></p>

Action	Description
Eject guest tools	<p>Click <b>Eject guest tools</b> to install the Guest Agent.</p> <p>For more information about guest tools, see the following topic:</p> <p><a href="#">“Install guest agent tools” on page 68</a></p>
Take backup	<p>Click <b>Take backup</b> to create a local backup of the instance.</p> <p>For more information about local backups, see the following topic:</p> <p><a href="#">“Manage local backups for an application instance” on page 269</a></p>
Create template	<p>Click <b>Create template</b> to create a template from the application instance.</p> <p>For more information about creating a template from an instance, see the following topic:</p> <p><a href="#">“Create an instance from an installer” on page 37</a></p>
Copy Object ID to clipboard	<p>Click <b>Copy Object ID to clipboard</b> to make a copy of the object ID, which can be used with the ThinkAgile CP Web Services API.</p> <p>For more information about the ThinkAgile CP Web Services API, see the following topic:</p> <p><a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/web-services-api.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/web-services-api.html</a></p>
Add vDisk	<ol style="list-style-type: none"> <li>1. Click <b>Add vDisk</b> to add a virtual disk.</li> <li>2. In the New vDisk dialog, enter the name and size. You can also enter limits for IOPS and bandwidth, if necessary.</li> <li>3. Click <b>Add vDisk</b> to add the vDisk.</li> </ol> <p>For more information about working with vDisks, see the following topic:</p> <p><a href="#">“Work with vDisks” on page 48</a></p> <p><b>Watch and learn</b></p> <p><a href="#">Add a vNIC and a vDisk to an existing VM instance</a></p>
Add vNIC	<ol style="list-style-type: none"> <li>1. Click <b>Add vNIC</b> to add a virtual NIC.</li> <li>2. In the New vNIC dialog, enter the name, networking mode (VNET or VLAN), and network details.</li> <li>3. Click <b>Add vNIC</b> to add the vNIC.</li> </ol> <p><b>Note:</b> The application instance must be shut down before adding a vNIC.</p> <p><b>Watch and learn</b></p> <p><a href="#">Add a vNIC and a vDisk to an existing VM instance</a></p>

Action	Description
Edit instance	<p>Click <b>Edit instance</b> to make changes to the details for an instance. You can choose to edit the following information:</p>  <p>For more information about the meaning of these attributes, see the following topic:</p> <p><a href="#">“Create an instance from a template” on page 29</a></p>
Delete instance	<ol style="list-style-type: none"> <li>1. Click <b>Delete instance</b> to delete the application instance.</li> <li>2. In the Delete instance confirmation dialog, decide whether you want to delete the instance and all backups, or delete the instance and retain the replicated backups (quick DR backups and external backups).</li> <li>3. Click <b>Delete Instance</b></li> </ol> <p>For example, assume that you want to delete the instance External Backup - Ubuntu-19.04.1. The instance has quick DR backups and external backups:</p>



Action	Description																																																												
	<p>Resources</p> <table border="1"> <thead> <tr> <th>Application Instance</th> <th>Latest Backup</th> <th>Total backups</th> <th>Local</th> <th>Quick DR</th> <th>Quick DR Repository</th> <th>External</th> <th>External Repository</th> </tr> </thead> <tbody> <tr> <td>CentOS 7.5 (64-bit) - Lenovo ...</td> <td>Feb 10, 2021 2:56 AM</td> <td>6</td> <td>4</td> <td>—</td> <td>—</td> <td>2</td> <td>My Backup Repo, MyAmazon...</td> </tr> <tr style="border: 2px solid red;"> <td>External Backup - Ubuntu-18...</td> <td>Feb 10, 2021 3:16 AM</td> <td>9</td> <td>2</td> <td>4</td> <td>RO 150.3 Pool</td> <td>3</td> <td>My Backup Repo</td> </tr> <tr> <td>New Manual Backup 4 - CentOS</td> <td>Feb 09, 2021 3:34 PM</td> <td>1</td> <td>1</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>Ubuntu-18.04.1 - Lenovo Tem...</td> <td>Feb 09, 2021 3:49 PM</td> <td>15</td> <td>5</td> <td>5</td> <td>RO 150.3 Pool</td> <td>5</td> <td>My Backup Repo</td> </tr> </tbody> </table> <p><i>Figure 40. Resources section of the Backups page</i></p> <p>In the Delete Application Instance confirmation dialog, you click <b>Maintain replicated backups</b> and then click <b>Delete Application Instance</b>.</p> <div> <p>Delete Application Instance</p> <p>Are you sure you want to permanently delete application instance <b>External Backup - Ubuntu-18.04.1</b>?</p> <p>This instance has replicated backups. Choose what to do with backups currently at the replication site:</p> <p><input type="radio"/> Delete application instance, local backups, and replicated backups</p> <p><input checked="" type="radio"/> <b>Maintain replicated backups</b> Delete application instance and local backups but <b>RETAIN</b> replicated backups</p> <p>Cancel <span style="background-color: red; color: white; padding: 2px 10px;">Delete Application Instance</span></p> </div> <p><i>Figure 41. Delete application instance dialog</i></p> <p>The application instance is removed from the VDC instances page, but it remains in the Resources section of the Backups page. If you click the application instance in the Resources section, you see the following:</p> <div> <p>MyVDC &gt; Backups</p> <p>External Backup - Ubuntu-18.04.1 [Deleted]</p> <p>Backups Available</p> <p>Instance Profile</p> </div> <p><i>Figure 42. Deleted application instance details</i></p> <p>If you scroll down to the Backups section, you can choose to create a new instance from one of the backups:</p> <div> <p>Backups</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Time</th> <th>Locations</th> <th>Actions</th> </tr> </thead> <tbody> <tr> <td>Automatic Snapshot 3</td> <td>Feb 10, 2021 3:15 AM</td> <td></td> <td> </td> </tr> <tr> <td>Automatic Snapshot 2</td> <td>Feb 09, 2021 9:15 PM</td> <td></td> <td> </td> </tr> <tr> <td>Automatic Snapshot 1</td> <td>Feb 09, 2021 3:15 PM</td> <td></td> <td> </td> </tr> <tr> <td>Initial Application Snapshot</td> <td>Feb 09, 2021 10:37 AM</td> <td></td> <td> </td> </tr> </tbody> </table> <p><i>Figure 43. Deleted application instance details</i></p> <p>For more information about creating a new instance from a backup, see one of the following topics:</p> </div>	Application Instance	Latest Backup	Total backups	Local	Quick DR	Quick DR Repository	External	External Repository	CentOS 7.5 (64-bit) - Lenovo ...	Feb 10, 2021 2:56 AM	6	4	—	—	2	My Backup Repo, MyAmazon...	External Backup - Ubuntu-18...	Feb 10, 2021 3:16 AM	9	2	4	RO 150.3 Pool	3	My Backup Repo	New Manual Backup 4 - CentOS	Feb 09, 2021 3:34 PM	1	1	—	—	—	—	Ubuntu-18.04.1 - Lenovo Tem...	Feb 09, 2021 3:49 PM	15	5	5	RO 150.3 Pool	5	My Backup Repo	Name	Time	Locations	Actions	Automatic Snapshot 3	Feb 10, 2021 3:15 AM			Automatic Snapshot 2	Feb 09, 2021 9:15 PM			Automatic Snapshot 1	Feb 09, 2021 3:15 PM			Initial Application Snapshot	Feb 09, 2021 10:37 AM		
Application Instance	Latest Backup	Total backups	Local	Quick DR	Quick DR Repository	External	External Repository																																																						
CentOS 7.5 (64-bit) - Lenovo ...	Feb 10, 2021 2:56 AM	6	4	—	—	2	My Backup Repo, MyAmazon...																																																						
External Backup - Ubuntu-18...	Feb 10, 2021 3:16 AM	9	2	4	RO 150.3 Pool	3	My Backup Repo																																																						
New Manual Backup 4 - CentOS	Feb 09, 2021 3:34 PM	1	1	—	—	—	—																																																						
Ubuntu-18.04.1 - Lenovo Tem...	Feb 09, 2021 3:49 PM	15	5	5	RO 150.3 Pool	5	My Backup Repo																																																						
Name	Time	Locations	Actions																																																										
Automatic Snapshot 3	Feb 10, 2021 3:15 AM																																																												
Automatic Snapshot 2	Feb 09, 2021 9:15 PM																																																												
Automatic Snapshot 1	Feb 09, 2021 3:15 PM																																																												
Initial Application Snapshot	Feb 09, 2021 10:37 AM																																																												

Action	Description
	<ul style="list-style-type: none"> <li>Restore or start an instance from a quick DR backup</li> <li>Restore an instance from an external backup</li> </ul>

## Work with vDisks

You can add a vDisk, add a vDisk clone, resize a vDisk, and modify IOPS and bandwidth limits.

### Add a vDisk

**Infrastructure admin** users and **VDC manager** users can add additional virtual disks to an application instance.

Complete the following steps to add a vDisk to an application instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.

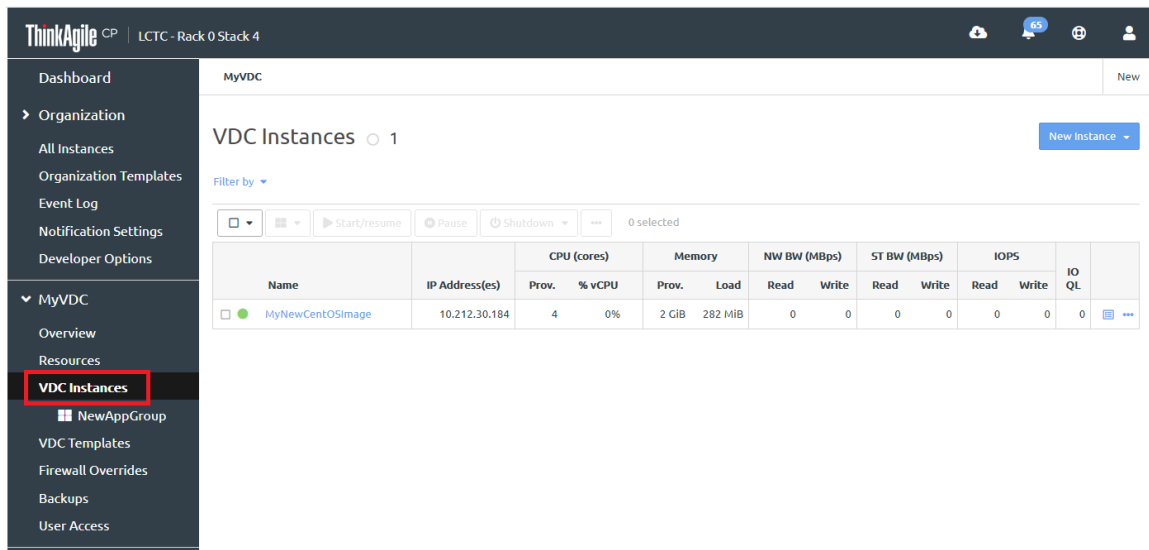


Figure 44. VDC instances page

- Step 3. Click the application instance to display the details for that instance. Then click the **Profile** tab.

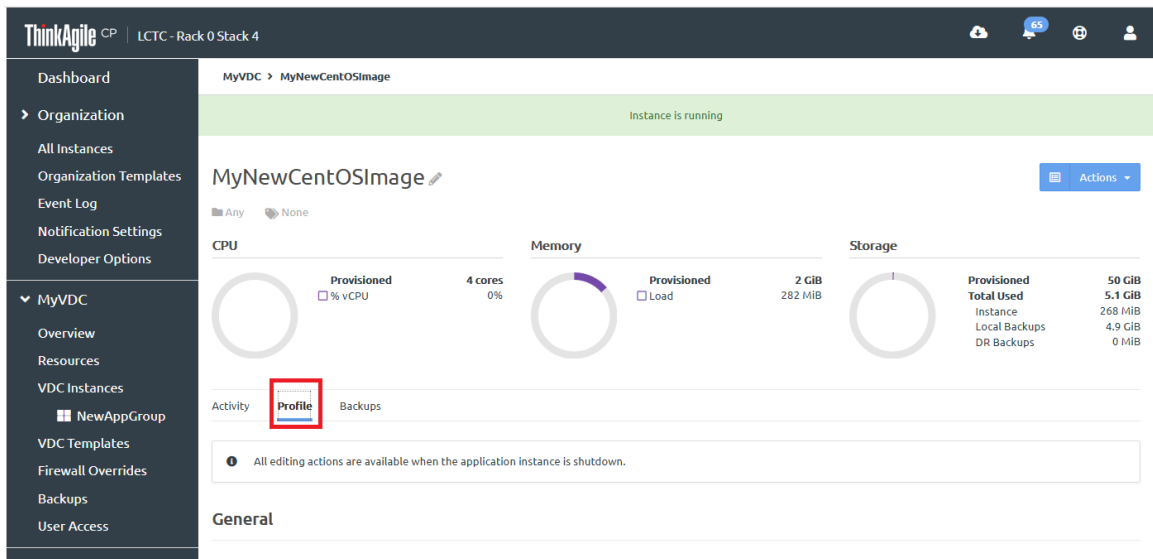


Figure 45. Profile tab

Step 4. Scroll down to the Storage section and click **Add vDisk** → **New vDisk**.

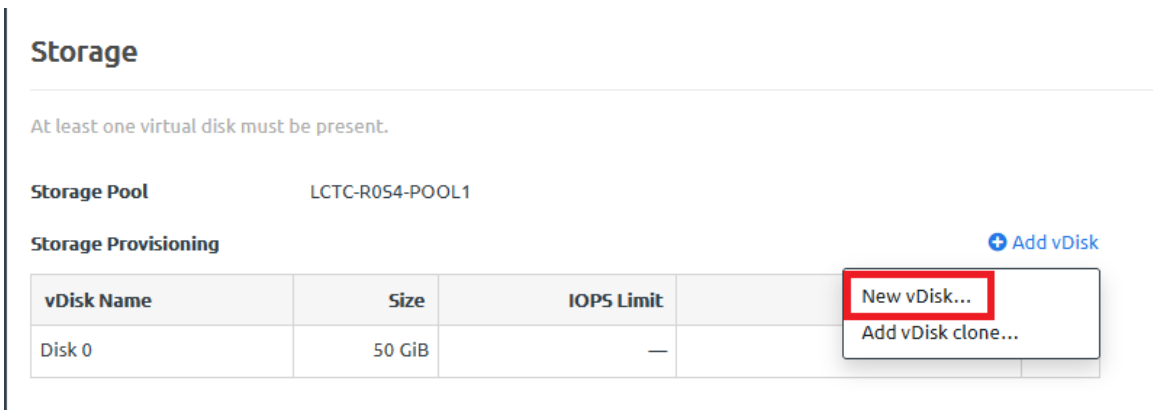


Figure 46. New vDisk option

Step 5. In the New vDisk dialog, enter the vDisk Name and size (in GiB).

**New vDisk**

Enter details for the new vDisk

**vDisk Name**

**vDisk Size**

Add custom limits if needed. IOPS and bandwidth are unlimited by default.

**IOPS Limit**

**Bandwidth Limit**

Figure 47. Add vDisk dialog box

Step 6. If needed, set IOPS and Bandwidth limits.

Setting these limits is useful for Quality of Service (QoS) monitoring and maintaining performance predictability of running workloads. (IOPS and bandwidth limits are unlimited by default.) Storage QoS limits ensure that the application instance does not consume more than the specified limit of IOPS or bandwidth. Other factors, including your specific workload and other workloads running on the storage block, may prevent your application instance from reaching these limits. When you update these limits, it may take some time for the system to respond; for example, it could take up to three to five minutes for you to see results.

For more information about working with IOPS and bandwidth limits, see the following topic:

[“Modify IOPS and bandwidth limits” on page 58](#)

Step 7. Click **Add vDisk**.

The vDisk is added to the application instance.

**Storage**

At least one virtual disk must be present.

**Storage Pool** LCTC-R054-POOL1

**Storage Provisioning** [+ Add vDisk](#)

vDisk Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
MyNewvDisk	10 GiB	—	—	...

Figure 48. New vDisk added to application instance

## Add a vDisk clone

Adding a vDisk clone from a backup is a way to attach the vDisk to an application instance from a backup of the application instance. **Infrastructure admin** users and **VDC manager** users can add a vDisk clone to an application instance.

For an overview about cloning and attaching vDisks, see the following topic:

[Clone and attach a vDisk](#)

You can also attach the vDisk from a backup of one application instance to a different application instance. For more information, see the following topic:

[“Attaching a vDisk to an instance from a backup from a different instance” on page 72](#)

Complete the following steps to add a vDisk clone to an instance from its own backup:

**Note:** As an alternative to the following procedure, you can attach a vDisk to an instance from the **Backups** tab. For more information, see the following topic: [“Attaching a vDisk to an instance from its own backup” on page 70](#)

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.

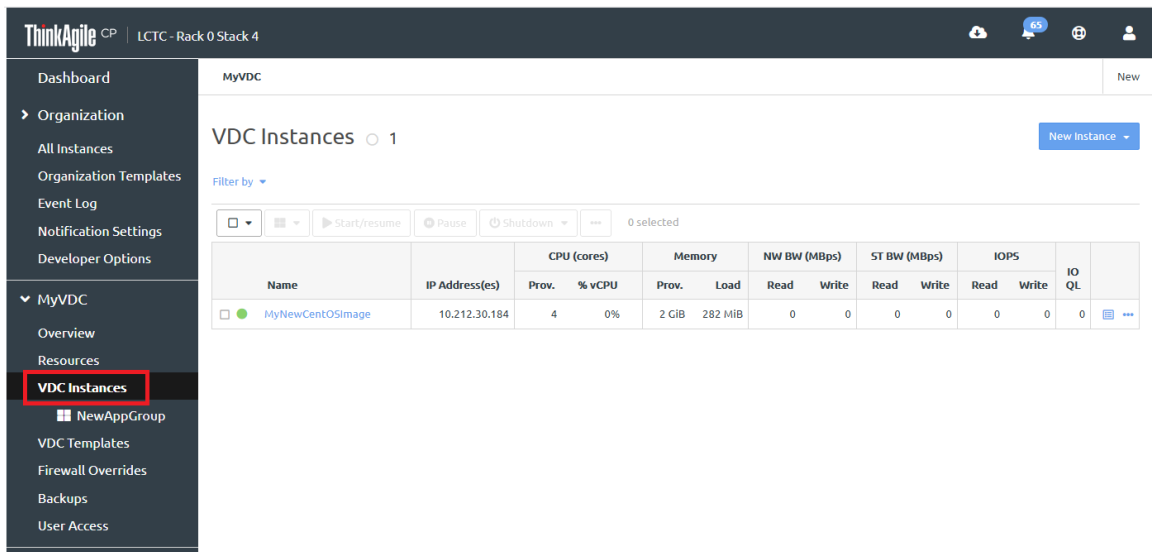


Figure 49. VDC instances page

- Step 3. Click the application instance to display the details for that instance. Then click the **Profile** tab.

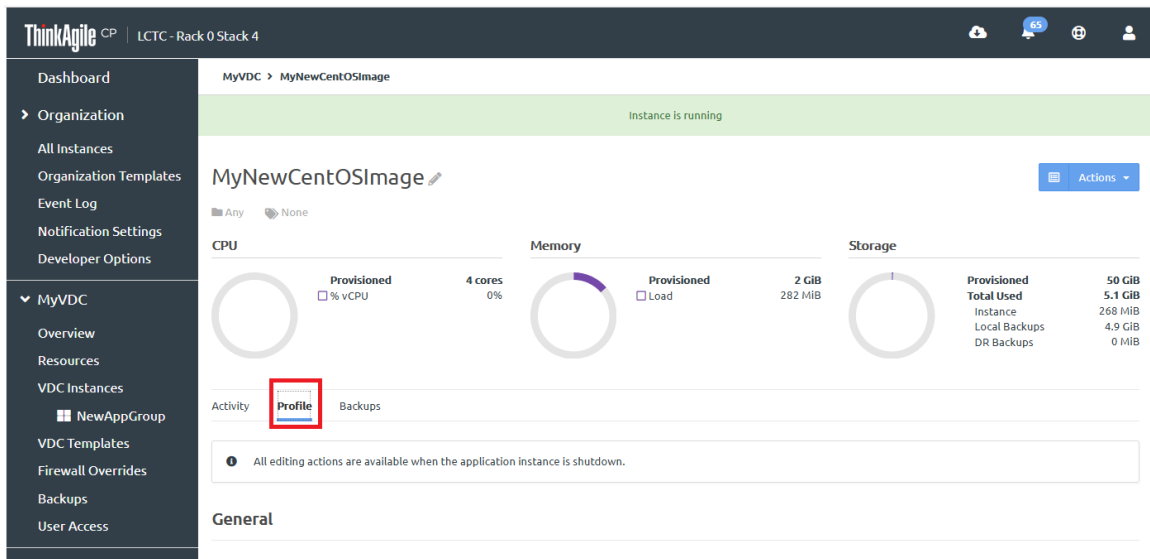


Figure 50. Profile tab

- Step 4. On the **Profile** tab for an application instance, scroll down to the Storage section and click **Add vDisk** → **Add vDisk clone**.

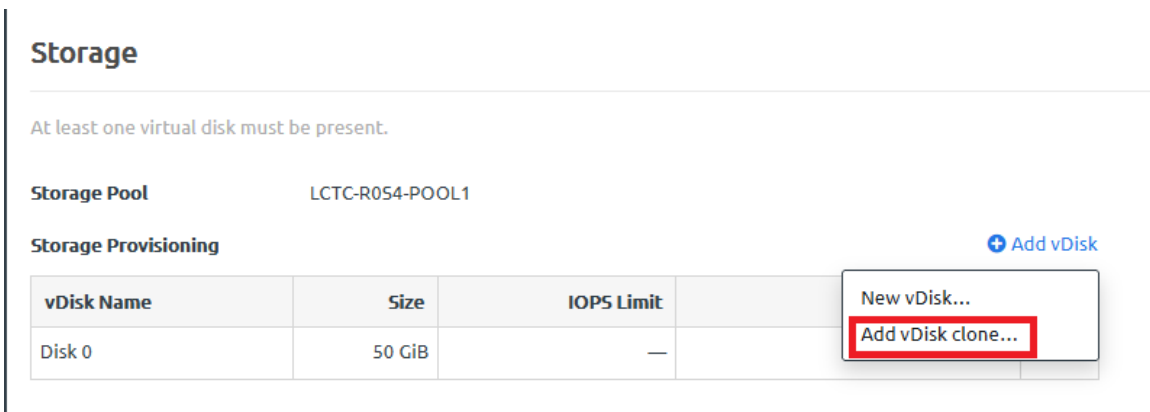


Figure 51. Add vDisk clone option

- Step 5. In the Add vDisk Clone dialog, choose from which backup to get the vDisk and a vDisk name.
- Click **Select vDisk**.

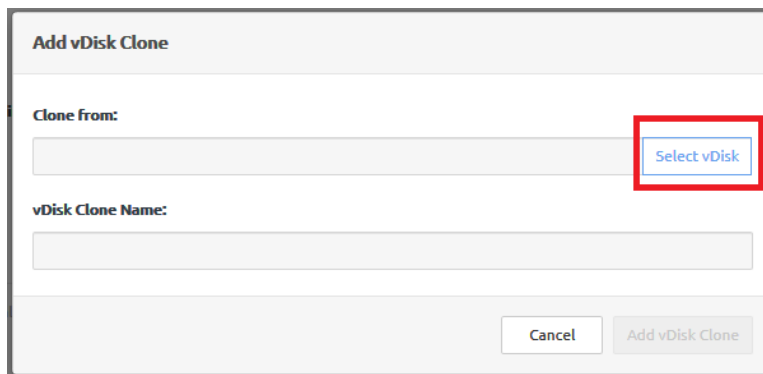


Figure 52. Add vDisk Clone dialog

- b. Click the backup from which to clone a vDisk.

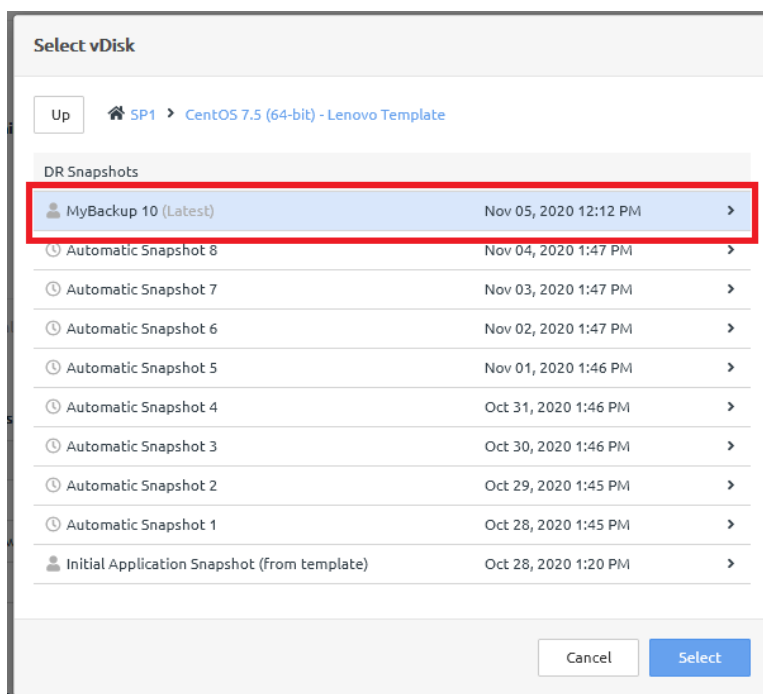


Figure 53. Select a vDisk

- c. Click the vDisk to be cloned and then click **Select**.

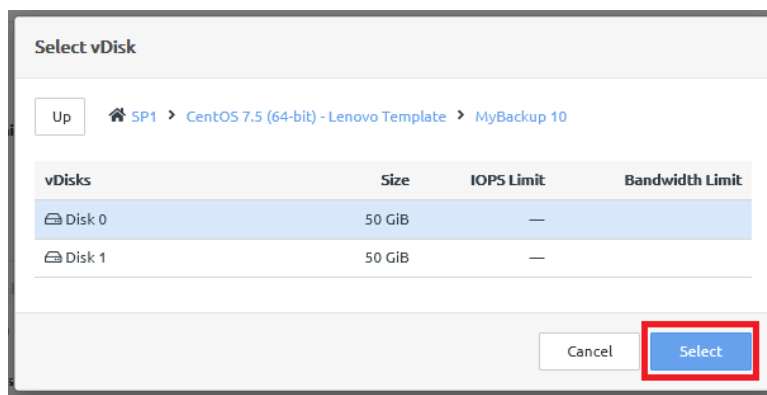


Figure 54. Select a vDisk

Step 6. Enter a name for the new vDisk clone and click **Add vDisk clone**.

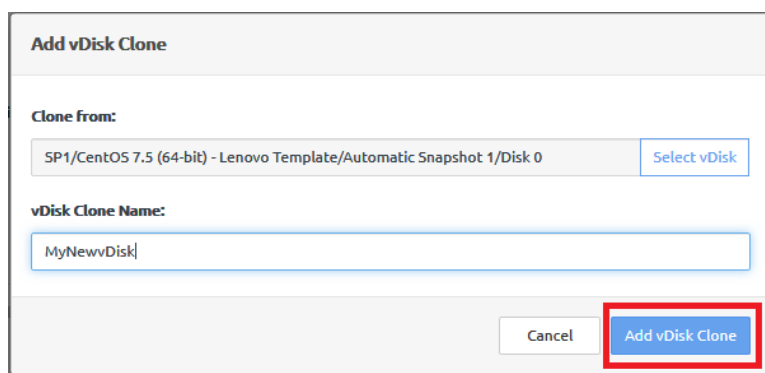


Figure 55. Adding a vDisk

The vDisk clone is shown in the list of vDisks and it is added to the boot order.

**Note:** You might need to refresh the page to show the vDisk.



**Storage**

At least one virtual disk must be present.

Storage Pool [SP1](#)

Virtual Disks (vDisks) [Add vDisk](#)

Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
Disk 1	50 GiB	—	—	...
Clone 1 of MyNewvDisk	50 GiB	—	—	...

**Networking**

At least one virtual network interface controller must be present.

Virtual Network Interface Controllers (vNICs) [Add vNIC](#)

vNIC	IP Address	MAC Address	Networking Mode	Network	Firewall Profile	Firewall Override	
vNIC 0	—	b4:d1:35:00:02:3f (automatic)	VNET	VNET	—	—	...

**Settings**

Boot Order [Disk 0](#) > [vNIC 0](#) > [Disk 1](#) > [Clone 1 of MyNewvDisk](#)

Timezone Configuration [Default](#)

Figure 56. Select a vDisk

## Resize a vDisk

**Infrastructure admin** users and **VDC manager** users can increase the size of a virtual disk that is available for an application instance.

Complete the following steps to resize a vDisk:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.

ThinkAgile CP | LCTC - Rack 0 Stack 4

MyVDC New

VDC Instances 0 1 New Instance

Filter by

0 selected

Name	IP Address(es)	CPU (cores)		Memory		NW BW (MBps)		ST BW (MBps)		IOPS		IO QL
		Prov.	% vCPU	Prov.	Load	Read	Write	Read	Write	Read	Write	
MyNewCentOSImage	10.212.30.184	4	0%	2 GiB	282 MiB	0	0	0	0	0	0	0

Figure 57. VDC instances page

Step 3. Click the application instance to display the details for that instance. Then click the **Profile** tab.

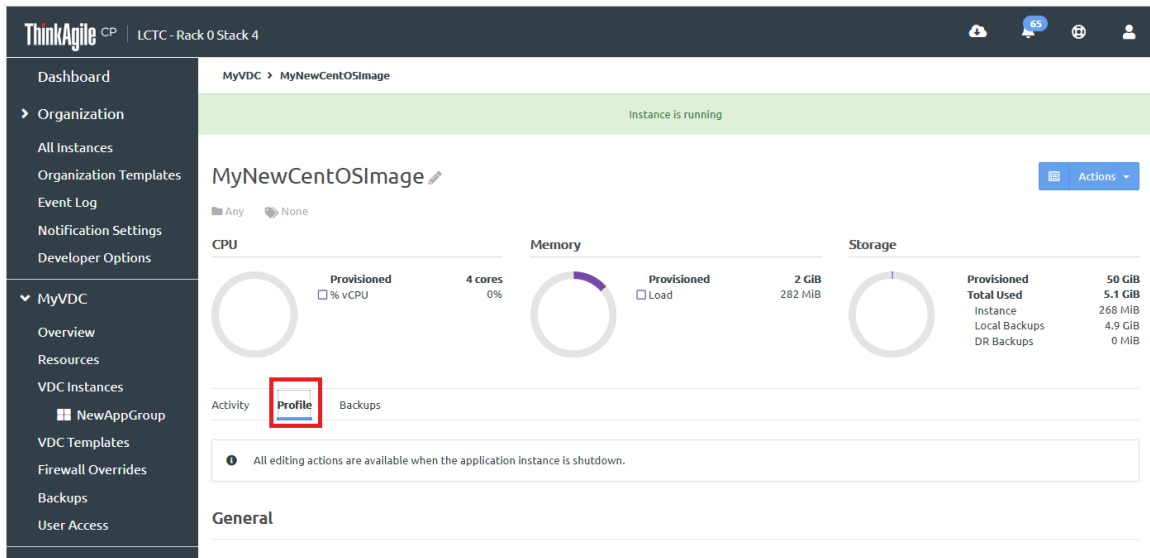



Figure 58. Profile tab

Step 4. Scroll down to the Storage section and click the Actions menu (  ) for the vDisk to be resized. Then click **Edit size**.

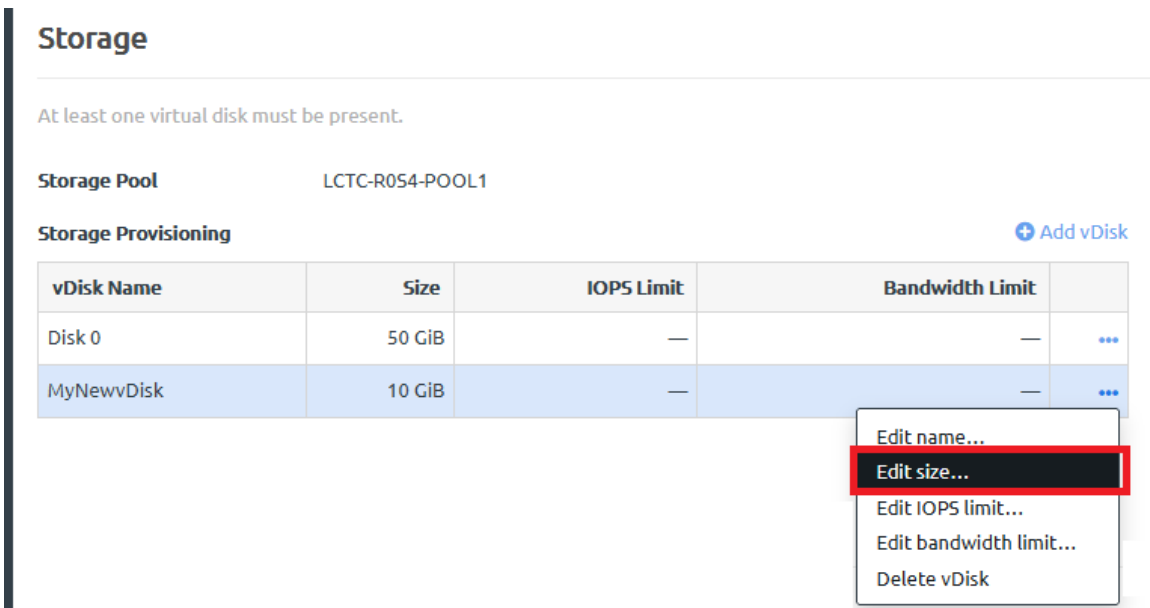


Figure 59. Actions menu

Step 5. Enter the new size of the disk and then click **Save**.

**Note:** The new size must be larger than the current size.

Step 6. After the disk has been resized, follow the additional steps below for your operating system (Windows or Linux).

### After resizing a vDisk for Windows

After you resize a vDisk for Windows, complete the following steps:

1. Establish a console session with the Windows instance, and open Disk Management. The disk that was resized will show in Unallocated space.
2. Complete the following steps to create a new volume in the Unallocated space:
  - a. Right-click the Unallocated space and select **New Simple Volume**.
  - b. Click **Next** and enter the volume size.
  - c. Click **Next** and assign a drive letter to the new volume.
  - d. Click **Next**, select formatting options, and assign a volume label.
  - e. Click **Next** and **Finish**.
3. Complete the following steps to extend the current volume into the Unallocated space:
  - a. Right-click the volume and select **Extend Volume**.
  - b. Click **Next** and enter the amount of space to add to the volume.
  - c. Click **Next** and **Finish**.
4. Verify the partition is aligned and realign it if necessary:
  - a. Open System Information (msinfo32).
  - b. Click **Components** → **Storage** → **Disks**.
  - c. For each disk, make note of the size in bytes, the partition size in bytes, and the partition starting offset in bytes.
  - d. Check for misalignment:
    - 1) If you have multiple partitions, add the Partition Size (bytes) to the Partition Starting Offset (bytes). Subtract this value from the Partition Starting Offset (bytes) of the subsequent partition. You should get either 0 or a positive number.
    - 2) For the last partition on the disk, add the Partition Size (bytes) to the Partition Starting Offset (bytes). Subtract this value from the disk Size (bytes). You should get either 0 or a positive number.
    - 3) If you get a negative number for either of these, it means your partition is misaligned by that number of bytes: it's either overlapping another partition or it ends beyond the end of the disk.
  - e. Shrink the volume if necessary:
    - 1) Open Disk Management.
    - 2) For each partition that is misaligned, right click on it and select Shrink. Shrink the volume by the amount by which it's misaligned or more. That is, take the negative number you calculated in the previous step and divide it by 1,048,576 to get the size in MB, then shrink the volume by at least that amount.

### After resizing a vDisk for Linux

After resizing a vDisk for Linux, complete the following steps:

1. Establish a console session with the Linux instance.
2. Create a new ext4 partition /dev/sdb2 on disk /dev/sdb:
  - a. Check how many drives are installed:

```
fdisk -l | grep '^Disk'
```
  - b. Add a partition to the disk:

```
fdisk /dev/sdb
```

- c. Type `p` to use the partitioner, type `n` to create a new partition, and select your preferred settings when prompted.
  - d. Type `w` to save the partition.
  - e. Format the disk:
 

```
mkfs.ext4 /dev/sdb2
```
  - f. Create a mount point and mount the partition:
 

```
mkdir /disk2
mount /dev/sdb2 /disk2
```
  - g. Edit `fstab` so the new partition automatically mounts to `/disk2` on reboot:
 

```
vi /etc/fstab
```
  - h. Type `i` to edit the file.
  - i. Add the following line:
 

```
/dev/sdb2 /disk2 ext4 defaults 1 2
```
  - j. Enter `ESC` and type `:wq` to write the changes and save the file.
3. To expand an existing ext4 partition `/dev/sdc1` on disk `/dev/sdc` that's mounted to `/disk3`:
    - a. Unmount the partition:
 

```
umount /disk3
```
    - b. Expand the partition by deleting and recreating it without deleting the data:
 

```
fdisk /dev/sdc
```
    - c. Print the current partitions: `p`
    - d. Delete the partition: `d`
    - e. If multiple partitions are present, select the desired partition when prompted.
    - f. Recreate the partition:
      - 1) Type `p` to use the partitioner, `n` to create a new partition, and select your preferred settings when prompted.
      - 2) Type `w` to save the partition.
    - g. Expand the ext4 filesystem:
 

```
resize2fs /dev/sdc1
```

### Modify IOPS and bandwidth limits

You can easily specify quality of service limits for individual application instances by defining limits for IOPS and Bandwidth. To modify vDisk IOPS and bandwidth limits for an application instance, follow these steps. If you are a **VDC manager** user, you can set these limits for the application instances in the virtual datacenters to which you have access. **Infrastructure admin** users can set these limits for any application instance.

**Note:** These limits are useful for Quality of Service (QoS) monitoring and maintaining performance predictability of running workloads. (IOPS and bandwidth limits are unlimited by default.) Storage QoS limits ensure that the application instance does not consume more than the specified limit of IOPS or bandwidth. Other factors, including your specific workload and other workloads running on the storage block, may prevent your application instance from reaching these limits.

When you update these limits, it may take some time for the system to respond; for example, it could take up to three to five minutes for you to see results.

Complete the following steps to modify the IOPS and bandwidth limits for a vDisk:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.

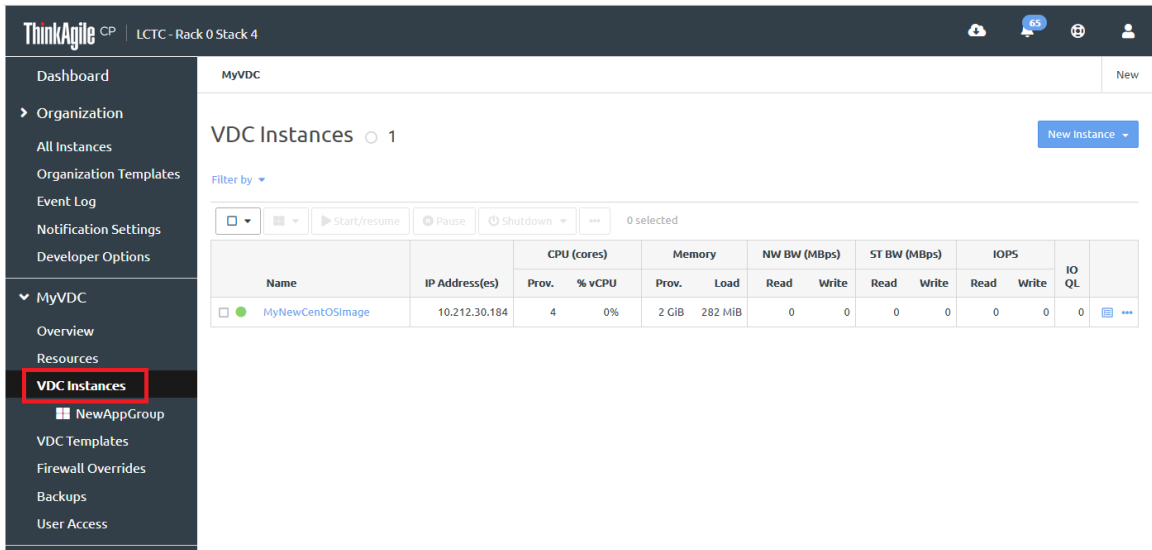


Figure 60. VDC instances page

- Step 3. Click the application instance to display the details for that instance. Then click the **Profile** tab.

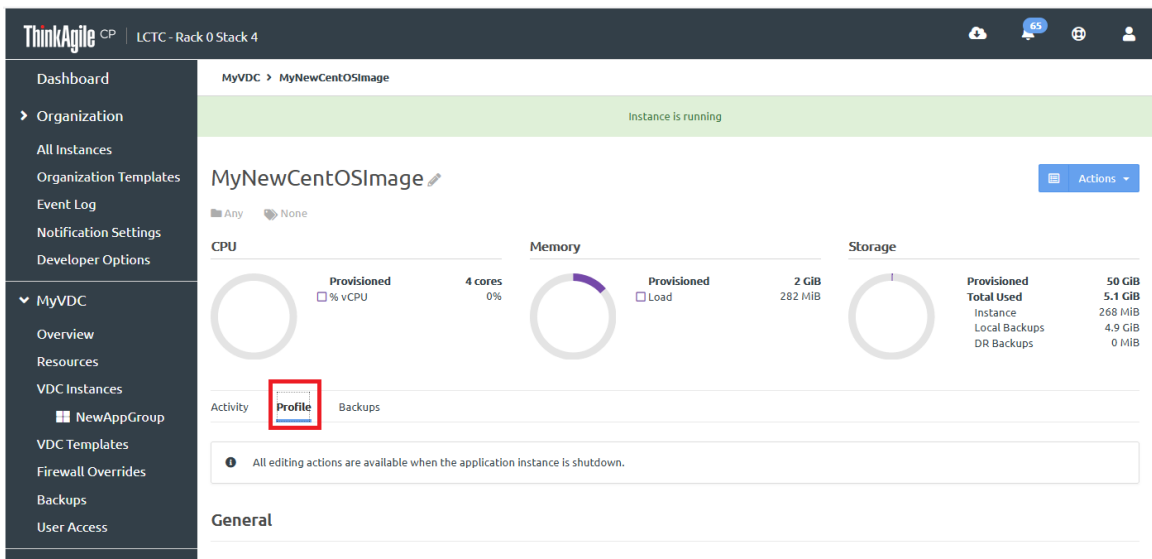


Figure 61. Profile tab

- Step 4. Scroll down to the Storage section and click the Actions menu (  ) for the vDisk to be resized.

## Storage

At least one virtual disk must be present.

**Storage Pool** LCTC-R054-POOL1

**Storage Provisioning**

[+ Add vDisk](#)

vDisk Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
MyNewvDisk	10 GiB	—	—	...

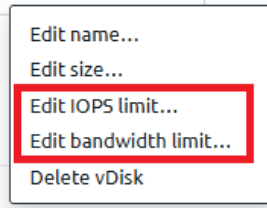
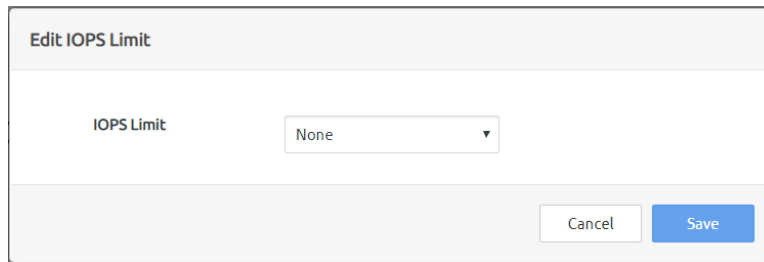


Figure 62. Actions menu

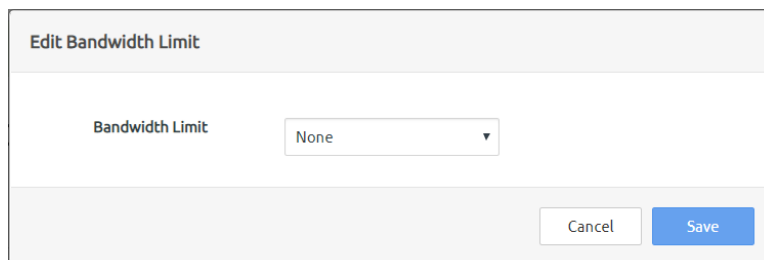
- Step 5. Complete the following steps to modify or set the IOPS limit for a vDisk:
- Click **Edit IOPS limit** to display the Edit IOPS Limit dialog.



The 'Edit IOPS Limit' dialog box features a title bar, a label 'IOPS Limit', and a drop-down menu currently set to 'None'. At the bottom, there are 'Cancel' and 'Save' buttons.

Figure 63. Edit IOPS Limit dialog box

- On the IOPS Limit drop-down, select **Custom**.
  - Enter a value for I/O per second and click **Save**. (The minimum value you can enter is 50.)
- Step 6. Complete the following steps to modify or set the Bandwidth limit for a vDisk:
- On the actions menu for the vDisk, click **Edit bandwidth limit** to display the Edit Bandwidth Limit dialog box opens.



The 'Edit Bandwidth Limit' dialog box features a title bar, a label 'Bandwidth Limit', and a drop-down menu currently set to 'None'. At the bottom, there are 'Cancel' and 'Save' buttons.

Figure 64. Edit Bandwidth Limit dialog box

- b. On **Bandwidth Limit** drop-down menu, select **Custom**.
- c. Enter a value for MB per second and click **Save**. (The minimum value you can enter is 5 MBps.)

## Move an instance to an application group

Application groups exist within virtual datacenters. **Infrastructure admin** users and **VDC manager** users can move an application instance to an application group.

Complete the following steps to move an instance to a different application group:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.

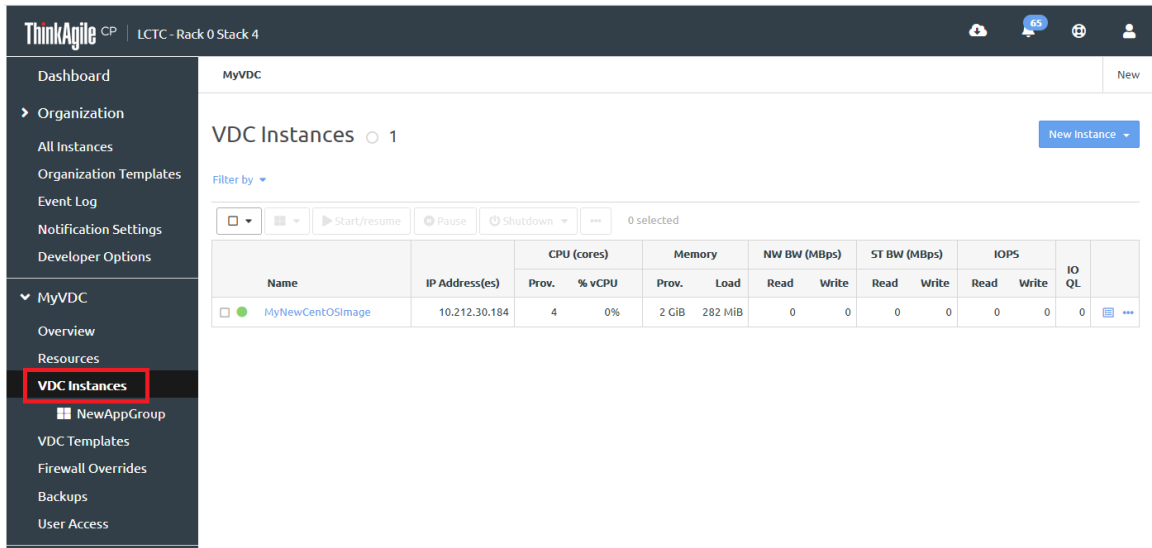



Figure 65. VDC instances page

- Step 3. On the VDC Instances page, choose the application instances that you want to add to an application group.
- Step 4. Click the group Actions menu (  ) and choose the application group to which to assign the instances.

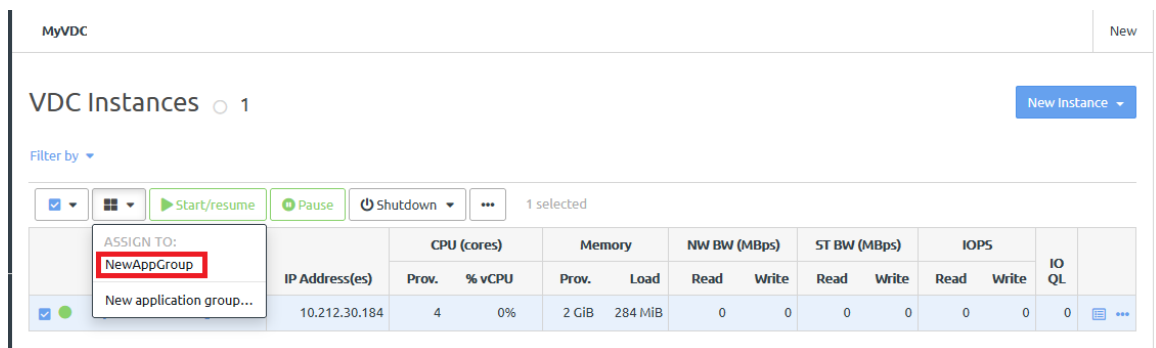


Figure 66. Add instance to an application group

You can also click **New application group** to create a new group for the selected application instances. In that case you would be prompted to add a new name to create the application group.

The instance appears in the page for the application group.

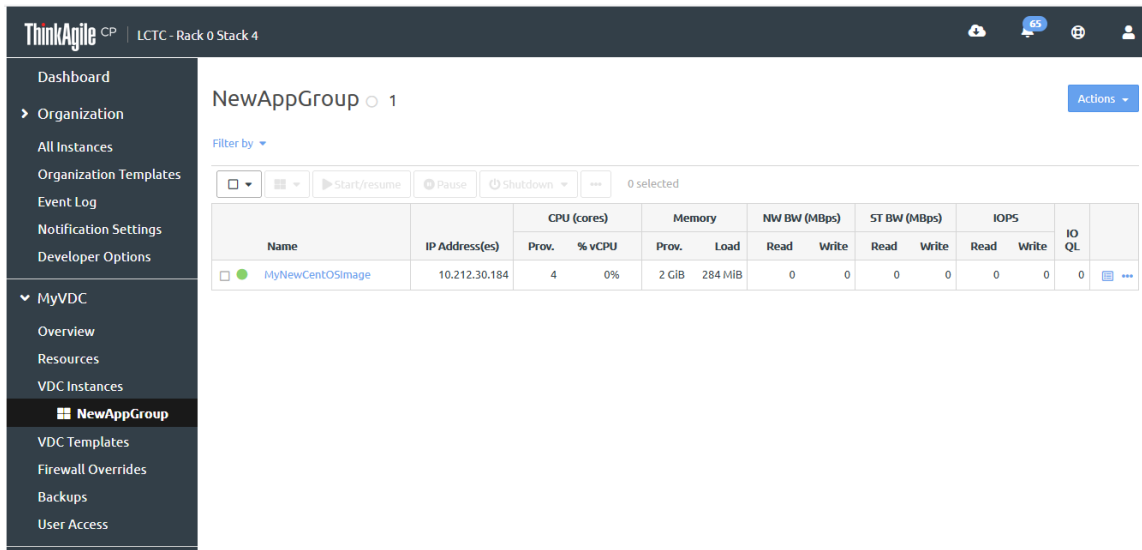


Figure 67. Application group page

## Create a backup

Several different types of backups can be created from an application instance.

To work with backups for an application instance, view the application instance details and click the **Backup** tab. The following types of backups are available:

- **Local backups.** Local backups are stored to a storage pool that is accessible from the VM instance. You can choose to automate local backups at specific intervals and how long local backups are retained. In addition, you can choose to manually back up a VM instance.

For more information about setting up and managing local backups, see the following topic:

[“Manage local backups for an application instance” on page 269](#)

- **Quick DR backups.** If enabled, a quick DR backup is stored in a different storage pool whenever an automated local backup occurs. You can choose how many quick DR backups to retain.

For more information about setting up and managing quick DR backups, see the following topic:

[“Manage quick DR backups” on page 288](#)

- **External backups.** If enabled, a backup is stored in an external repository. You can choose how many external backups are kept and how long those backups are retained.

**Note:** Before you set up an external backup for an application instance, you must register the external repository with ThinkAgile CP.

For more information about setting up and managing external backups, see the following topic:

[“Manage external backups” on page 305](#)

For an application instance, you can choose to implement any of these backups, or you can choose to implement all of them.

## Create a template

**Infrastructure admin** users and **VDC manager** users can create templates from an application instance.



For more information, see the following topic:

[“Manage application templates” on page 97](#)

## Add multiple network interfaces to an instance

**Infrastructure admin** users and **VDC manager** users can add multiple network interfaces (vNICs) to an instance.

Complete the following steps to add multiple network interfaces (multi-vNICs) to an instance:

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.

Step 2. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps:

- Expand **Applications** and click **All Instances**.
- Expand the virtual datacenter where the instance is located and click **VDC Instances**.

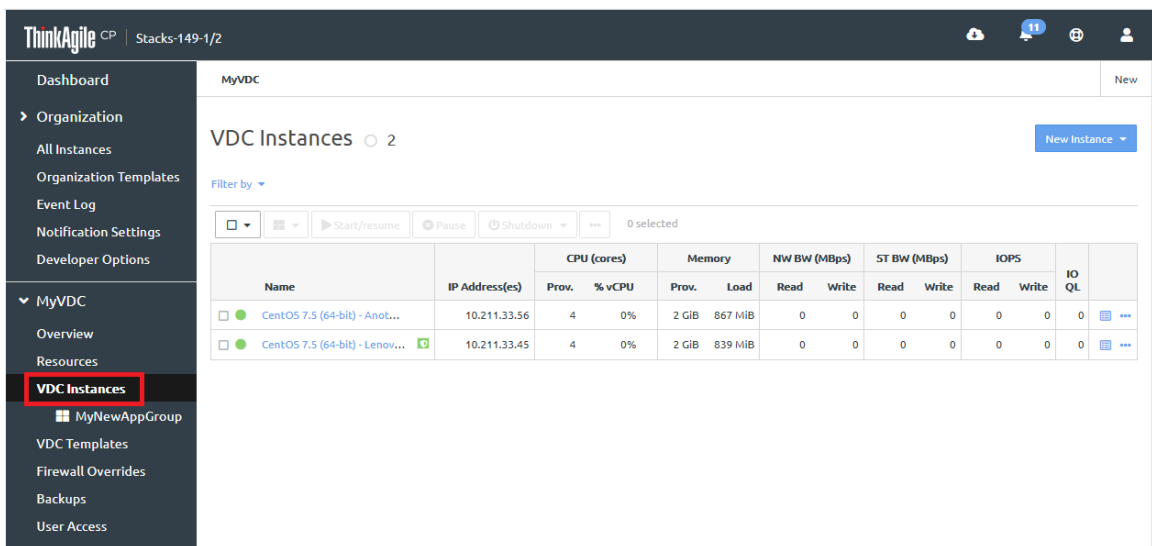


Figure 68. VDC Instances page

Step 3. Select the instance and click **Shutdown** to shut down the instance.

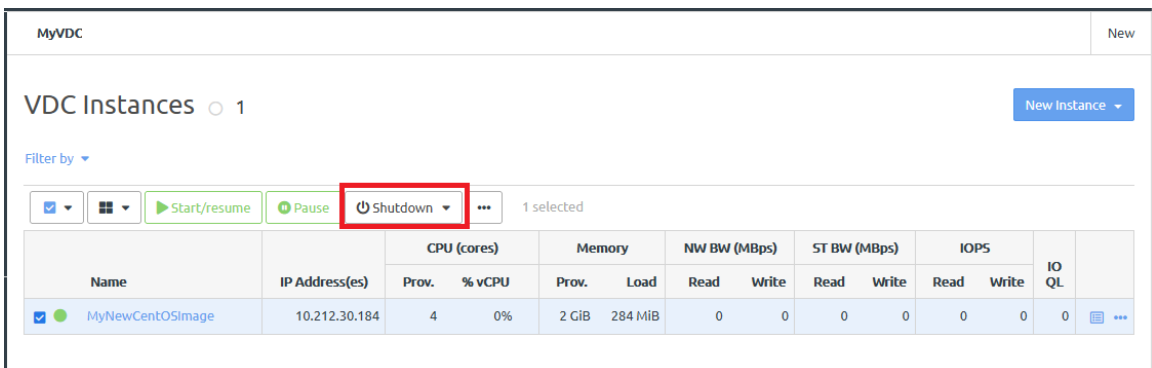


Figure 69. Shutting down an instance

Step 4. Click the instance and then click the **Profile** tab to display the details for the instance.

Step 5. Scroll down to the Networking section. Then click **Add vNIC**.

Networking						
At least one virtual network interface controller must be present.						
Virtual Network Interface Controllers (vNICs)						<a href="#">+ Add vNIC</a>
vNIC	IP Address	MAC Address	Networking Mode	Network	Firewall Profile	Firewall Override
vNIC 0	—	b4:d1:35:00:02:06 (automatic)	VNET	VNET2	—	—

Figure 70. Add vNIC option

Step 6. In the New vNIC dialog, fill in the information for the vNIC and click **Add vNIC**.

Step 7. Make a note of the MAC addresses used for the instance vNICs.

Networking						
At least one virtual network interface controller must be present.						
Virtual Network Interface Controllers (vNICs)						<a href="#">+ Add vNIC</a>
vNIC	IP Address	MAC Address	Networking Mode	Network	Firewall Profile	Firewall Override
vNIC 0	—	b4:d1:35:00:02:06 (automatic)	VNET	VNET2	—	—
vNIC 1	—	b4:d1:35:00:03:32 (automatic)	VNET	VNET2	—	—

Figure 71. Newly added vNIC

Configure the multi-vNICs:

**Note:** Up to 64 vNICs (vNIC 0 - vNIC 63) can be added to a single instance.

- If it is a CentOS instance, see the following topic:  
[“Configure multi-vNICs for CentOS instances” on page 64](#)
- If it is an Ubuntu instance, see the following topic:  
[“Configure multi-vNIC for Ubuntu instances” on page 66](#)

### Configure multi-vNICs for CentOS instances

For CentOS instances to use multiple vNICs, the network interfaces must be configured within the operating system.

Complete the following steps to configure the network interfaces:

Step 1. In the ThinkAgile CP Cloud Controller management console, go to the **Profile** tab of the instance. Make note of the MAC Addresses for each vNIC (in this example, B4:D1:35:00:03:6A for vNIC 0 and B4:D1:35:00:03:6B for vNIC 1).

Step 2. Log in to the CentOS instance.

Step 3. Run the following command:

```
cd /etc/sysconfig/network-scripts
```

and then:

```
ls
```

If there are no `ifcfg-eth#` files for all of the vNICs, those files will need to be created. For example, if two vNICs are attached, there should be `ifcfg-eth0` and `ifcfg-eth1`.

Step 4. To create a copy of the `ifcfg-eth0` file, run the following command:

```
cp ifcfg-eth0 ifcfg-eth1
```

Step 5. Edit the `ifcfg-eth0` files

a. Run the following command:

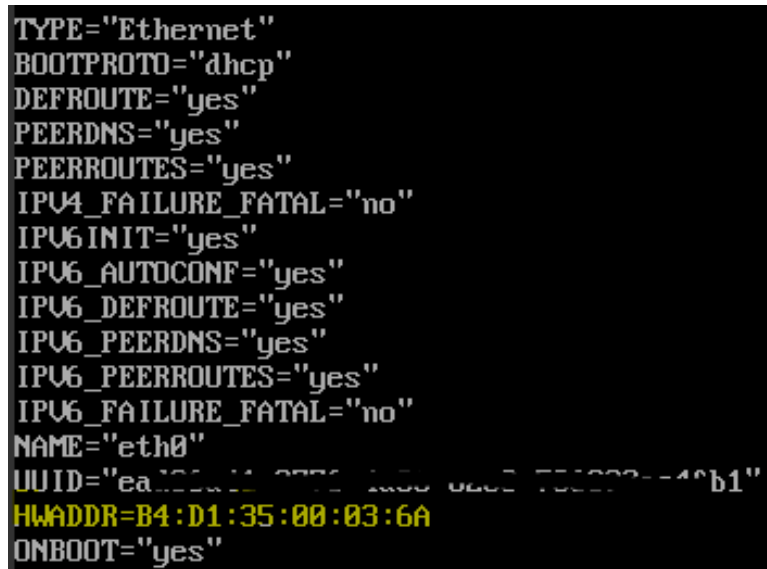
```
vi /etc/sysconfig/network-scripts/ifcfg-eth0
```

b. Type `i` to input data.

c. Add the `HWADDR={MAC Address}` entry noted in the first step.

d. Set `ONBOOT=yes` if it is not set already.

e. Press ESC and type `:wq` to write the changes and exit.



```
TYPE="Ethernet"  
BOOTPROTO="dhcp"  
DEFROUTE="yes"  
PEERDNS="yes"  
PEERROUTES="yes"  
IPV4_FAILURE_FATAL="no"  
IPV6INIT="yes"  
IPV6_AUTOCONF="yes"  
IPV6_DEFROUTE="yes"  
IPV6_PEERDNS="yes"  
IPV6_PEERROUTES="yes"  
IPV6_FAILURE_FATAL="no"  
NAME="eth0"  
UUID="ea125x11-2770-4339-9602-751002-40b1"  
HWADDR=B4:D1:35:00:03:6A  
ONBOOT="yes"
```

Figure 72. Updated `ifcfg-eth0` file

Step 6. Edit the `ifcfg-eth0` files

a. Run the following command:

```
vi /etc/sysconfig/network-scripts/ifcfg-eth1
```

b. Type `i` to input data.

c. Add the `HWADDR={MAC Address}` entry noted in the first step.

d. Set `ONBOOT=yes` if it is not set already.

e. Change `DEVICE=eth0` to `DEVICE=eth1`

f. Remove the `UUID` line so that it does not conflict with `ETH0`

g. Press ESC and type `:wq` to write the changes and exit.

```

TYPE="Ethernet"
BOOTPROTO="dhcp"
DEFROUTE="yes"
PEERDNS="yes"
PEERROUTES="yes"
IPV4_FAILURE_FATAL="no"
IPV6INIT="yes"
IPV6_AUTOCONF="yes"
IPV6_DEFROUTE="yes"
IPV6_PEERDNS="yes"
IPV6_PEERROUTES="yes"
IPV6_FAILURE_FATAL="no"
NAME="eth1"
HWADDR=B4:D1:35:00:03:6B
ONBOOT="yes"

```

Figure 73. Updated `ifcfg-eth1` file

Step 7. Run the following commands to start the network interfaces:

```

ifup eth0

ifup eth1

```

**Note:** These instructions will bring up the network interfaces and allow them to receive IPs. If additional networking configuration is required, refer to CentOS documentation.

### Configure multi-vNIC for Ubuntu instances

For Ubuntu instances to use multiple vNICs, the network interfaces must be configured within the operating system.

Complete the following steps to configure the network interfaces:

- Step 1. Log in to the Ubuntu instance and become `root`.
- Step 2. Run the following command:

```
ip a
```

- Step 3. Make note of the interface names.
- Step 4. Edit `/etc/network/interfaces`:

Repeat the lines for the primary interface, replacing the interface name with that of the secondary interface. For example, to enable interface `ens4` add the following lines:

```
auto ens4iface ens4 inet dhcp
```

- Step 5. Run the following command:

```
service networking restart
```

**Note:** These instructions will bring up the network interfaces and allow them to receive IPs. If additional networking configuration is desired, refer to the Ubuntu documentation

## Manage instance modes and guest agents

**Infrastructure admin** users and **VDC manager** users can manage the mode selected for an application instance and whether or not to install guest agent tools for an instance.

For more information about instance modes and guest agents, see the following topics:

- [“Understand instance modes” on page 67](#)
- [“Install guest agent tools” on page 68](#)

### Understand instance modes

An application instance can boot in either of these two modes: Compatibility or Enhanced. Instance modes are dependent on whether the guest operating system has paravirtualized drivers installed. Installing KVM paravirtualized drivers (that is, VirtIO) enables higher disk and network performance within an instance.

#### Compatibility mode

Compatibility mode instances do not have VirtIO drivers installed. This mode should be used in the following situations:

- If the guest operating system is not in the list of operating systems supported by the ThinkAgile CP platform. For more information, see the following topic:  
[“Working with application instances” on page 28](#)
- To resolve bootstrap issues when creating an instance from a template (VMDK) or an ISO that does not have VirtIO drivers installed.

For Compatibility mode instances:

- Storage disks are exported as SATA.
- Disk backups on Windows operating systems crash-consistent instead of application-consistent.
- NICs are exported as Intel 1Gbps NICs which use e1000 driver.
- Hot-plug of memory to running instances will not work.

For your convenience, ThinkAgile CP Guest Agent and VirtIO drivers are included in the Guest Tools ISO, which is mounted into all instances. It is recommended to install the Guest Agent and Virtio drivers as applicable and boot into Enhanced mode at the earliest possible convenience. For more information, see the following topic:

[“Install guest agent tools” on page 68](#)

#### Enhanced mode

For Enhanced mode instances with VirtIO drivers installed:

- Storage disks are exported as SCSI disks.
- Disk backups on Windows operating systems are application-consistent, if the Guest Agent is installed and responsive.
- NICs are exported as RedHat VirtIO Network Adapters with 10Gbps link speed.
- Hot plug of memory is available for supported guest operating systems.

**Note:** FreeBSD, FreeNAS and Netscaler do not support guest agent tools.

For more information about changing the mode for an application instance, see the following topic:

[“Manage application instances” on page 42](#)



## Install guest agent tools

**Infrastructure admin** users and **VDC manager** users can install guest agent tools.

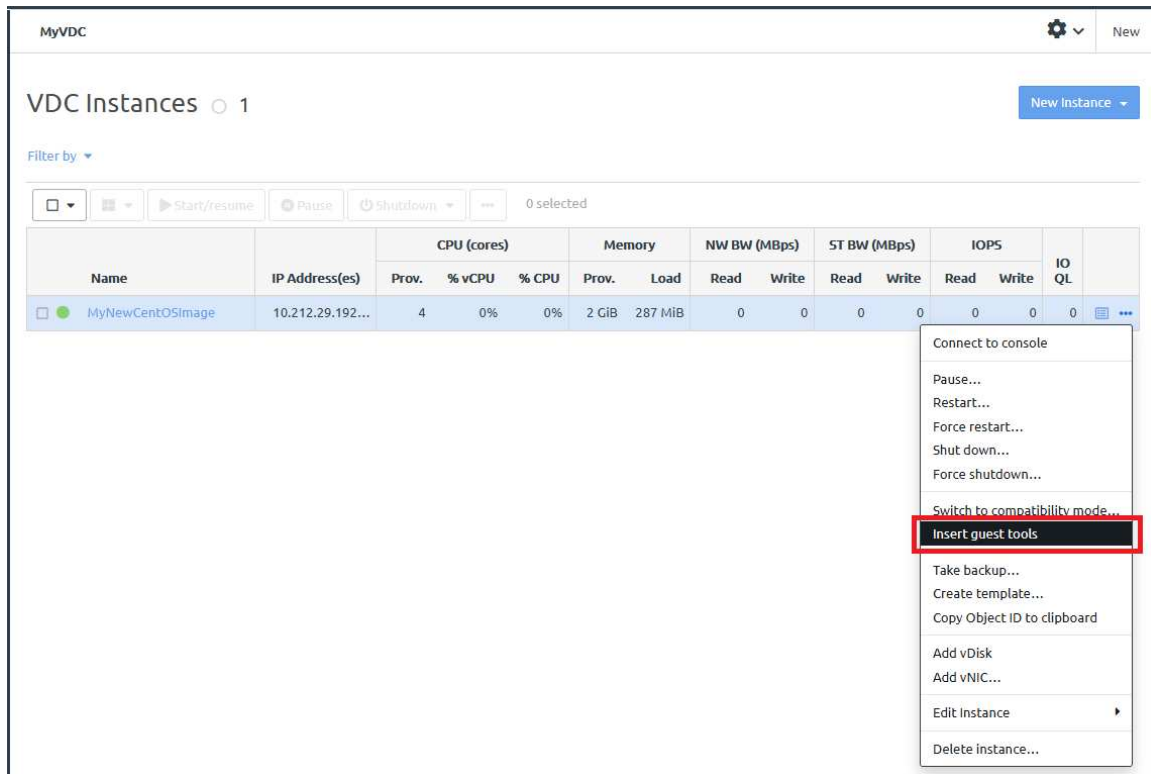
Complete the following steps to install guest agent tools:

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.

Step 2. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps:

- Expand Applications and click **All Instances**. On the Application Instances page, go to the row for the instance, and click the Actions menu (  ).
- Expand the virtual datacenter where the instance is located and click **VDC Instances**. On the VDC Instances page, go to the row for the instance, and click the Actions menu (  ).

Step 3. Click **Insert guest tools**.



The screenshot shows the 'VDC Instances' page in the ThinkAgile CP Cloud Controller. The page title is 'MyVDC' and 'VDC Instances 0 1'. There is a 'New Instance' button. Below the title, there is a 'Filter by' dropdown and a row of action buttons: Start/resume, Pause, Shutdown, and an actions menu icon. Below the buttons, there is a table of instances. The table has columns for Name, IP Address(es), CPU (cores), Memory, NW BW (MBps), ST BW (MBps), IOPS, and IO QL. The instance 'MyNewCentOSImage' is selected. The Actions menu is open, and the 'Insert guest tools' option is highlighted with a red box.




Name	IP Address(es)	CPU (cores)			Memory		NW BW (MBps)		ST BW (MBps)		IOPS		IO QL
		Prov.	% vCPU	% CPU	Prov.	Load	Read	Write	Read	Write	Read	Write	
  MyNewCentOSImage	10.212.29.192...	4	0%	0%	2 GiB	287 MiB	0	0	0	0	0	0	

Figure 74. Insert guest tools option

A confirmation message is displayed when the guest tools have been inserted.

Step 4. To validate that the guest tools have been installed, log in to the application instance. A CDROM folder will be displayed.

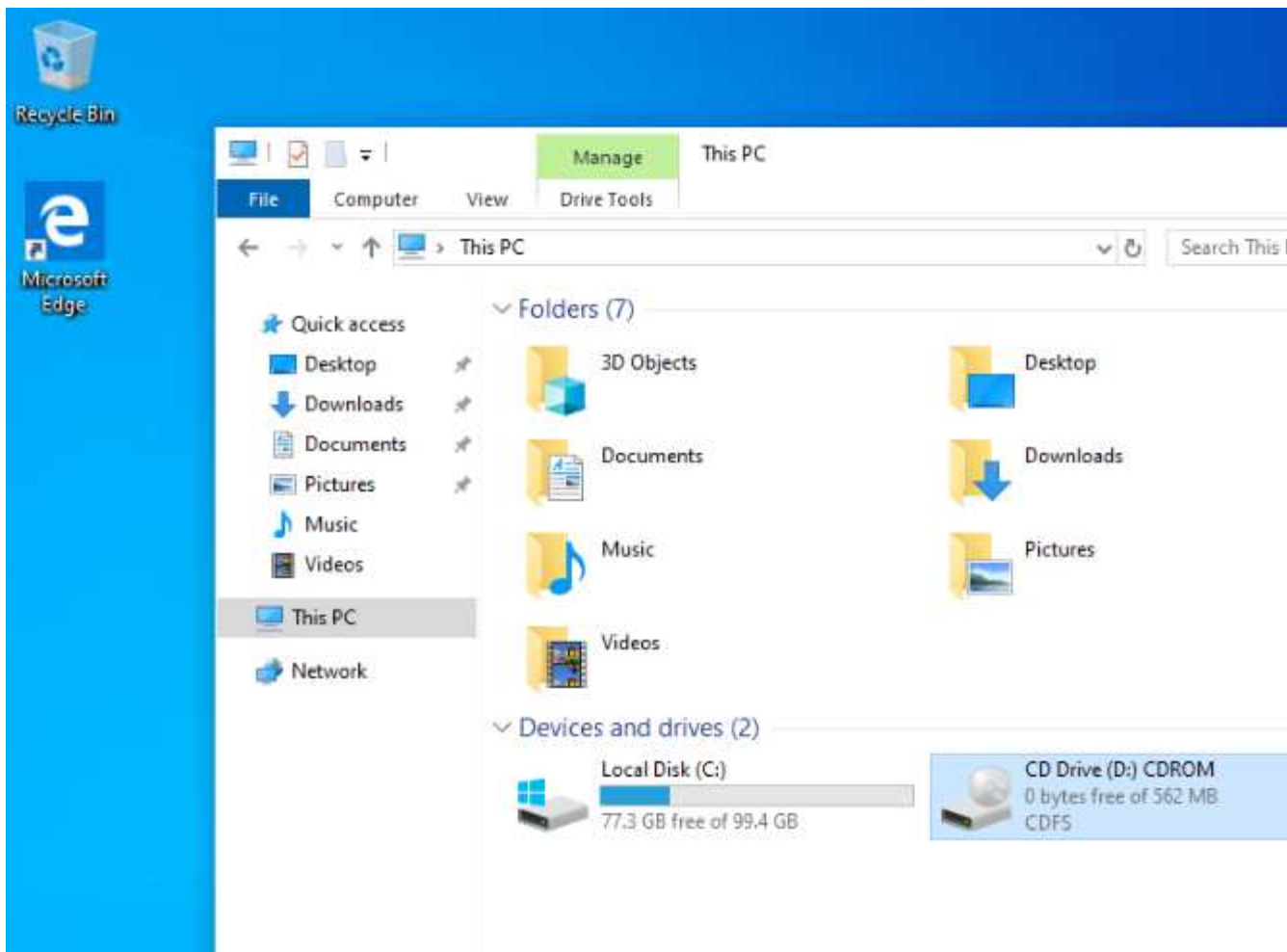


Figure 75. CDROM folder displayed in a Windows instance

After installing guest agent tools, consider setting the application instance to Enhanced mode. For information about setting the instance to Enhanced mode, see the following topic:

[“Manage application instances” on page 42](#)

## Remove guest agent tools

**Infrastructure admin** users and **VDC manager** users can remove guest agent tools from an application instance.

Complete the following steps to remove guest agent tools for an application instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps:
  - Expand Applications and click **All Instances**. On the Application Instances page, go to the row for the instance, and click the Actions menu (⋮).
  - Expand the virtual datacenter where the instance is located and click **VDC Instances**. On the VDC Instances page, go to the row for the instance, and click the Actions menu (⋮).
- Step 3. Click **Eject guest tools**.

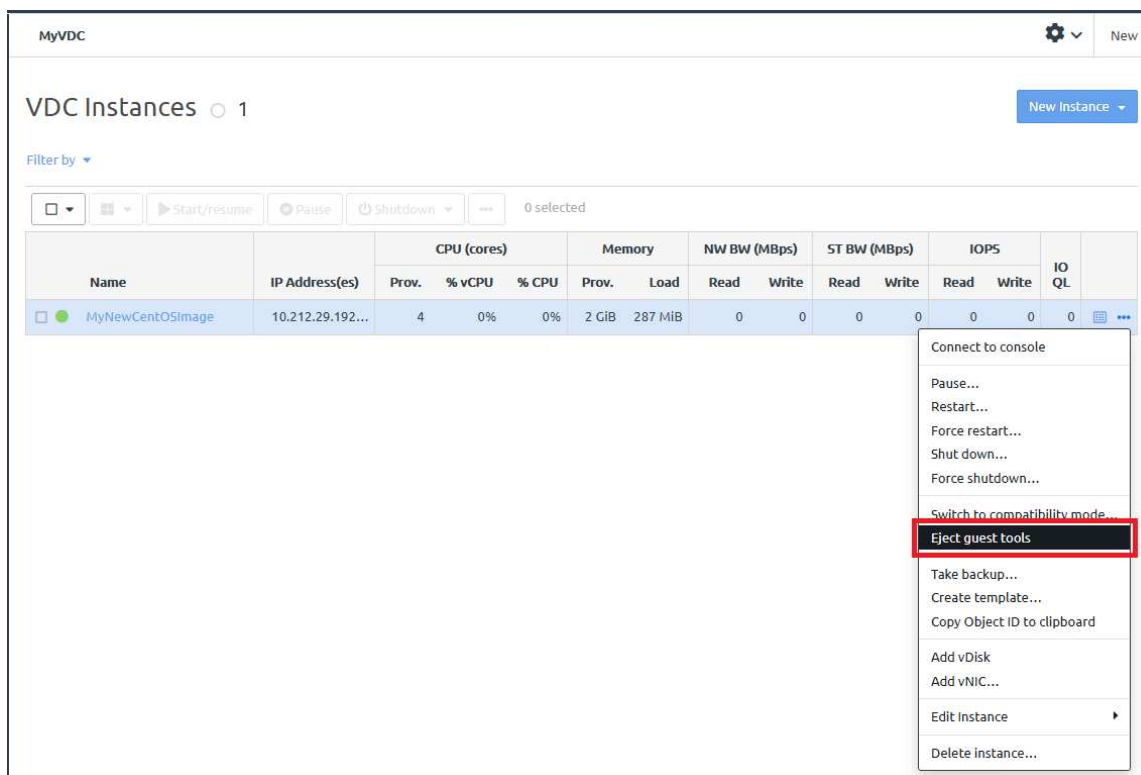


Figure 76. Eject guest tools option

A confirmation message is displayed when the guest tools have been removed.

## Clone and attach a vDisk

**Infrastructure admin** users and **VDC manager** users can clone a vDisk from local or quick DR backup, and attach the cloned vDisk to an application instance in the same virtual datacenter and storage pool as the backup. A vDisk can be cloned and attached as many times as needed.

Each cloned disk is independent of other clones and of the original backup. When you make a change to a clone, other clones disks and the original backup remain unchanged.

To understand more about cloning and attaching vDisks, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/technical-brief-clone-and-attach-a-vdisk.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/technical-brief-clone-and-attach-a-vdisk.html)

**Note:** These instructions do not apply to Logical Volume Management (LVM) drives, which are the default for some templates.

Refer to the following topics for more information about working with vDisk clones:

- “Attaching a vDisk to an instance from its own backup” on page 70
- “Attaching a vDisk to an instance from a backup from a different instance” on page 72
- “Deleting a vDisk clone” on page 74

## Attaching a vDisk to an instance from its own backup

**Infrastructure admin** users and **VDC manager** users can attach a vDisk to an application instance from the **Profiles** tab or the **Backups** tab of the instance.



For an overview about cloning and attaching vDisks, see the following topic:

### Clone and attach a vDisk

Complete the following steps to attach a vDisk to an instance from the **Backups** tab of the instance:

**Note:** As an alternative to the following procedure, you can attach a vDisk to an instance from the Profile tab. For more information, see the following topic: [“Add a vDisk clone” on page 51](#)

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.

Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.

Step 3. Click the application instance to display the application instance details page and click the **Backups** tab.

Step 4. Click the Actions menu ( **...** ) of the vDisk that you want to clone; then click **View vDisks**.

**Note:** If quick DR backups are enabled, you will see two versions of the backup: an automatic local backup and a quick DR backup.

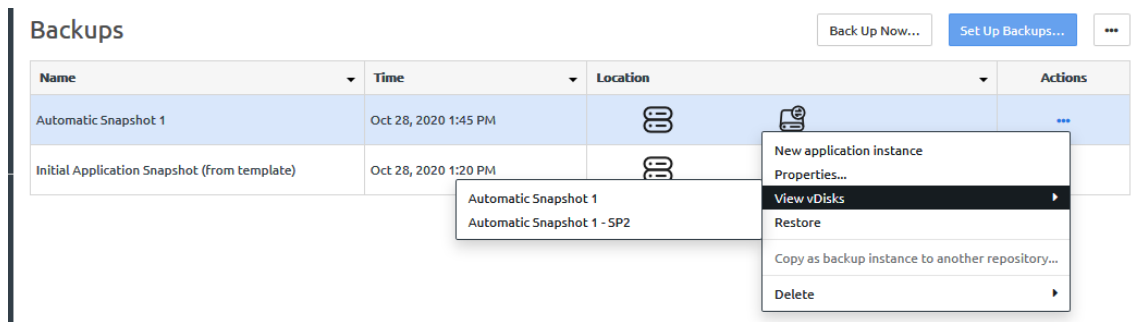


Figure 77. View vDisks option from backup Actions menu

Step 5. In the Backup vDisks dialog, click the Actions menu ( **...** ); then click **Clone and attach to this instance**.

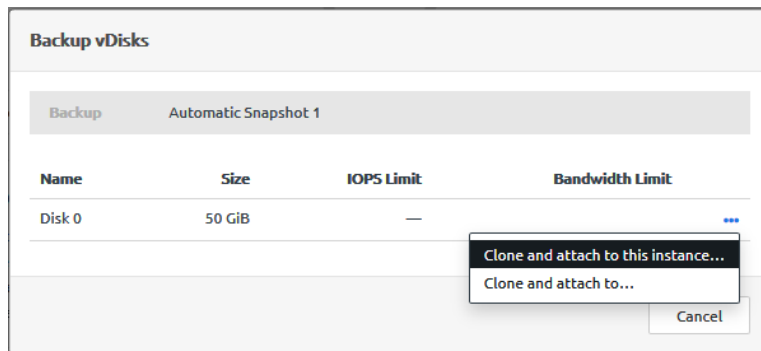


Figure 78. Clone and attach to this instance option

Step 6. In the Clone and Attach to this Instance confirmation dialog, click **Clone and attach to this instance**.

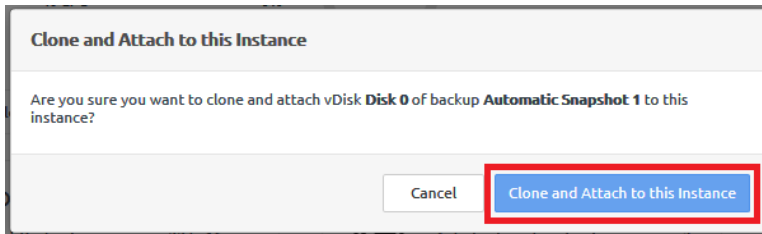


Figure 79. Clone and Attach to this Instance confirmation dialog

The vDisk clone is shown in the list of vDisks and it is added to the boot order for the application instance.

**Note:** You might need to refresh the page to show the vDisk that was added.

**Storage**

At least one virtual disk must be present.

Storage Pool **SP1**

Virtual Disks (vDisks) [Add vDisk](#)

Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
Clone 1 of MyNewvDisk	50 GiB	—	—	...
Clone 1 of Disk 0	50 GiB	—	—	...

**Networking**

At least one virtual network interface controller must be present.

Virtual Network Interface Controllers (vNICs) [Add vNIC](#)

vNIC	IP Address	MAC Address	Networking Mode	Network	Firewall Profile	Firewall Override	
vNIC 0	—	b4:d1:35:00:02:3f (automatic)	VNET	Divya_VNET	—	—	...

**Settings**

Boot Order Disk 0 > vNIC 0 > Clone 1 of MyNewvDisk > Clone 1 of Disk 0

Timezone Configuration **Default**

Figure 80. Select a vDisk

## Attaching a vDisk to an instance from a backup from a different instance

**Infrastructure admin** users and **VDC manager** users can attach a vDisk to an application instance from the backup of a different application instance.

For an overview about cloning and attaching vDisks, see the following topic:

[Clone and attach a vDisk](#)

Complete the following steps to attach a vDisk to an instance from the backup of a different instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.
- Step 3. Click the application instance to display the application instance details page and click the **Backups** tab.

Step 4. Click the Actions menu (  ) of the vDisk that you want to clone; then click **View vDisks**.

**Note:** If quick DR backups are enabled, you will see two versions of the backup: an automatic local backup and a quick DR backup.

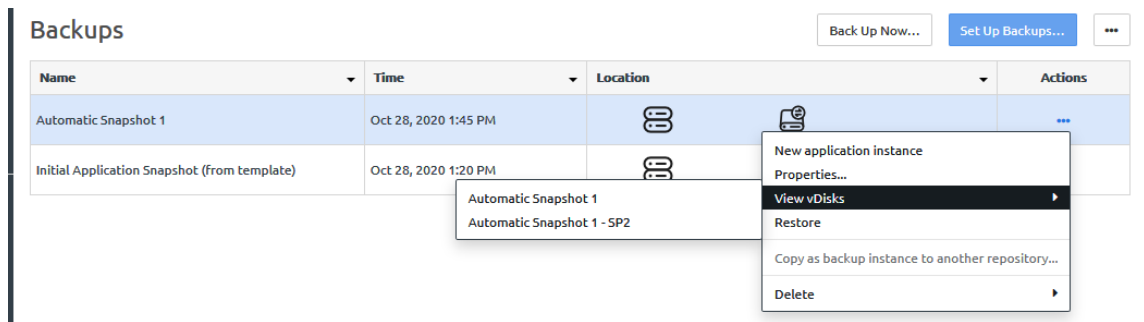


Figure 81. View vDisks option from backup Actions menu

Step 5. In the Backup vDisks dialog, click the Actions menu (  ); then click **Clone and attach to**.

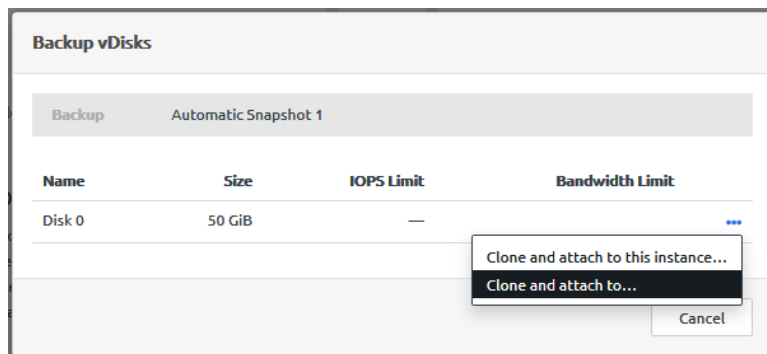


Figure 82. Clone and attach to option

Step 6. In the Select Application Instance dialog, click the instance to which the vDisk will be attached. Then, click **Clone and attach to instance**.

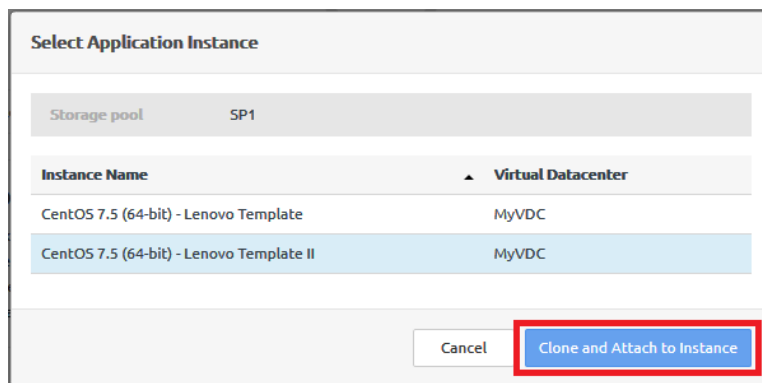


Figure 83. Select Application Instance dialog

Navigate to the **Profile** tab of the instance to which the vDisk was attached. The vDisk is displayed in the list of vDisks, and it is added to the boot order.

**Storage**

At least one virtual disk must be present.

**Storage Pool** SP1

**Virtual Disks (vDisks)** Add vDisk

Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
Clone 1 of Disk 0	50 GiB	—	—	...

**Networking**

At least one virtual network interface controller must be present.

**Virtual Network Interface Controllers (vNICs)** Add vNIC

vNIC	IP Address	MAC Address	Networking Mode	Network	Firewall Profile	Firewall Override
vNIC 0	—	b4:d1:35:00:02:0c (automatic)	VNET	VNET	—	—
vNIC 1	—	b4:d1:35:00:02:3e (automatic)	VNET	VNET	—	—

**Settings**

**Boot Order** Disk 0 > vNIC 0 > vNIC 1 > Clone 1 of Disk 0

**Timezone Configuration** Default

Figure 84. vDisk clone from one instance added to another instance

## Deleting a vDisk clone

**Infrastructure admin** users and **VDC manager** users can delete a vDisk clone. Any changes made to the clone will be deleted, but any other vDisk clones and the original backup will not be affected.

Complete the following steps to delete a vDisk clone:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Expand the VDC that contains the application instance and click **VDC Instances**.
- Step 3. Click the application instance to display the application instance details page; then click the **Profile** tab.
- Step 4. Scroll down to the Storage section to see the list of vDisks that are available for this application.
- Step 5. Click the Actions menu ( ... ) beside the vDisk clone to be deleted. Then click **Delete vDisk**.

**Storage Pool** SP1

**Virtual Disks (vDisks)** Add vDisk

Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
Clone 1 of MyNewvDisk	50 GiB	—	—	...
Clone 1 of Disk 0	50 GiB	—	—	...

**Networking**

At least one virtual network interface controller must be present.

- Edit name...
- Edit size...
- Edit IOPS limit...
- Edit bandwidth limit...
- Delete vDisk**

Figure 85. Delete vDisk option from vDisk Actions menu

Step 6. From the Delete vDisk confirmation dialog, click **Delete vDisk**.

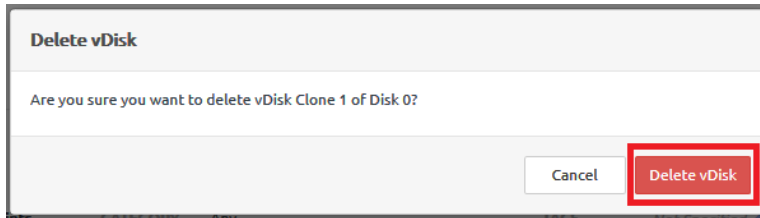


Figure 86. Delete vDisk confirmation dialog

The vDisk clone is removed from the list of vDisks available to this application instance.

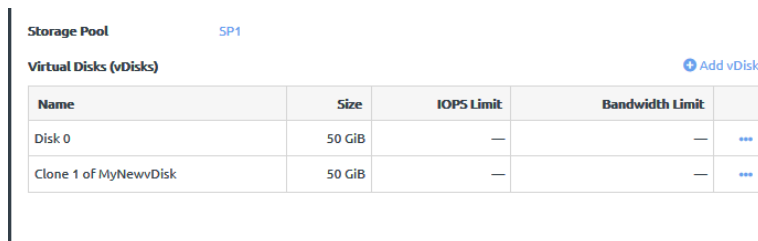
A screenshot of the 'Virtual Disks (vDisks)' section in a management console. It shows a table with columns for Name, Size, IOPS Limit, and Bandwidth Limit. There are two rows: 'Disk 0' and 'Clone 1 of MyNewvDisk'. The 'Clone 1 of MyNewvDisk' row is highlighted. Above the table, there is a '+ Add vDisk' button. The storage pool is identified as 'SP1'.

Figure 87. List of vDisks after deleting vDisk clone

## View instances

You can view details about an instance, such as the current state, metrics, and backups.

**Infrastructure admin** and **infrastructure viewer** users can view details about all instances associated with an organization. **VDC manager** and **VDC viewer** users can view details about the instances associated with the VDCs to which they have access.

Refer to the following topics for more information about the details for an application instance:

- [“View all instances” on page 75](#)
- [“View application instance details” on page 80](#)
  - [“Metrics and activity” on page 81](#)
  - [“Application instance profile” on page 85](#)
  - [“Local application backups and quick DR backups” on page 87](#)

### View all instances

The Application Instances page displays information about all application instances to which you have access. **Infrastructure admin** and **infrastructure viewer** users can view all instances associated with an organization. **VDC manager** and **VDC viewer** users can view the instances associated with the VDCs to which they have access.

Complete the following steps to view all instances to which you have access:

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. Complete one of the following steps, depending on your user role:

- If you are logged in as an **infrastructure admin** or **infrastructure viewer** user, expand **Applications** and click **All Instances**.

- If you are a **VDC manager** or a **VDC viewer** user, expand **Organization** and click **All Instances**.

The screenshot displays the 'Application Instances' page in the ThinkAgile CP Cloud Controller. The page title is 'Application Instances' with a count of 54. A 'New Instance' button is located in the top right. A 'Filter by' dropdown is on the left. Below the filter is a table of application instances. The table has columns for Name, IP Address(es), CPU (cores), Memory, NW BW (MBps), ST BW (MBps), IOPS, and IO QL. The CPU column is further divided into Prov., % vCPU, and % CPU. The Memory column is divided into Prov. and Load. The NW BW and ST BW columns are divided into Read and Write. The IOPS column is divided into Read and Write. The IO QL column has a value of 0. The table lists various instances such as 'centos7-iso-shawn', 'CentOS 7 (1810) with Pyt...', 'CentOS 7 - Jenkins - Leno...', 'CentOS 7 with OwnCloud...', 'DefaultVNET-NFV', 'Divya\_test-NFV', 'iulia - CentOS 7.5 (64-bit) ...', 'iulia - CentOS 7.5 (64-bit) ...', 'iulia - RHEL 7.4 (Minimal) ...', 'iulia - RHEL 7.4 (Minimal) ...', 'NetScaler 12.1 - Lenovo T...', 'nradulet - RHEL 7.4 (Mini...', 'nradulet app from snapsh...', 'nradulet app from snapsh...', 'nradulet-4659-OL Windo...', and 'ownCloud Appliance 10.3...'. Red callout letters 'a' through 'g' are placed over the page to highlight specific features: 'a' points to the instance count '54', 'b' points to the 'New Instance' button, 'c' points to the 'Filter by' dropdown, 'd' points to the '0 selected' status, 'e' points to the 'Name' column header, 'f' points to the instance actions menu, and 'g' points to the 'All Instances' link in the sidebar.

Figure 88. Application Instances page in ThinkAgile CP Cloud Controller

- View the number of application instances within the organization or virtual datacenter.
- Click **New Instance** to create a new application instance from an installer or template.

You must be logged in as an **infrastructure admin** user or a **VDC manager** user to create new application instances.

For more information about creating a new application instance, see the following topic:

[“Create and deploy applications” on page 28](#)

- Click **Filter by** to filter this list by selecting a migration zone, a node, a storage pool, a virtual network, instance status, such as running, paused, or shut down, or by DR status (if enabled).
- View the count of currently selected instances and select one or more instances in the list.

You can perform actions on the selected application instances from the top of the table. You can perform actions such as:

- Stopping and starting an instance
- Pausing an instance
- Deleting an instance

For more information about the actions that can be performed on an instance, see the following topic:

[“Manage application instances” on page 42](#)

- e. View the following information in the list of applications.





Column in Applications List	Description
Name	The name of the application instance.
IP Address(es)	The IP address(es) of the application instance.
CPU Provisioned	The number of cores/amount of CPU provisioned to this instance. This value is entered when the application instance is created.
% vCPU	The average virtual CPU utilization on the cores provisioned to this application instance as reported by the instance.
% CPU	The average CPU utilization on the cores provisioned to this application instance as reported by the node (hypervisor).
Memory Provisioned	The amount of memory provisioned to this instance (in GB). This value is entered when you create the application instance.
Memory Load	The amount of data (in bytes) currently held in memory by this instance. This is the memory usage from the application perspective.
NW BW (MBps) Read	Network Read Bandwidth. The amount of data received (in MBps) from the network.
NW BW (MBps) Write	Network Write Bandwidth. The amount of data transmitted (in MBps) to the network.
ST BW (MBps) Read	Storage Read Bandwidth. The amount of data transferred (in MBps) outbound from the disk(s) to the node.
ST BW (MBps) Write	Storage Write Bandwidth. The amount of data transferred (in MBps) inbound from the node to the disk(s).
IOPS Read	The number of read requests per second to the disk(s).
IOPS Write	The number of write requests per second to the disk(s).
IO QL	IO Queue Length. The number of outstanding IO requests to the disk(s).

- f. From the Actions menu, perform actions on the application instance, such as connecting to the console. For more information about the actions you can perform on application instances, see the following topic:







[“Manage application instances” on page 42](#)



- g. View the current state of the application instance.

An application instance can be in one of the following states:

Icon	State	Description
	Running	The instance is operational after a successful start or restart. (Instances do not have to run a guest agent; therefore, an instance can show <i>running</i> before the guest agent starts or the instance is fully booted).
	Paused	The instance is reachable but is paused. Application instances continue to use memory resources while paused.
	Shutdown	The instance has been properly shut down.
	Unresponsive	<p>The instance was not shut down by a user, but the guest agent in the instance is not responding to ThinkAgile CP Cloud Controller.</p> <p><b>Note:</b> When some Windows- and Linux-based application instances are launched in ThinkAgile CP, a guest agent might be installed, which periodically communicates with the platform. If ThinkAgile CP is unable to communicate with the agent on the instance, the instance will move to the unreachable state. The instance itself may be working, but the guest agent is unreachable.</p> <p>The VM might be functioning normally; the management of the host by ThinkAgile CP is the issue.</p> <p>If you restart the instance, this issue will resolve. If you do not want to restart the instance, but require assistance, you should contact ThinkAgile CP Support.</p>



Icon	State	Description
	Unreachable	<p>The compute node host on which the instance is running, is no longer responding to health checks from the ThinkAgile CP Cloud Controller. This would indicate a host level issue.</p> <p>The VM might be functioning normally; the management of the host by ThinkAgile CP is the issue.</p>
	Working/ Changing state	The instance is in the process of changing from one state to another.
	NFV instance	<p>The application instance is running as a custom NFV instance.</p> <p>For more information about custom NFV appliances, see the following topic:</p> <p><a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/create-a-custom-nfv-appliance.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/create-a-custom-nfv-appliance.html</a></p>
	Temporary revert	<p>The instance has been reverted, and the reversion has not been made permanent. The following actions are not available until the revert is made permanent:</p> <ul style="list-style-type: none"> <li>• Take a backup</li> <li>• Automatic local backups</li> <li>• Create template</li> <li>• vDisk and vNIC management</li> </ul>
	Compatibility Mode	<p>The instance is running in compatibility mode.</p> <p>For more information about compatibility mode, see the following topic:</p> <p><a href="#">“Understand instance modes” on page 67</a></p>
	Quick DR backups available	Quick DR backups are available at the DR location for this application instance.

Icon	State	Description
	Replicating	Disaster recovery is enabled and quick DR backups are currently transferring to the disaster recovery location.
	Protected	DR is enabled and all quick DR backups have replicated or transferred to the disaster recovery location.

## View application instance details

**Infrastructure admin** and **infrastructure viewer** users can view details about all instances associated with an organization. **VDC manager** and **VDC viewer** users can view details about the instances associated with the VDCs to which they have access.

Complete the following steps to view details about an application instance:

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. Complete one of the following steps, depending on your user role:

- If you are logged in as an **infrastructure admin** or **infrastructure viewer** user, expand **Applications** and click **All Instances**.
- If you are a **VDC manager** or a **VDC viewer** user, expand **Organization** and click **All Instances**.

Step 3. On the Application Instances page, click the instance for which you want to view details.

The details page for the application instance is displayed.,

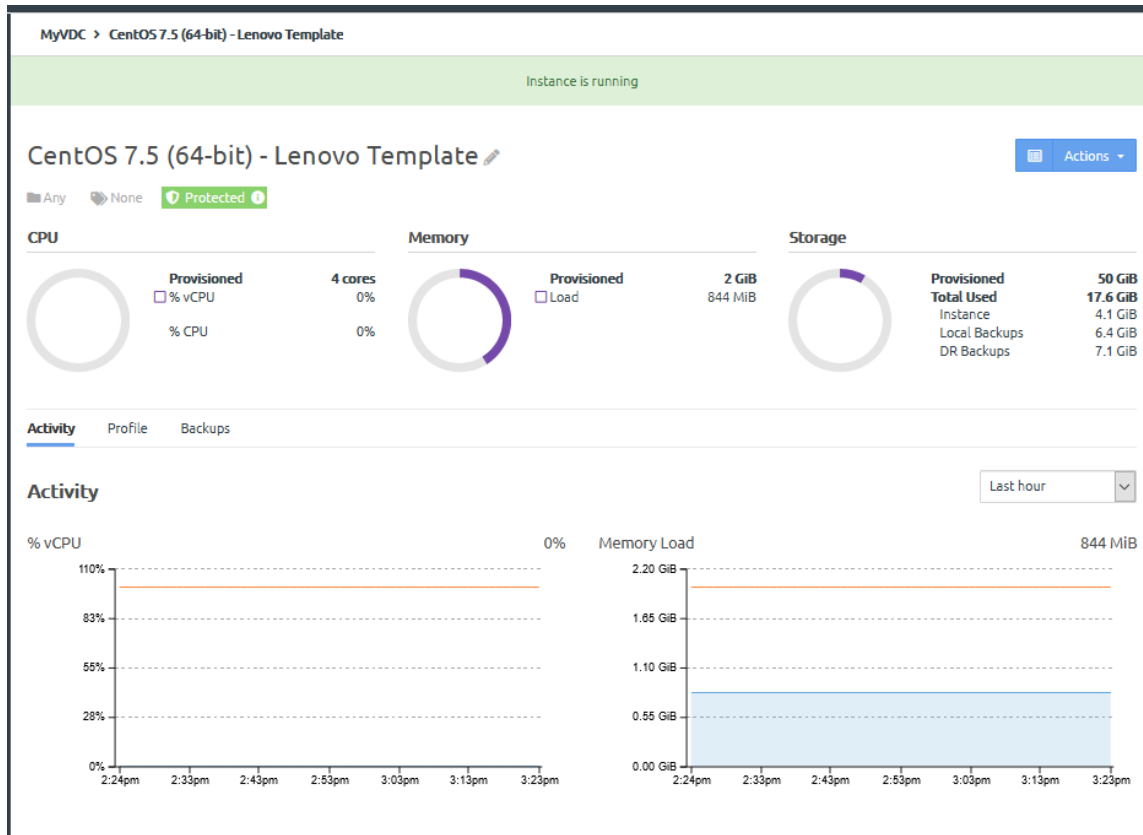


Figure 89. Application instance details

The page contains multiple tabs to provide detailed information. For more information about the details, see the following topics:

- [“Metrics and activity” on page 81](#)
- [“Application instance profile” on page 85](#)
- [“Local application backups and quick DR backups” on page 87](#)

### Metrics and activity

You can view information about application instance resource utilization on the application instance details page.

### CPU, memory, and storage charts

The following three charts are displayed at the top of the application instance page.

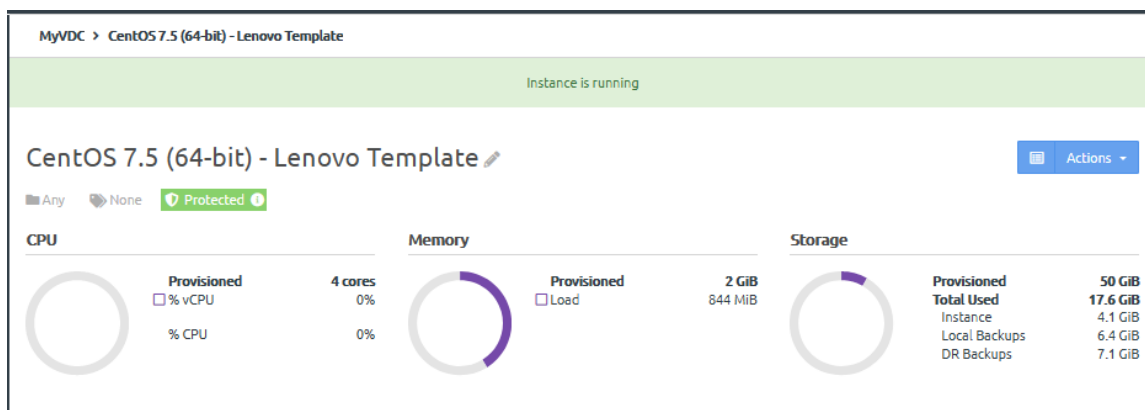


Figure 90. Application instance CPU, memory and storage charts

- **Provisioned CPU.** The percentage of CPU provisioned to the application instance when it was created. % vCPU is the average virtual CPU utilization on the cores provisioned to this application as reported by the instance. %CPU is the average real CPU utilization on the cores provisioned to this application as reported by the node.
- **% vCPU.** The average virtual CPU utilization on the cores provisioned to this application as reported by the instance. %CPU is the average real CPU utilization on the cores provisioned to this application as reported by the node.
- **Memory.** The memory provisioned to the application instance when it was created. The Load represents the current memory utilization of the instance.
- **Storage.** The storage provisioned to the application instance when it was created, as well as the amount of storage used.

**Note:** For Windows-based application instances, you will notice a minor discrepancy on storage space reported on the portal versus the disk properties inside the operating system. This is due to the Windows file system formatting overhead, associated with NTFS.

In addition, specific details about how the storage is being used are displayed:

- **Instance.** For instances created from a template, this is the storage used by the current instance but does not include base image size or backups. For instances created from an installer, this is the storage used by the current instance but does not include backups.
- **Local Backups.** For instances created from a template, this is the storage used by all local backups but does not include base image. For instances created from an installer, this is the storage used by all local backups.
- **DR Backups.** For instances created from a template, this is the storage used by replicated backups at all replication sites. For instances created from an installer, this is the storage used by replicated backups at all replication sites.

**Note:** If you see a **Thin-Provisioned** label for this instance, this instance is a thin-provisioned application clone. The "Storage Used" by the instance represents only the size of this application clone the base image size is counted once in the virtual datacenter's storage usage, as the base image may be shared by multiple application clones within the virtual datacenter.

### Application instance activity charts

The **Activity** tab displays several charts that show recent activity for the instance.



Figure 91. Application instance activity charts on an application instance page

1. You can adjust the time interval displayed in the charts by selecting one an interval from the last hour to the last year.

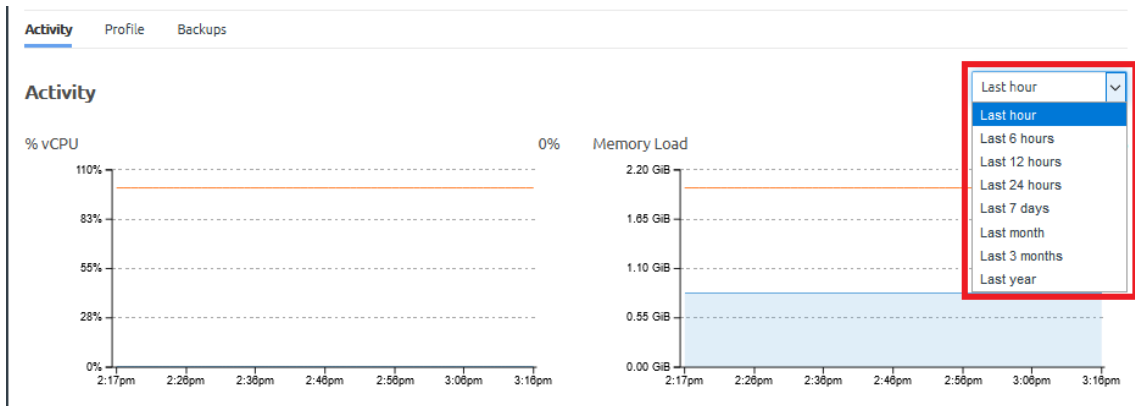


Figure 92. Application instance activity interval

2. The following activity information is displayed.

Activity Chart	Description
% vCPU	Average virtual CPU utilization on the cores provisioned to this instance as reported by the instance.
Memory Load	The amount of data (in bytes) currently held in memory by this instance. This is the memory usage from the application perspective.

Activity Chart	Description
Network Read Bandwidth	The amount of data received (in MBps) from the network.
Network Write Bandwidth	The amount of data (MBps) transmitted to the network.

3. You can also view storage activity by all storage disks or by selecting a specific disk. If you select a disk, an additional chart will be displayed that shows Disk Latency for the selected disk.



Figure 93. Application instance storage charts on an application instance page

4. You can view the following storage pool information.

Storage Activity Chart	Description
Storage Instance	<ul style="list-style-type: none"> <li>• For instances created from a template, this is the storage used by current instance. It does not include the base image size or backups.</li> <li>• For instances created from an installer, this is the storage used by current instance. It does not include backups.</li> </ul>
Storage Footprint	<ul style="list-style-type: none"> <li>• For instances created a template, this is the storage used by current instance, including local backups and quick DR backups. It does not include the base image.</li> <li>• For instances created from an installer, this is the storage used by current instance, including local backups and quick DR backups. (It does not include the base image size of thin-provisioned clones.)</li> </ul>
Storage Read Bandwidth	The amount of data transferred (in MBps) outbound from the disk(s) to the node.
Storage Write Bandwidth	The amount of data transferred (in MBps) inbound from the node to the disk(s).
Read IOPS	The number of read requests per second to the disk(s).
Write IOPS	The number of write requests per second to the disk(s).
IO Queue Length (Average Across Disks)	Outstanding I/O requests to the disk(s).
Disk Latency	If you select a disk, an additional chart will be displayed that shows Disk Latency for the selected disk. Latency is a measure of how long it takes for a single I/O request to occur from the standpoint of the application instance.

### Application instance profile

The **Profile** tab displays details about the instance, such as the compute, storage, and networking resources.

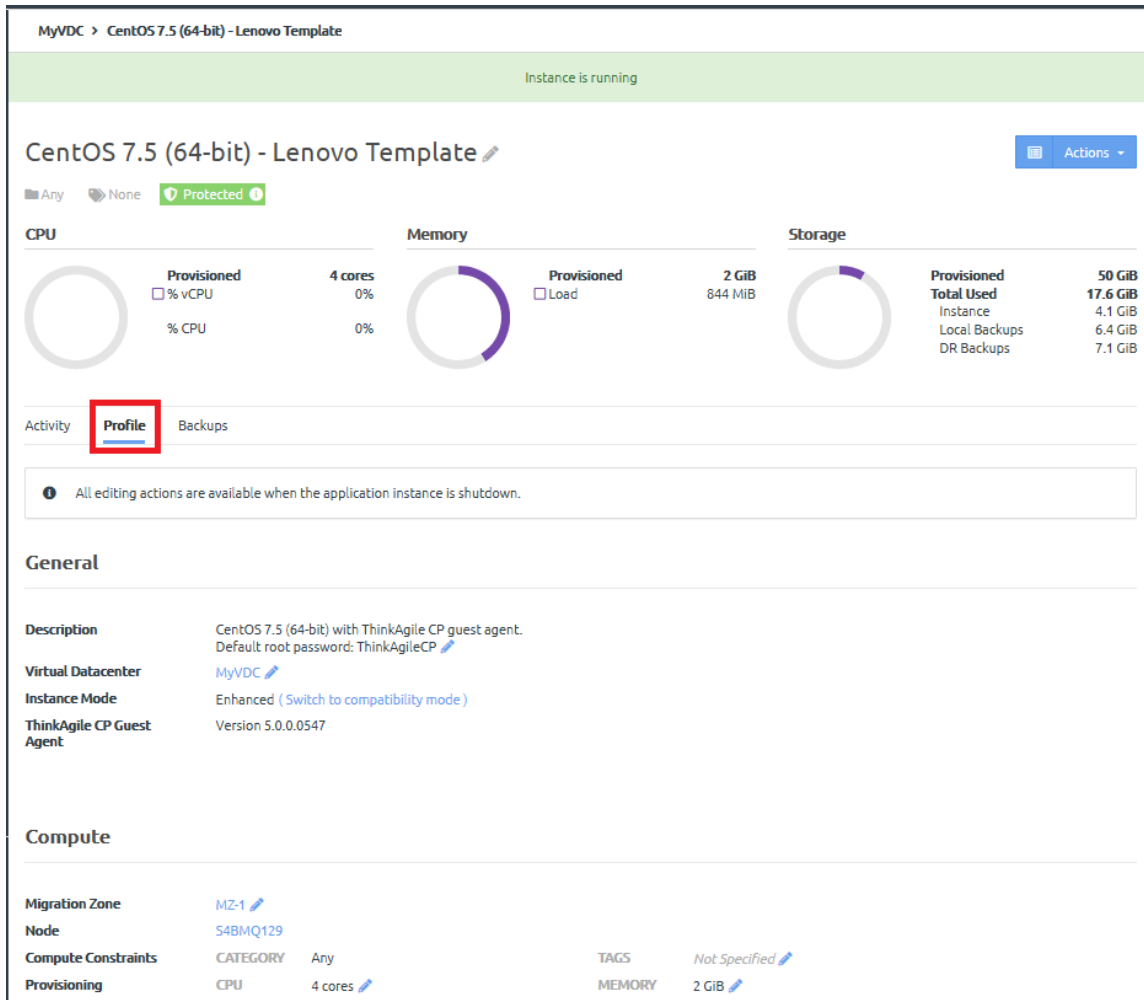


Figure 94. Application instance Profile tab

You can view the following details about the application instance

Information	Description
General section	
Description	Displays a description for this application instance if one exists.
Virtual Datacenter	Displays the virtual datacenter to which this application instance is associated.
Instance Mode	Displays the mode as either Compatibility or Enhanced. For more information about instance modes, see the following topic:  <a href="#">"Understand instance modes" on page 67</a>
ThinkAgile CP Guest Agent	Shows the version of the ThinkAgile CP guest agent, if installed.
Compute section	
Migration Zone	Shows the migration zone in which this instance runs.



Information	Description
Compute Constraints	Shows the compute categories and tags for this instance if applicable.
Provisioning	Shows the CPU and memory provisioned for this instance.
Storage	
Storage Pool	Shows the storage pool used by this application instance.
Virtual Disks	Shows any related vDisk information for this instance, including the name, size, and any IOPS or Bandwidth limits. (These limits are useful for managing Quality of Service (QoS) for individual application instances.) You can also add a vDisk or modify vDisk settings here as needed. For more information about vDisks, see the following topic: <a href="#">“Work with vDisks” on page 48</a>
Network section	
vNICs	Shows the virtual network interface controllers (vNICs) and related networking information for this instance, including networking mode (VLAN or VNET) and any associated firewall profiles and overrides.
Settings section	
Boot Order	Shows the boot order for this instance.
Timezone Configuration	Shows the time zone that is set for this instance.
Automatic Recovery	Shows whether automatic recovery is enabled or disabled for this instance. If enabled, if a node fails, the instance will restart elsewhere when resources are available.
Nested Virtualization	Shows whether nested virtualization is enabled or disabled for this instance.

If you are an **infrastructure admin** user or a **VDC manager** user, click the Edit icon (  ) next to the setting that you want to change. You can also click **Actions** → **Edit instance**, and then click the setting you want to edit.

**Note:** You can only edit certain settings when the application instance is shut down.

For more information about modifying instance settings, see the following topic:

[“Working with application instances” on page 28](#)

### Local application backups and quick DR backups

On the **Backups** tab, you can view all backups that have been created for an application instance. **Infrastructure admin** users and **VDC manager** users can manually create backups or set up automatic backups.

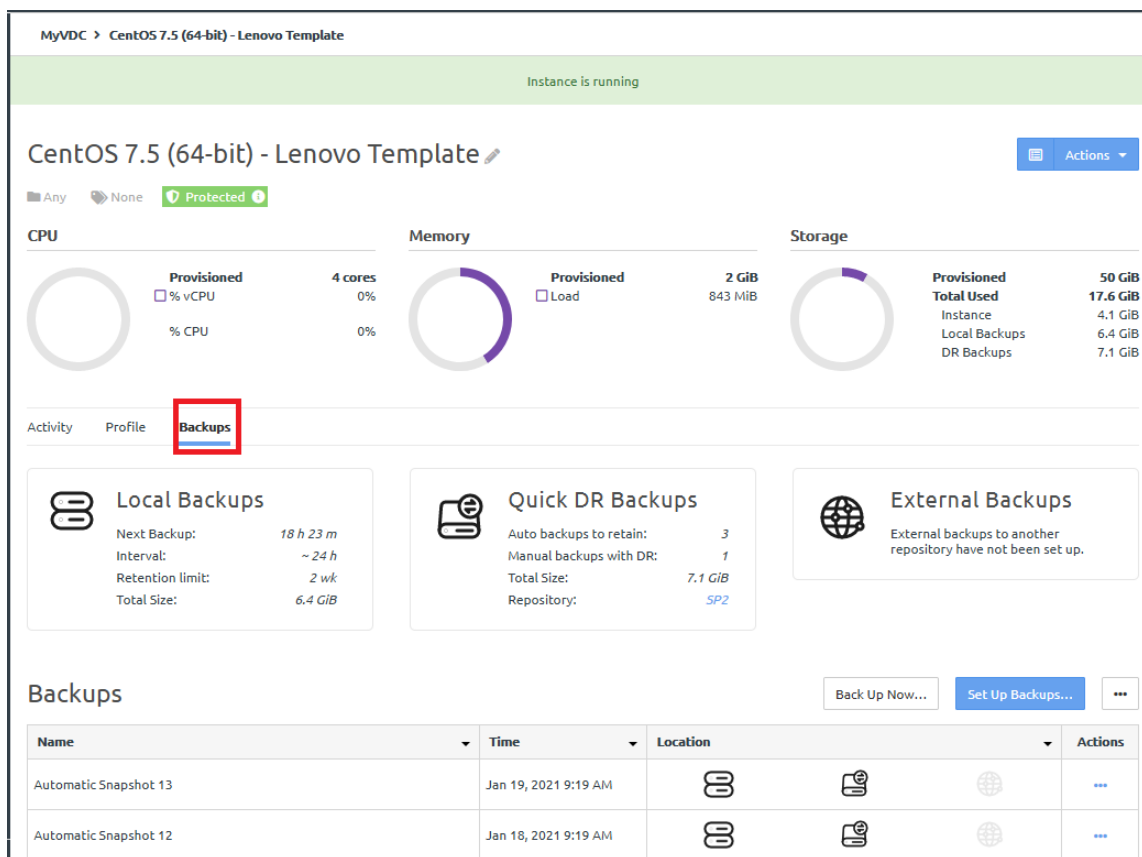


Figure 95. Backups tab

For more information about local backups, see the following topic:

[“Manage local backups for an application instance” on page 269](#)

For more information about quick DR backups, see the following topic:

[“Manage quick DR backups” on page 288.](#)

## Manage application domains

Infrastructure admin users can set up and manage application domains.

Refer to the following topics for more information about managing these application domains:

- [“Configure NetScaler” on page 88](#)
- [“Use NetScaler as an NFV” on page 89](#)
- [“Use Docker in the ThinkAgile CP Cloud Controller” on page 90](#)
- [“Configure for CentOS 6 instances” on page 93](#)
- [“Set up PXE boot in the ThinkAgile CP Cloud Controller” on page 94](#)

## Configure NetScaler

If you will be using a NetScaler instance as an NFV, you need to configure NetScaler. You need to configure networking for vNIC0, which will include giving it an IP in the bridged VLAN and configuring other settings accordingly.

## Prerequisites for configuring NetScaler for the first time

Make sure you obtain the following information before attempting to set up NetScaler:

- Proper gateway (if it is on a bridged network, it will need to be the gateway IP on that VLAN)
- Usable IP within your network range
- Netmask
- Subnetmask

You can obtain the information from the command line interface (CLI). Type the following commands:

```
set ns config -ipaddress<IPAddress> -netmask<subnetMask>
add ns ip<IPAddress> <subnetMask> -type<type>
add route<network> <netmask> <gateway>
set system user <userName> -password
save ns config
reboot
```

**Note:** You can ping from "shell" to test this configuration.

### Example:

```
set ns config -ipaddress 10.102.29.60 -netmask 255.255.255.0
add ns ip 10.102.29.61 255.255.255.0 -type snip
add route 0.0.0.0 0.0.0.0 10.102.29.1
set system user nsroot -password
Enter password: *****
Confirm password: *****
save ns config
reboot
```

## Use NetScaler as an NFV

You can set up a NetScaler instance to be used as an NFV.

Complete the following steps before configuring NetScaler as an NFV instance:

1. Create a VNET and choose **Manual** for Network Services.

For information about creating a VNET, see the following topic:

[“VNET Overview” on page 115](#)

2. Download and create a Netscaler application for vNIC0. Then, add a second vNIC, selecting virtual networking and the VNET you just created.

For information about adding a vNIC, see the following topic:

[“Manage application instances” on page 42](#)

3. Go to the VNET you created and click **Deploy NFV instance**.
4. Follow the steps to configure NetScaler as described in this topic:

[“Configure NetScaler” on page 88](#)

You are configuring networking for vNIC0, so give it an IP in the bridged network and configure other settings accordingly.

Complete the following steps to set up routing to use a NetScaler instance as an NFV

- Step 1. Establish an SSH session to the interconnect switch and enter the following command:
- ```
/usr/share/tacp/export_bgp_route.sh "add
```

```
<Network address of vnet>  
<mask range of vnet>  
<Netscaler vNIC0 IP address>"
```

For example:

```
/usr/share/tcp/export_bgp_route.sh "add 10.104.9.232 29 10.102.9.6"
```

**Note:** The network address is the IP address before the usable IP range of your VNET.

Step 2. In your browser, enter the IP address you configured for Netscaler and log in.

The default ID and password is: nsroot:nsroot

Step 3. In the **Configuration** tab, click the subnet IP address.

Step 4. Add the gateway IP address and subnet mask of your VNET. Then click **Create**.

Step 5. Click **Save**.

Step 6. Remove all other IPs under the subnet IP address and click **Save**.

You should be able to ping your VNET gateway from outside of the virtual network if your NetScaler NFV is set up properly.

**Note:** NetScaler is not a DHCP server. Within the operating system of an instance using the NetScaler VNET, configure a static IP within the VNET IP range and set the gateway to the gateway IP address for the VNET.

## Use Docker in the ThinkAgile CP Cloud Controller

You can run the Docker platform in the ThinkAgile CP Cloud Controller.

Complete the following steps to use Docker in the ThinkAgile CP Cloud Controller:

Step 1. Create three instances from the CentOS 7 - Docker CS Engine 1.12 template, which you can download from the Lenovo Cloud Marketplace:

```
swarm-manager, swarm-worker-1, and swarm-worker-2
```

For information about creating an instance from a template, see the following topic:

[“Create an instance from a template” on page 29](#)

Step 2. Update the host names on the instances:

```
hostnamectl set-hostname swarm-manager --static && reboot
```

(change the host name to swarm-worker-1 and swarm-worker-2 for the other instances)

Step 3. On the swarm-manager instance, run the following command::

```
docker swarm init
```

The swarm should successfully initialize, and the IP and token should be listed.

Then run:

```
docker node ls
```

The swarm manager should be listed.

Step 4. On each swarm worker instance, run the following command:

```
docker swarm join --token <token from previous step> <ip from previous step>:2377
```

Step 5. On the swarm-manager instance, run the following command:

```
docker node ls
```

It should now list the worker nodes and the swarm manager.

Step 6. On the swarm-manager instance, run the following command:

```
docker run -d --restart always --name visualizer -p 8080:8080
-e HOST=$(/sbin/ip -o -4 addr list eth0 | awk '{print $4}' | cut -d/ -f1)
-v /var/run/docker.sock:/var/run/docker.sock manomarks/visualizer
```

Step 7. Navigate in a web browser to <swarm manager ip>:8080. It should load and show the manager and both workers.

Step 8. On the swarm-manager instance, create a volume with an application by running the following commands:

```
docker volume create --driver taccp --name my-website
```

```
docker run -it --rm --name taccp-configure -v my-website:/data --volume-driver taccp busybox sh
```

Inside the container (where previous command lands you) run the following command:

```
vi /data/index.html
```

Then type *i* to edit the file

Step 9. Paste the following code:

```
<html>
<head>
<title>Hello world!</title>
<link href='http://fonts.googleapis.com/css?family=Open+Sans:400,700' rel='stylesheet' type='text/css'>
<style>body {background-color: white;text-align: center;padding: 50px;font-family:
Open Sans,Helvetica Neue,Helvetica,Arial,sans-serif;}
#logo {margin-bottom: 40px;}
</style>
</head>
<body>
<img id=logo src=http://www.iatechexpo.com/images/logo_cloudistics.png />
<h1>Docker 1.12 powered by the ThinkAgile CP Platform</h1>
</body>
</html>
```

Step 10. Exit the container (type *exit*).

Step 11. On the swarm-manager instance, create a second volume with an application:

```
docker volume create --driver taccp --name my-website2
```

```
docker run -it --rm --name taccp-configure -v my-website2:/data --volume-driver taccp busybox sh
```

Inside the container (where previous command lands you) run the following command:

```
vi /data/index.html
```

Then type *i* to edit the file

Step 12. Paste the code from the previous step into the file.

Step 13. Create and remove a third volume on the swarm-manager instance:

```
docker volume create --driver tacp --name my-website  
  
docker volume rm my-website3
```

Step 14. On the swarm-manager instance, launch the web application service for the first volume:

```
docker service create --name my-app --mount type=volume,target=/usr/share/nginx/html,source=my-website,volume-driver=tacp  
--publish 8081:80  
--constraint 'node.role == worker' nginx:latest nginx -g 'daemon off;'
```

In the visualizer, the container should be scheduled on the cluster.

Step 15. In a browser, navigate to <swarm-worker ip>:8081 to view the container

Step 16. On the swarm-manager instance, launch the web application service for the second volume:

```
docker service create --name my-app2 --mount type=volume,target=/usr/share/nginx/html,source=my-website2,volume-driver=tacp  
--publish 8082:80  
--constraint 'node.role == worker' nginx:latest nginx -g 'daemon off;'
```

In the visualizer, the container should be scheduled on the cluster.

Step 17. In a browser, navigate to <swarm-worker ip>:8082 to view the container.

Step 18. On the manager node, run the following command:

```
docker node ls
```

then enter:

```
docker node update --availability drain swarm-worker-1
```

In the visualizer, the node should show it is draining, and the container should move to swarm-worker-2

Step 19. On the manager node, run the following command:

```
docker node update --availability active swarm-worker-1
```

In the visualizer the node should show it is reactivated

Step 20. On the manager node, run the following command:

```
docker node ls, then docker node update --availability drain swarm-worker-2
```

In the visualizer, the node should show it is draining, and the containers should move to swarm-worker-1

Step 21. On the manager node, run the following command:

```
docker node update --availability active swarm-worker-2
```

In the visualizer, the node should show it is reactivated.

Step 22. Shut down a worker node to validate the failover process:

```
shut down swarm-worker-1
```

(the worker node with the containers)

In the visualizer, Docker should reschedule the containers.

## Configure for CentOS 6 instances

There is a known issue with cloning CentOS 6 machines wherein the resulting machine retains information regarding the ETH0 network interface (including MAC address) of the original. As a result, it labels the new network interface as eth1 and is unable to start it because there are no network scripts referencing eth1.

This issue can be resolved in one of two ways:

- Method 1. Click **Run sysprep** when creating a CentOS 6 instance from the template. This will prevent the problem from occurring.

For more information about creating an application instance from a template, see the following topic:

[“Create an instance from a template” on page 29](#)

- Method 2. After creating a CentOS 6 instance without running sysprep, complete the following steps:
  1. In the ThinkAgile CP Cloud Controller management console, go to the **Profile** tab of the CentOS 6 instance. Make note of the MAC Address (we will use 76:00:00:00:00:00 for this example).
  2. Log in to the CentOS instance and run the following command:

```
vi /etc/udev/rules.d/70-persistent-net.rules
```

There will be two entries: eth0 and eth1.

- a. Type `i` to input data, and delete the entry with the MAC address that does not match the one that you recorded from the **Profile** tab. If the remaining entry is for eth1, change it to eth0.
  - b. Press ESC and type `:wq` to write the changes and exit.
3. Run the following command:

```
ls /etc/sysconfig/network-scripts
```

If `ifcfg-eth1` is present, delete it:

```
rm -d /etc/sysconfig/network-scripts/ifcfg-eth1
```

4. Run the following commands:
  - a. Type `i` to input data.
  - b. Add `aHWADDR={MAC Address}` entry.
  - c. Set `ONBOOT=yes` if it is not set already.
  - d. Press ESC and type `:wq` to write the changes and exit.
- 5.

```

TYPE="Ethernet"
BOOTPROTO="static"
IPADDR=10.1.1.12
NETMASK=255.255.255.0
NM_CONTROLLED="no"
DEFROUTE="yes"
PEERDNS="yes"
PEERROUTES="yes"
IPV4_FAILURE_FATAL="no"
IPV6INIT="yes"
IPV6_AUTOCONF="yes"
IPV6_DEFROUTE="yes"
IPV6_PEERDNS="yes"
IPV6_PEERROUTES="yes"
IPV6_FAILURE_FATAL="no"
NAME="eth0"
UUID="ad...e"
DEVICE="eth0"
ONBOOT="yes"
HWADDR=76:00:00:00:00:00_

```

6. To start the network interface, Run the command to start the network interface:

```
ifup eth0
```

Step 1.

## Set up PXE boot in the ThinkAgile CP Cloud Controller

You can set up a PXE boot server in the ThinkAgile CP Cloud Controller

Complete the following steps to set up PXE Boot in the ThinkAgile CP Cloud Controller:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user.
- Step 2. In the left navigation, click **Hardware** to display the Hardware Stack page.
- Step 3. Click **Show Network Settings** and make note of the IP address for the interconnect switch (Hardware Management Network).
- Step 4. SSH into the IP address as user admin. Use the password that was chosen when the hardware was registered with the ThinkAgile CP Cloud Controller.
- Step 5. Run the following command:

```
sudo su
```

and then re-enter the admin password to gain root privileges, if needed. If this is not the first time PXE has been setup, run the following command:

```
rm /etc/dhcp/dhcp-site-custom
```

before proceeding to the next step.

- Step 6. Run the following command:

```
/usr/share/tacp/tacp_configure_pxe.sh -p <pxe_server> -f <bootfilename>
```



where:

- `<pxe_server>` is the IP address of your PXE server
- `<bootfilename>` with the file from which the instance will boot.

Step 7. On the **Profile** tab of the instance on which you want to boot to PXE, click **Actions → Edit Instance → Edit boot order**.

Step 8. Move the vNIC to the top of the boot order, and click **Save**.

Step 9. Start the instance.

## Application templates

An *application template* is a gold master, sys-prepped image of an application instance. Templates facilitate the easy and instantaneous creation of application instances, and a single template can be used to create any number of instances.

In the ThinkAgile CP Cloud Controller, **infrastructure admin** users and **VDC manager** users can create application templates in several ways:

- Create a new template from an existing application instance.
- Import a VM from a .VMDK, .VHD, .VHDx, .IMG, .OVA, .QCOW2, .QED, or .RAW and save it as a template.

**Note:** Make sure that you cleanly shut down the source virtual machine (VM) before importing the disk file (s).

- Download a template from the Lenovo Cloud Marketplace.

For more information about the Lenovo Cloud Marketplace, see the following topic:

[“Lenovo Cloud Marketplace” on page](#)

## View templates

ThinkAgile CP has three types of template repositories.

- The Lenovo Cloud Marketplace. All users have access to the Lenovo Cloud Marketplace. However, you must be logged in as an **infrastructure admin** user or a **VDC manager** user to download templates.

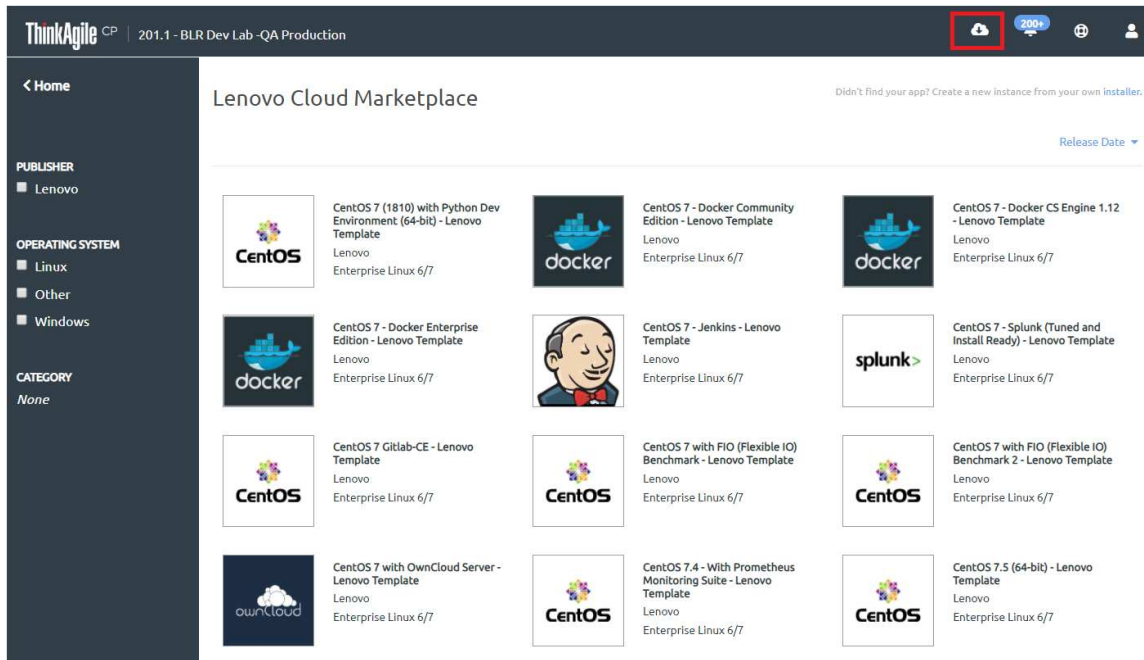


Figure 96. Lenovo Cloud Marketplace

- The template store for the organization, which is a repository of templates accessible to anyone in a given organization, irrespective of the storage pool in which they are stored (they are copied over to the local storage pool as needed).

In the left navigation, click **Applications → Organization Templates** in the left navigation to view the templates.

**Note:** VDC manager users and VDC viewer users click **Organization → Organization Templates**.

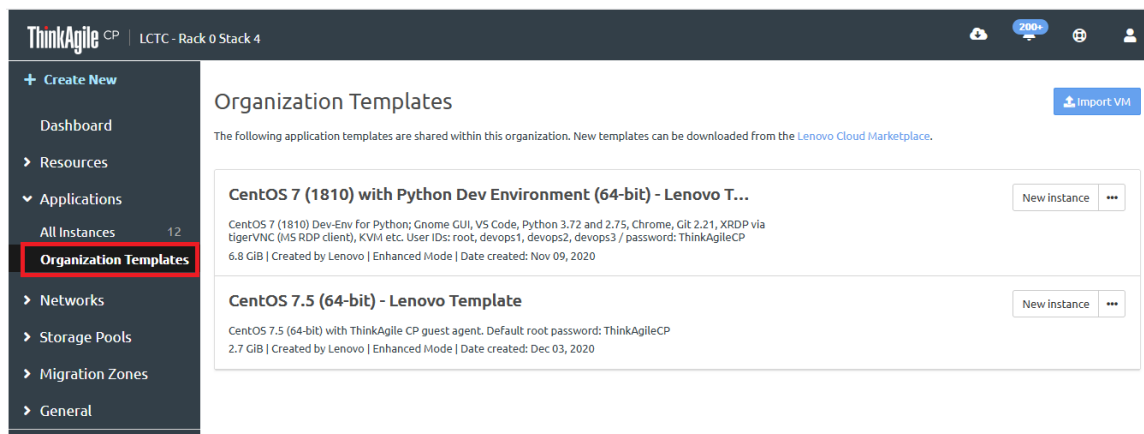


Figure 97. Organization Templates store

- An individual template store for each virtual datacenter. Templates are stored only in the storage pools that are allocated to that virtual datacenter.

In the left navigation, click a VDC and then click **VDC Templates** to view the templates.

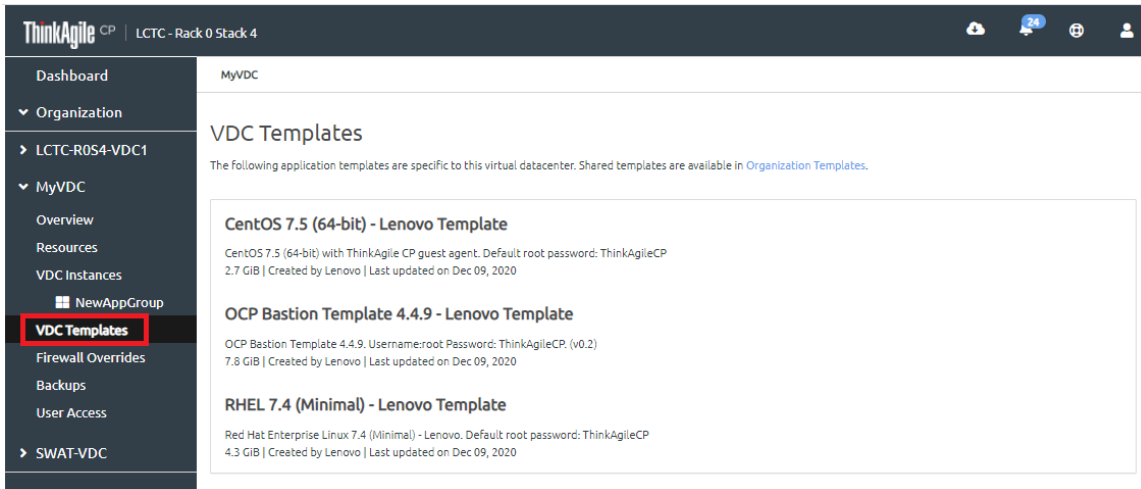


Figure 98. VDC Templates store

## Manage application templates

You can perform actions on templates, such as creating an instance from a template, copying a template, or deleting a template. **Infrastructure admin** users can manage templates that are stored in Organization Templates and templates stored in VDC Templates. **VDC manager** users can manage templates stored in VDC Templates for VDCs to which they have access.

Refer to the following topics for more information about managing application templates:

- [“Create a new instance from a template” on page 97](#)
- [“Edit a template” on page 102](#)
- [“Copy a template” on page 105](#)
- [“Delete a template” on page 107](#)
- [“Allow share access for importing a VM” on page 107](#)

### Create a new instance from a template

**Infrastructure admin** users and **VDC manager** users can use a pre-defined template to quickly create and deploy an application instance. These instances function as thin-provisioned clones that share a common base image, reducing storage usage across a virtual datacenter.

**Note:** A number of pre-defined templates are offered in ThinkAgile CP Cloud Controller. You can use one of those templates to create a new application instance, or you can download more templates from the Lenovo Cloud Marketplace. For more information about the Lenovo Cloud Marketplace, see the following topic:

Complete the following steps to create an application instance from a template:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Download a template from the Lenovo Cloud Marketplace to the Organization Templates or the VDC Templates page.

For more information about the Lenovo Cloud Marketplace, see the following topic:

[“Use the Lenovo Cloud Marketplace” on page 110](#)

- Step 3. In the ThinkAgile CP Cloud Controller left-side menu, perform one of the following steps, depending on where the template was downloaded:

- Expand **Applications** and click **Organization Templates** to view a list of the application templates in your organization. Then select the template you want, and click **New Instance**.
- Expand a virtual datacenter to which you have access. Click **VDC Templates** and select the template you want. Then click **New Instance**.

Step 4. In the New instance from Template dialog, enter the instance properties, virtual datacenter settings, and resource settings for deploying this application instance.

## New instance from Template

### Properties

Instance Name:  ← a

Description (Optional):

Source Template: Linux CentOS 7 - Docker Enterprise Edition - Lenovo Template (created by Lenovo)

Template Type: Organization Template

---

### Virtual Datacenter

Select a virtual datacenter for the application instance, then complete the resource profile for networking, storage, and compute.

Virtual Datacenter:  ← b

Application Group:  ← c

Number of Instances:  ← d

---

### Storage

Storage Pool:  ← e

Virtual Disks (vDisks)

Name	Size	IOPS Limit	Bandwidth Limit
Disk 0	80 GiB	—	—
Disk 1	50 GiB	—	—

---

### Compute

Provisioning:  ← f

Migration Zone:  ← g

[Compute Constraints](#) ← h

---

### Network

Configure at least one virtual network interface controller (vNIC) to specify the instance's network settings. [Add vNIC](#)

vNIC	Networking Mode	Network	Firewall Profile	Firewall Override	Mac Address
vNIC 0	<input type="text" value="Select one"/>	<input type="text" value="Select one"/> ← i	—	—	<input type="text" value="Automatic"/>

Boot Order: Disk 0 > Disk 1 > Network (vNIC 0) ← j

Figure 99. New instance from Template dialog

- a. Enter a name (required) and a description (optional) for the new application instance. The new name must be unique across all application instances in the associated virtual datacenter.

- b. Select the virtual datacenter where the instance should reside and get its resources. The virtual datacenter selection determines the migration zone and storage pool resources available for the application instance.
- c. You can select an application group (which are used to organize application instances in a virtual datacenter) and then specify the number of instantiations you want to include in this group.

For more information about application groups, see the following topic:

[“Managing application groups” on page 232](#)

- d. If you want to create more than one instance, enter the number of instances to be created.
- e. Select a storage pool for the application instance resources. (Note that virtual disk information as defined by the template is shown but cannot be modified during instance creation from a template. You may view IOPS and bandwidth limits from the instance vDisk, but you may not edit the values.)
- f. Select the VM provisioning for this instance by specifying the CPU (number of cores) and memory in GB.
- g. Select the migration zone from which the application instance will get its compute resources.
- h. If the instance requires a specific compute category or tag, expand compute constraints and add the category and tags.
- i. Select a networking mode for the instance as either VNET or VLAN for each vNIC and select a virtual network from the drop-down menu.
- j. Edit the boot order if needed. The application instance will attempt to boot in the sequence you define.

Step 5. In the Instance Settings section, configure the settings:

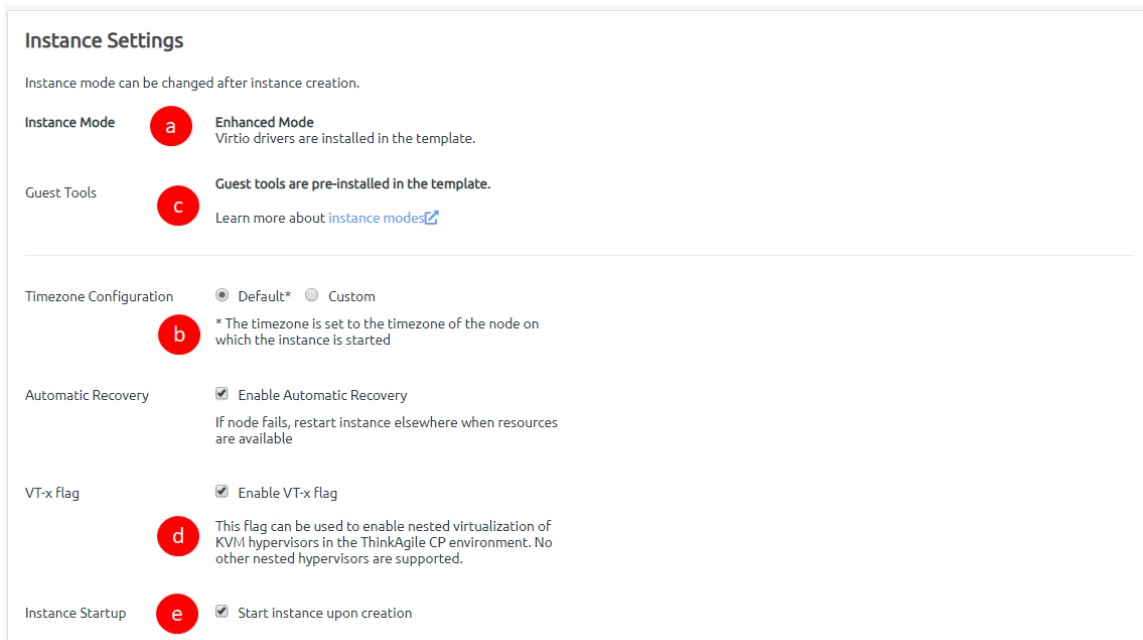


Figure 100. New Instance from Template - instance settings

- a. Guest tools may be installed in some application instances, and you can define related settings here. Select one of the following modes.

**Note:** Most users should select Compatibility mode. You should only select Enhanced mode if the template was created with VirtIO drivers installed. The instance mode is read-only for a new instance created from a ThinkAgile CP template. For more information about these modes, see the following topic:

[“Understand instance modes” on page 67](#)

1. **Compatibility Mode** - All instances can boot in this mode.
  2. **Enhanced Mode** - Virtio drivers must be installed to boot in this mode.
- b. For Timezone Configuration, select one of the following.
1. **Default** - The time zone is set to the time zone of the node on which the instance starts.
  2. **Custom** - You can set the time zone for the application instance by selecting the time zone area and location.

**Note:** Linux instances should use Default or the UTC time zone, rather than a custom local time zone.

- c. Select the **Enable Automatic Recovery** checkbox to enable automatic recovery, which specifies to restart the instance where resources are available if the node fails.
- d. Select the **Enable VT-x flag** checkbox to enable nested virtualization of KVM hypervisors in your ThinkAgile CP environment.
- e. If you do not want the instance to start upon creation, clear the checkbox near the bottom of this page (Start instance upon creation is enabled by default).

Step 6. Click **Create Instance**.

Step 7. To view the application instance, expand your VDC in the left navigation and click VDC Instances. The instance will appear in the list.

The screenshot shows the 'VDC Instances' page in the ThinkAgile CP interface. The page title is 'MyVDC' and 'VDC Instances 1'. There is a 'New Instance' button. Below the title, there are filter options and a table of instances. The table has the following data:

Name	IP Address(es)	CPU (cores)			Memory		NW BW (MBps)		ST BW (MBps)		IOPS		IO QL
		Prov.	% vCPU	% CPU	Prov.	Load	Read	Write	Read	Write	Read	Write	
MyNewCentOSImage	10.212.30.184	4	0%	0%	2 GiB	850 MiB	0	0	0	0	0	0	0

Figure 101. VDC instances page

Step 8. Click the instance to display the details about the instance, such as the CPU and memory usage.

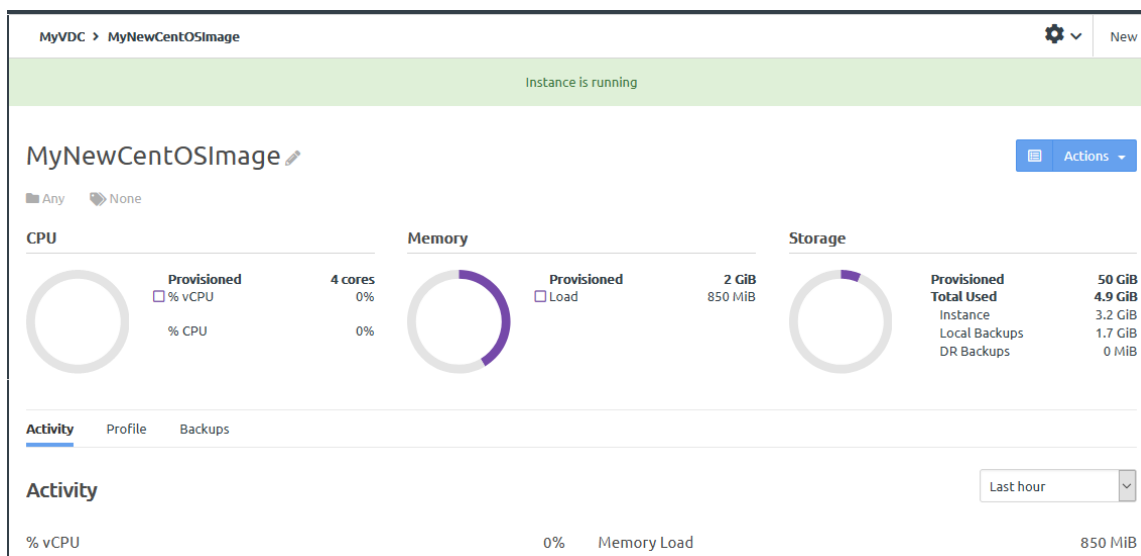


Figure 102. VDC instances page

For more information about the application instance details page and the Activity tab, see the following topic:

[“View application instance details” on page 80](#)

**Important:** Before ThinkAgile CP, Release 5.1.4, some Microsoft Windows templates in the Lenovo Cloud Marketplace included drivers that could cause issues when migrating VMs that were created from those templates. If you create an instance from the Microsoft Windows 10 template (Pro or Enterprise), Microsoft Windows Server 2016 template, or Microsoft Windows Server 2019 template that was dated before September, 2020, you need to delete some drivers to avoid having issues during migration. For details about deleting the relevant drivers, see [“Issues when migrating Windows VMs” on page 365](#).

### Edit a template

**Infrastructure admin** users and **VDC manager** users can edit templates.

Complete the following steps to edit a template:


Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user or a **VDC manager** user.

Step 2. In the ThinkAgile CP Cloud Controller left-side menu, complete one of the following steps:

- Click **Applications** → **Organization Templates** if you are logged in as an **infrastructure admin** to view a list of the application templates in your organization.

**Note:** **VDC manager** users cannot edit templates in **Organization Templates**.

- Select a virtual datacenter to which you have access, and click **VDC Templates** to view a list of templates available to the VDC.

Step 3. Click the Actions menu (  ) to the right of the template; then click **Edit**.



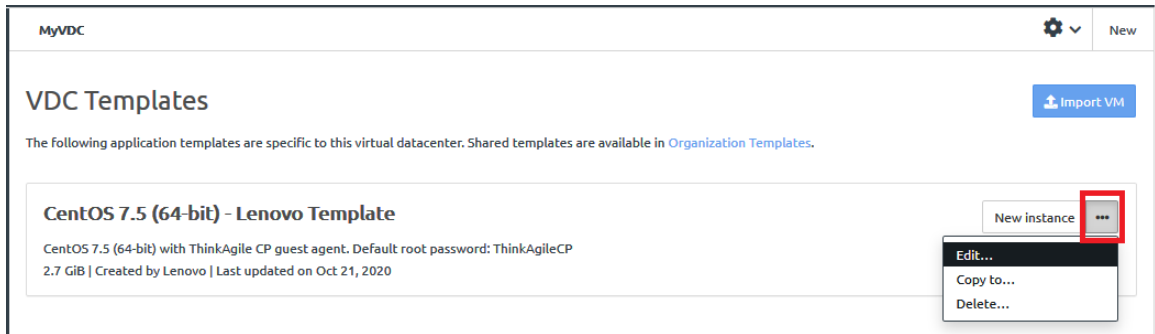


Figure 103. Actions menu - Edit option

Step 4. In the Edit Application Template dialog, fill in the information that you want to change.

## Edit Application Template

### Template Properties

**Template Name**

**Description**

**Provisioning**

CPU	4	cores	Memory	2	GiB
-----	---	-------	--------	---	-----

**Application Disk and Boot Orders**

The template's application disks and boot order are listed below. Drag and drop the list items to set the boot order.

**BOOT ORDER**

1	<b>Disk 0</b> Storage Disk - 50 GiB	☰
2	<b>vNIC 0</b> Virtual Network Interface Controller	☰

Cancel

Figure 104. Edit Application Template dialog

You can modify the following settings:

- Template Name. If you change the template name, it must be unique.
- Description.
- Provisioning. Choose the number of CPU cores and the amount of memory (in GiB) that is available for the template.
- Boot order.

The updated version of the template is available.

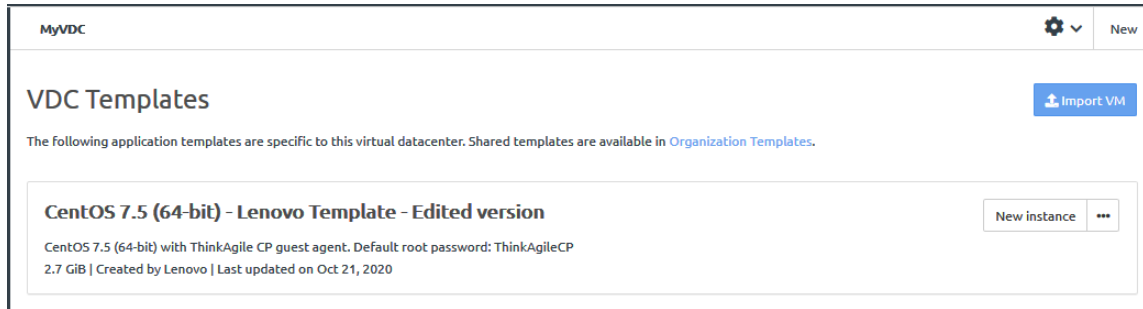



Figure 105. Updated template in VDC Templates

### Copy a template

**Infrastructure admin** users and **VDC manager** users can copy templates from one template store to another.

Complete the following steps to copy a template:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user or a **VDC manager** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, complete one of the following steps:
  - Click **Applications** → **Organization Templates** if you are logged in as an **infrastructure admin** to view a list of the application templates in your organization.
  - Select a virtual datacenter to which you have access, and click **VDC Templates** to view a list of templates available to the VDC.
- Step 3. Click the Actions menu (  ) to the right of the template; then click **Copy to**.

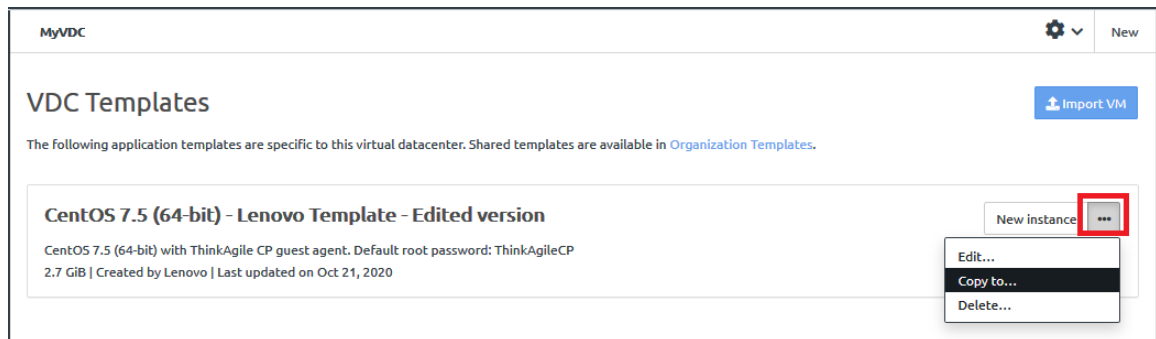


Figure 106. VDC Templates Actions menu - Copy to

- Step 4. In the Copy To dialog, choose the location where the template will be copied. You can choose another VDC or the Organization Templates. However, you cannot copy the template to the same location where it currently resides.

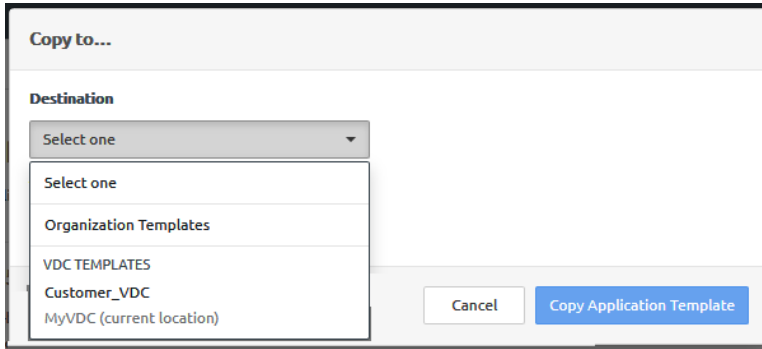


Figure 107. VDC Templates - Copy to dialog

Step 5. Give the template a new, unique name and click **Copy Application Template**.

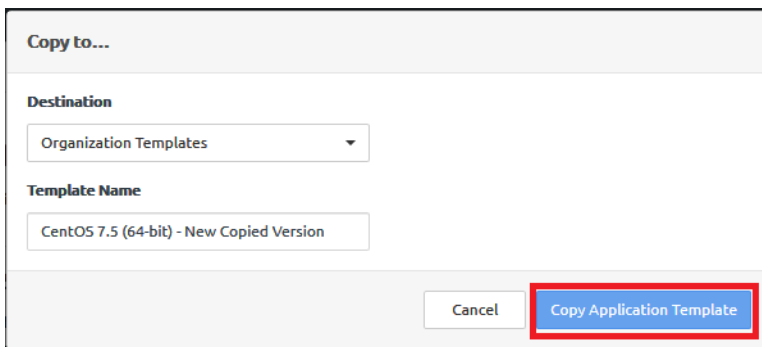


Figure 108. VDC Templates - Copy to dialog filled in

The updated version of the template is available.

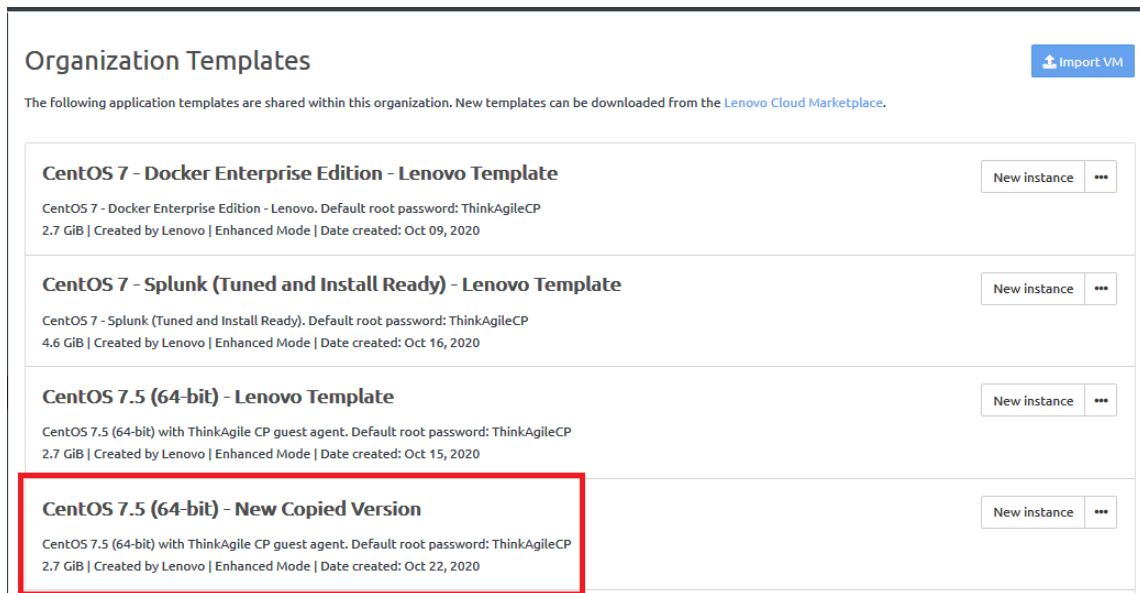


Figure 109. Updated template in VDC Templates page

## Delete a template

**Infrastructure admin** users and **VDC manager** users can delete a template from **Organization Templates** or **VDC Templates**.

Complete the following steps to delete a template:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user or a **VDC manager** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, complete one of the following steps:
  - Click **Applications** → **Organization Templates** if you are logged in as an **infrastructure admin** to view a list of the application templates in your organization.
  - Select a virtual datacenter to which you have access, and click **VDC Templates** to view a list of templates available to the VDC.
- Step 3. Click the Actions menu ( **...** ) to the right of the template; then click **Delete**.

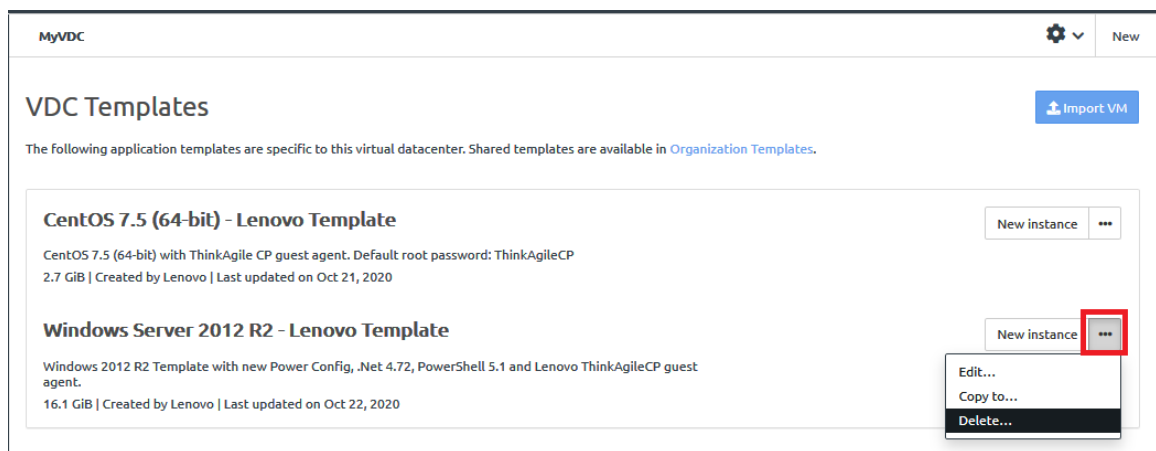


Figure 110. VDC Templates Actions menu - Delete

- Step 4. On the confirmation, click **Delete**.

The template is removed from the template store.

## Allow share access for importing a VM

**Infrastructure admin** users can set up a share that can be used to import a VM. They can import a .VMDK/.VHD/.VHDx/.IMG/.OVA/.QCOW2/.QED/.RAW file via an NFS or CIFS share.

**Note:** Shares with special characters in the name are not supported.

Complete the following steps to grant access to a share that can be used to import a VM:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user.
- Step 2. In the ThinkAgile CP Cloud Controller left-side menu, click **Hardware** to display the Hardware Stack page.
- Step 3. Scroll down to the Storage Block and click **Show Virtual IPs** to view all virtual IP addresses for the storage block.

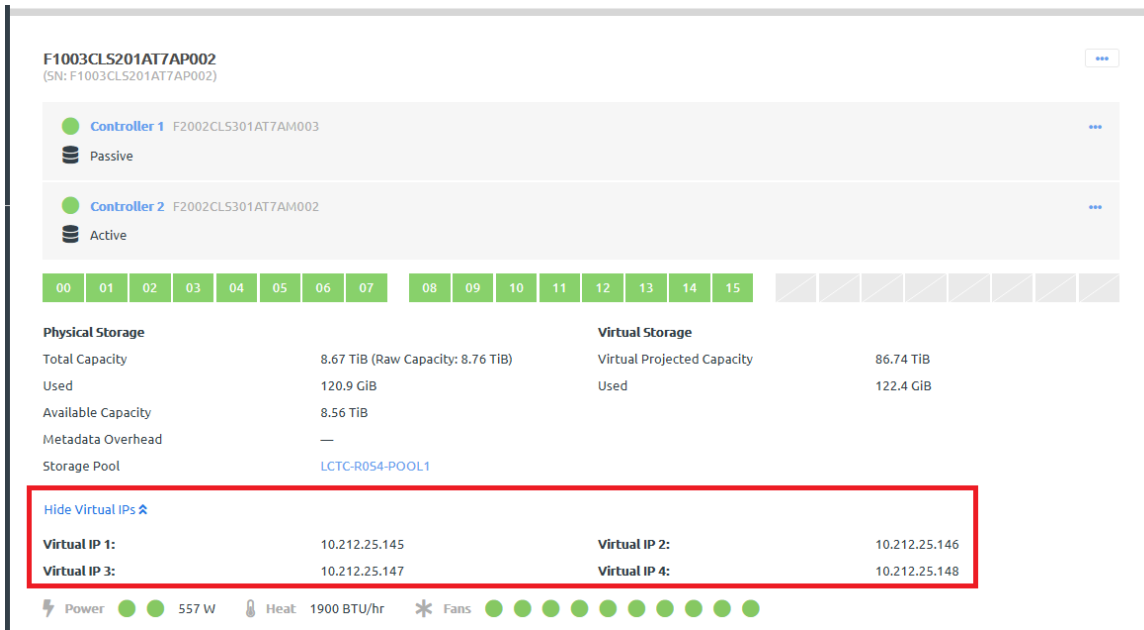


Figure 111. Storage block virtual IP addresses

- Step 4. Click each storage controller to view the details page for that controller. Scroll down to the Networking section and make a note of all IP addresses for the controller.

**Networking**

IP Address 1	10.212.25.156	Gateway 1	10.212.25.254	MAC Address 1	00:e0:ec:80:c7:98*
IP Address 2	10.212.25.157	Gateway 2	10.212.25.254	MAC Address 2	00:e0:ec:80:c7:99
IP Address 3	10.212.25.158	Gateway 3	10.212.25.254	MAC Address 3	00:e0:ec:80:c7:9a
IP Address 4	10.212.25.159	Gateway 4	10.212.25.254	MAC Address 4	00:e0:ec:80:c7:9b

\* Actual MAC address for bonded network

Figure 112. Storage controller IP addresses

- Step 5. Make sure that the storage nodes have read/write access to the share. Make sure that the regular IP addresses for each storage controller and the virtual IP addresses for the storage block have access. The IP addresses for the storage node and the virtual IP addresses for the storage block are assigned via DHCP. Therefore, the addresses are subject to change. Because of this, you should grant the access by the entire subnet to the share.
- Step 6. On the Hardware Stack page, scroll to the interconnect switches section and click **Show Network Settings**. The IP address range under Hypervisor Network is the range of IPs that can be assigned to the storage nodes and the virtual IP.

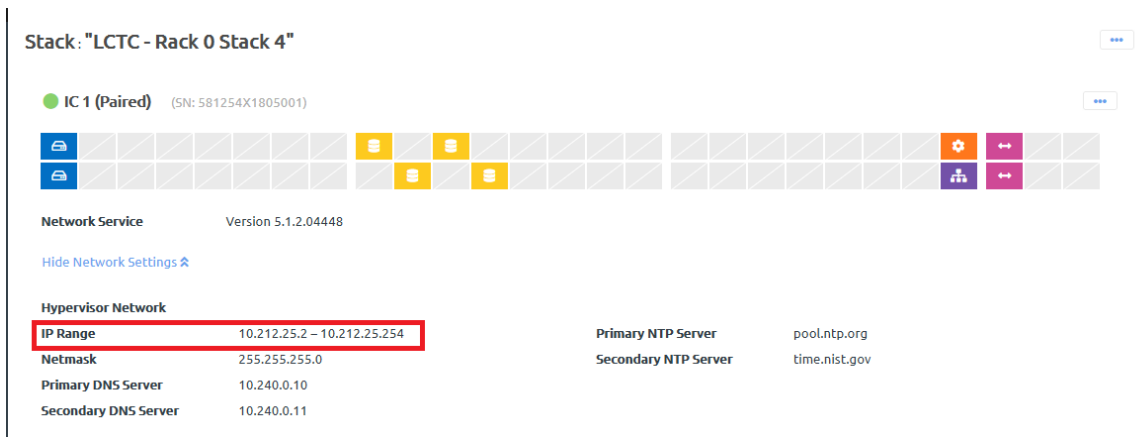


Figure 113. Interconnect switch IP addresses

- Step 7. Grant access to the share from this range to allow consistent access to the share from the ThinkAgile CP Cloud Controller.
- Step 8. In the ThinkAgile CP Cloud Controller left-side menu, complete one of the following steps:
- Click **Applications** → **Organization Templates** if you are logged in as an **infrastructure admin** to view a list of the application templates in your organization.
  - Select a virtual datacenter to which you have access, and click **VDC Templates** to view a list of templates available to the VDC.
- Step 9. From the templates page, click **Import VM**.

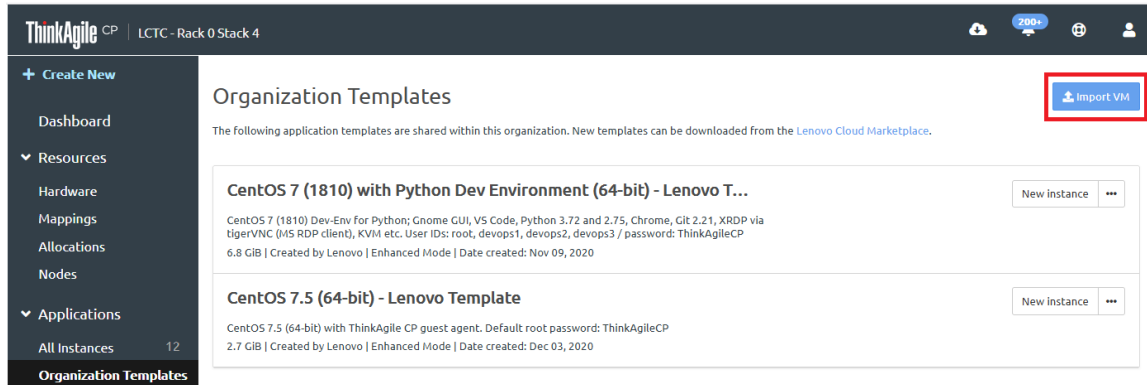


Figure 114. Import VM option on Organization Templates

Fill in the details on the Import VM dialog:

- Specify the location (**Organization Templates** or **VDC Templates**) where the VM will be stored.
- Fill in the template name and, optionally, a description.
- Specify the operating system type and version.
- Click **Select Virtual Disk Files**.
- In the Select Virtual Disk Files dialog, specify the share to be used.

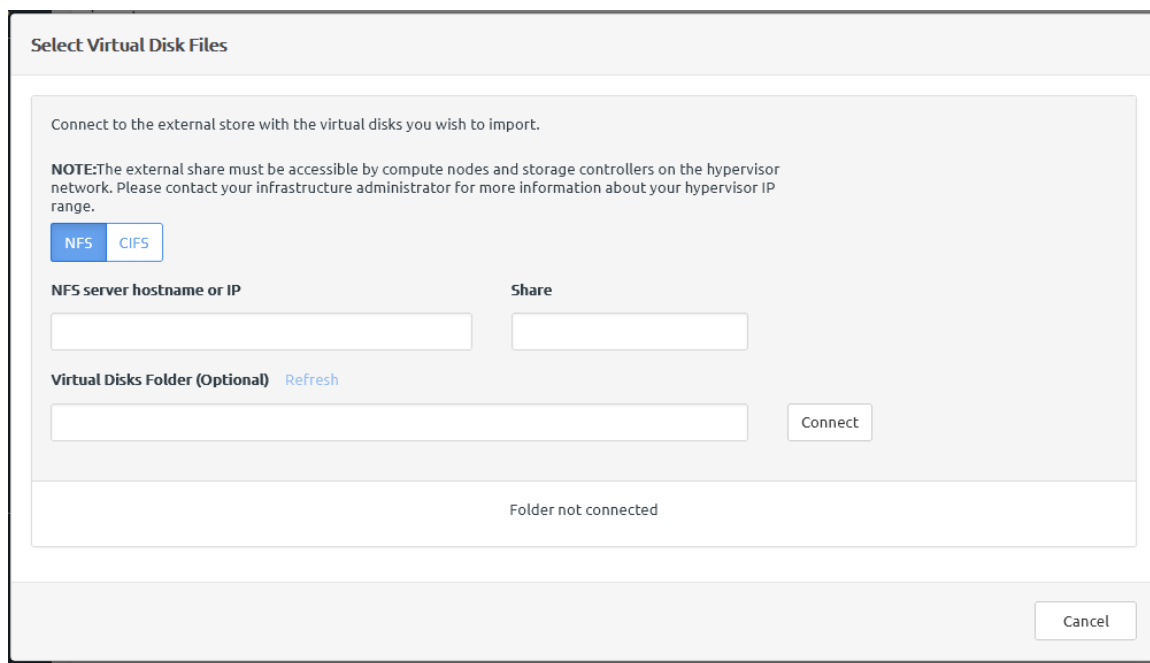


Figure 115. Select Virtual Disk Files dialog

- f. Specify the VM settings (Virtio drivers and Sysprep). Then, click **Save as Application Template**.

The new template is added to the template store.

## Use the Lenovo Cloud Marketplace

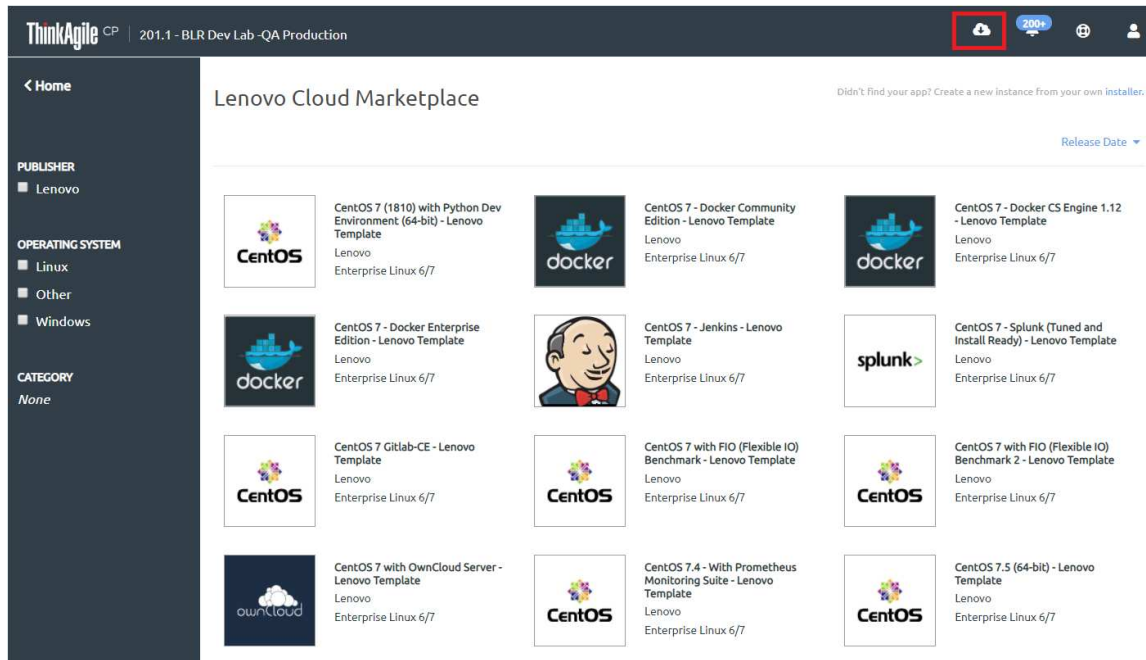
The Lenovo Cloud Marketplace contains a collection of application instance templates, all of which are free to download. All users can view the applications that are in the marketplace, but you must be logged in as an **infrastructure admin** user or a **VDC manager** user to download the template.

You can access the Lenovo Cloud Marketplace by clicking the  button in the top menu bar of the Cloud Controller.

**Note:** To use the Lenovo Cloud Marketplace, the Router Physical Network range must have access to s3.amazonaws.com, TCP ports 80 and 443.

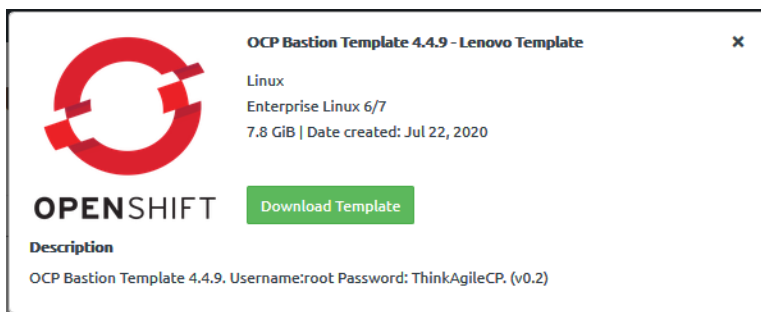
Figure 116. Lenovo Cloud Marketplace





Complete the following steps to download a template:

1. Click the template that you want to download, such as the OCP Bastion Template.
2. Click **Download Template**.



3. Complete the download dialog.

### Download Template

**Save To:** Select one ▼

**Template Properties**

**Template Name**

OCP Bastion Template 4.4.9 - Lenovo Template

**Description**

OCP Bastion Template 4.4.9. Username:root Password: ThinkAgileCP. (v0.2)

**Provisioning**

CPU

6

cores

Memory

12

GiB

**Application Disk and Boot Order**

The template's application disks and boot order are listed below.

**BOOT ORDER**

1	Disk 0	160 GiB
2	Network (vNIC0)	—

Cancel

Save Application Template

- Choose whether to save the template to **Organization Templates** or to **VDC Templates** in the VDC in which you are working.
  - Update the Template name and description, if desired.
  - Determine the number of CPU cores and the amount of memory to be allocated to the template. Templates typically come with minimum recommendations already filled in.
  - Determine the boot order for the application disks.
4. Click **Save Application Template**.

The template is downloaded to **Organization Templates** or to **VDC Templates**.

---

## Networking

When creating and deploying applications in ThinkAgile CP Cloud Controller, you will select the network mode as either VLAN or VNET. ThinkAgile CP allows you to take advantage of your existing virtual LANs (VLANs) or create new VLANs for use in the ThinkAgile CP stack.

You also have the option to set up virtual networks (VNETs) for deploying applications. Each vNIC on an application instance can be configured to use any VLAN or virtual network that has access to the virtual datacenter where the instance is deployed.

Refer to the following topics:

- [“What is a VLAN?” on page 113](#)
- [“What is a Virtual Network?” on page 113](#)
- [“What is an NFV Instance?” on page 113](#)
- [“Setting up Networking” on page 113](#)

### **What is a VLAN?**

A virtual LAN (Local Area Network) is a logical subnetwork that groups together devices from different physical LANs without having to run new cables or make changes in current infrastructure. VLANs are often set up to re-partition a network for better traffic management.

ThinkAgile CP allows you to take advantage of your existing virtual LANs (VLANs) or create new VLANs for use in the ThinkAgile CP Cloud Controller stack.

ThinkAgile CP offers stack-specific bridged networks based on VLAN tagging for use by application instances. Infrastructure administrators can create VLAN-tagged bridged networks, each tied to a specific stack. When an application instance uses these VLAN networks, traffic from those instances is tagged with the VLAN ID.

In ThinkAgile CP, a VLAN network has the following properties: Name, Stack, VLAN tag/ID.

### **What is a Virtual Network?**

You can deploy applications in a secure and micro-segmented virtual network with just a click. ThinkAgile CP allows application instances to migrate seamlessly among compute nodes without changing their networking configurations. Each VNET supports network function virtualization (NFV) services such as firewalls, load balancing, NAT and DHCP.

### **What is an NFV Instance?**

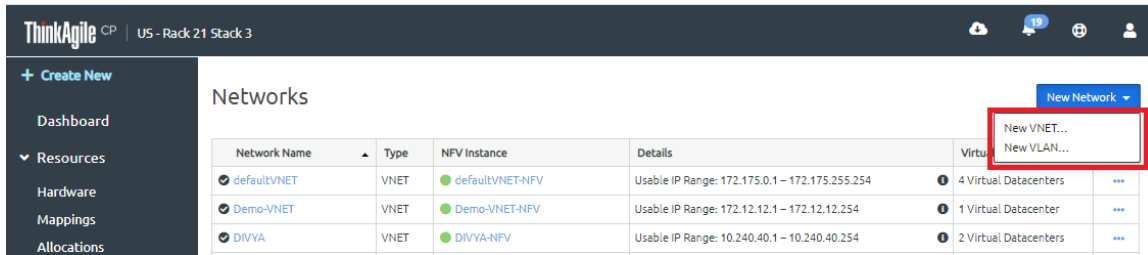
When you create a VNET, the ThinkAgile CP Cloud Controller management console manages all DHCP and NAT services via an auto-deployed application instance called the NFV instance. There is one NFV instance per VNET. This NFV instance acts like any application instance in your cloud infrastructure. It resides in a virtual datacenter and consumes migration zone and storage pool resources. It uses the gateway IP address for your VNET.

You can also choose your own application instance to act as a VNET NFV instance. This allows load balancer and firewall applications, such as Netscaler, to run in ThinkAgile CP and act as the VNET gateway.

### **Setting up Networking**

ThinkAgile CP allows you to take advantage of your existing virtual LANs (VLANs) or create new VLANs for use in the ThinkAgile CP Cloud Controller stack. You also have the option to set up virtual networks (VNETs) for deploying applications. Each vNIC on an application instance can be configured to use any VLAN or virtual network that has access to the virtual datacenter where the instance is deployed.

1. To set up networking, in the left navigation menu of ThinkAgile CP Cloud Controller, select **Networks** under Networking.
2. On the **New Network** menu, select either **New VLAN** or **New VNET** as appropriate.



Refer to the following topics:

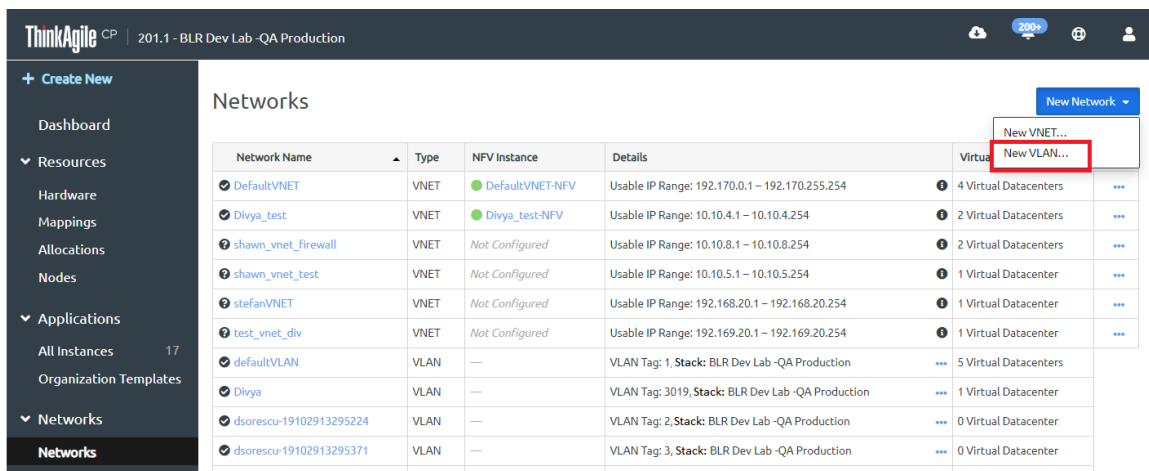
- [“Add a VLAN” on page 114](#)
- [“VNET Overview” on page 115](#)
- [View Networks](#)
- [Manage firewall profiles](#)
- [Modify Hypervisor Network Settings](#)

## Add a VLAN

ThinkAgile CP allows you to take advantage of your existing virtual LANs (VLANs) or create new VLANs for use in the ThinkAgile CP stack.

Follow these steps to add a new VLAN in ThinkAgile CP Cloud Controller.

- Step 1. In the left navigation menu of ThinkAgile CP Cloud Controller, select **Networks** under Networks.
- Step 2. Click **New Network** and then select **New VLAN**.



The New VLAN page opens.

Figure 117. Define VLAN properties when creating a new VLAN

Step 3. Enter the following information.

- **VLAN Name** - Enter a name for the VLAN.
- **Stack** - Select the stack where the VLAN should be available. A VLAN is stack-specific. You can select from all stacks within your infrastructure.
- **VLAN Tag** - Enter a VLAN Tag (the VLAN ID). If you want to use an existing VLAN, enter the VLAN ID of your existing VLAN network. The VLAN tag entered must be between 0 and 4094, and it cannot be a reserved tag or be already in use within the associated stack.

**Note:** Each stack can use a unique set of VLAN tags.

**Note:** If this VLAN must be available for other stacks, you should create a new VLAN in ThinkAgile CP Cloud Controller for each of the stacks but with the same VLAN ID. If you have more than one location with different VLAN tags and create a migration zone that spans the different locations, then the application could potentially start on a compute node in a location that does not support the given VLAN tag. However, if the different locations share a VLAN tag, then as long as one of the locations VLANs is chosen, the migration zone spanning multiple locations will work when starting the application.

Step 4. Click **Create VLAN**

**Note:** For application instances to use the VLAN, you would select the VLAN while configuring the application instance vNICs.

## VNET Overview

A virtual network (VNET) in ThinkAgile CP enables application instances to migrate seamlessly among compute nodes without changing networking configurations.

### Prerequisites

Review the following prerequisites for creating a VNET.

Before you create a VNET, do the following:

1. Determine how large your subnet should be.
2. Determine how many CPU cores you will need and how much memory you would like to allocate to your VNET's Network Function Virtualization (NFV) instance. (The NFV instance acts as a DHCP server and gateway for instances in the VNET.)

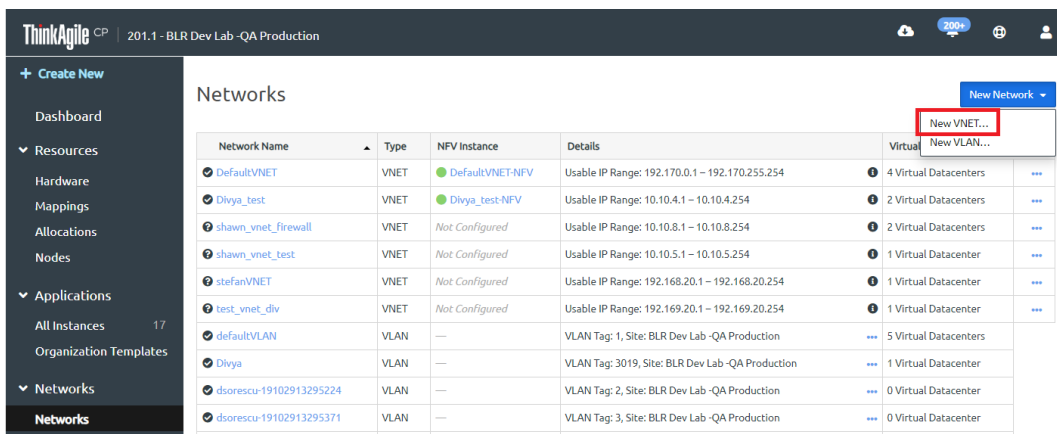
3. Create a migration zone.
4. Create a storage pool.
5. Create a virtual datacenter.
6. Create a firewall profile (if needed).

**Note:** At least one VLAN must be created before a VNET can be deployed. It is possible to create an "incomplete" VNET, which you can deploy later.

## Create a VNET

Complete these steps to create a virtual network (VNET) in the ThinkAgile CP Cloud Controller.

- Step 1. In the left navigation menu of ThinkAgile CP Cloud Controller, select **Networks** under Networking.
- Step 2. Click **New Network** and then select **New VNET**.



The New VNET page opens with the Properties section at the top of the page.

## New VNET

### Properties

VNET Name	<input type="text"/>
Network Address	<input type="text"/>
Netmask	<input type="text"/>
Usable IP Range	—
Default Gateway	<input type="text"/>

Figure 118. Defining VNET properties when creating a new VNET

Step 3. In the Properties section, enter the following information:

- **VNET Name** - Enter a name for the VNET.
- **Network Address** - Enter a network address (This should be an IP address preceding your usable IP range.)
- **Netmask** - Enter the netmask address for this network.

**Note:** The **Usable IP Range** automatically populates after your IP address and netmask have been added.

- **Default Gateway** - Enter the default gateway address for this network.

Step 4. In the DHCP Settings section, enter the following information. (Click **Show Advanced Settings** to configure advanced DHCP settings.)

**Note:** You need to enter DHCP information if you will use an auto-deployed NFV instance.

### DHCP Settings

DHCP Range  —

Enter the range of the network you want to allocate via DHCP.

[Hide Advanced Settings](#)

DHCP Lease Time  seconds

Domain Name (optional)

Primary DNS Server (optional)

Secondary DNS Server (optional)

Static Binding (optional)

Hostname (optional)	MAC Address	IP Address	
<input type="text"/>	<input type="text"/>	<input type="text"/>	...

[Add Row](#)

Figure 119. Entering DHCP Settings for new VNET

- **DHCP Range** - Enter the part of this VNET's IP address range that should be served by DHCP. The DHCP range must be within the usable IP range but does not include your default gateway.
- **DHCP Lease Time** - Enter the amount of time in seconds for how long the DHCP lease is retained on your client. The default is set to one day (86400 seconds), but you can override it.
- **Domain Name** (optional) - Enter the domain name for DHCP as applicable.
- **Primary DNS Server** (optional) - Enter the primary DNS server for DHCP as applicable.
- **Secondary DNS Server** (optional) - Enter the secondary (redundant) DNS server for DHCP as applicable.
- **Static Binding** (optional) - To assign fixed IP addresses via DHCP, use Static Binding. Once instances using your VNET have been created, you can enter their MAC addresses and IP addresses in the Static Binding section. These IP addresses must be in your DHCP range. The specified instances will request the specified IP addresses from DHCP. You can click **Add Row** or click the ellipsis action menu and click **Remove Row** to add or remove rows as needed. To avoid issues with any outstanding DHCP leases, make sure you also set the IP address specified in this section as the static IP address within the instance's guest OS.

Step 5. In the Network Services section, select the type of network service to deploy for this VNET.



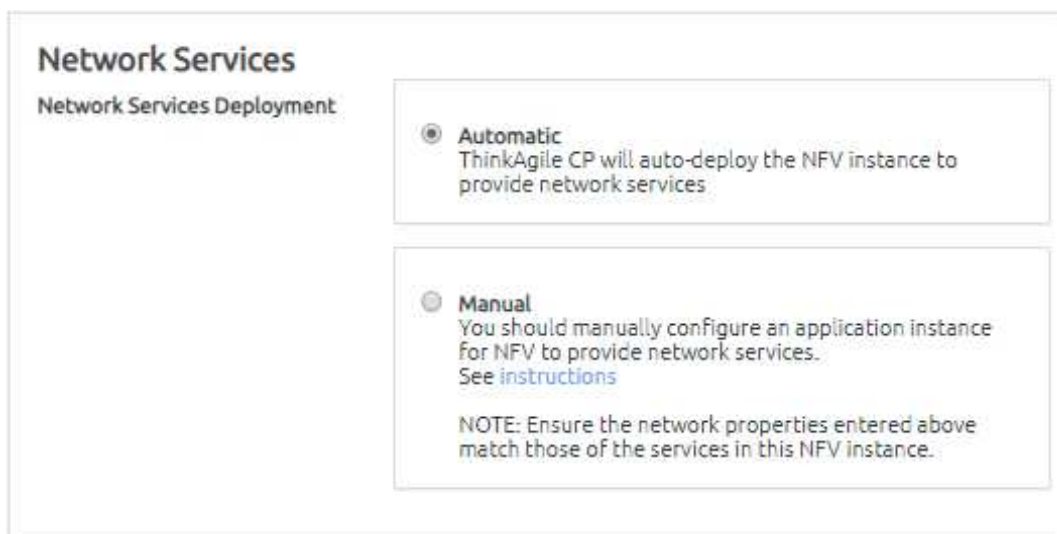


Figure 120. Selecting Network Services Deployment for new VNET

- **Automatic** - A network functional virtualization (NFV) instance for this VNET will be created for you. An auto-deployed NFV instance will act as a DHCP server and gateway for instances in the corresponding VNET. It will be assigned two IP addresses: the internal interface IP address specified as the VNET's gateway, and the outside interface IP address that will be determined by the Routing Service settings. If you select Automatic, you need to define the DHCP settings for this VNET as described in the previous step. Also, see the topic, "[Define Settings for Auto-Deployed VNET](#)" on page 119, for defining other settings, including NFV settings and routing service settings.
- **Manual** - You will need to create and configure an NFV instance to provide network services for this VNET. For more information, see "[Create and deploy a custom NFV instance](#)" on page 121.

## Define Settings for Auto-Deployed VNET

Complete these steps to define the settings for an auto-deployed VNET.

- Step 1. If you selected Automatic for the Network Service, you need to define the DHCP settings for this VNET as described in the previous section in Step 4.
- Step 2. Next, you should define NFV Instance settings as described below.

### Network Function Virtualization (NFV) Instance

Select where the NFV instance is to be deployed. This virtual network will be available to all instances in the selected virtual datacenter.

Virtual Datacenter	Design Team	
Storage Pool	Pool 1	
Migration Zone	MZ A	
Provisioning	CPU 4 cores	Memory 4 cores
	<a href="#">▶ Compute Constraints</a>	
Automatic Recovery	<input checked="" type="checkbox"/> Enable Automatic Recovery If node fails, restart instance elsewhere when resources are available.	

Figure 121. NFV Settings for auto-deployed NFV instance

- **Virtual Datacenter** - Select the virtual datacenter where this VNET's auto-deployed NFV instance should run. This VNET will be available to all instances running in this virtual datacenter.

**Note:** If there are no VLANs, and you are creating an auto-deployed VNET, you will not be able to select a virtual datacenter here; the only option to select is **Deploy NFV Instance Later**. You can still create the VNET (as incomplete), but it will work only after the NFV instance is fully deployed.

- **Storage Pool** - Select the Storage Pool where this VNET's auto-deployed NFV instance should run.
- **Migration Zone** - Select the Migration Zone where this VNET's auto-deployed NFV instance should run.
- **Provisioning** - Specify CPU, memory, and other optional compute constraints for the NFV instance. (Click **Compute Constraints** to view and select compute categories and compute tags as applicable.)
- **Automatic Recovery** - Select the **Enable Automatic Recovery** option as needed. In the event of node failure, this option restarts the instance elsewhere when resources are available.

Step 3. Configure the routing service for the auto-deployed VNET. The Outside Interface (Routing Service) settings define the external network through which all traffic of this VNET will communicate. You can select the outside interface only after a migration zone has been selected for the NFV.

**Note:** This Outside Interface section is not available if you selected to deploy the NFV later.

### Outside Interface (Routing Service)

Networking Mode	VNET
Network	Select one
Firewall Profile	—
Firewall Override	None
Address Mode	<input type="radio"/> DHCP <input checked="" type="radio"/> Static
IP Address	
Netmask	
Gateway	

Figure 122. Outside Interface (Routing Service) settings for auto-deployed NFV

- **Networking Mode** - You can select either VLAN or VNET as the external networking mode.
- **Network** - Select the network to use for the external network. This setting is disabled until a virtual datacenter is selected for the NFV, and this list is populated only by only the networks to which the NFV virtual datacenter has permissions.

**Note:** If you choose a VLAN network for the external network, a static route needs to be created on your core router.

- **Firewall Profile** - This field shows any associated firewall profiles for this external network.
- **Firewall Override** - Select a firewall override for this external network if needed.
- **Address Mode** - Select the address mode as either DHCP (IP address will be automatically assigned) or Static (to assign an IP address of your choosing).
  - **IP Address** - If you selected the Static Address mode, enter the external IP address for this external network.
  - **Netmask** - If you selected the Static Address mode, enter the netmask for this external network.
  - **Gateway** - If you selected the Static Address Mode, enter the gateway address for this external network. The gateway should be within the usable IP range for the external network.

### Create and deploy a custom NFV instance

If you selected the Manual option in the Network Services section to use your own NFV instance for the VNET, you will need to create and configure your NFV instance. At least one of the vNICs for this instance must use this VNET. You must be an **infrastructure admin** user to create and deploy a custom NFV instance.

**Note:** For more information about user roles in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

Step 1. From the next navigation, click **Create New** → **New VNET** Click **Create VNET** to create the VNET.

**Note:** The VNET will be considered *incomplete* and will work only when an associated NFV instance with necessary network services has been deployed.

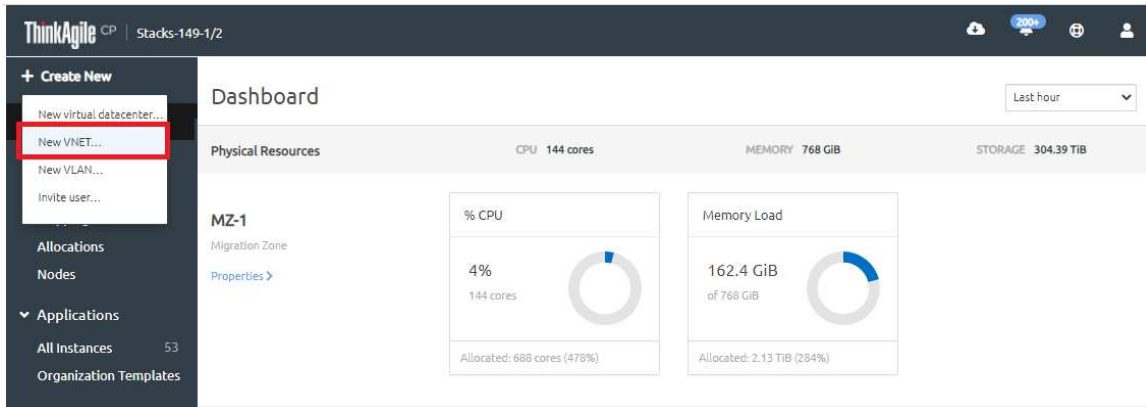


Figure 123. Create new VNET option

Step 2. Create the NFV instance.

- See the following topic for instructions on creating an application instance:  
[“Create and deploy applications” on page 28](#)
- See the following topic for specific instructions about using NetScaler as an NFV:  
[“Manage application domains” on page 88](#)

Step 3. From the Networks page, double-click the VNET to display the details for the VNET.

Step 4. Click **Deploy NFV Instance** or click the Actions menu and then click **Deploy NFV Instance**.

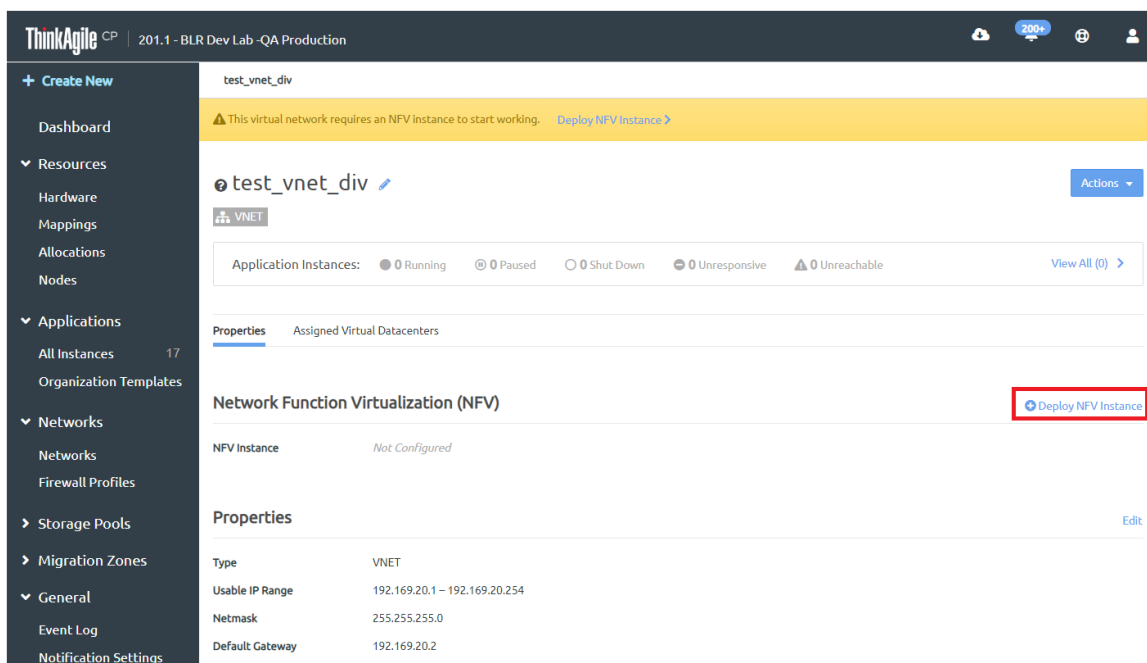


Figure 124. Deploy NFV instance option on a VNET with custom NFV instance.

Step 5. Fill in the content for the Deploy NFV Instance dialog.

## Deploy NFV Instance

**Network** test\_vnet\_div

Note: The selected virtual datacenter will be assigned to this VNET.

### Network Function Virtualization (NFV) Instance

Select where the NFV instance is to be deployed. This VNET will be available to all instances in the selected virtual datacenter.

**Virtual Datacenter** Select one ▾

**Storage Pool** Select one ▾

**Migration Zone** Select one ▾

**Provisioning** CPU  core Memory  GB

[Show Compute Constraints](#)

**Automatic Recovery**

**Enable Automatic Recovery**  
If node fails, restart instance elsewhere when resources are available

### Routing Service (Outside Interface)

**Networking Mode** VNET - Not available ▾

**Network** Select one ▾

**Address Mode**  DHCP  Static

**Firewall Profile** None ▾ [View rules](#)

**Firewall Override** None ▾ [View rules](#)

Cancel Save

Figure 125. Deploy NFV Instance dialog

Enter the following information for the NFV instance as needed:

- **Virtual Datacenter.** Select the virtual datacenter where the NFV instance is to be deployed. This VNET will be available to all instances in the selected virtual datacenter.
- **Storage Pool.** Select the storage pool for the NFV instance.
- **Migration Zone.** Select the migration zone for the NFV instance.
- **Provisioning.** Specify CPU, memory, and other optional compute constraints for the NFV instance. (Click **Compute Constraints** to view and select compute categories and compute tags as applicable.)
- **Automatic Recovery.** Click **Enable Automatic Recovery** to specify that if the node fails, the instance will restart elsewhere when resources are available
- Routing Service/Outside Interface Details (The Outside Interface is used by the Routing Service.)
  - **Networking Mode.** Select the networking mode for external traffic as either VLAN or VNET.
  - **Network.** Select the network for the outside interface.
  - **Address Mode.** Select the address mode as either DHCP (and IP address will be automatically assigned) or Static (to assign an IP address of your choosing). If you select Static, you will then need to add the IP Address, Netmask, and Gateway.
  - **Firewall Profile.** To apply a firewall profile, select a firewall profile from the drop-down menu.
  - **Firewall Override.** To apply a firewall override, select an override from the drop-down menu.

Step 6. Click **Save** to save the NFV instance.

Step 7. Start the custom NFV instance to complete the VNET creation.

## Configure VNET for external routing service

When creating a virtual network (VNET) in ThinkAgile CP version 3.3 and later, additional configuration is required if you select Virtual Networking for the external Routing Service. A static route must be added to the Interconnect and the Network Function Virtualization (NFV) instance of the VNET acting as the routing service.

**Note:** If you choose a VLAN network for the external network, a static route needs to be created on your core router.

To illustrate creating a VNET for the external routing service, refer to the following example. In this example, a user is creating VNET2, which will use VNET1 as the Routing Service (external) interface.

VNET1:

- VNET IP Range: 10.104.14.0/24
- External Routing Service IP (bridged): 10.102.14.200
- Internal IP: 10.104.14.1

VNET2:

- VNET IP Range: 10.6.200.0/24
- External Routing Service IP (VNET1): 10.104.14.100
- Internal IP: 10.6.200.1

## Configuring the Interconnect

Follow these steps to add a static route to the Interconnect.

Step 1. SSH into the Interconnect with the username `admin` and the password that was set when the hardware was registered.

Step 2. Run the following command and retype your administrator password to become root:

```
sudo su
```

Step 3. Run the following command:

```
> /usr/share/tacp/export_bgp_route.sh "add <network address of VNET2> <subnet mask of VNET2> <external IP of VNET1>"
```

In this example, the command would be:

```
/usr/share/tacp/export_bgp_route.sh "add 10.6.200.0 24 10.102.14.200"
```

### Configuring the VNET1 NFV instance

Follow these steps to add a static route to the NFV instance of the VNET acting as a routing service.

Step 1. Open the console to the NFV instance for VNET1.

Step 2. Log in with the following credentials:

- Username: root
- Password: ThinkAgileCP

Step 3. Enter the command:

```
vi /etc/sysconfig/network-scripts/route-internal
```

and type i to edit the file.

Step 4. Enter the command:

```
<vnet IP range of VNET2> via <external IP of VNET2> dev internal
```

In this example, the entry would be:

```
10.6.200.0/24 via 10.104.14.100 dev internal
```

Step 5. Press ESC and enter :wq to write changes and close the file.

Step 6. Run: ifup internal.

Alternatively, you can use an application instance as a NFV. For more information, see [“Use NetScaler as an NFV” on page 89](#).

### Configure a firewall for a VNET (optional)

You can easily specify firewall settings for a VNET.

Step 1. On the New VNET page under Firewall Settings, to apply a firewall profile, select a firewall profile from the drop-down menu. (You can click **View Rules** to view the detailed rules for the selected profile. Or, to create a new firewall profile, click the **Firewall profiles** link. )

Step 2. To apply a firewall override, select an override from the drop-down menu. (You can click **View Rules** to view the detailed rules for the selected profile.)



Figure 126. Specifying firewall settings for the new VNET

## Finalize Creating the VNET

This section covers the final step to finish creating the new VNET.

Step 1. On the New VNET page, click the **Create the VNET** button.

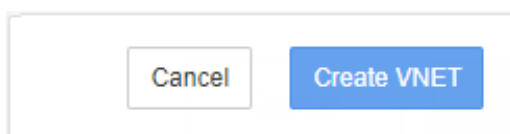


Figure 127. Create VNET

**Note:** An incomplete auto-deployed VNET can be created only if there are no existing networks.

## Configure the core router

The Core Router is required to be configured when VNETs are created. For virtual networking to work successfully in infrastructures without BGP, the core router must be configured to recognize the IP addresses in each virtual network.

**Note:** Ensure that the core router has a rule to route all traffic coming to each virtual network's IP address range to the appropriate Network Interconnect's IP address.

Once your core router is configured, you are ready to deploy applications instances within the VNET. For more information, see [“Create and deploy applications” on page 28](#)

## View Networks

You can view all network and view details about a network, such as the application instances that are running within a network.

Refer to the following topics:

- [“View All Networks” on page 128](#)
- [“View network details” on page 129](#)
  - [“View applications in a network” on page 129](#)
  - [“View Network Properties” on page 130](#)
  - [“View assigned virtual datacenters” on page 133](#)

## View All Networks

To view your networks in ThinkAgile CP Cloud Controller, under Networks in the left navigation area, click **Networks**. The Networks page opens, displaying a list of all VLANs and VNETs in your ThinkAgile CP Cloud Controller infrastructure

The screenshot shows the 'Networks' page in the ThinkAgile CP Cloud Controller. The page title is '201.1 - BLR Dev Lab - QA Production'. The left sidebar has a 'Networks' menu item highlighted. The main content area displays a table of networks. The table has the following columns: Network Name, Type, NfV Instance, Details, and Virtual Datacenter(s). The table lists various VNETs and VLANs. A 'New Network' button is located in the top right corner. Below the table, there is a section titled 'Configure Edge Router for VNETs' with a 'Hide details' link and a list of IP ranges for different networks.

Network Name	Type	NfV Instance	Details	Virtual Datacenter(s)
DefaultVNET	VNET	DefaultVNET-NFV	Usable IP Range: 192.170.0.1 – 192.170.255.254	4 Virtual Datacenters
Divya_test	VNET	Divya_test-NFV	Usable IP Range: 10.10.4.1 – 10.10.4.254	2 Virtual Datacenters
shawn_vnet_firewall	VNET	Not Configured	Usable IP Range: 10.10.8.1 – 10.10.8.254	2 Virtual Datacenters
shawn_vnet_test	VNET	Not Configured	Usable IP Range: 10.10.5.1 – 10.10.5.254	1 Virtual Datacenter
stefanVNET	VNET	Not Configured	Usable IP Range: 192.168.20.1 – 192.168.20.254	1 Virtual Datacenter
test_vnet_div	VNET	Not Configured	Usable IP Range: 192.169.20.1 – 192.169.20.254	1 Virtual Datacenter
defaultVLAN	VLAN	—	VLAN Tag: 1, Site: BLR Dev Lab -QA Production	5 Virtual Datacenters
Divya	VLAN	—	VLAN Tag: 3019, Site: BLR Dev Lab -QA Production	1 Virtual Datacenter
dsorescu-19102913295224	VLAN	—	VLAN Tag: 2, Site: BLR Dev Lab -QA Production	0 Virtual Datacenter
dsorescu-19102913295371	VLAN	—	VLAN Tag: 3, Site: BLR Dev Lab -QA Production	0 Virtual Datacenter
dsorescu-19102913332699	VLAN	—	VLAN Tag: 4, Site: BLR Dev Lab -QA Production	0 Virtual Datacenter
dsorescu-19102913332908	VLAN	—	VLAN Tag: 5, Site: BLR Dev Lab -QA Production	1 Virtual Datacenter
dsorescu-19102913343213	VLAN	—	VLAN Tag: 6, Site: BLR Dev Lab -QA Production	0 Virtual Datacenter
dsorescu-19102913365505	VLAN	—	VLAN Tag: 7, Site: BLR Dev Lab -QA Production	0 Virtual Datacenter
shawn_vlan	VLAN	—	VLAN Tag: 8, Site: BLR Dev Lab -QA Production	1 Virtual Datacenter

**Configure Edge Router for VNETs** [Hide details](#)  
 Make sure your edge network Interconnect is configured with the following IP ranges:

- 192.170.0.0 - 192.170.255.255 (DefaultVNET)
- 10.10.4.0 - 10.10.4.255 (Divya\_test)
- 10.10.8.0 - 10.10.8.255 (shawn\_vnet\_firewall)
- 10.10.5.0 - 10.10.5.255 (shawn\_vnet\_test)
- 192.168.20.0 - 192.168.20.255 (stefanVNET)
- 192.169.20.0 - 192.169.20.255 (test\_vnet\_div)

Figure 128. Networks page in ThinkAgile CP Cloud Controller

Step 1. You can view the following information in the list of networks.

**Note:** You can click the Name column heading to sort the list alphabetically by Name or you can click the Type heading to sort the list by network type.

Column	Description
Name	Lists the name of the network. You can click the name to drill down to view details for this specific network.
Type	The type of network, as either VNET or VLAN.
NfV Instance	If the network type is VNET and has an NFV instance, it will be appear here. You can click the name of the NFV instance to drill down to view details for the instance. You can also view the state of the NFV instance, which is represented by an icon. For a description of the state icon meanings, see the following topic:  <a href="#">“View all instances” on page 75</a>

Column	Description
Details	For VNET network types, this column lists the IP, Netmask, and Gateway details. Hover the mouse over the information icon to view netmask and gateway.  For VLAN network types, this column lists the VLAN Tag (ID) and stack.
Virtual Datacenter	The number of virtual datacenters that have permission to use the selected network.

- Step 2. You can click **New Network** to create a new VNET ( [“VNET Overview” on page 115](#)) or VLAN.
- Step 3. In this column, you can click the ellipsis (...) to access the Actions menu, for example, to edit network settings or delete the network. For more information about the actions you can perform on networks, see the topic, [“Manage networks” on page 133](#).
- Step 4. (For VNETs) Click **Show Details** to view the IP ranges for which you should configure your core router.

**Note:** For VNETs to work successfully in infrastructures without BGP, your core router must be configured to recognize the IP addresses in each virtual network. For more information, see the topic, [“Configure the core router” on page 127](#).

## View network details

Follow these steps to view detailed information about a specific network.

- Step 1. In the left navigation menu, under Networking, click **Networks**.
- Step 2. On the Networks page, in the Name column, select and click the network for which you want to view details. The network page opens and displays detailed information for the network as described below, including applications in a network network properties, and assigned virtual datacenters.

## View applications in a network

The Network page displays information about the application instances running on the selected network, including the number of instances that are running, paused, shut down, unresponsive, or unreachable.

Click **View All** to view a more detailed list of the applications running in the network.

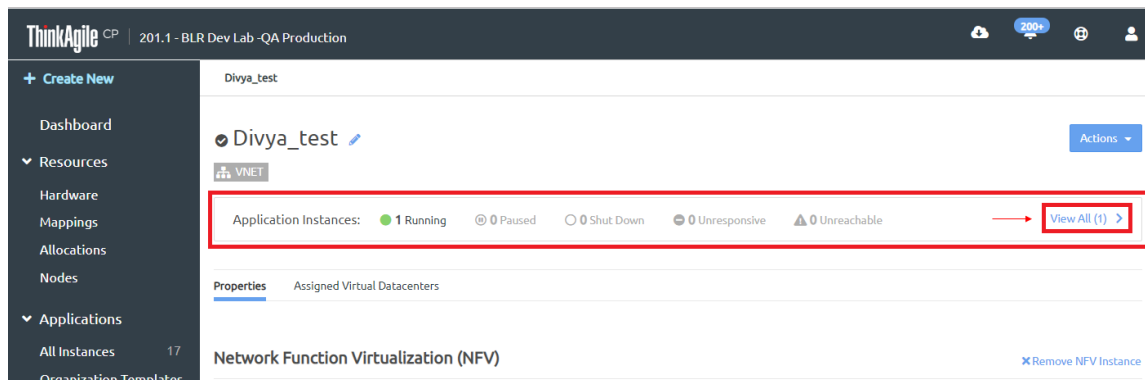


Figure 129. Application Instances on Network Details page

## View Network Properties

On the Properties tab, you can view the following detailed information about the network, depending on the type of network (either VLAN or VNET).

### VLAN Properties

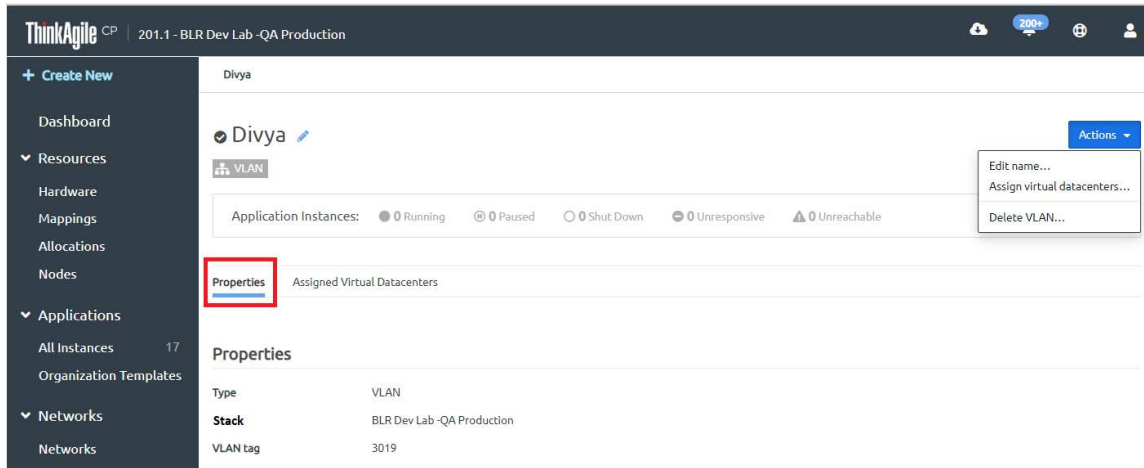


Figure 130. VLAN Properties

For VLANs you can view the following information.

- **Network Type** - For VLANs, this would display VLAN.
- **Stack** - The stack to which this VLAN is deployed.
- **VLAN Tag** - The VLAN ID.
- The Actions menu is also available for you to perform certain actions on the network. For more information about the actions you can perform on networks, see the topic, [“Manage networks” on page 133](#).

## VNET Properties

ThinkAgile CP | 201.1 - BLR Dev Lab - QA Production

Divya\_test

Divya\_test

VNET

Application Instances: 1 Running 0 Paused 0 Shut Down 0 Unresponsive 0 Unreachable View All (1) >

Properties Assigned Virtual Datacenters

Network Function Virtualization (NFV) Remove NFV Instance

NFV Instance Divya\_test-NFV

Properties Edit

Type	VNET
Usable IP Range	10.10.4.1 - 10.10.4.254
Netmask	255.255.255.0
Default Gateway	10.10.4.2
DHCP Range	10.10.4.3 - 10.10.4.252
DHCP Lease Time	86400 seconds
Domain Name	—
Primary DNS Server	—
Secondary DNS Server	—
Static Binding	None

Firewall Settings Edit

Firewall Profile None

Inside Interface (Used by DHCP Service) Edit in NFV Instance

Outside Interface (Used by Routing Service) Edit in NFV Instance

Networking Mode	VLAN
Network	defaultVLAN
Firewall Profile	—
Firewall Override	None
Address Mode	DHCP
IP Address	—
Netmask	—
Gateway	—

Figure 131. VNET Properties

For VNETs, you can view the following information.

1. You can view the associated NFV instance as applicable for the VNET. You can click the link to drill down and view details of the NFV instance.
2. You can view the following network properties:

Property	Description
Type	Lists the type of network as VNET.
Usable IP Range	The range of usable IP addresses on this network.
Netmask	The netmask for the network.
Default Gateway	The default gateway for this network.
DHCP Range	The part of this VNET's IP address range that is served by DHCP. The DHCP range does not include your default gateway.
DHCP Lease Time	The amount of time in seconds for how long your DHCP lease is retained on your client.
Domain Name	Domain name for DHCP as applicable.
Primary DNS Server	Primary DNS server for DHCP as applicable.
Secondary DNS Server	Secondary (redundant) DNS server for DHCP as applicable.
Static Binding	Refers to the use of fixed IP addresses via DHCP. If used, you would see MAC addresses and IP addresses in this section. If static binding is not used, this setting will be None.

3. You can view any Firewall Settings, that is, any [“Manage firewall profiles” on page 156](#) for this network if they exist.
4. You can view details of the Inside Interface, which is used by the DHCP Service, and may include a firewall override.
5. You can view details of the Outside Interface, which is used by the Routing Service. When using an auto-deployed NFV instance, it will act as a DHCP server and gateway for instances in the corresponding VNET. It will be assigned two IP addresses: the internal interface IP address specified as the VNET's gateway, and the outside interface IP address, which will be determined by the Routing Service settings. Inside and outside interfaces are edited from the NFV vNIC section.

Setting	Description
Networking Mode	Lists the external networking mode as either VLAN or VNET for external traffic.
Network	Lists the network used for the outside interface.
Firewall Profile	Lists the firewall profile, if applicable
Firewall Override	Lists the firewall override, if applicable.
Address Mode	Address mode for the outside interface, such as DHCP
IP Address	IP Address for the outside interface, as applicable.
Netmask	Netmask for the outside interface, as applicable.
Gateway	Gateway for the outside interface, as applicable.

To edit the network details on the Properties tab, click the Edit icon next to the setting you want to change, or, on the Actions menu, select the setting you want to edit. For more information about modifying network settings, see the topic, [“Manage networks” on page 133](#).

## View assigned virtual datacenters

On the Assigned Virtual Datacenters tab, you can view the virtual datacenters that have permission to use the network.

1. To navigate to view information about the virtual datacenter, click the name/link of the virtual datacenter in the name column.
2. You can click **Assign Virtual Datacenters** to select and assign a virtual datacenter to this network. See the topic, “[Working with virtual datacenters](#)” on page 204, for more information.
3. To unassign a virtual datacenter, click the action menu (...) to the right of the datacenter name.

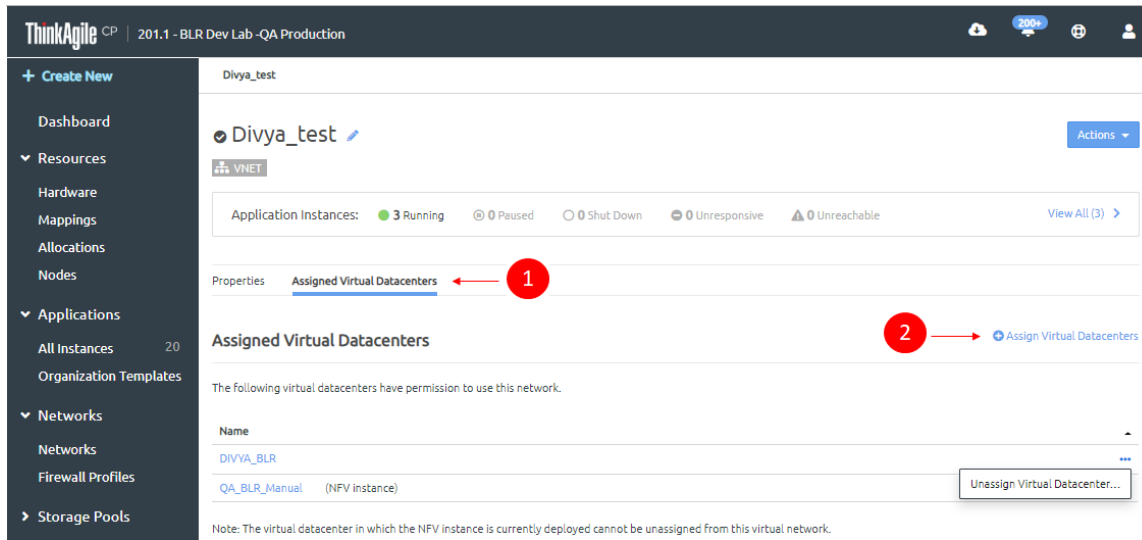


Figure 132. Assigned Virtual Datacenters for a Network

## Manage networks

You can access details about a VLAN or VNET by selecting Networks under the Networking heading in the left navigation menu in the ThinkAgile CP Cloud Controller management console, and then selecting the network for which you want to view details.

Refer to the following topics, depending on the type of network you are managing.

- “[Manage VLANs](#)” on page 133
- “[Manage VNETs and NFV instances](#)” on page 138

### Manage VLANs

Complete these steps to manage or modify a VLAN.

Step 1. In the left navigation menu under Networks, click **Networks**.

Step 2. On the Networks page, do one of the following:

1. In the list of networks, click the actions menu (...) for the VLAN you want to modify.

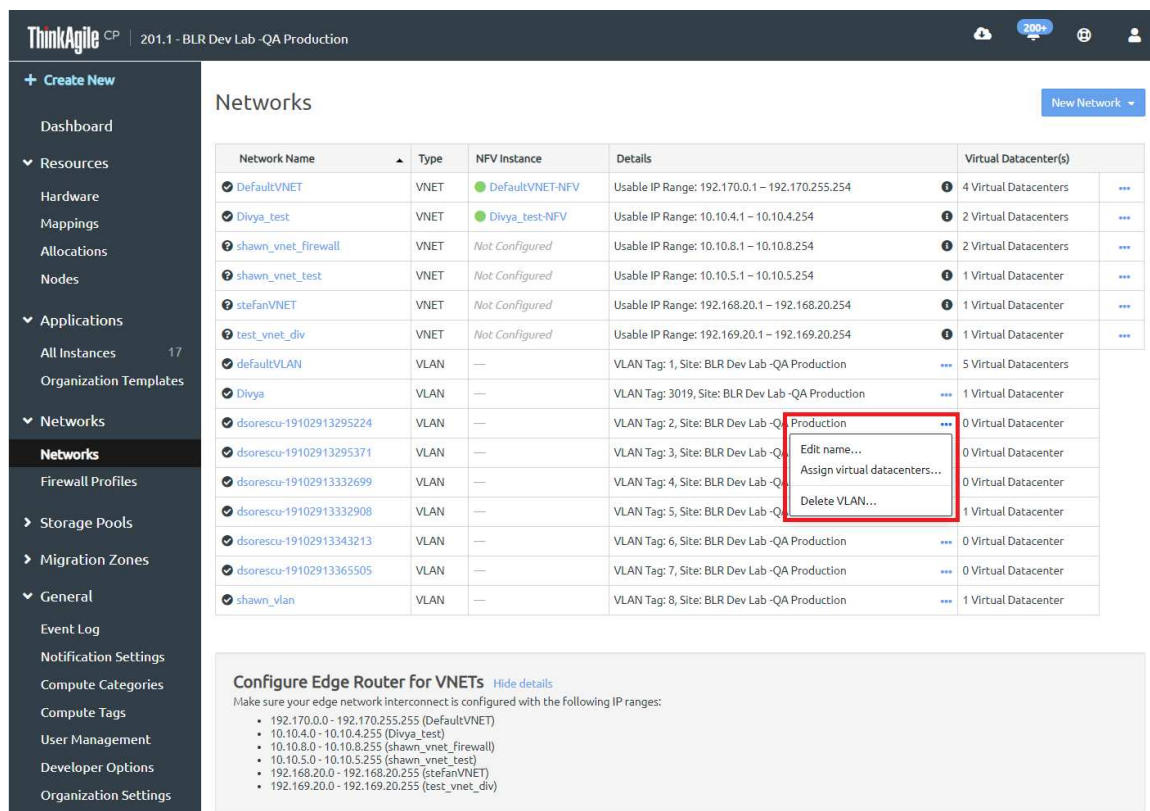


Figure 133. Networks page - VLAN actions menu

- In the Name column of the Networks page, click the VLAN you want to manage or modify, which opens the details page for that network, and then click **Actions**.

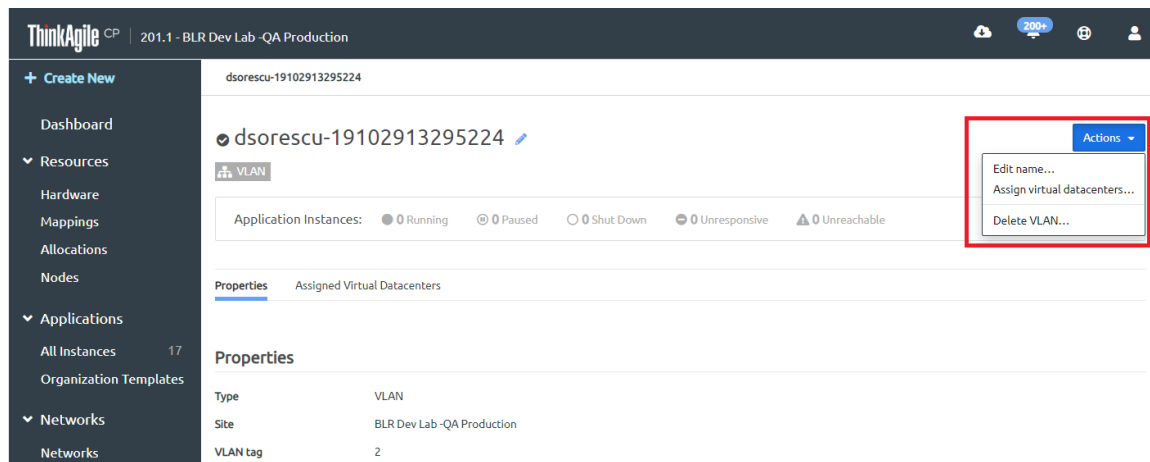


Figure 134. VLAN Actions Menu

Depending on your permissions, you can perform such actions as edit the VLAN name, assign or unassign virtual datacenters, copy the object ID for the VLAN, or delete the VLAN. Refer to the following topics for instructions on managing VLANs.

- “Edit a VLAN name” on page 135
- “Assign a Virtual Datacenter to a VLAN” on page 135



- “Unassign a virtual datacenter from a VLAN” on page 137
- “Delete a VLAN” on page 138

### Edit a VLAN name

Complete these steps to edit the name of a VLAN.

Step 1. Do one of the following:

- At the top of the page, next to the VLAN name, click the edit icon.
- Or, on the Actions menu, click **Edit Name**.

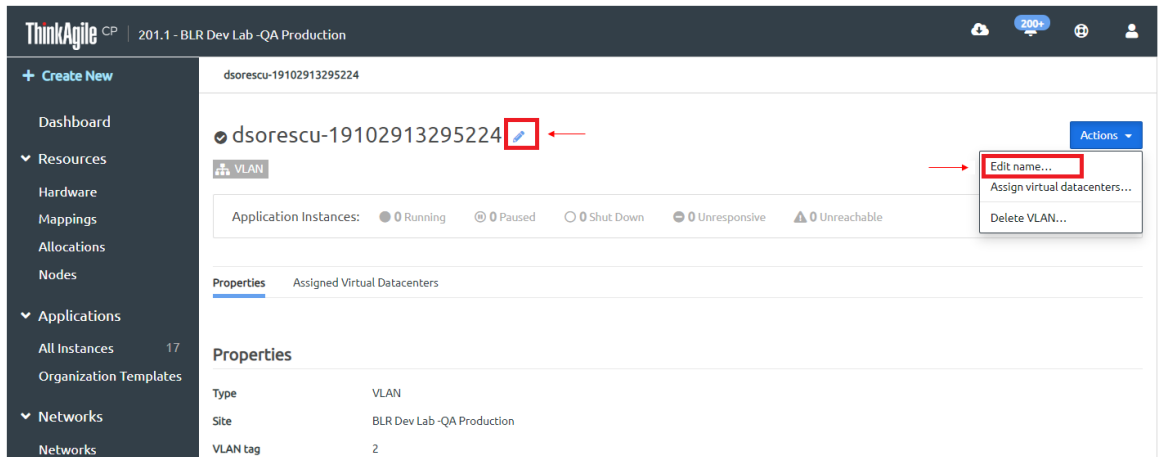


Figure 135. Edit VLAN Name

- In the Rename dialog box, enter a unique name for this VLAN, and click **Update**.

### Assign a Virtual Datacenter to a VLAN

Complete these steps to assign a virtual datacenter to a VLAN.

Step 1. Do one of the following:

- On the Actions menu, click **Assign Virtual Datacenters**.

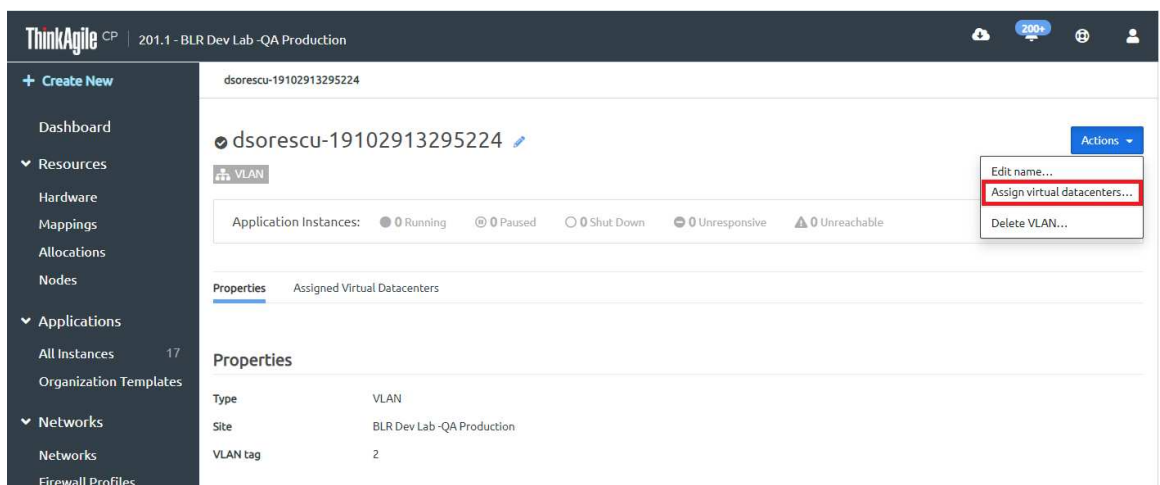


Figure 136. Action Menu - Assign Virtual Datacenters

- b. Or, click the **Assigned Virtual Datacenters** tab and then click the **Assign Virtual Datacenters** button.

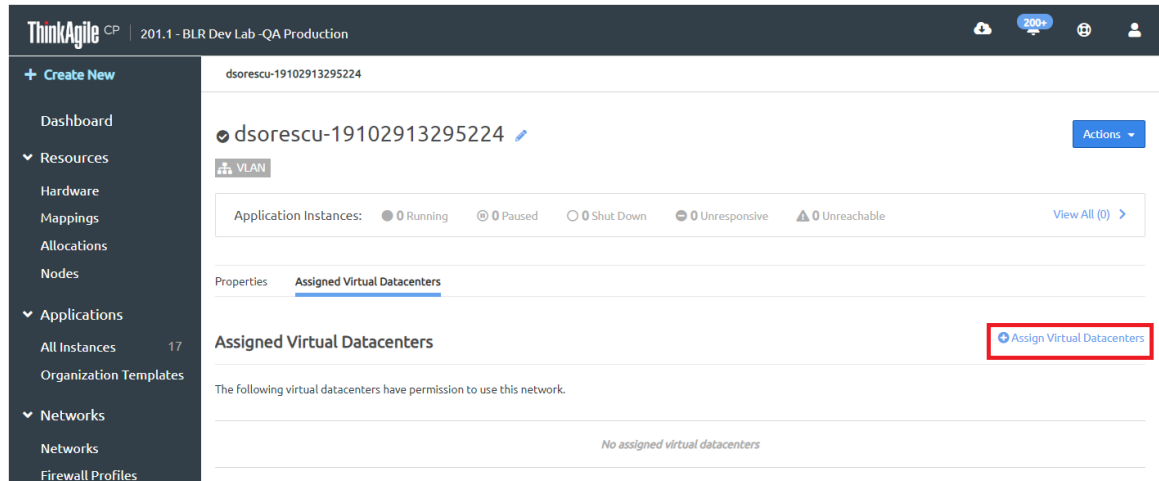


Figure 137. Assign Virtual Datacenters from the Assigned Virtual Datacenters tab

- Step 2. In the Assign Virtual Datacenters dialog, select the virtual datacenter(s) that you want to assign to this network.

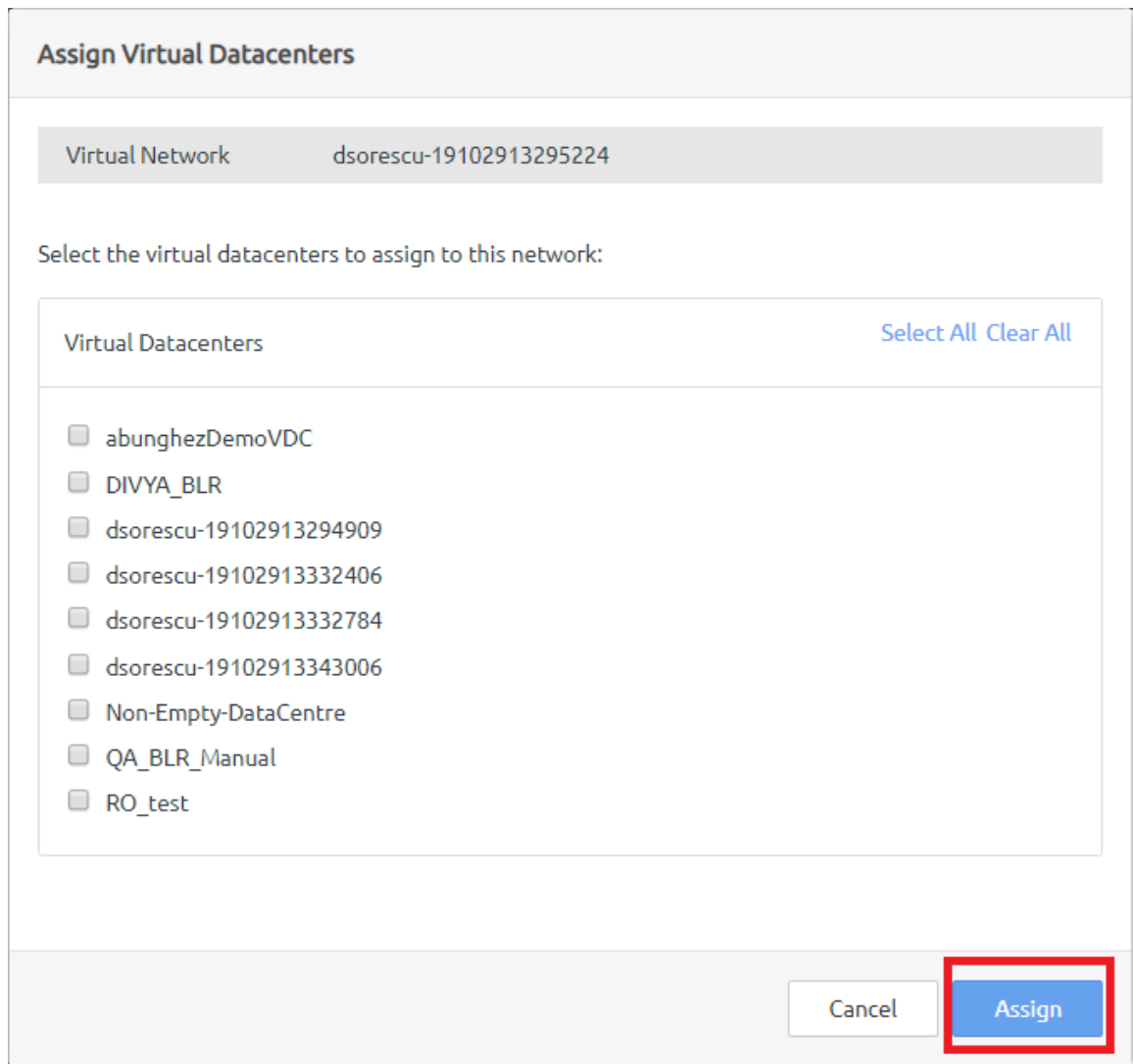


Figure 138. Assign Virtual Datacenters dialog

Step 3. Click **Assign**.

#### **Unassign a virtual datacenter from a VLAN**

Follow these steps to unassign a virtual datacenter from a VLAN.

- Step 1. On the page of the VLAN for which you want to unassign virtual datacenters, click the **Assigned Virtual Datacenters** tab.
- Step 2. Next to the virtual datacenter you want to unassign, click the action menu (...), and then click **Unassign Virtual Datacenter**.

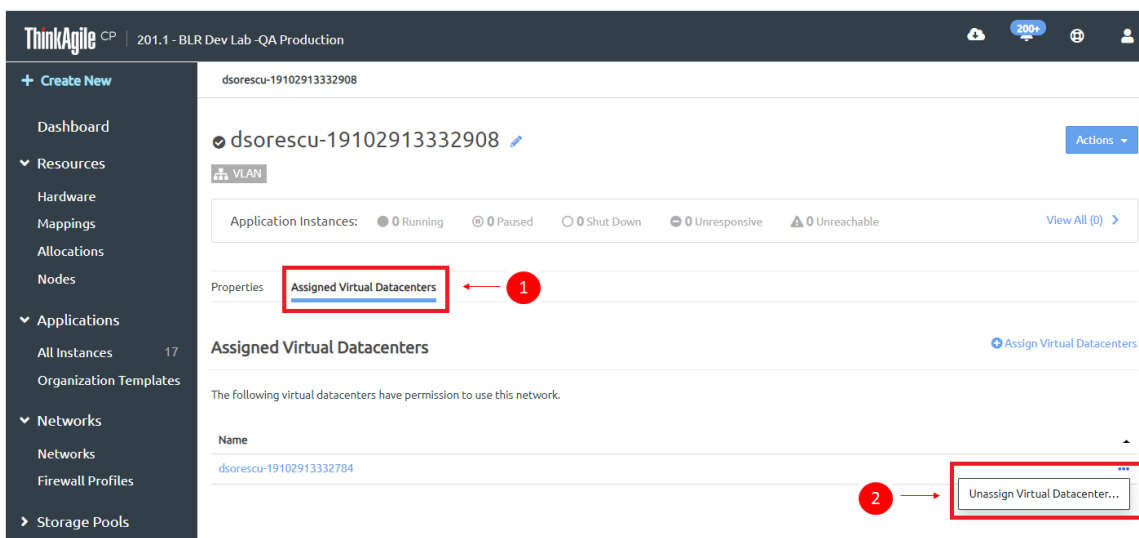


Figure 139. Unassign virtual datacenter from VLAN

Step 3. In the Unassign Virtual Datacenter confirmation dialog, click **Unassign Virtual Datacenter**.

### Delete a VLAN

This action cannot be undone, and this network will be removed from all vNICs set to use this network.

Step 1. On the Actions menu for the VLAN you want to delete, click **Delete VLAN**.

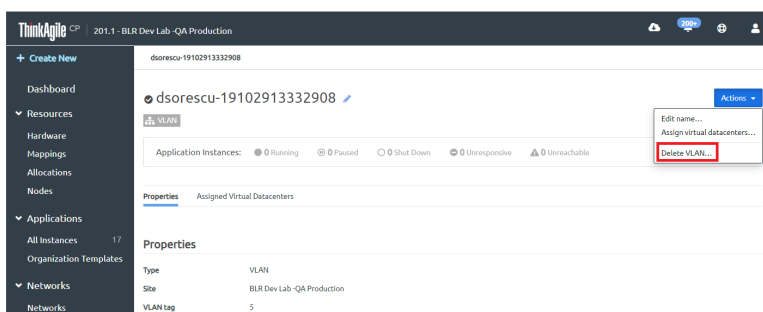


Figure 140. Delete a VLAN

Step 2. In the Delete Network confirmation dialog box, click **Delete Network**.

### Manage VNETs and NFV instances

Complete these steps to manage or modify a VNET.

Step 1. In the left navigation menu under Networking, click **Networks**.

Step 2. On the Networks page, do one of the following:

- a. In the list of networks, click the actions menu (...) for the VNET you want to modify.

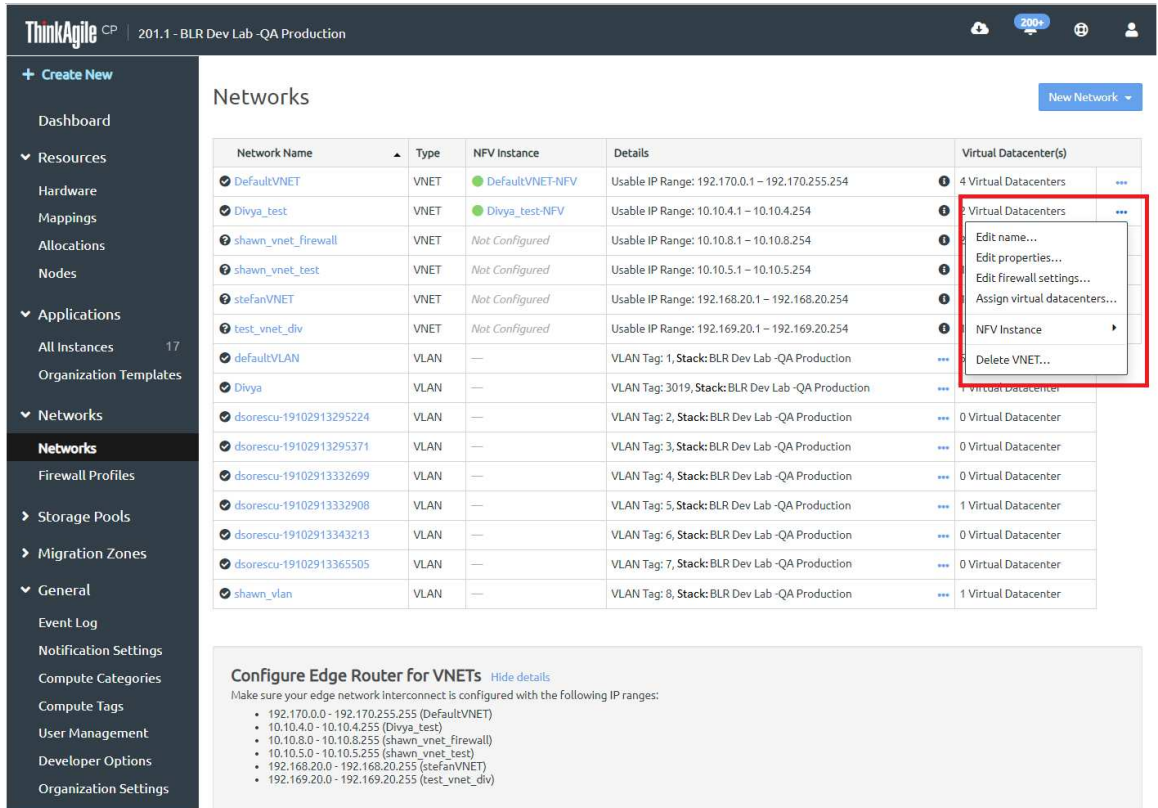


Figure 141. Networks page - VNET Actions

- b. In the Name column of the Networks page, click the VNET you want to manage, which opens the details page for that network, and then click **Actions**.

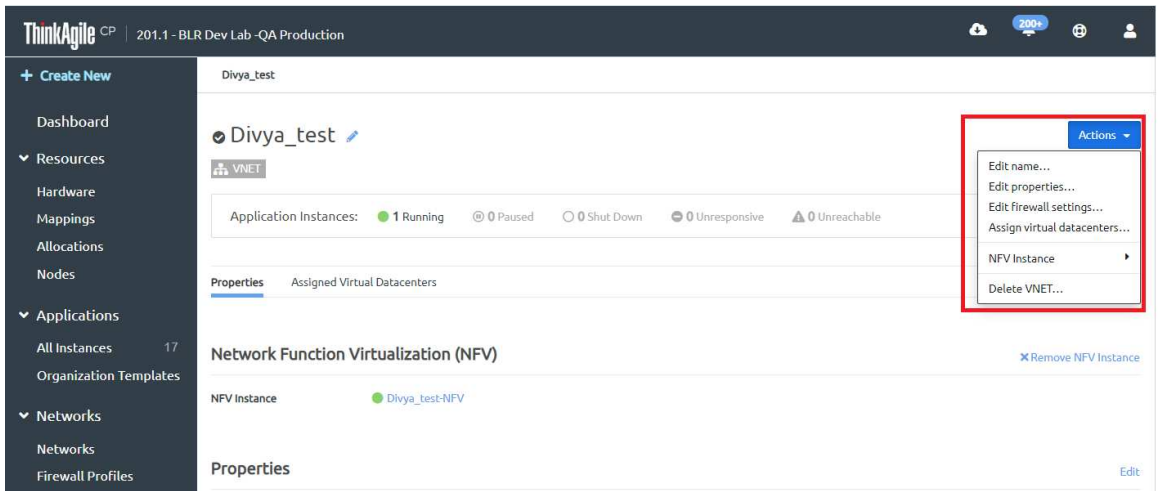


Figure 142. VNET Actions menu

Refer to the following topics for instructions on managing VNETs and NFVs.

- “Edit VNET name” on page 140
- “Edit VNET properties” on page 140
- “Edit the DHCP lease for a VNET” on page 146


- “Edit firewall settings for a VNET” on page 146
- “Delete a VNET” on page 147
- “Assign a virtual datacenter to a VNET” on page 148
- “Unassign a virtual datacenter from a VNET” on page 149
- “Move a VNET to another stack” on page 150
- “Use VNETs in multi-locale organizations” on page 151
- “Manage NFV instances” on page 152

### Edit VNET name

You can change the name of a VNET.

Complete the following steps to edit a VNET name:

Step 1. Perform one of the following actions to access the Rename VNET dialog:

- At the top of the page, next to the VNET name, click the edit icon.
- On the Actions menu (  ), click **Edit Name**.

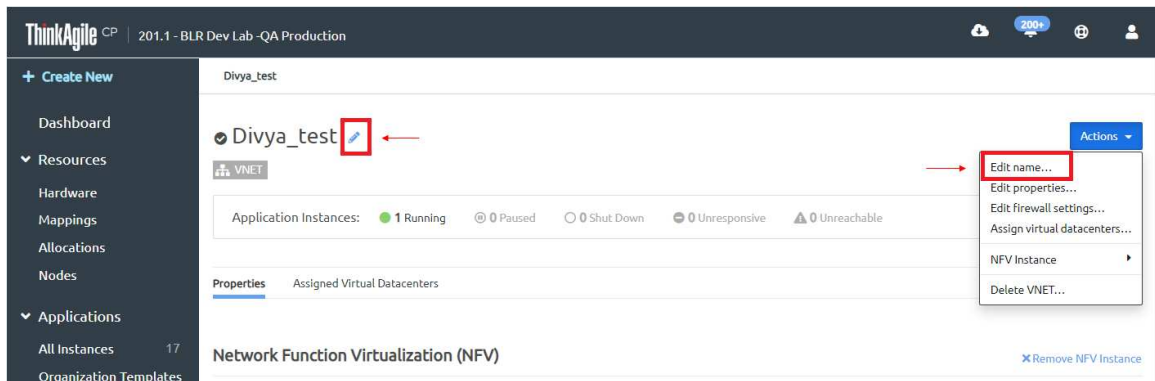


Figure 143. Edit VNET Name

Step 2. In the Rename VNET dialog, enter a unique name for the VNET, and click **Update**.

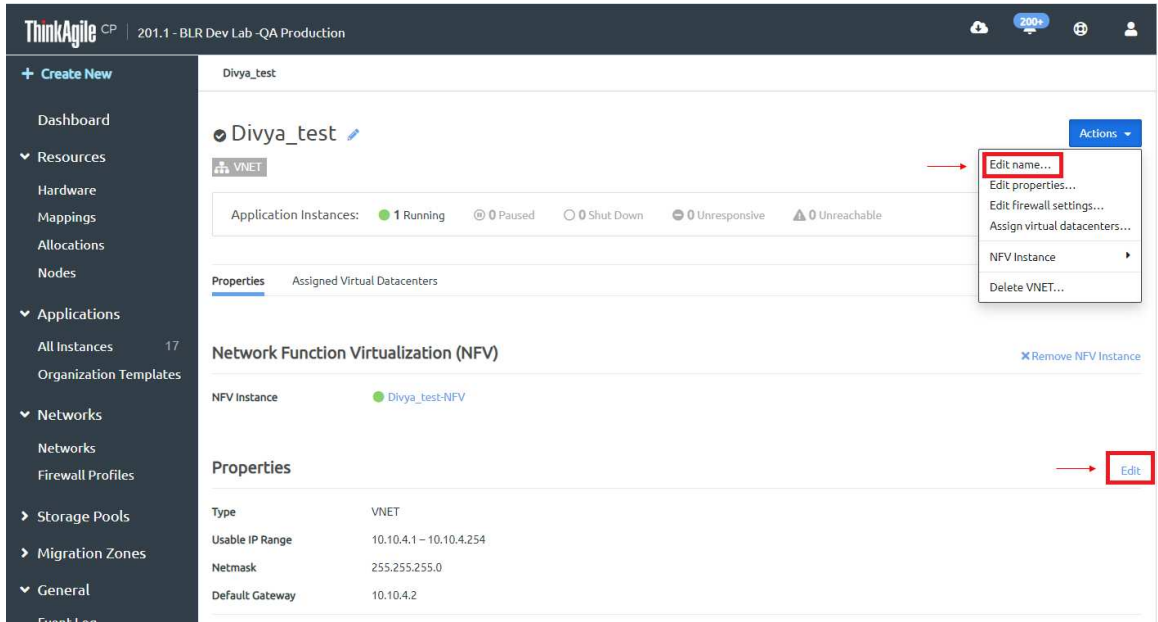
### Edit VNET properties

Follow these steps to modify VNET Properties

**Note:** Editing VNET properties may have adverse impacts on any running application instances using the virtual network.

Step 1. Do one of the following:

- On the Actions menu, click **Edit properties**.
- On the VNET page, next to Properties click **Edit properties**.



The Edit Network Properties dialog opens.

## Edit Network Properties

WARNING: Editing these properties may have adverse impacts on any running application instances using this virtual network.

Network Divya\_test

Network Address

Netmask

Usable IP Range 10.10.4.1 — 10.10.4.254

Default Gateway

Default gateway should be within the specified usable IP range.

DHCP Range  —

DHCP range should be within the usable IP range.

[Hide Advanced Settings](#)

DHCP Lease Time

Domain Name

Primary DNS Server

Secondary DNS Server

Static Binding (Optional)

Hostname (Optional)

MAC Address

IP Address

<input type="text"/>	<input type="text"/>	<input type="text"/>	...
----------------------	----------------------	----------------------	-----

[Add Row](#)

Cancel

Save



Step 2. Modify the following properties as needed.

- **Network Address** - Network IP address.
- **Netmask** - The range of usable IP addresses on this network.
- **Default Gateway** - The default gateway for this network. This should be within the specified usable IP range.
- **DHCP Range** - The part of this VNET's IP address range that is served by DHCP. The DHCP range does not include your default gateway. This should be within the usable IP range.

Click **Show Advanced Settings** to view the following properties.

- **DHCP Lease Time** - The amount of time in seconds for how long your DHCP lease is retained on your client.
- **Domain Name** - Domain name for DHCP.
- **Primary DNS Server** - Primary DNS server for DHCP.
- **Secondary DNS Server** - Secondary (redundant) DNS server for DHCP.
- **Static Binding** - Refers to the use of fixed IP addresses via DHCP. If static binding is not used, this setting will be None.
- **Hostname, MAC Address, IP Address** - If using Static Binding, once instances using your VNET have been created, you can enter their MAC addresses and IP addresses in the Static Binding section. These IP addresses must be in your DHCP range. The specified instances will request the specified IP addresses from DHCP. You can click **Add Row** or click the ellipsis action menu and click **Remove Row** to add or remove rows as needed. To avoid issues with any outstanding DHCP leases, make sure you also set the IP address specified in this section as the static IP address within the instance's guest OS.

If you modify DHCP settings, see this topic, [“Edit the DHCP lease for a VNET” on page 146](#) for additional steps.

Step 3. Click **Save**.

**Note:** These changes will not take effect on the clients until they renew their DHCP leases.

### Static DHCP bindings for a VNET

This section covers the steps required to view, add, modify, or remove static DHCP bindings for a specific VNET.

The Dynamic Host Configuration Protocol (DHCP) is a network protocol used to automatically manage the network configuration of devices within an IP network so they are able to communicate with other IP networks. A DHCP server dynamically assigns IP addresses and other network settings to each client device within its network.

Besides automatically assigning IP network settings, DHCP servers can be configured to allocate specific IP and MAC addresses. Such an IP and MAC address pair is considered a static DHCP binding.

To configure a static DHCP bindings for a VNET, follow these steps:

Step 1. From the left-side navigation menu, expand **Networks** and then click on **Networks**.

Step 2. This displays the list of VLANs and VNETs currently configured.

## Networks

New Network ▾

Network Name	Type	NFV Instance	Details	Virtual Datacenter(s)
VDC_VNET_test	VNET	Not Configured	Usable IP Range: 192.168.3.1 – 192.168.3.254	1 Virtual Datacenter
VNET_Default	VNET	VNET_Default-NFV	Usable IP Range: 10.10.10.1 – 10.10.10.254	3 Virtual Datacenters
Default VLAN	VLAN	—	VLAN Tag: 1, Stack: stack21.1	3 Virtual Datacenters

Step 3. Click a VNET from the list. The current static DHCP bindings for that VNET are displayed under the Properties section.

## Properties

Type	VNET
Usable IP Range	10.10.10.1 – 10.10.10.254
Netmask	255.255.255.0
Default Gateway	10.10.10.2

DHCP Range	10.10.10.4 – 10.10.10.220
DHCP Lease Time	86400 seconds
Domain Name	—
Primary DNS Server	—
Secondary DNS Server	—

Static Binding		
Hostname	Mac Address	IP Address
ACME-machine	b4:d1:35:00:00:a9	10.10.10.48

Step 4. To add, modify or remove a static DHCP binding, click on **Edit** next to the Properties heading. The Edit Network Properties dialog box appears.

## Edit Network Properties

WARNING: Editing these properties may have adverse impacts on any running application instances using this virtual network.


Network	VNET_Default		
Network Address	<input type="text" value="10.10.10.1"/>		
Netmask	<input type="text" value="255.255.255.0"/>		
Usable IP Range	10.10.10.1 — 10.10.10.254		
Default Gateway	<input type="text" value="10.10.10.2"/> <small>Default gateway should be within the specified usable IP range.</small>		
DHCP Range	<input type="text" value="10.10.10.4"/> — <input type="text" value="10.10.10.220"/> <small>DHCP range should be within the usable IP range.</small>		
DHCP Lease Time	<input type="text" value="86400"/> <input type="text" value="seconds"/>		
Domain Name	<input type="text" value="Optional"/>		
Primary DNS Server	<input type="text" value="Optional"/>		
Secondary DNS Server	<input type="text" value="Optional"/>		
<b>Static Binding (Optional)</b>			
<b>Hostname</b>	<b>MAC Address</b>	<b>IP Address</b>	
<input type="text" value="ACME-machine"/>	<input type="text" value="b4:d1:35:00:00:a9"/>	<input type="text" value="10.10.10.48"/>	<input type="text" value="..."/>
<input type="button" value="Add Row"/>			
		<input type="button" value="Cancel"/>	<input type="button" value="Save"/>

Step 5. To edit the currently configured static DHCP bindings, modify the following fields for an entry:

- Hostname
- MAC Address
- IP Address

Step 6. To add a new static DHCP binding, click on the **Add Row** button. A new entry appears for which you need to fill in the following fields:

- Hostname
- MAC Address
- IP Address

Step 7. To remove a static DHCP binding, click on the **Action** menu (  ) next to it and then select **Remove Row**.

Step 8. Click **Save** to submit your changes.

### Edit the DHCP lease for a VNET

After adding, changing, or removing a static binding from an instance that already has a DHCP IP, the DHCP server and client will still have the old lease cached, so additional steps are required.

Follow these steps if you modify the DHCP service for a VNET. After changing a VNET's DHCP settings, such as adding, changing, or removing a static binding from an instance that already has a DHCP IP, follow these steps.

Step 1. Open a console to the NFV instance.

Step 2. Run: `vi /var/lib/dnsmasq/dnsmasq.leases` and type **i** to edit the file.

Step 3. Remove the line containing the old IP of the instance whose static binding is being changed. Press **ESC** and type `:wq` to save the changes.

Step 4. Run: `systemctl restart dnsmasq`

Step 5. Open a console to the instance whose static binding is being changed.

- For Linux instances:
  - Run: `rm /var/lib/NetworkManager/dhclient-* -<Interface Name>.lease` to remove the old DHCP lease file.
  - Then run: `nmcli con up <Interface Name>` to bring up the interface.
- For Windows instances:
  - Open Network and Sharing Center and click **Change adapter settings**.
  - Right-click the network adapter and select **Disable this network device**.
  - Right-click the network adapter and select **Enable this network device**.

**Note:** These changes will not take effect on the clients until they renew their DHCP leases.

### Edit firewall settings for a VNET

Follow these steps to edit firewall settings for a VNET

(For more information about firewall profiles, see the topic, [“Manage firewall profiles” on page 156.](#))

**Note:** Editing firewall settings may have adverse impacts on any running application instances using this virtual network.

Step 1. Do one of the following

- On the Actions menu, select **Edit firewall settings**.

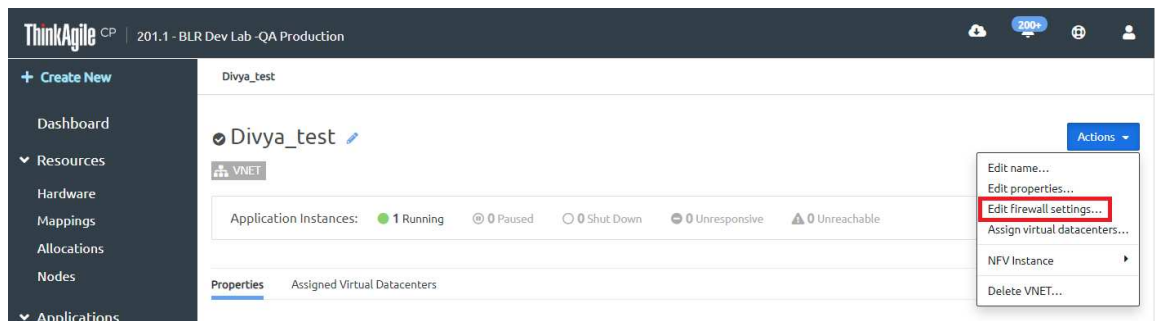


Figure 144. Actions Menu - Edit Firewall Settings

- On the VNET page, next to Firewall Settings click **Edit**.

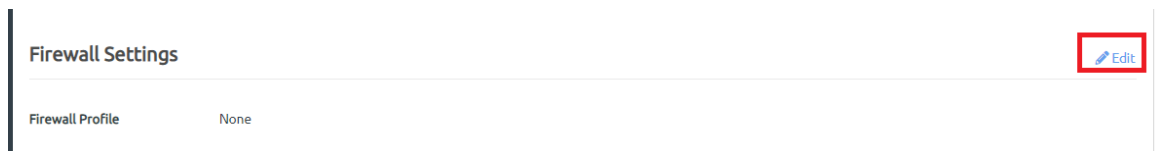


Figure 145. VNET page - Edit Firewall Settings

The Edit Firewall Profile dialog opens.

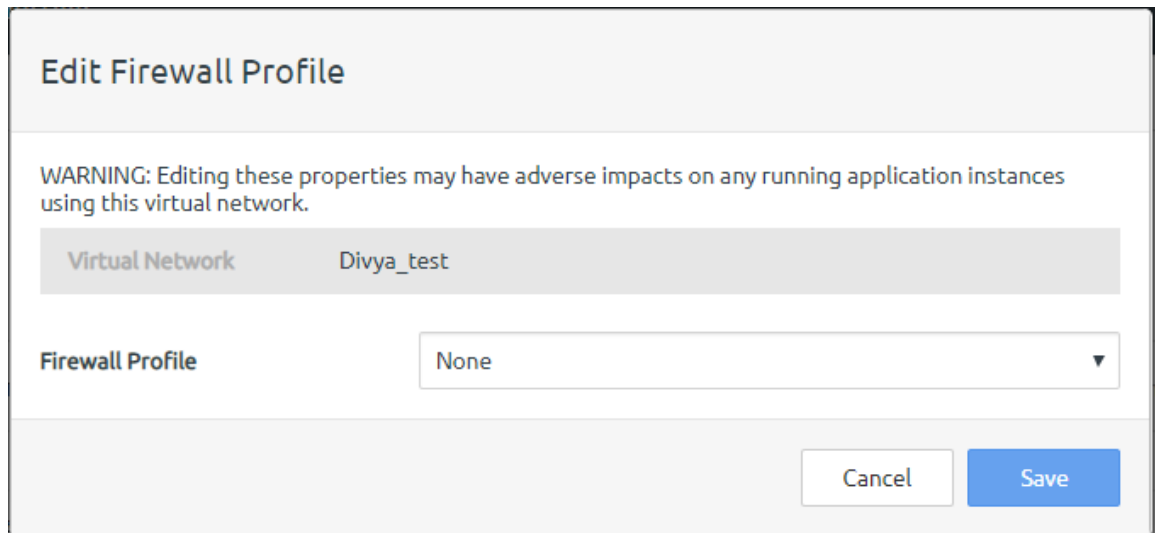


Figure 146.

- Step 2. From the Firewall Profile drop-down menu, select a new firewall profile.
- Step 3. Click **Save**.

### Delete a VNET

Follow these steps to delete a VNET

This action cannot be undone, and the network will be removed from all vNICs set to use the network.

- Step 1. On the Actions menu, click **Delete VNET**.

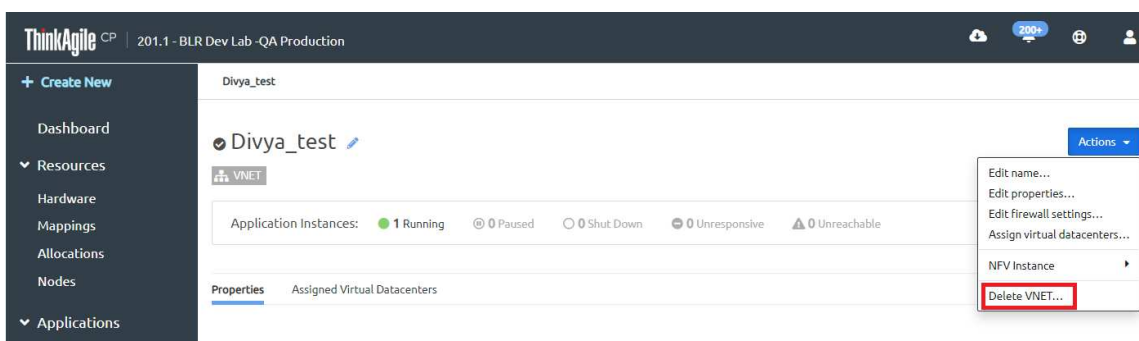


Figure 147. Delete VNET

The Delete Network dialog opens.

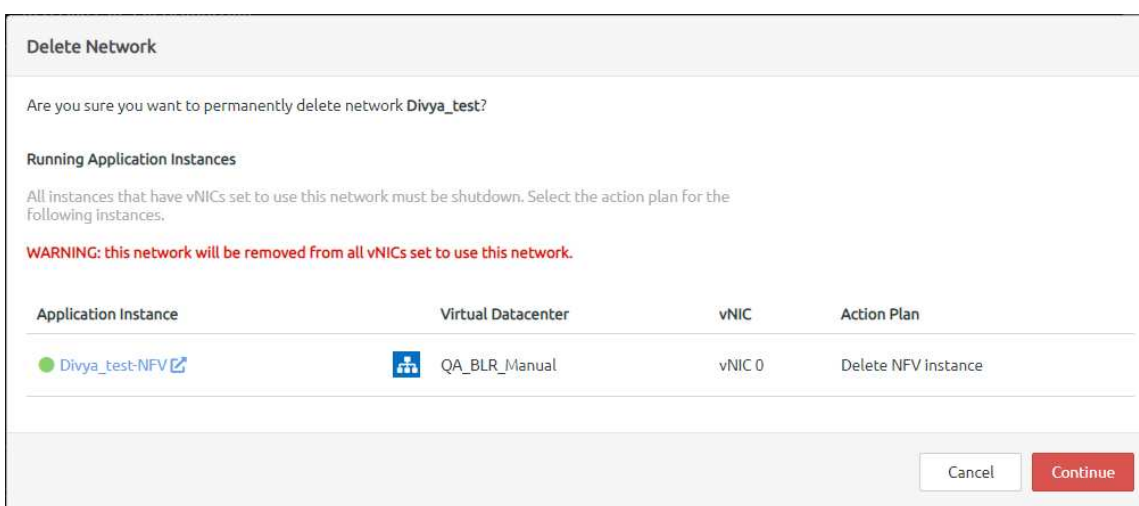


Figure 148. Delete Network dialog

Step 2. Click **Continue** to confirm.

**Note:** Any instances that have vNICs set to use this network must be shutdown. You will need to select an action plan for the related instances as applicable.

Step 3. Click **Delete Virtual Network**.

### Assign a virtual datacenter to a VNET

Follow these steps to assign a virtual datacenter to a VNET.

Step 1. On the page of the VNET for which you want to assign virtual datacenters, click the **Assigned Virtual Datacenters** tab.

Step 2. Alternatively, click the **Assign Virtual Datacenters** button.

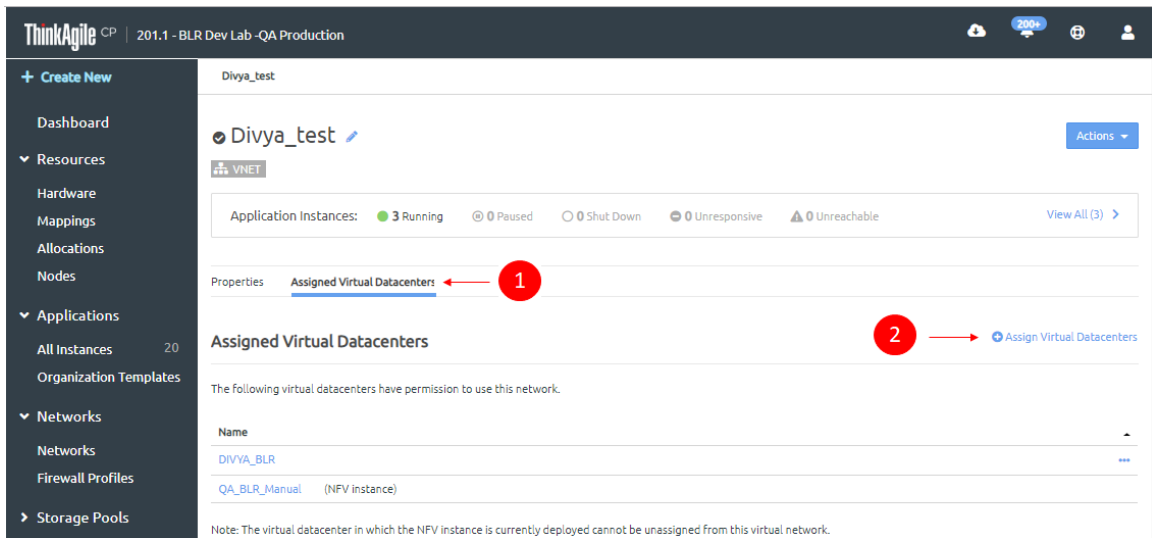


Figure 149. Assign virtual datacenter tab and button

Step 3. In the Assign Virtual Datacenters dialog, select the virtual datacenter(s) that you want to assign to this network, and then click **Assign**.

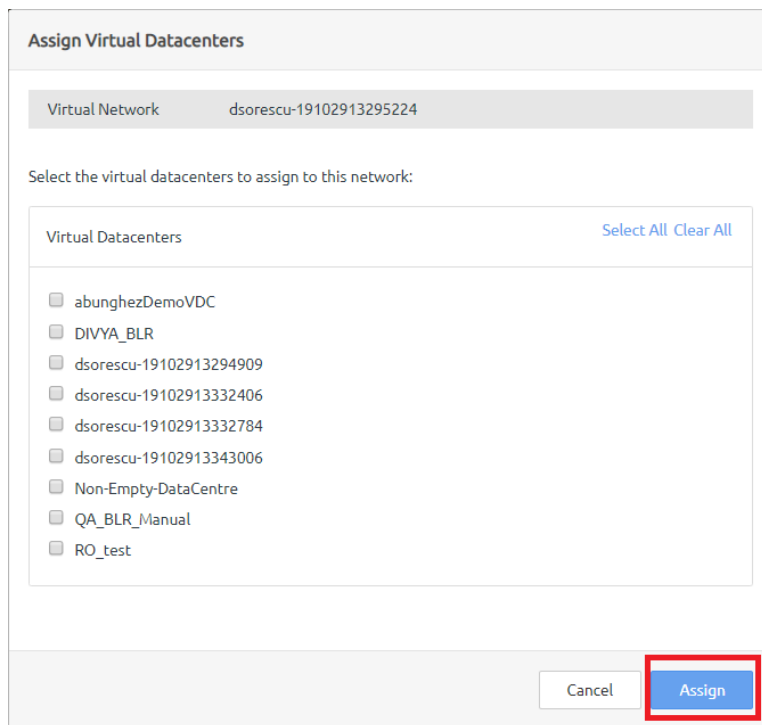


Figure 150. Assign Virtual Datacenters dialog

### Unassign a virtual datacenter from a VNET

Follow these steps to unassign a virtual datacenter from a VNET.

**Note:** The virtual datacenter in which the NFV instance is currently deployed cannot be unassigned from this virtual network.

- Step 1. On the page of the VNET for which you want to unassign virtual datacenters, click the **Assigned Virtual Datacenters** tab.
- Step 2. Alternatively, next to the virtual datacenter you want to unassign, click the action menu (...), and then click **Unassign Virtual Datacenter**

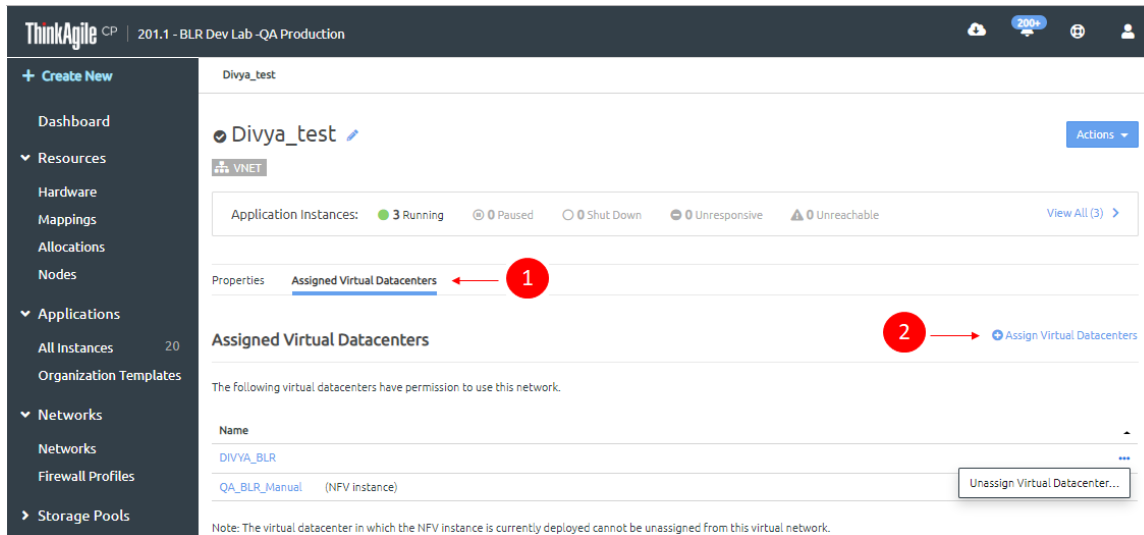


Figure 151. Unassign virtual datacenter from VLAN

- Step 3. In the Unassign Virtual Datacenter confirmation dialog, click **Unassign Virtual Datacenter**.

### Move a VNET to another stack

**Infrastructure admin** users can move a VNET from one stack to another. After removing the NFV instance from a stack, users can then deploy the NFV instance to a new stack.

#### Notes:

- For more information about user roles in ThinkAgile CP, see the following topic:  
[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)
- This process should only be completed when you are moving instances that use the VNET to another stack by creating new instances from quick DR backups of the originals. The NFV instance must run on the same stack as the instances using the VNET.

Complete the following steps to move a VNET to another stack.

- Step 1. On the Networks page, select the VNET that you want to move to the other stack.
- Step 2. Delete the NFV instance.

**Note:** Removing the NFV instance will cause network connectivity interruptions for the VNET until a new NFV instance is deployed.

- a. On the Actions menu (...), click **NFV Instance** and then click **Remove NFV Instance**.



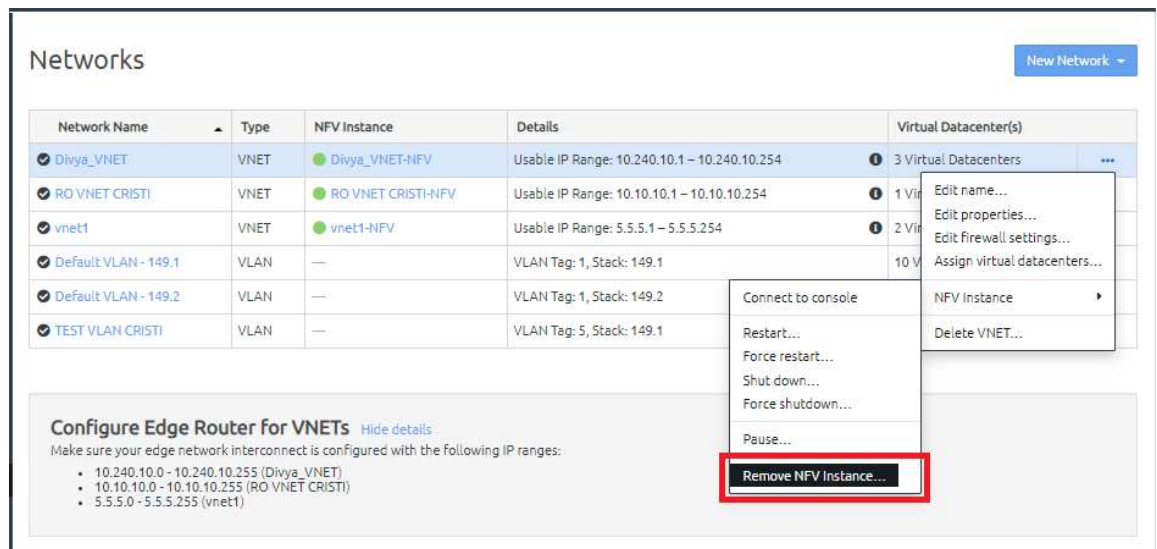


Figure 152. Remove NFV Instance option for a VNET

b. In the confirmation dialog, click **Remove NFV Instance**.

Step 3. Configure your core router on the new stack to route traffic to the VNET.

Step 4. Deploy the NFV instance to the new stack.

Follow the procedure described in the following topic to deploy the NFV instance:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/deploy-an-nfv-instance.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/deploy-an-nfv-instance.html)

Step 5. Start the custom NFV instance to complete the VNET creation.

Step 6. Wait a few minutes for the NFV instance to deploy and automatically configure with the interconnect switches.

### Use VNETs in multi-locale organizations

The following example demonstrates the use of virtual networks (VNETs) in an organization with multiple locations.

In this example:

- LocationA has SwitchA, ComputeA and StorageA. Migration-ZoneA, virtual-DatacenterA and Storage-PoolA are only allocated hardware from LocationA
- LocationB has SwitchB, ComputeB and StorageB. Migration-ZoneB, virtual-DatacenterB and Storage-PoolB are only allocated hardware from LocationB.

The core router is configured to send 10.1.1.1-10.1.1.254 traffic to SwitchA, and 10.2.1.1-10.2.1.254 traffic to SwitchB.

A VNET (vnetA) using the range 10.1.1.1-10.1.1.254 can only work properly if the VNET services application is deployed on hardware associated with SwitchA. That is, when creating the VNET, Migration-ZoneA, virtual-DatacenterA and Storage-PoolA should be selected.

A VNET (vnetB) using the range 10.2.1.1-10.2.1.254 can only work properly if the VNET services application is deployed on hardware associated with SwitchB. That is, when creating the vnet Migration-ZoneB, virtual-DatacenterB and Storage-PoolB should be selected.

An instance using vnetA must be deployed on hardware associated with SwitchA for its networking to function properly. That is, when creating the instance Migration-ZoneA, virtual-DatacenterA and Storage-PoolA should be selected.

An instance using vnetB must be deployed on hardware associated with SwitchB for its networking to function properly. That is, when creating the instance Migration-ZoneB, virtual-DatacenterB and Storage-PoolB should be selected.

## Manage NFV instances

From the VNET actions menu you can manage the NFV instance associated with the VNET.

Follow these steps to manage a VNET's NFV instance:

Step 1. In the left navigation menu under Networking, click **Networks**.

Step 2. On the Networks page, do one of the following:

- In the Name column of the Networks page, click the VNET you want to manage, which opens the details page for that network, and then on the **Actions** menu, click **NFV Instance**
- In the NFV Instance column of the Networks page, click the NFV instance of the VNET you want to manage, which opens the details page for that NFV instance, and then on the **Actions** menu, click **NFV Instance**.
- In the list of networks, click the actions menu (...) for the VNET for which you want to modify the NFV, and then click **NFV Instance**.

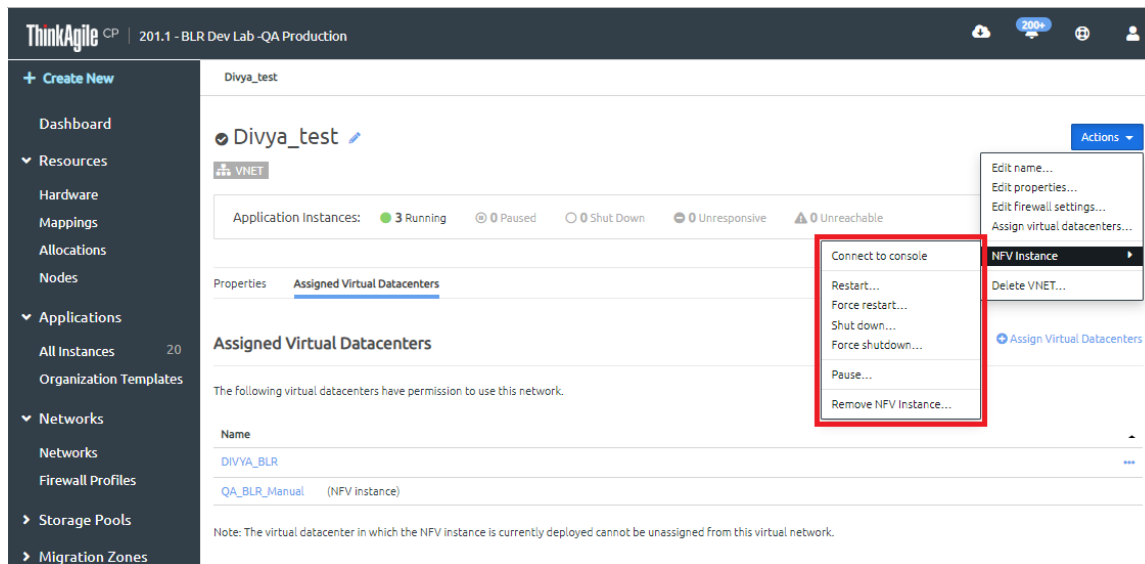


Figure 153. VNET NFV Instance Actions

**Note:** Some actions may appear grayed out since the availability of some actions is dependent on the NFV instance state.

Refer to the following topics for instructions on managing NFVs.

- [“Connect to a console” on page 153](#)
- [“Restart an NFV instance” on page 153](#)
- [“Force a restart an NFV instance” on page 153](#)
- [“Shut down an NFV instance” on page 153](#)

- [“Force the shutdown of an NFV Instance” on page 153](#)
- [“Start an NFV instance” on page 153](#)
- [“Remove an NFV instance” on page 154](#)
- [“Deploy an NFV instance” on page 154](#)

#### ***Connect to a console***

Complete these steps to connect to the NFV instance and open a console.

- Step 1. On the Actions menu, select **Connect to console**.
- Step 2. ThinkAgile CP Cloud Controller will create a secure VNC connection to the NFV instance and open the console in a new window. For the console to open, the firewall must allow incoming connections from the internal network to the compute node's (Router physical network) through ports TCP 1024-49151, inclusive.

#### ***Restart an NFV instance***

Follow these steps to restart an NFV instance.

**Note:** Restarting the NFV can cause network connectivity interruptions.

- Step 1. On the Actions menu, click **NFV Instance → Restart NFV Instance**.
- Step 2. In the confirmation dialog, click **Restart**.

#### ***Force a restart an NFV instance***

Complete these steps to force a restart an NFV instance.

**Note:** Forcing a restart of the NFV can cause network connectivity interruptions, and any unsaved data may be lost.

- Step 1. On the Actions menu, click **NFV Instance → Force Restart NFV Instance**.
- Step 2. In the confirmation dialog, click **Force Restart Instance**.

#### ***Shut down an NFV instance***

Follow these steps to shut down an NFV instance.

**Note:** Shutting down the NFV can cause network connectivity interruptions.

- Step 1. On the Actions menu, click **NFV Instance → Shutdown NFV Instance**.
- Step 2. In the confirmation dialog, click **Shutdown Instance**.

#### ***Force the shutdown of an NFV Instance***

Follow these steps to force a shutdown of an NFV Instance.

Shutting down the NFV can cause network connectivity interruptions, and can cause any unsaved data to be lost.

- Step 1. On the Actions menu, click **NFV Instance → Force Shutdown NFV Instance**.
- Step 2. In the confirmation dialog, click **Force Shutdown Instance**.

#### ***Start an NFV instance***

Follow these steps to force a shutdown of an NFV Instance.

Step 1. On the Actions menu, click **NFV Instance** → **Start NFV Instance**.

### Remove an NFV instance

Follow these steps to remove an NFV from a VNET.

**Note:** Removing the NFV instance will cause network connectivity interruptions for the VNET until a new NFV instance is deployed.

Step 1. On the Actions menu, click **NFV Instance** → **Remove NFV Instance**.

Step 2. Click **Remove NFV Instance**.

### Deploy an NFV instance

After creating a new NFV instance for an incomplete VNET or removing an old NFV instance from an existing VNET, **Infrastructure admin** users can deploy a new NFV instance for a VNET.

**Note:** For more information about user roles in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

Complete the following steps to deploy a VNET instance.

Step 1. On the VNET details page for which you want to deploy an NFV, click **Deploy NFV Instance** next to the Network Function Virtualization (NFV) section, or select **Deploy NFV Instance** from the Actions menu.

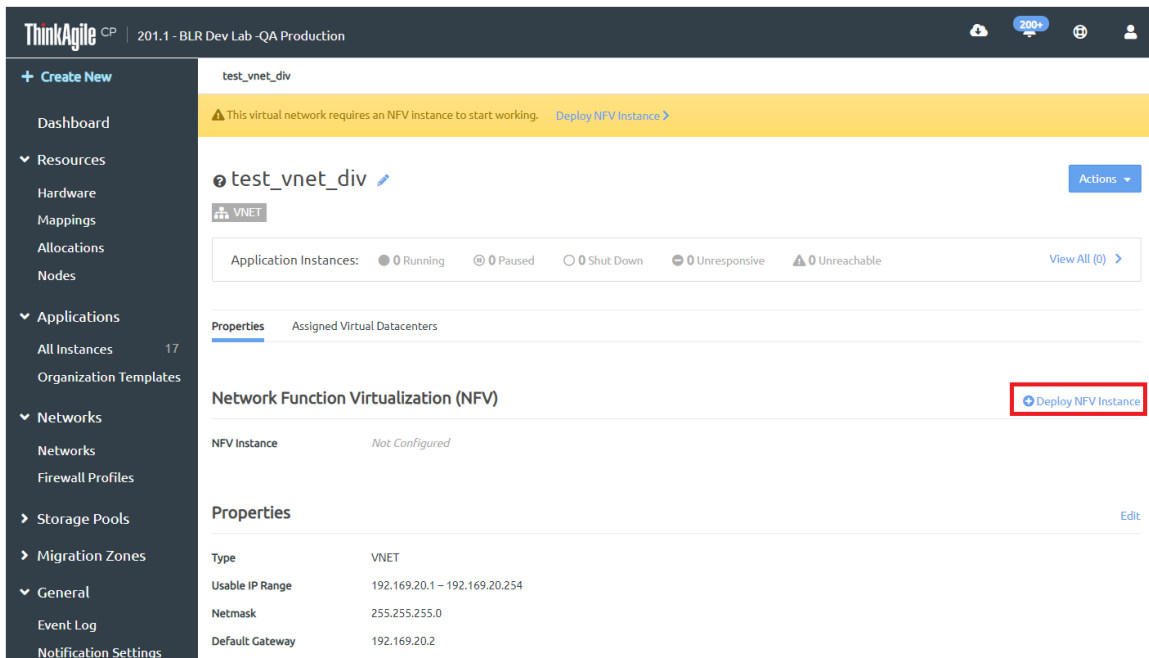


Figure 154. Deploy NFV Instance option on VNET page

Step 2. Fill in the content for the Deploy NFV Instance dialog.

## Deploy NFV Instance

Network test\_vnet\_div

Note: The selected virtual datacenter will be assigned to this VNET.

### Network Function Virtualization (NFV) Instance

Select where the NFV instance is to be deployed. This VNET will be available to all instances in the selected virtual datacenter.

**Virtual Datacenter** Select one ▾

**Storage Pool** Select one ▾

**Migration Zone** Select one ▾

**Provisioning** CPU  core Memory  GB

[Show Compute Constraints](#)

**Automatic Recovery**

**Enable Automatic Recovery**  
If node fails, restart instance elsewhere when resources are available

### Routing Service (Outside Interface)

**Networking Mode** VNET - Not available ▾

**Network** Select one ▾

**Address Mode**  DHCP  Static

**Firewall Profile** None ▾ [View rules](#)

**Firewall Override** None ▾ [View rules](#)

Cancel Save

Figure 155. Deploy NFV Instance dialog

Enter the following information for the NFV instance as needed:

- **Virtual Datacenter.** Select the virtual datacenter where the NFV instance is to be deployed. This VNET will be available to all instances in the selected virtual datacenter.
- **Storage Pool.** Select the storage pool for the NFV instance.
- **Migration Zone.** Select the migration zone for the NFV instance.
- **Provisioning.** Specify CPU, memory, and other optional compute constraints for the NFV instance. (Click **Compute Constraints** to view and select compute categories and compute tags as applicable.)
- **Automatic Recovery.** Click **Enable Automatic Recovery** to specify that if the node fails, the instance will restart elsewhere when resources are available
- Routing Service/Outside Interface Details (The Outside Interface is used by the Routing Service.)
  - **Networking Mode.** Select the networking mode for external traffic as either VLAN or VNET.
  - **Network.** Select the network for the outside interface.
  - **Address Mode.** Select the address mode as either DHCP (and IP address will be automatically assigned) or Static (to assign an IP address of your choosing). If you select Static, you will then need to add the IP Address, Netmask, and Gateway.
  - **Firewall Profile.** To apply a firewall profile, select a firewall profile from the drop-down menu.
  - **Firewall Override.** To apply a firewall override, select an override from the drop-down menu.

Step 3. Click **Save** to save the NFV instance.

Step 4. Wait a few minutes for the NFV instance to deploy and automatically configure with the interconnect switches.

## Manage firewall profiles

A Firewall Profile is a set of firewall rules that apply to a VNET and therefore the application instances running within that VNET. You can select a firewall profile in the VNET Firewall Settings.

**Note:** These rules can be overridden by a Firewall Override, which is a set of firewall rules applied at the virtual datacenter level.

Refer to the following topics:

- [“How firewall profiles and overrides are applied” on page 156](#)
- [“Default profile rules” on page 157](#)
- [“Create a firewall profile” on page 157](#)
- [“View firewall profiles” on page 158](#)
- [“View firewall profile details” on page 159](#)
- [“Modify firewall details” on page 159](#)
- [“Examples of firewall rules” on page 163](#)

## How firewall profiles and overrides are applied

Firewall Override rules (at the virtual datacenter level) are evaluated prior to the Firewall Profiles rules (at the VNET level) and will override the VNET Firewall Profile rules if there is a conflict.

Firewall rules follows this iptables rule chain:

- Rules are evaluated in order from top to bottom
- If the rule matches, it executes the specified action

- If the rule does not match, it moves to the next rule
- All communication is allowed unless otherwise specified

## Default profile rules

Two firewall profile rules are available by default.

- Allow outgoing and incoming UDP traffic to destination ports 67-68.
- Allow traffic from instances to the VNET and DHCP requests from instances to the VNET, respectively.

If these rules are deleted and rules are added that block this traffic, the VNET will not function normally.

## Create a firewall profile

**Infrastructure admin** users can create and add a firewall profile to a VNET in your ThinkAgile CP infrastructure.

Complete the following steps to create a firewall profile:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the ThinkAgile CP Cloud Controller management console, under Networking in the left navigation area, click **Firewall Profiles**
- Step 3. On the Firewall Profiles page, click **New Firewall Profile** to display the New Firewall Profile dialog:

Figure 156. New Firewall Profile page

- Step 4. In the Firewall Profile Name field, enter a name for the firewall profile.

Step 5. Click **Add Rule** to add a new rule to the Firewall Profile as needed. The new rule will appear under the [“Default profile rules” on page 157](#), which are required for VNETs.

Step 6. Define the rule as follows:

1. In the first drop-down, select the type of rule as **Allow**, **Drop**, or **Reject**.
2. In the second drop-down, select the type of traffic to apply the rule to as either **Incoming** or **Outgoing**.
3. In the third drop-down, select the traffic protocol type as **All**, **TCP**, **UDP**, or **ICMP**.
4. For the fields, From Source IP Range and To Destination IP Range, you can enter an IP range in the format 198.168.100-198.168.0.100 or 198.168.0.100, or you can leave the fields blank for all IPs.
5. For the Source Port Range and Destination Port Range fields, you can enter a port range in the format 1-65535 or 65535, or you can leave the fields blank for all ports.
6. For the Comment field, you can enter a comment for this rule. (optional)

Step 7. When you have added all needed rules, click **Create Firewall Profile**.

Step 8. To add the firewall profile to a new VNET, see the topic, [“VNET Overview” on page 115](#).

Step 9. To add the firewall profile to an existing VNET, see the topic, [“Manage networks” on page 133](#).

## View firewall profiles

You can view firewall profiles from the ThinkAgile CP Cloud Controller management console.

To view firewall profiles, in the ThinkAgile CP Cloud Controller management console, under Networking in the left navigation area, click **Firewall Profiles**.

The Firewall Profiles page opens, displaying a list of the firewall profiles in your ThinkAgile CP infrastructure.

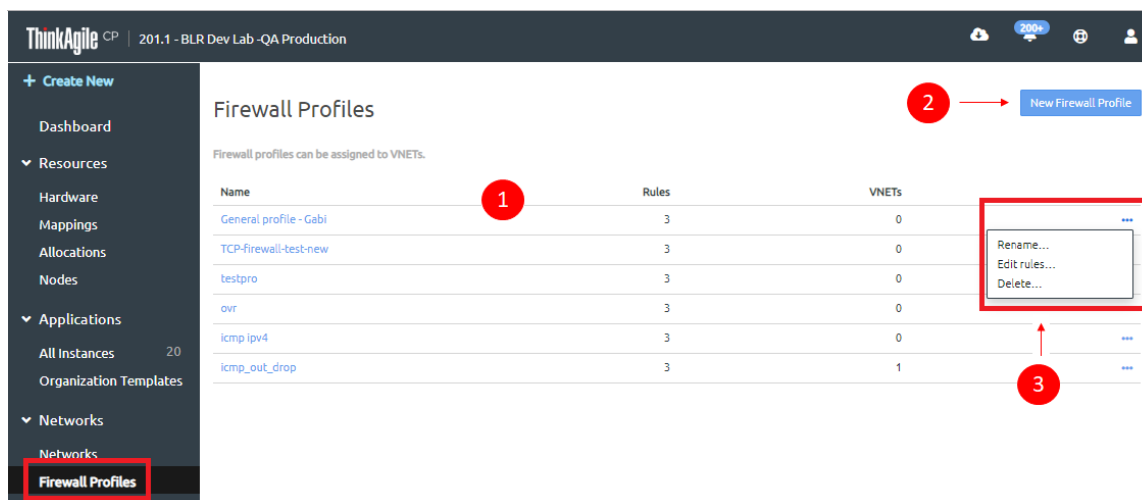


Figure 157. Firewall Profiles page

Step 1. You can view the following information in the list of firewall profiles.

**Note:** You can click the Name column heading to sort the list alphabetically by Name or you can click the Type heading to sort the list by network type.

- **Name** - Lists the name of the firewall profile.



- **Rules** - Lists the number of rules in the firewall profile.
- **VNETs** - Lists the number of VNETs to which this firewall profile applies.

Step 2. You can click **New Firewall Profile** to “[Create a firewall profile](#)” on page 157.

Step 3. In the last column, you can click the ellipsis (...) to access the Actions menu, for example, to edit the firewall profile. For more information about the actions you can perform on firewall profiles, see the topic, “[Modify firewall details](#)” on page 159.

## View firewall profile details

To view more detailed information about an individual firewall profile, on the Firewall Profiles page, in the Name column, select and click the firewall profile for which you want to view details. The Firewall Profile page opens and displays detailed information, such as the list of Rules that are part of the firewall profile and the VNETs to which this firewall profile applies.

## Modify firewall details

If you have the proper permissions, you can modify an existing firewall profile. Follow these steps to access the Actions menu for firewall profiles in ThinkAgile CP Cloud Controller.

Step 1. In the left navigation menu under Networking, click **Firewall Profiles**.

Step 2. On the Firewall Profiles page, do one of the following:

- In the list of networks, click the actions menu (...) for the Firewall Profile you want to modify.

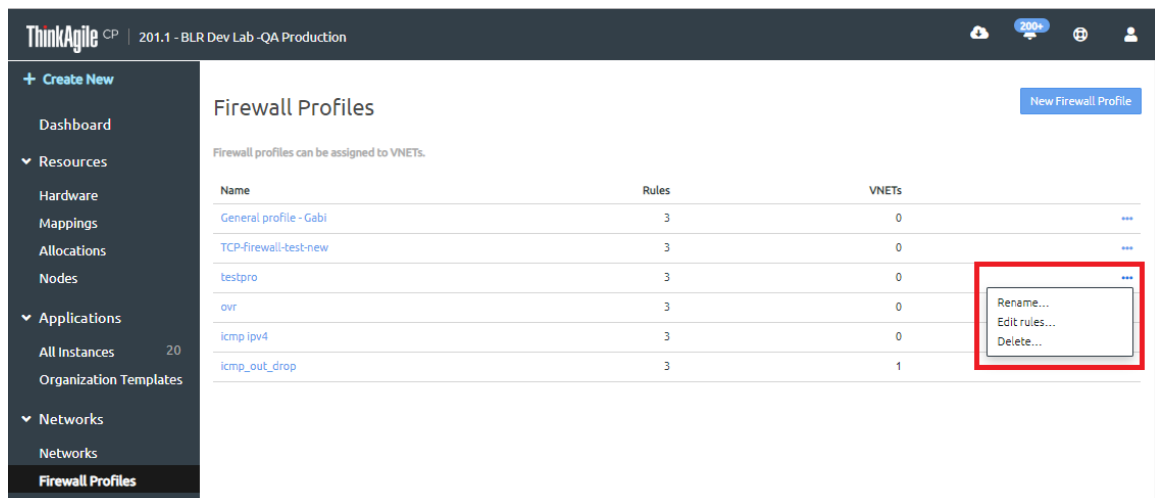


Figure 158. Firewall Profiles page - Actions menu

- In the Name column of the Firewall Profiles page, click the firewall profile you want to manage or modify, which opens the details page for that profile, and then click **Actions**.

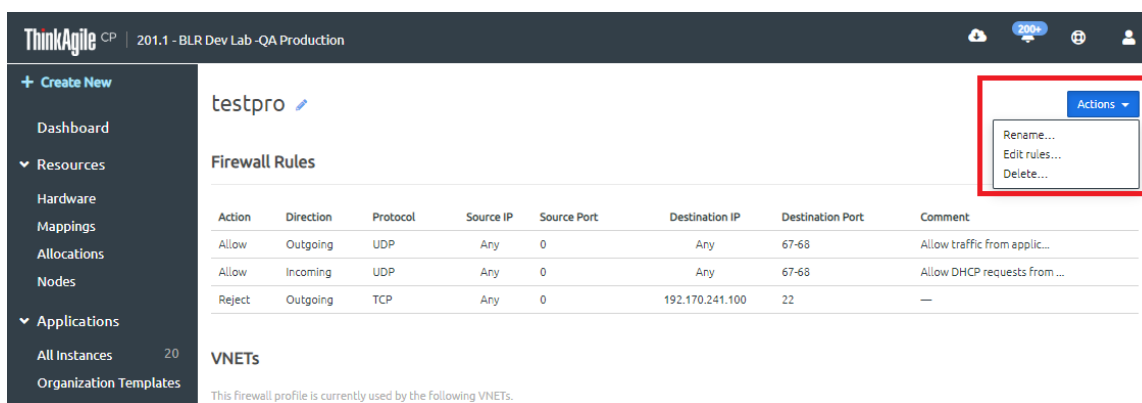


Figure 159. Firewall Profile details page - Actions menu

You can perform such actions as rename the firewall profile, edit the rules of the profile, or delete the profile. Refer to the following topics for instructions on modifying firewall profiles.

- “Rename a firewall profile” on page 160
- “Edit the rules in a firewall” on page 161
- “Delete a firewall profile” on page 162

### Rename a firewall profile

Complete these steps to rename a firewall profile.

Step 1. Do one of the following:

- At the top of the details page of a Firewall Profiles, next to the name of the profile, click the edit icon.
- Or, on the Actions menu, click **Rename**.

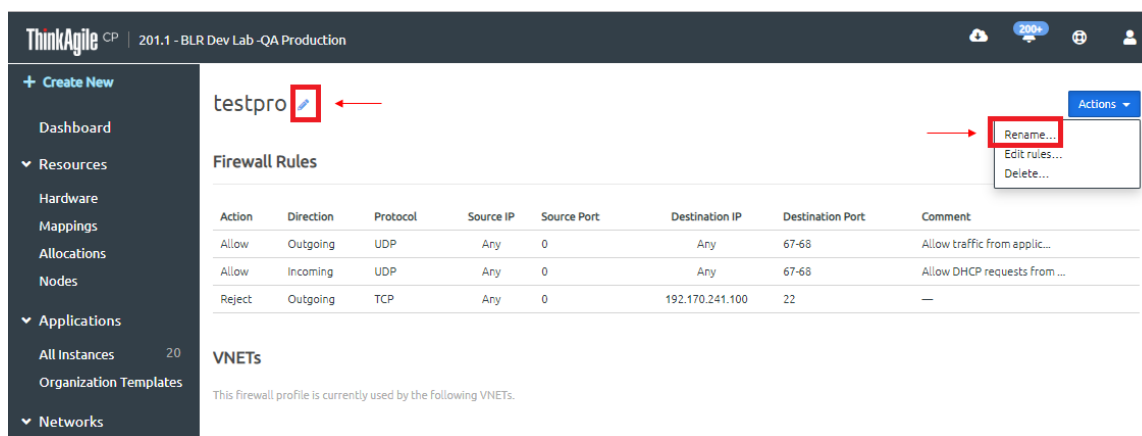


Figure 160. Rename a Firewall Profile

Step 2. In the Edit Name dialog box, enter a new name and then click **Save**.

Figure 161. Edit Firewall Profile Name

### Edit the rules in a firewall

Follow these steps to edit the rules in a firewall.

Step 1. On the firewall rules page, click **Edit Rules**. You can also click **Edit Rules** from the Action menu.

The screenshot shows the 'Edit Rules' page for a selected Firewall Profile named 'ProfileA'. The page displays a table of Firewall Rules and a table of VNETs. The 'Edit Rules' button is highlighted with a red box.

Action	Direction	Protocol	Source IP	Source Port	Destination IP	Destination Port	Comment
Allow	Outgoing	UDP	Any	0	Any	67-68	Allow traffic from applic...
Allow	Incoming	UDP	Any	0	Any	67-68	Allow DHCP requests from ...
Allow	Incoming	TCP	Any	0	Any	0	—

Network Name	Type	NFV Instance	Details	Virtual Datacenter(s)
✓ Demo-VNET	VNET	● Demo-VNET-NFV	Usable IP Range: 172.12.12.1 – 172.12.12.254	1 Virtual Datacenter
✓ VNET 2	VNET	● VNET 2-NFV	Usable IP Range: 192.177.0.1 – 192.177.255.254	1 Virtual Datacenter

Figure 162. Edit Rules for a selected Firewall Profile

The Edit Rules page opens.

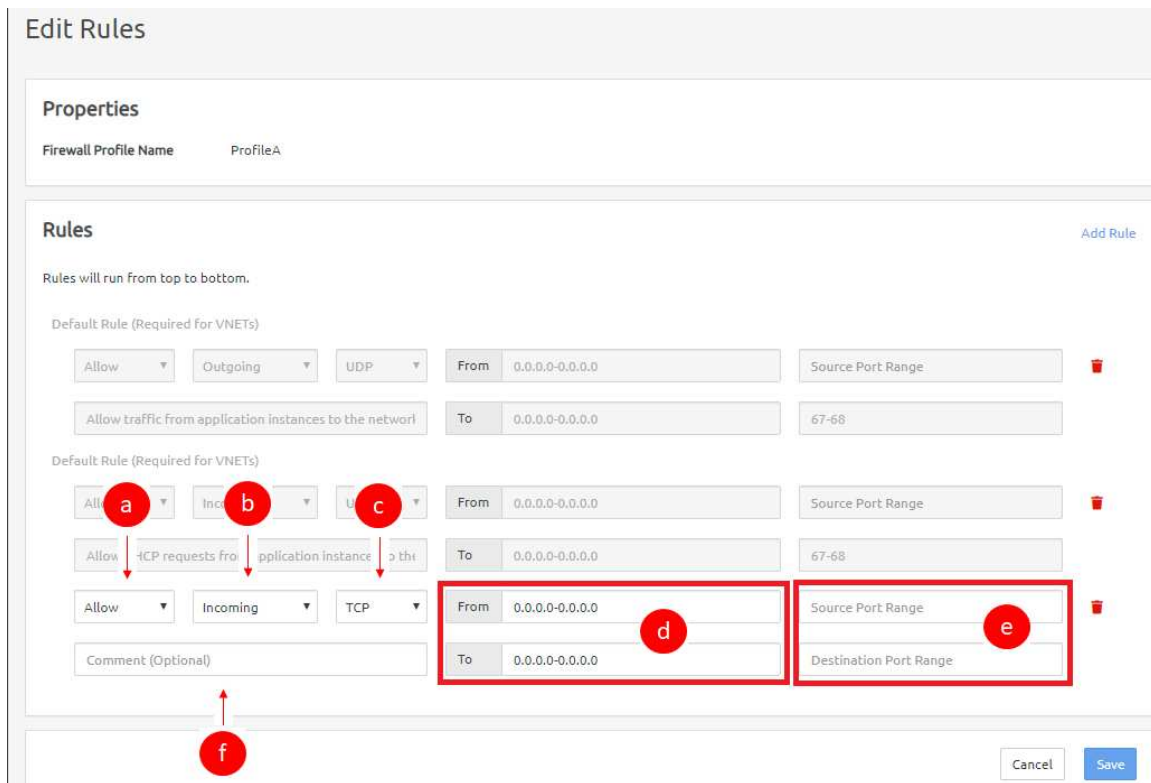


Figure 163. Edit Rules page

Step 2. On the Edit Rules page, you can modify the following.

- Modify existing rules, or click **Add Rule** to add a new rule and define the rule as follows.
  1. In the first drop-down, select the type of rule as **Allow**, **Drop**, or **Reject**.
  2. In the second drop-down, select the type of traffic to apply the rule to as either **Incoming** or **Outgoing**.
  3. In the third drop-down, select the traffic protocol type as **All**, **TCP**, **UDP**, or **ICMP**.
  4. For the fields, From Source IP Range and To Destination IP Range, you can enter an IP range in the format 198.168.100-198.168.0.100 or 198.168.0.100, or you can leave the fields blank for all IPs.
  5. For the Source Port Range and Destination Port Range fields, you can enter a port range in the format 1-65535 or 65535, or you can leave the fields blank for all ports.
  6. For the Comment field, you can enter a comment for this rule (optional).
- To delete a rule, click the trash can icon next to a rule to delete that rule, and in the confirmation dialog box, click **Delete Rule**.

Step 3. Click **Save** when you have made all needed changes.

It is not recommended that you delete the “Default profile rules” on page 157. These rules allow DHCP response from the NFV instance of the VNET to the application instances.

### Delete a firewall profile

Follow these steps to delete a firewall profile.

**Note:** If this profile is associated with any VNETs in the system, you will remove firewall protection for the VNETs, and application instances in the affected VNETs will no longer be able to use the firewall profile.

Step 1. On the Actions menu, click **Delete**.

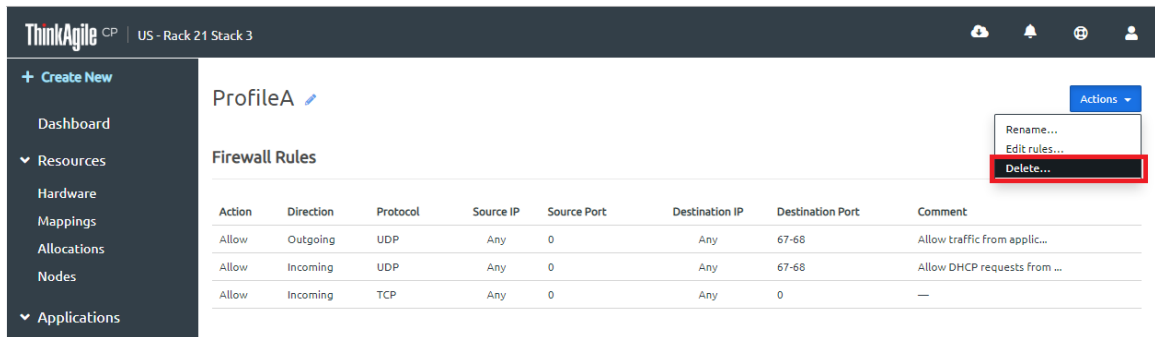


Figure 164. Delete a Firewall Profile

a. In the confirmation dialog box, click **Delete Firewall Profile**.

## Examples of firewall rules

Review this topic to view examples of firewall rules allowing HTTP and HTTPS only, and firewall rules to allow SSH access to a specific range.

### Example Rule Allowing HTTP and HTTPS only

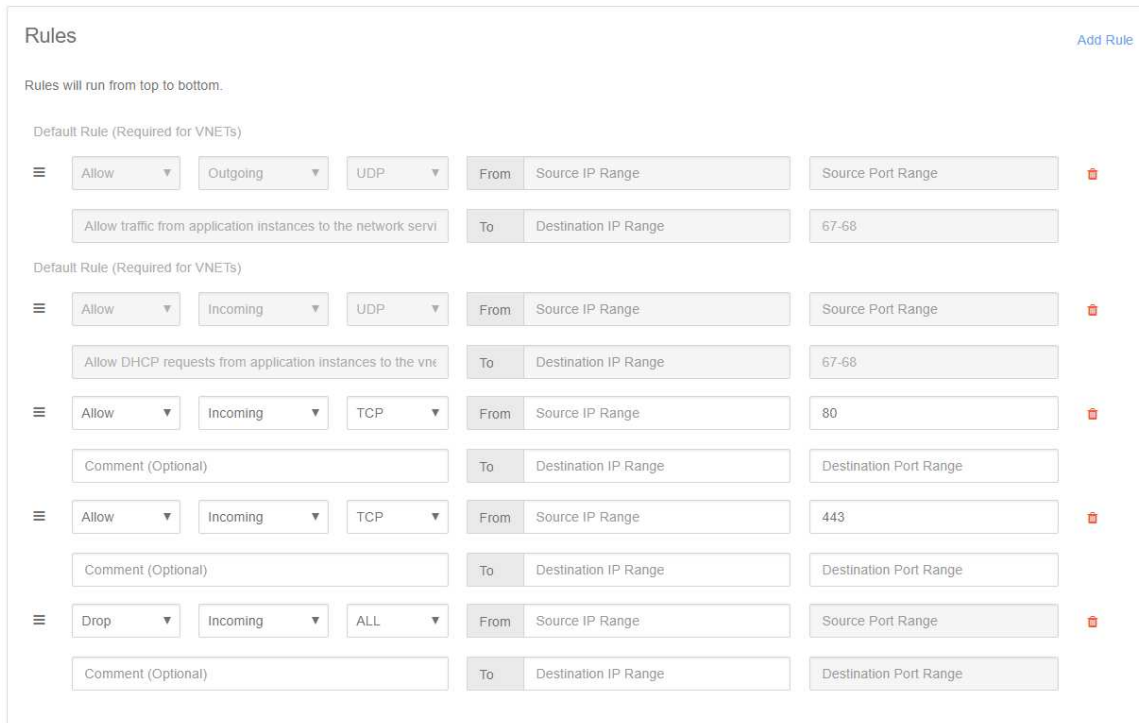


Figure 165. Example rule allowing HTTP and HTTPS only


## Example Rule Allowing SSH Access to a Specific Range

The screenshot shows two firewall rule configurations. The first rule is set to 'Allow' for 'Incoming' traffic on 'TCP' port '22' from the source IP range '10.0.44.1-10.0.44.253'. The second rule is set to 'Reject' for 'Incoming' traffic on 'TCP' port '22' from the source IP range. Both rules have a 'Destination IP Range' and 'Destination Port Range' field.

Figure 166. Example rule allowing SSH access to a specific range only

## Manage interconnect switches

The **Action** menu enables you to perform various operations on each interconnect switch that is part of the ThinkAgile CP solution.

To perform an action on a specific interconnect switch, open the Hardware page in the ThinkAgile CP Cloud Controller management console, navigate to the Interconnect Switch section, and click on the **Actions** menu button (  ) beside the specific interconnect switch.

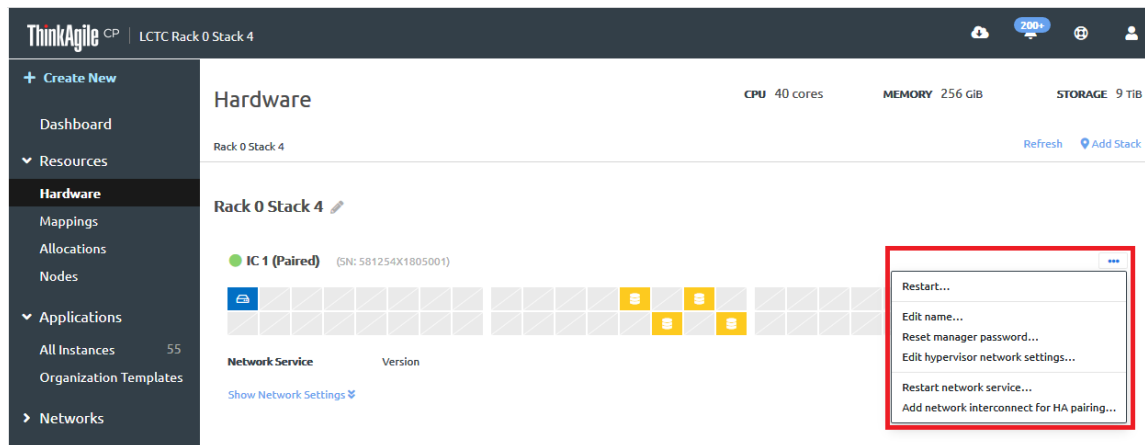


Figure 167. Interconnect switch Action menu

You can perform the following actions for an interconnect switch:

Action	Description
Restart	<ol style="list-style-type: none"> <li>1. Click <b>Restart...</b> from the <b>Actions</b> menu. A dialog box opens.</li> </ol> <p><b>Note:</b> For single interconnect ThinkAgile CP4000 Series, the ThinkAgile CP infrastructure and the applications running on it are unreachable while the interconnect restarts. For dual interconnect environments, the ThinkAgile CP infrastructure and the applications running on it are reachable if the two interconnect switches are restarted sequentially.</p> <ol style="list-style-type: none"> <li>2. Click <b>Restart Network Interconnect</b> to confirm the restart process.</li> </ol>
Edit name	<ol style="list-style-type: none"> <li>1. Click <b>Edit name...</b> from the Actions menu. A dialog box opens.</li> <li>2. Enter a new name for the interconnect.</li> </ol> <p><b>Note:</b> The new name must be unique across all interconnect switches in your ThinkAgile CP environment.</p> <ol style="list-style-type: none"> <li>3. Click <b>Update</b>.</li> </ol>
Reset manager password	<p>The administrator password is used to log into the interconnect switch via a VNC console or an SSH session.</p> <ol style="list-style-type: none"> <li>1. Click <b>Reset manager password...</b> from the <b>Actions</b> menu. A dialog box opens.</li> <li>2. Enter a new password.</li> <li>3. Click <b>Reset Password</b>.</li> </ol> <p><b>Note:</b> The updated password is pushed to the interconnect switch. Hardware passwords are not stored in ThinkAgile CP.</p>
Edit hypervisor network settings	See <a href="#">“Modify Hypervisor Network Settings” on page 166</a> .


Action	Description																																								
Restart network service	<ol style="list-style-type: none"> <li>Click <b>Restart Network Service...</b> from the <b>Actions</b> menu. A dialog box opens.  <b>Note:</b> The interconnect switch does not restart, only the network services running on it. The ThinkAgile CP infrastructure and the applications running on it are reachable during the restart of the network services.</li> <li>Click <b>Restart Network Service</b> to confirm the restart process.</li> </ol>																																								
Add network interconnect for HA pairing	<p>For more details about HA, see <a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/network-high-availability.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/network-high-availability.html</a>.</p> <p><b>Note:</b> All storage blocks and compute nodes linked to the interconnect switch need to be powered off before creating a HA interconnect pair.</p> <ol style="list-style-type: none"> <li>Click <b>Add network interconnect for HA pairing...</b> from the <b>Actions</b> menu. A dialog box opens.</li> <li>Enter the serial number of the second interconnect switch.</li> <li>You are redirected to a page where you can view the network settings for the second interconnect switch and configure the password for the manager account.</li> </ol> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p><b>Network Interconnect Information</b></p> <p>The Network Interconnect will be paired with the following Network Interconnect for high availability.</p> <table border="0"> <tr> <td>Site</td> <td>RoStack2</td> <td></td> <td></td> </tr> <tr> <td>Network Interconnect</td> <td>RoStack2-Primary (J1M101379)</td> <td></td> <td></td> </tr> <tr> <td>Hypervisor Network</td> <td></td> <td>Data Center Uplink Network</td> <td></td> </tr> <tr> <td>VLAN Tag</td> <td>4091</td> <td>VLAN Tag</td> <td>544</td> </tr> <tr> <td>IP Range</td> <td>10.241.14.98 – 10.241.14.126</td> <td>IP Address</td> <td>10.241.14.38</td> </tr> <tr> <td>Netmask</td> <td>255.255.255.224</td> <td>Netmask</td> <td>255.255.255.224</td> </tr> <tr> <td>Primary DNS Server</td> <td>8.8.8.8</td> <td>Gateway</td> <td>10.241.14.33</td> </tr> <tr> <td>Secondary DNS Server</td> <td>8.8.4.4</td> <td></td> <td></td> </tr> <tr> <td>Primary NTP Server</td> <td>time1.google.com</td> <td></td> <td></td> </tr> <tr> <td>Secondary NTP Server</td> <td>time2.google.com</td> <td></td> <td></td> </tr> </table>   <p><b>Network Interconnect Properties</b></p> <p>Set Manager Password <input type="password" value="Password"/></p> <p><small>Enter a password to allow physical access to the network interconnect with username 'manager'. Lenovo will not store this password on its servers.</small></p> </div>	Site	RoStack2			Network Interconnect	RoStack2-Primary (J1M101379)			Hypervisor Network		Data Center Uplink Network		VLAN Tag	4091	VLAN Tag	544	IP Range	10.241.14.98 – 10.241.14.126	IP Address	10.241.14.38	Netmask	255.255.255.224	Netmask	255.255.255.224	Primary DNS Server	8.8.8.8	Gateway	10.241.14.33	Secondary DNS Server	8.8.4.4			Primary NTP Server	time1.google.com			Secondary NTP Server	time2.google.com		
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Secondary DNS Server	8.8.4.4																																								
Primary NTP Server	time1.google.com																																								
Secondary NTP Server	time2.google.com																																								

## Modify Hypervisor Network Settings

You can update ThinkAgile CP hypervisor network settings.

**Note:** Interconnect switch network settings cannot be edited when connected storage blocks and compute nodes are powered on. To perform this procedure, you will first need to power off all storage blocks and compute nodes connected to the Interconnect.

After powering off the storage and compute blocks, complete the following steps to modify the hypervisor network settings:

- Step 1. In ThinkAgile CP Cloud Controller, navigate to the Hardware page from the left navigation menu.
- Step 2. Beside the Interconnect you want to edit, click the **Action** menu (  ) and click **Edit hypervisor network settings...**
- Step 3. In the Edit Network Interconnect Settings dialog box, make the required changes and click **Save**.
- Step 4. Beside each storage block and compute node, click the **Action** menu and select **Power on....**
- Step 5. After the storage block(s) power on, establish an SSH session with the each storage block. (The user is manager and the password is the password that was set when registering the hardware.)
- Step 6. Run `sudo su` and re-enter the manager password to become root.
- Step 7. Run `/usr/share/tacp/install/reset_san_mpio_vips.sh`



Step 8. Run `systemctl restart tacp-storage-controller`

This will allow the storage block to obtain a new virtual IP address.

---

## Storage blocks and storage pools

In ThinkAgile CP Cloud Controller a storage block refers to the physical storage resource, and a storage pool is where you allocate storage resources for use by application instances.

For an overview of the storage concepts in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/getting-started-storage-concepts.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-storage-concepts.html)

### Storage blocks

In the ThinkAgile CP platform, a storage block is the physical storage resource. and the storage block hardware consists of a set of two storage controllers and one or two storage sleds, all housed in a storage enclosure. In the ThinkAgile CP Cloud Controller management portal, on the Hardware Stack page, you can view a representation of each storage block, including controllers and sleds.

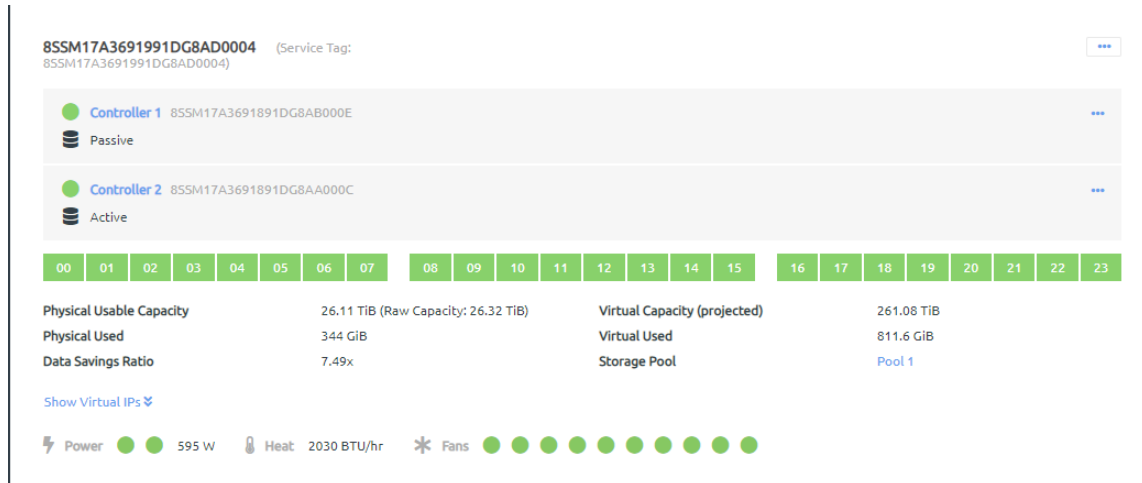


Figure 168. Example of storage hardware represented in ThinkAgile CP Cloud Controller

For more information about viewing storage hardware, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/view\\_storage.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/view_storage.html)

### Storage pools

A storage block must be assigned to a storage pool for it to be used by application instances; that is, the storage pool is where you allocate storage capacity for your application instances. The storage pool also contains a single template store that can be used by all virtual datacenters connected to the storage pool. You can monitor storage usage on the details page of a storage pool in the ThinkAgile CP Cloud Controller management portal by expanding Storage Pools and clicking a specific storage pool.

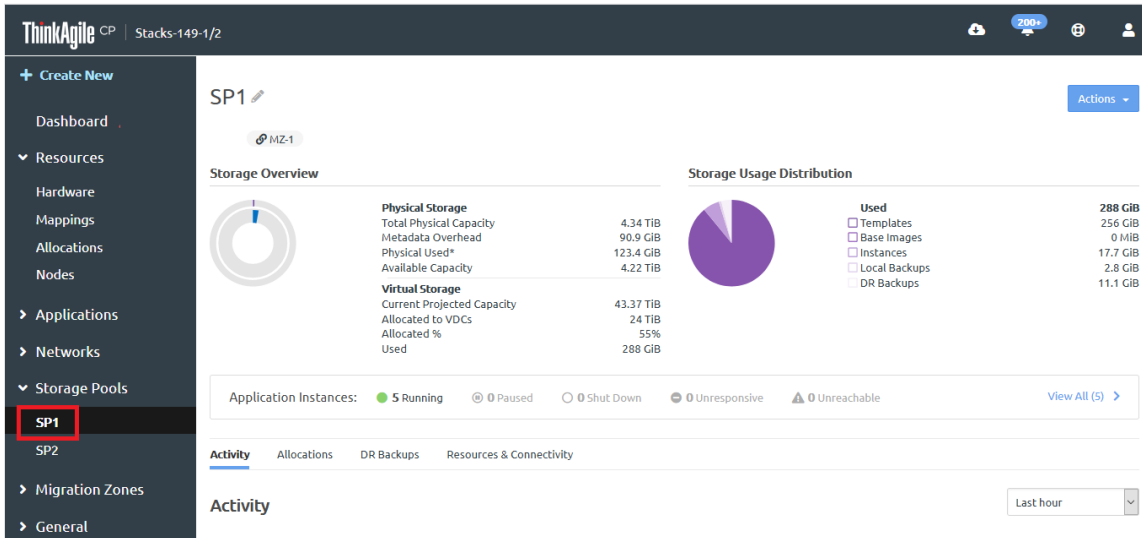


Figure 169. Example of a storage pool in the ThinkAgile CP Cloud Controller

## View storage pools

**Infrastructure admin** and **infrastructure viewer** users can view information about the storage pools that are associated with an organization.

### Notes:

- For more information about user roles in ThinkAgile CP, see the following topic:  
[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)
- **Infrastructure viewer** users can view information about storage pools, but they cannot actually make any changes.

For information about viewing information about storage hardware, see the following topic:

[“View hardware” on page 14](#)

Refer to the following topics for more information about working with storage pools:

- [“View storage pool details” on page 168](#)
- [“View storage metrics” on page 170](#)
- [“View storage pool activity” on page 171](#)
- [“View storage pool allocations” on page 176](#)
- [“View quick DR backups” on page 178](#)
- [“View resources and connectivity” on page 180](#)

## View storage pool details

**Infrastructure admin** and **infrastructure viewer** users can view details about a storage pool.

Complete the following steps to view storage pool details.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.

Step 2. In the ThinkAgile CP Cloud Controller, perform one of the following steps:

- On the Dashboard page, scroll down to the list of storage pools and click **Properties** on the storage pool for which you want to view details.

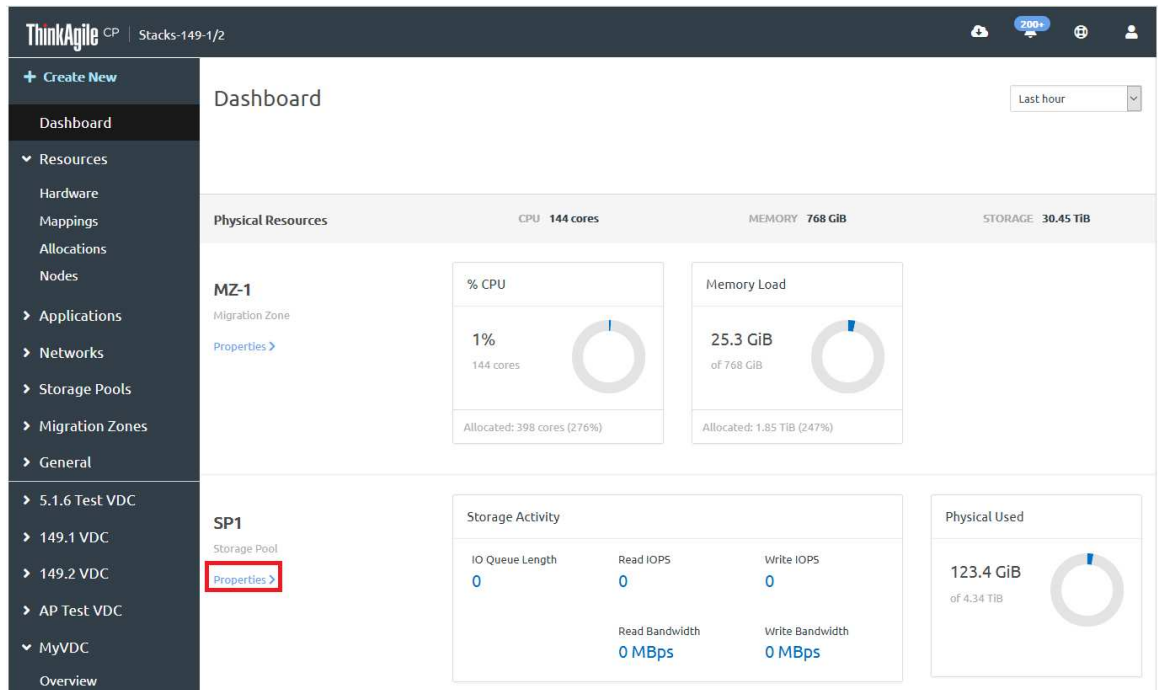


Figure 170. Storage pool properties on the Dashboard page

- In the left navigation menu, expand Storage Pools and click the storage pool for which you want to view details.

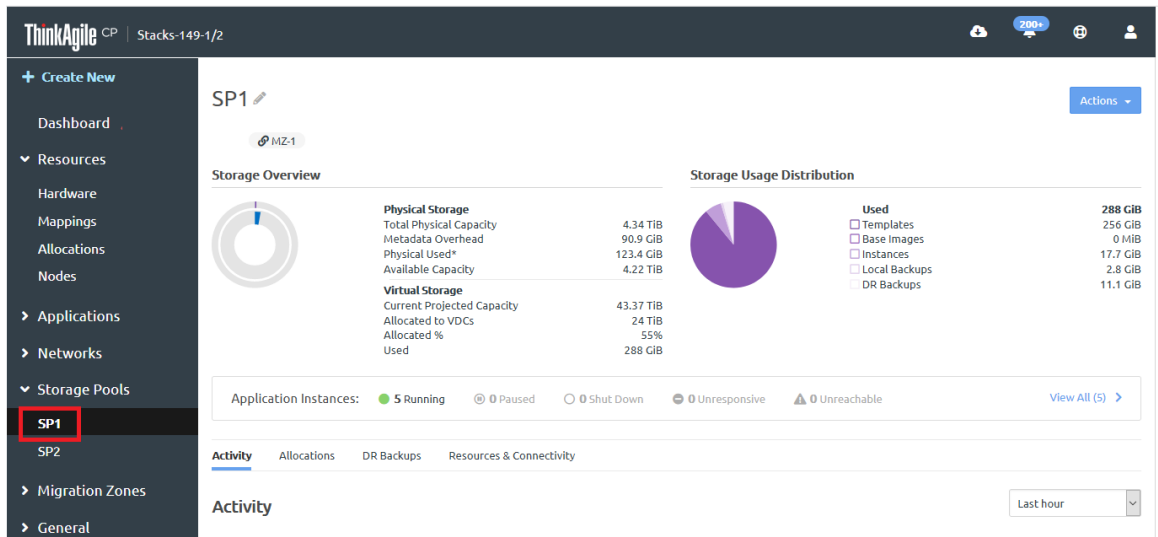
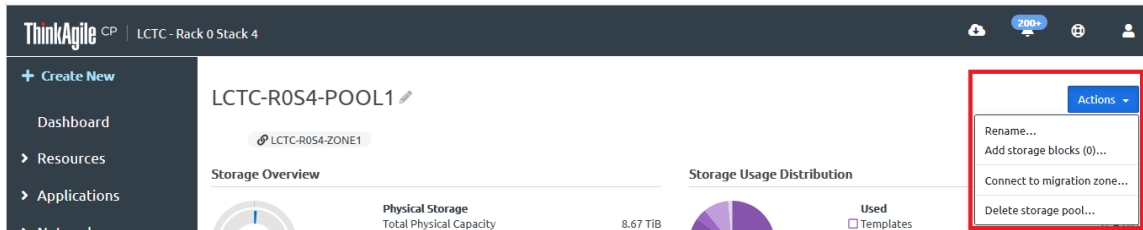


Figure 171. Select storage pool from navigation menu

Step 3. On the storage pool details page, you can view information such as a summary of capacity and usage information, associated application instances, activity statistics, allocations to virtual datacenters, associated quick DR backups, connected migration zones, and related storage hardware information.

Click the **Actions** button at the top of the page to view a list of available storage pool actions.

Figure 172. Storage pool actions menu



For more information about the actions that are available for managing storage pools, see the following topic:

[“Manage storage pools” on page 186](#)

## View storage metrics

At the top of the storage pool details page, **infrastructure admin** and **infrastructure viewer** users can view charts that show storage capacity and usage information.

## Overview of the storage pool

The Storage Overview chart displays the total storage physically present in the storage pool and how it is allocated.

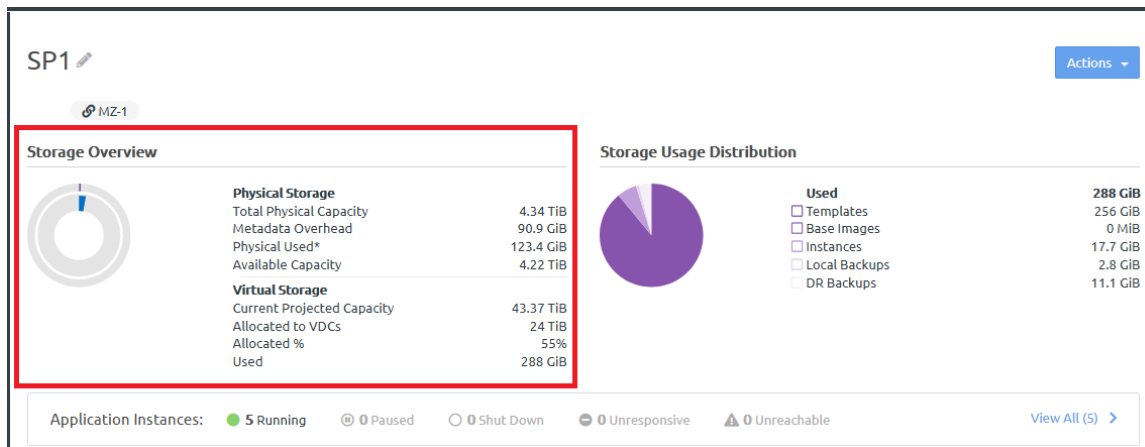


Figure 173. Storage Overview chart

- **Physical storage**
  - **Total physical capacity.** Total physical usable capacity of all storage blocks in the storage pool.
  - **Metadata overhead.** Total storage used for system overhead.
  - **Physical used.** Total physical storage used after compression and deduplication.
  - **Available capacity.** Remaining available physical capacity.
- **Virtual storage**
  - **Current projected capacity.** Total projected virtual capacity.
  - **Allocated to VDCs.** The amount of virtual storage allocated to virtual datacenters. Due to oversubscription, this value can be higher than the total storage.

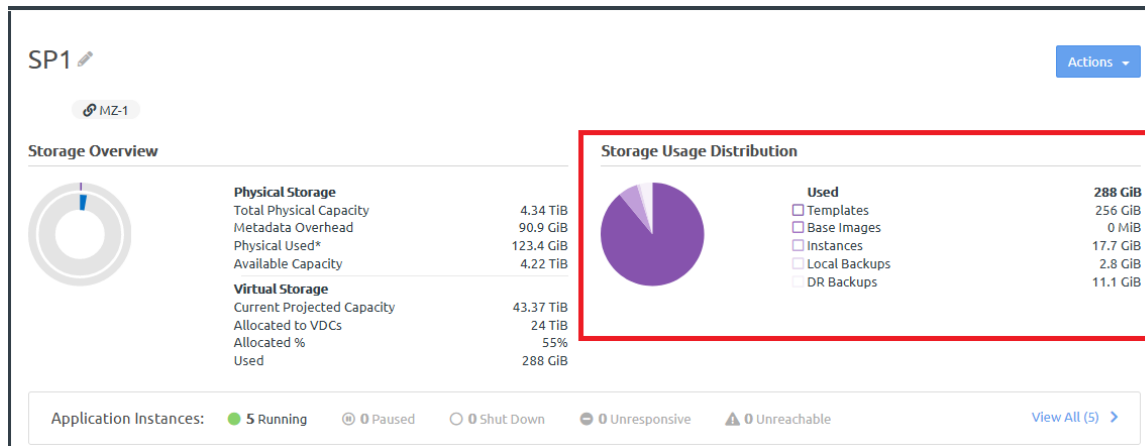
For more information about oversubscription, see the following topic:

### [Oversubscription in ThinkAgile CP](#)

- **Allocated %.** The percentage of virtual storage that is allocated to virtual datacenters. Due to oversubscription, this value can be higher than 100%.
- **Used.** How much virtual storage is used by application instances, backups (local and quick DR backups), base images, and templates before compression and deduplication.

## Storage usage distribution

The Storage Usage Distribution chart breaks down the amount of storage used by the type of data that is using the storage.



- **Templates.** The amount of space used by application templates in the local template store. The space used by a template is roughly equal to the used space on the disks of the template.
- **Base Images.** When an instance is first created on the storage pool, ThinkAgile CP Cloud Controller will save the base image of the instance as a thick-provisioned set of blocks. For example, if the instance was created from a template; the template is stored as thin-provisioned disks; so a thick-provisioned base image will be extrapolated from the template. The instance will be created with 0 size and pointed to the base image. If a new instance is created from the same template on the same storage pool, the new instance will point to the base image created for the first instance. The base images metric shows how much space is used by these base images.
- **Instances.** The amount of space used by application instances, not including the base image.
- **Local Backups.** The amount of space used by application instance backups on this storage pool.
- **DR Backups.** The amount of space used by quick DR backups taken on other storage pools and then recovered to this storage pool.

## View storage pool activity

**Infrastructure admin** and **infrastructure viewer** users can view details about the storage pools that are associated with an organization.

Complete the following steps to view storage pool activity.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.
- Step 2. In the ThinkAgile CP Cloud Controller management portal, perform one of the following steps:
  - On the Dashboard page, scroll down to the list of storage pools in your ThinkAgile CP infrastructure. Then for the storage pool for which you want to view details, click **Properties**.

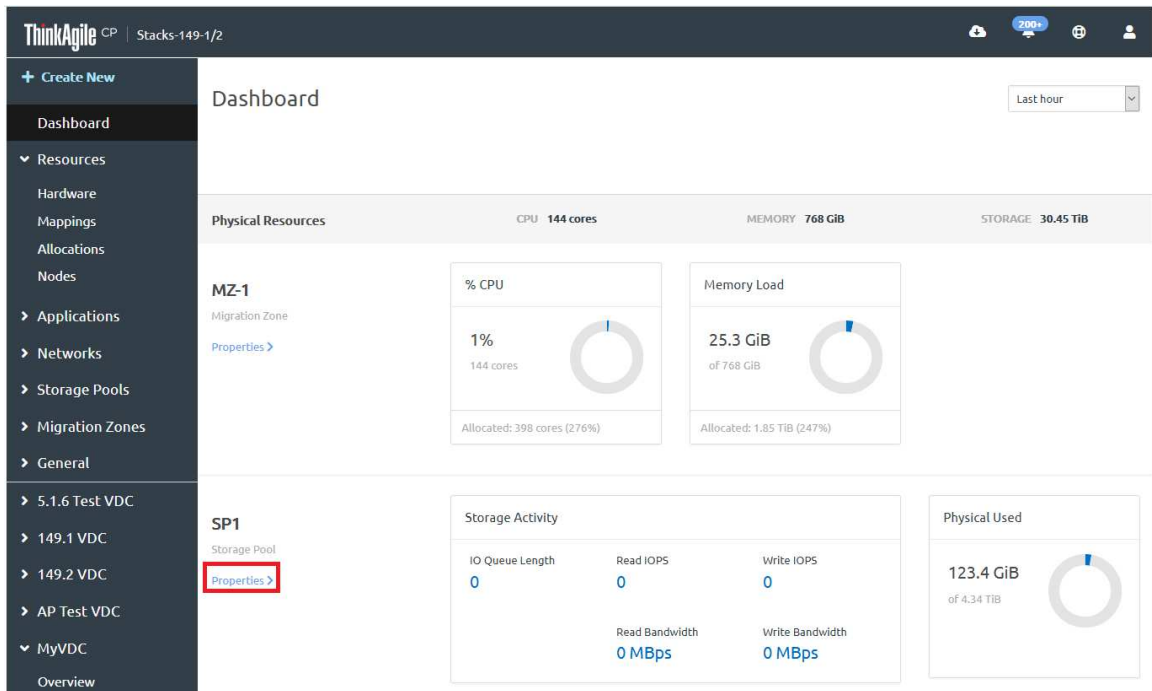


Figure 174. Storage pool properties on Dashboard

- In the left navigation menu under Storage Pools, click the storage pool for which you want to view details.

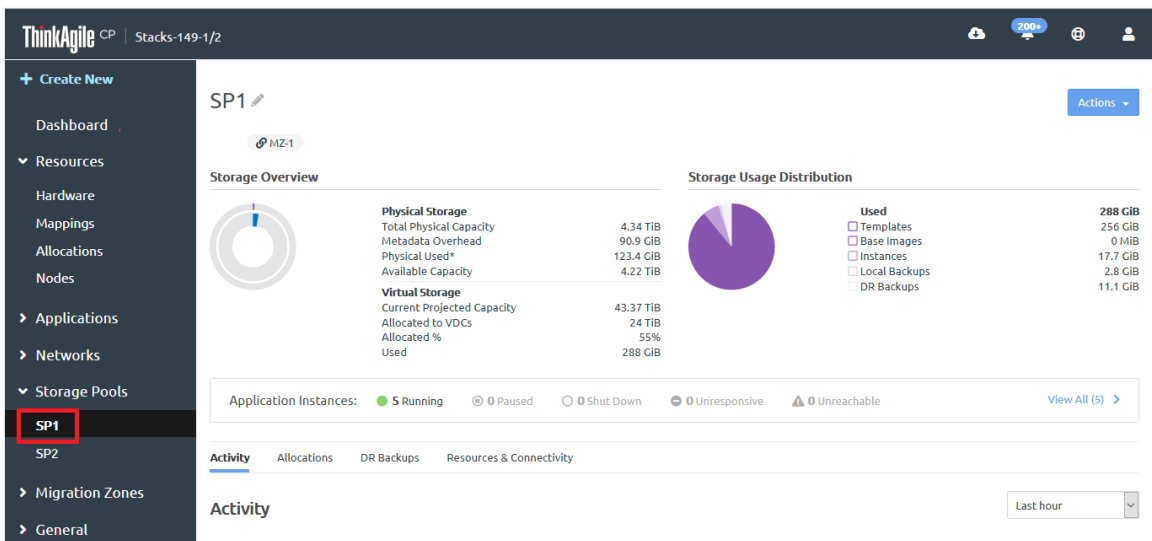


Figure 175. Select storage pool from navigation menu

Step 3. Scroll down to view the activity charts.

**Note:** By default, activity for the last hour is displayed. However, you can adjust the time interval from the last hour to the last year.

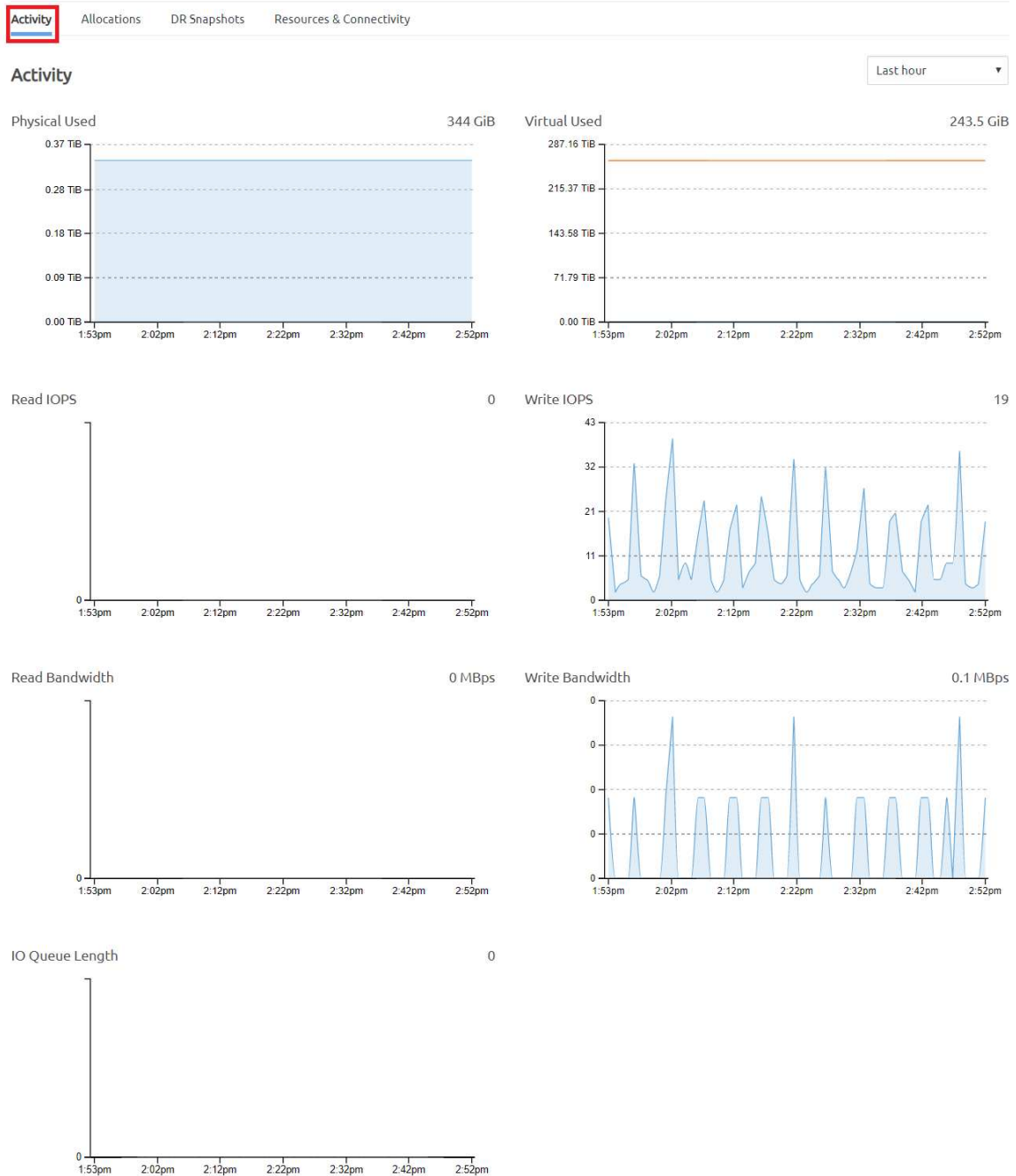


Figure 176. Activity section of the storage pool details page

The following charts are displayed on the Activity tab.

- **Physical Used.** The total physical storage used in this storage pool after compression and deduplication.
- **Virtual Used.** The virtual storage used by application instances, backups (local and quick DR backups), base images, and the templates before compression and deduplication.
- **Read IOPS.** Number of read requests per second to the disk(s).
- **Write IOPS.** Number of write requests per second to the disk(s).

- **Read Bandwidth.** Number of read requests per second to the disk(s).
- **Write Bandwidth.** Data transferred inbound from the node to the disk(s).
- **I/O Queue Length.** Number of outstanding I/O requests to the disk(s).

For more information about IOPS, IO queue length, and latency information, see the following topic:

[“Understand storage activity input/output and latency” on page 174](#)

### **Understand storage activity input/output and latency**

**Infrastructure admin** and **infrastructure viewer** users can view information about storage activity and latency information from the Compute Usage section of the application instances page as well as the Activity tab of the storage pool page.

The following information is displayed:

- **I/O operations per second (IOPS) - read and write.** An I/O performance measurement used to characterize computer storage devices like hard disk drives (HDD), solid state drives (SSD), and storage area networks (SAN).
- **Queue Length (queue depth).** The number of I/O requests (SCSI commands) that can be queued at one time on a storage controller. Each I/O request from the host's initiator HBA to the storage controller's target adapter consumes a queue entry. (Note: This number will vary as it shows how much your system is maxing at that moment.)

### **Calculating your I/O rate**

Latency is a measure of how long it takes for a single I/O request to occur from the standpoint of an application instance.

For example, if your charts show that IOPS are at 160,000, that means that 160k I/O operations are occurring in 1 second, which makes 1 IO take 0.00000625 of a second.

### ***Using CentOS with FIO marketplace template to determine latency***

You can use the CentOS with FIO template from the Lenovo Cloud Marketplace to determine latency.

**Note:** The recommended test to run is a direct I/O test, which means I/O access where you bypass the cache (as buffered I/O can be misleading).

You need to stop the automatic FIO that is running and manually run it.


Step 1. Download the Centos with FIO template from the Lenovo Cloud Marketplace and create an application instance from the template.





For more information about creating an application instance from a template, see the following topic:

[“Create an instance from a template” on page 29](#)

- Step 2. Connect to your application instance.
  - a. In the left navigation of the ThinkAgile CP Cloud Controller, expand your VDC.
  - b. Click **VDC Instances**.
  - c. Click the Actions menu (  ) for your application instance.
  - d. Click **Connect to console**.

- Step 3. Run the command:

```
systemctl stop runfio
```

- Step 4. To check the parameter settings, run the command:

```
cat rw_test.fio
```

- Step 5. Run the command:

```
/usr/bin/fio /root/rw_test.fio
```

**Note:** To stop the test at any time you, press the CTRL-C keys.

The test will look similar to the following example. In this example, you can see the same information provided on the activity page, including in depth details of your environment.

```

random rw test: (groupid=0, jobs=2): err= 0: pid=11450: Fri Nov 3 18:29:13 2017
 read : io=43100MB, bw=167185KB/s, iops=41796, runt=263987msec
   slat (usec): min=2, max=3027, avg= 6.59, stdev= 8.96
   clat (usec): min=76, max=64155, avg=1000.52, stdev=421.71
   lat (usec): min=226, max=64159, avg=1007.26, stdev=421.96
 clat percentiles (usec):
   | 1.00th=[ 506],  5.00th=[ 620], 10.00th=[ 684], 20.00th=[ 756],
   | 30.00th=[ 812], 40.00th=[ 868], 50.00th=[ 924], 60.00th=[ 980],
   | 70.00th=[ 1064], 80.00th=[ 1160], 90.00th=[ 1352], 95.00th=[ 1640],
   | 99.00th=[ 2608], 99.50th=[ 2832], 99.90th=[ 3344], 99.95th=[ 3696],
   | 99.99th=[ 7328]
 bw (KB /s): min=64464, max=103568, per=50.07%, avg=83712.16, stdev=3953.44
write: io=18440MB, bw=71529KB/s, iops=17882, runt=263987msec
   slat (usec): min=2, max=2638, avg= 7.06, stdev= 9.07
   clat (usec): min=128, max=67308, avg=1213.78, stdev=584.80
   lat (usec): min=204, max=67322, avg=1220.99, stdev=584.99
 clat percentiles (usec):
   | 1.00th=[ 556],  5.00th=[ 692], 10.00th=[ 764], 20.00th=[ 860],
   | 30.00th=[ 940], 40.00th=[ 1012], 50.00th=[ 1096], 60.00th=[ 1176],
   | 70.00th=[ 1288], 80.00th=[ 1432], 90.00th=[ 1784], 95.00th=[ 2256],
   | 99.00th=[ 3120], 99.50th=[ 3440], 99.90th=[ 4320], 99.95th=[ 4832],
   | 99.99th=[18560]
 bw (KB /s): min=27912, max=43800, per=49.92%, avg=35708.51, stdev=1670.96
 lat (usec) : 100=0.01%, 250=0.01%, 500=0.79%, 750=15.17%, 1000=39.19%
 lat (msec) : 2=40.80%, 4=3.97%, 10=0.06%, 20=0.01%, 50=0.01%
 lat (msec) : 100=0.01%
cpu      : usr=4.54%, sys=25.06%, ctx=5079575, majf=0, minf=62
IO depths : 1=0.1%, 2=0.1%, 4=0.1%, 8=0.1%, 16=0.1%, 32=99.9%, >=64=0.0%
 submit   : 0=0.0%, 4=100.0%, 8=0.0%, 16=0.0%, 32=0.0%, 64=0.0%, >=64=0.0%
 complete : 0=0.0%, 4=100.0%, 8=0.0%, 16=0.0%, 32=0.1%, 64=0.0%, >=64=0.0%
 issued   : total=r=11033649/w=4720708/d=0, short-r=0/w=0/d=0
 latency  : target=0, window=0, percentile=100.00%, depth=32

```

Figure 177. Example of running `rw_test.fio`

The following list describes the key sections of the results and how to read them:

- **Read and Write.** The first line of the 'read' or 'write' sections state the I/O requests, bandwidth, iops, and run time that occurred within the duration of the test. In the above example, fio did a total of 43GB of IO at 167.2MB/s for a total of 41796 IOPS, and ran for 4 minutes and 39 seconds.
- **slat** (or submission latency, measured in usec). The amount of time that it took to submit this I/O to the kernel for processing
- **clat** (or completion latency, measured in usec). The amount of time between request submission and request completion.
- **lat** (or latency distribution, measured in usec). The amount of time that it took for a certain percentage of I/O requests to complete. In the above example, 0.01% of requests took 100 microseconds, 0.01% of requests took 250 microseconds, 0.79% of requests took 500 microseconds, and so on.
- **I/O depths.** The amount of I/O depths reached at what percentage of the time.
- **Submit and complete.** The number of submitted IOs at a time by fio and the number completed at a time.

## View storage pool allocations

**Infrastructure admin** and **infrastructure viewer** users can view storage pool allocations related to virtual datacenters.

Complete the following steps to view storage pool allocations.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.
- Step 2. In the ThinkAgile CP Cloud Controller management portal, perform one of the following steps:

- On the Dashboard page, scroll down to the list of storage pools and, for the storage pool for which you want to view allocations, click **Properties**.

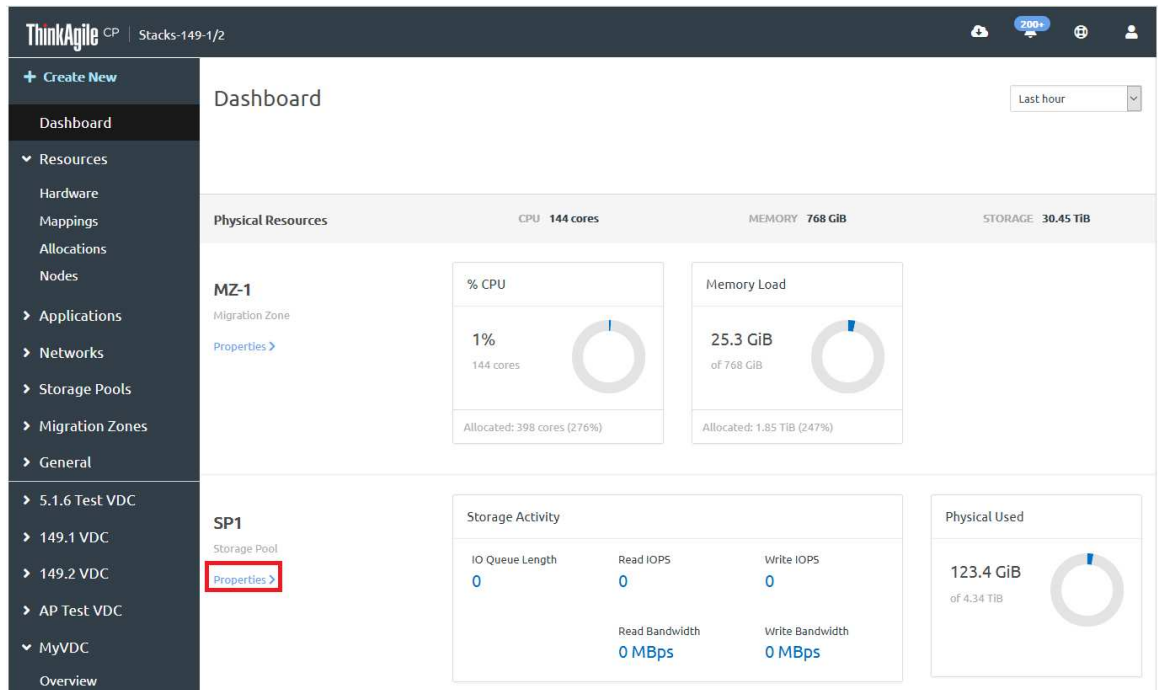


Figure 178. Storage pool properties on Dashboard

- In the left navigation menu under Storage Pools, click the storage pool for which you want to view allocations.

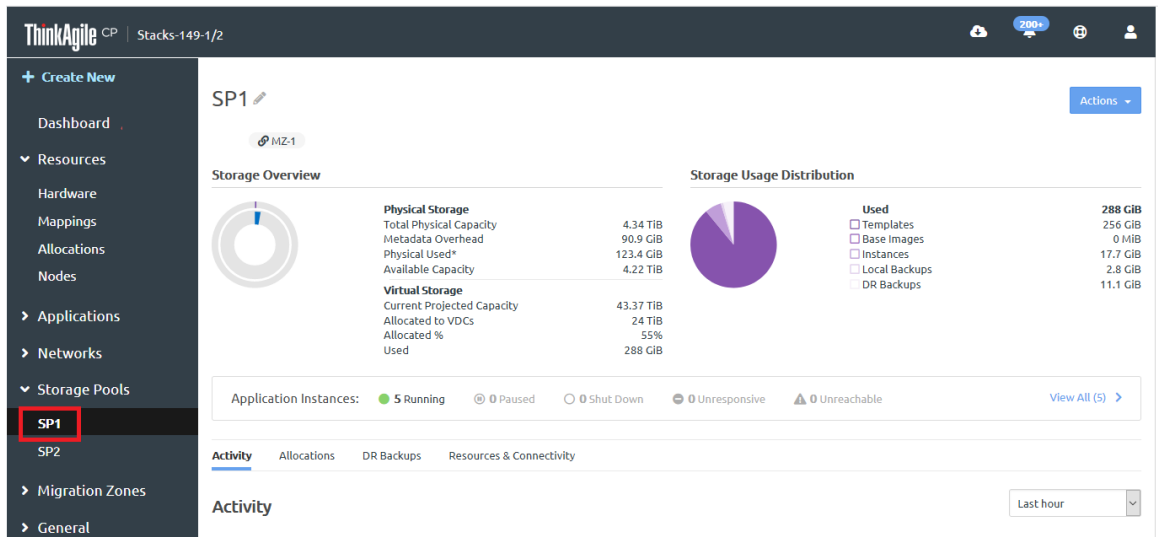
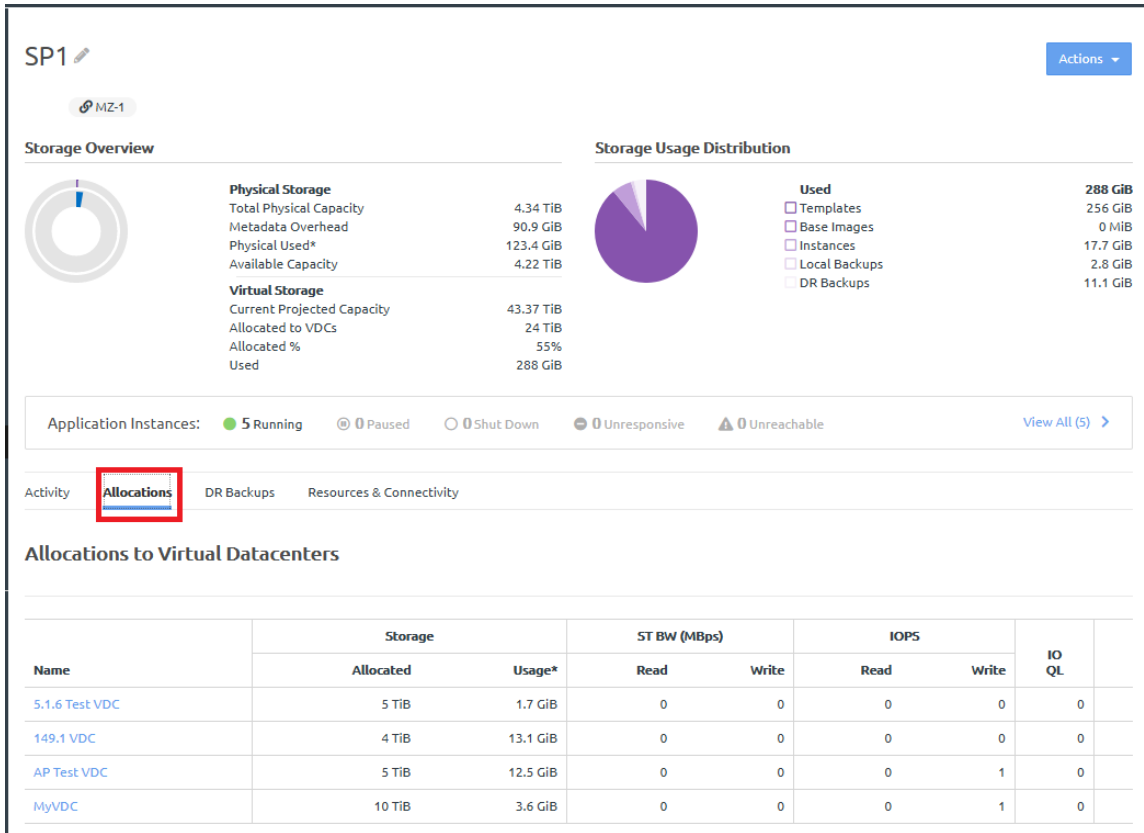


Figure 179. Select storage pool from navigation menu

Step 3. Click the Allocations tab.

Figure 180. Storage pool Allocations tab



The following information is displayed for each VDC:

- **Allocated Virtual Storage.** Storage allocated to this virtual datacenter. This is the value set when the virtual datacenter was created.
- **Storage Usage.** Storage used by all current instances, backups (local and quick DR backups), and base images of this virtual datacenter.
- **Read Bandwidth.** Number of read requests per second to the disk(s).
- **Write Bandwidth.** Data transferred inbound from the node to the disk(s).
- **Read IOPS.** Number of read requests per second to the disk(s).
- **Write IOPS.** Number of write requests per second to the disk(s).
- **I/O Queue Length.** Number of outstanding I/O requests to the disk(s).

### View quick DR backups

**Infrastructure admin** and **infrastructure viewer** users can view the quick DR backups that are stored in the storage pool.

Complete the following steps to view storage pool resources and connectivity.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.

Step 2. In the ThinkAgile CP Cloud Controller management portal, perform one of the following steps:

- On the Dashboard page, scroll down to the list of storage pools and, for the storage pool for which you want to view details, click **Properties**.

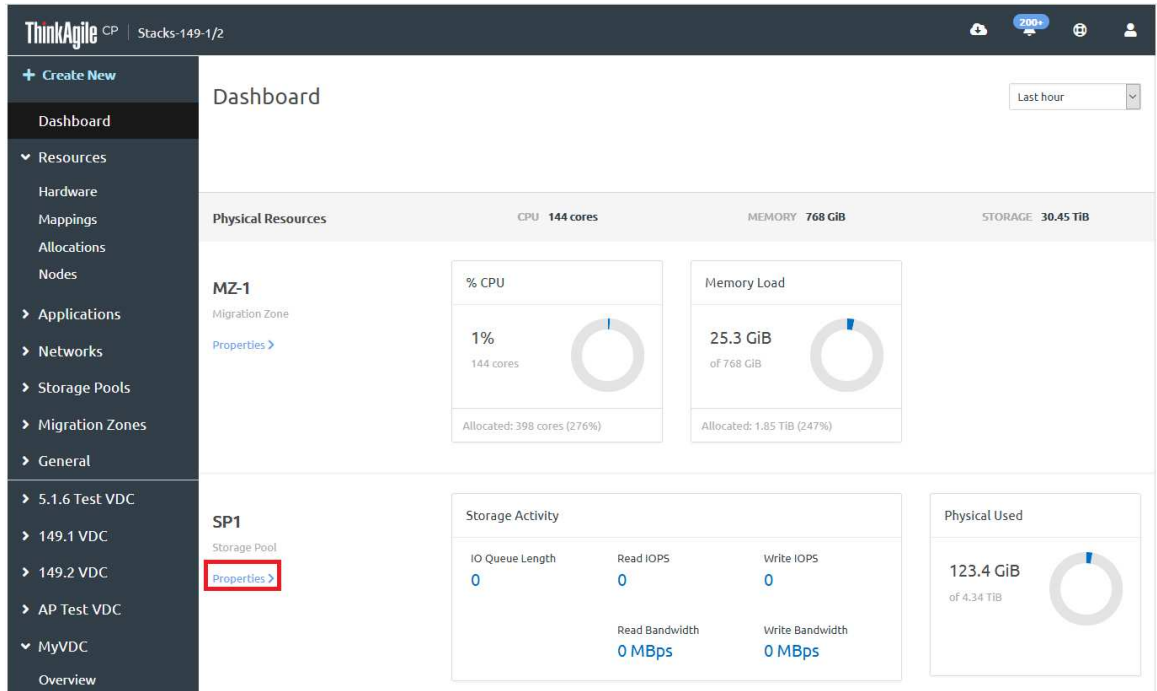


Figure 181. Storage pool properties on Dashboard

- In the left navigation menu under Storage Pools, click the storage pool for which you want to view details.

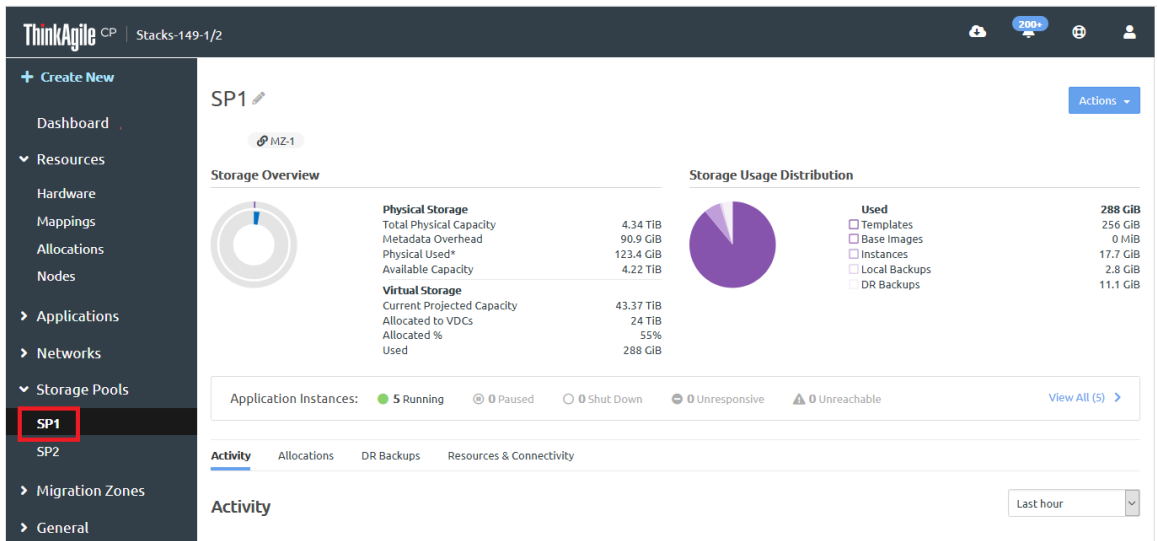


Figure 182. Select storage pool from navigation menu

Step 3. Click the DR Backups tab

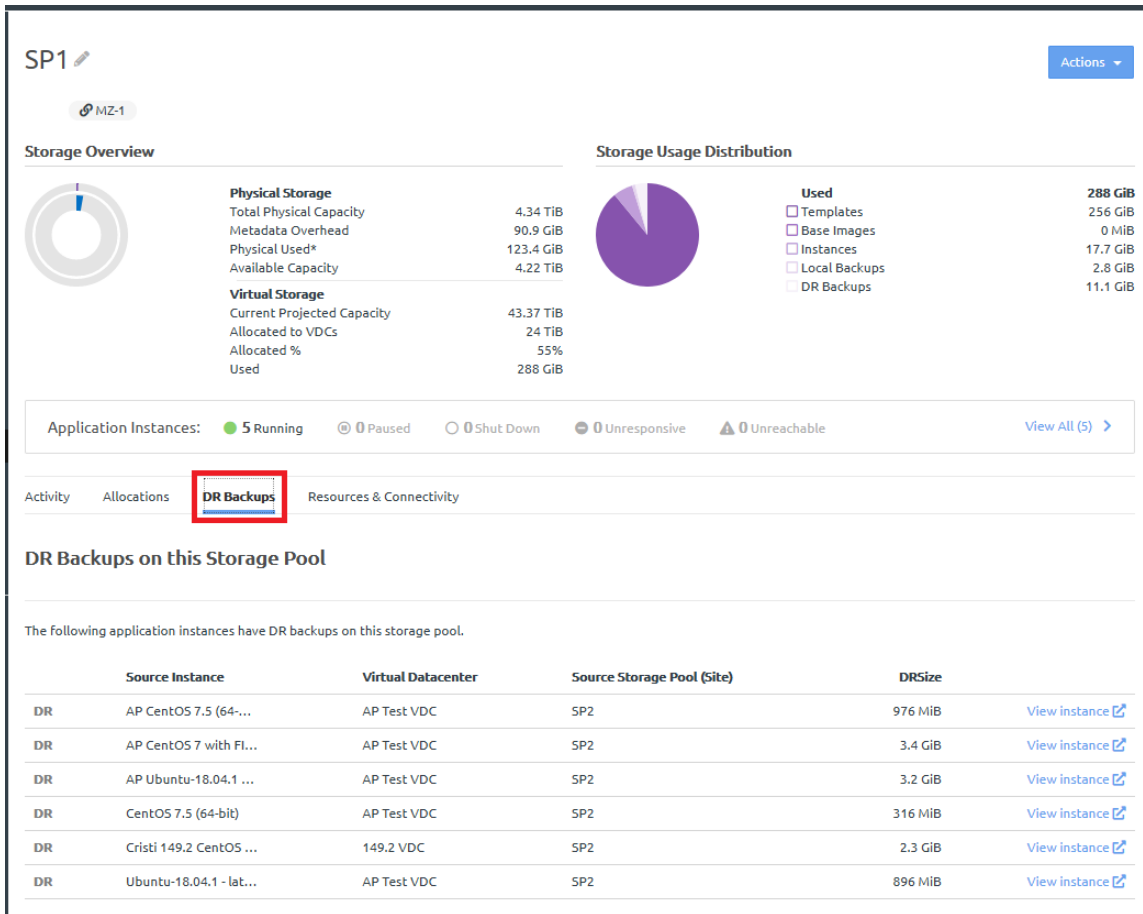


Figure 183. DR Backups tab

The following information is displayed for each quick DR backup:

- **Source Instance.** The name of the instance for which quick DR backups have been taken.
- **Virtual Datacenter.** The virtual datacenter to which this instance belongs.
- **Source Storage Pool.** The name of the storage pool that is storing these backups.
- **DR Size.** The size of the backups for this instance.

Click **View instance** to view the application instance details page.

### View resources and connectivity

**Infrastructure admin** and **infrastructure viewer** users can view the migration zones that are connected to this storage pool as well as the storage block hardware information.

Complete the following steps to view storage pool resources and connectivity.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **infrastructure viewer** user.
- Step 2. In the ThinkAgile CP Cloud Controller, complete one of the following steps:
  - On the Dashboard page, scroll down to the list of storage pools and, for the storage pool for which you want to view details, click **Properties**.

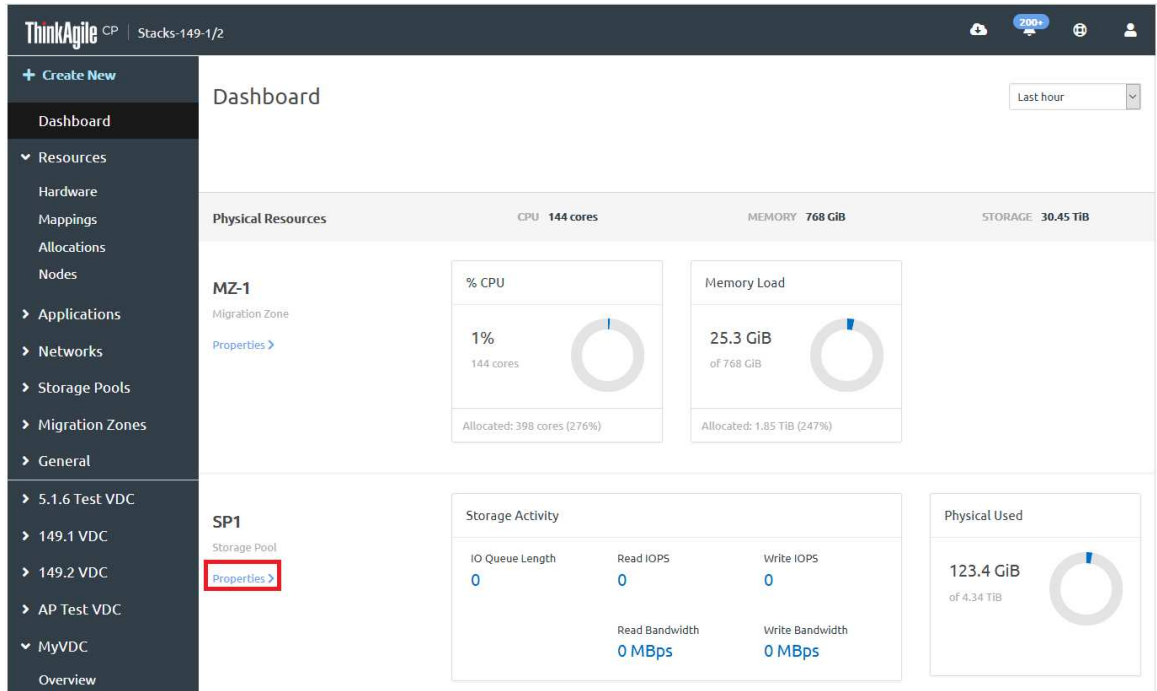


Figure 184. Storage pool properties on Dashboard

- In the left navigation menu under Storage Pools, click the storage pool for which you want to view details.

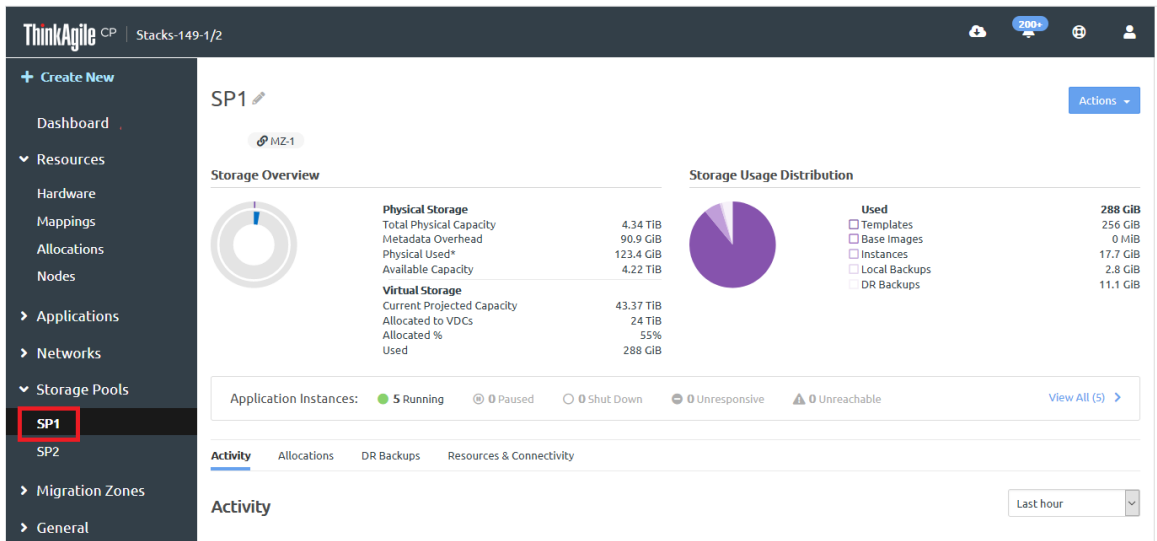



Figure 185. Select storage pool from navigation menu

Step 3. Click the Resources & Connectivity tab

SP1 Actions ▾

MZ-1

### Storage Overview




**Physical Storage**

Total Physical Capacity	4.34 TiB
Metadata Overhead	90.9 GiB
Physical Used*	123.4 GiB
Available Capacity	4.22 TiB

**Virtual Storage**

Current Projected Capacity	43.37 TiB
Allocated to VDCs	24 TiB
Allocated %	55%
Used	288 GiB

### Storage Usage Distribution



**Used** 288 GiB

Templates	256 GiB
Base Images	0 MiB
Instances	17.7 GiB
Local Backups	2.8 GiB
DR Backups	11.1 GiB

Application Instances: ● 5 Running ● 0 Paused ○ 0 Shut Down ● 0 Unresponsive ▲ 0 Unreachable View All (5) >

Activity Allocations DR Backups **Resources & Connectivity**

### Connected Migration Zones Manage Resource Connectivity >

This storage pool is connected to the following migration zone(s). Virtual datacenters are able to see and select a connected migration zone to run application instance stored on this storage pool.

Migration Zone
MZ-1 <span style="float: right;">Disconnect</span>

Storage Blocks | 1 Add Storage Blocks

Storage Block	Physical Capacity		Virtual Capacity		Virtual IP	Controller 1	Controller 2	
	Usable	Used	Projected	Used				
85SM17A3691991DG9CL0002	4.34 TiB	123.4 GiB	43.37 TiB	288 GiB	10.211.25.81...	Active	Passive	...

Figure 186. Resources and Connectivity tab

## Connected Migration Zones

The Connected Migration Zones section shows which migration zones are connected.

- Click **Manage Resource Connectivity** to view the Infrastructure Mappings page.
- Click **Disconnect** to remove the migration zone from the storage pool.

## Storage Blocks

The Storage Blocks section shows the following information.

- **Storage Block.** The name of the storage block (hardware resource) assigned to this storage pool.
- **Physical Capacity.** The usable and used physical capacity of the storage block (after accounting for the storage redundancy overhead).
- **Virtual Capacity.** The projected virtual capacity available for use as well as the currently used virtual capacity of the storage block.
- **Virtual IP.** The virtual IP addresses associated with the storage block.
- **Controller 1.** The current status of the storage controller as Active, Passive, or Offline.
- **Controller 2.** The current status of the second storage controller as Active, Passive, or Offline.



Click **Add storage blocks** to add any unassigned storage blocks to the storage pool.

## Manage storage

**Infrastructure admin** users can perform actions on storage controllers, storage blocks, and storage pools.

### About storage quality of service (QoS)

For monitoring and maintaining performance predictability of running workloads, you can specify storage quality of service (QoS) limits for IOPS and bandwidth for individual application instances.

You set these limits when you create an application instance from an installer, or when you edit the properties for an application instance. The New Instance from Installer page shows the IOPS and bandwidth limits for each vDisk. They are unlimited by default. You can change these limits by editing the vDisk settings as shown below.

### Notes:

- You cannot set this limit below the minimum values of 50 for IOPS and 5 MBps for bandwidth.
- If you create an instance from a template (instead of from an installer), you can view the limits for vDisk, but you cannot edit the values.

The screenshot shows the 'New instance from Installer' page in the ThinkAgile CP interface. The page is divided into three main sections: Properties, Virtual Datacenter, and Storage. The Storage section contains a table for Virtual Disks (vDisks) with the following data:

Name	Size	IOPS Limit	Bandwidth Limit	
Disk 0	50 GiB	—	—	...
Disk 1	25 GiB	250	50 MBps	...

Figure 187. IOPS and bandwidth limits on the New Instance from Installer page

For more information about managing storage, refer to the following topics:

- [“Manage storage controllers” on page 183](#)
- [“Manage storage blocks” on page 185](#)
- [“Manage storage pools” on page 186](#)

## Manage storage controllers

**Infrastructure admin** users can restart the storage service for a storage controller.

Complete the following steps to manage storage controllers.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.

Step 2. In the ThinkAgile CP Cloud Controller management portal, perform one of the following steps:

- In the left navigation, expand Resources and click **Hardware** to display the Dashboard page. Then click the Actions menu ( **...** ) next to the controller.

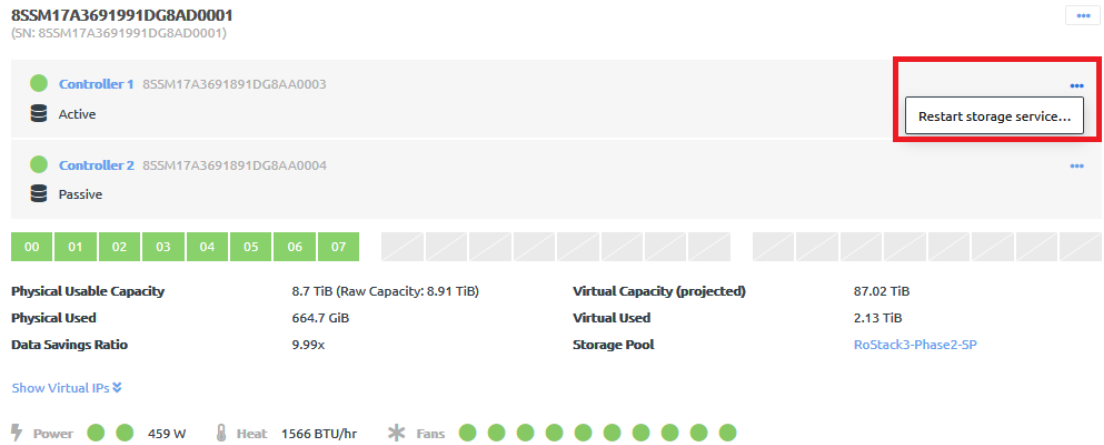


Figure 188. Storage node Actions menu on Hardware page

- In the left navigation, expand Resources and click **Hardware** to display the Dashboard page. Then, click the controller to display the controller details, and click the Actions menu ( **...** )

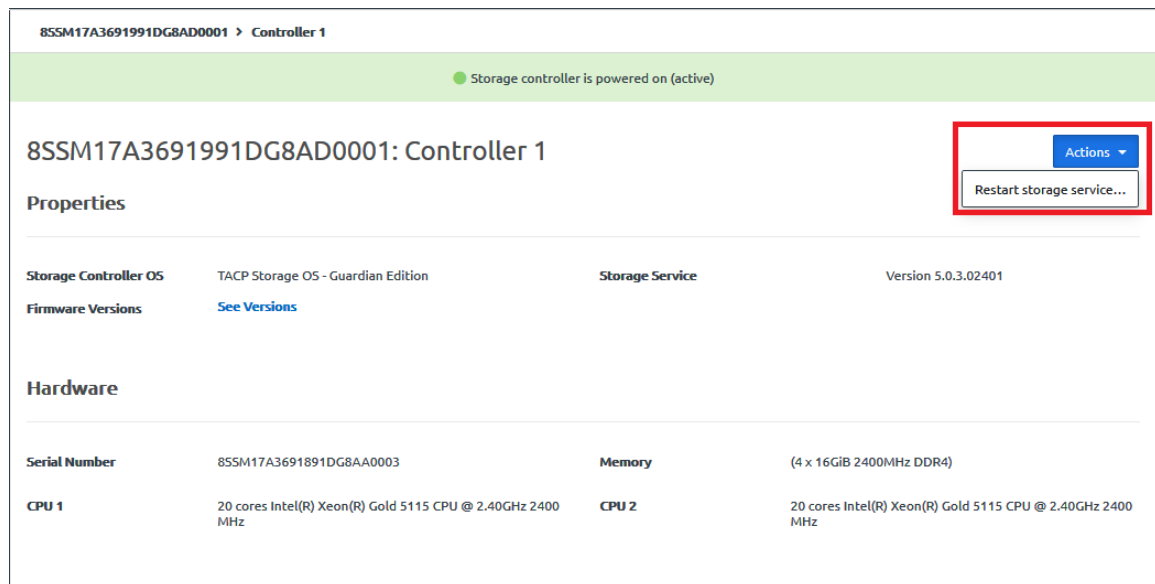


Figure 189. Storage node Actions button on compute node profile page

You can perform the following actions for a storage controller:

Action	Description
Restart storage service	Click <b>Restart storage controller service</b> to restart the storage controller. While it is restarting, instances might become unresponsive.


## Manage storage blocks

**Infrastructure admin** users can perform actions on a storage block, such as powering the storage block on and off, and editing the storage block name.

Complete the following steps to manage storage controllers.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.

Step 2. In the left navigation, expand Resources and click **Hardware** to display the Dashboard page. Then scroll down to view the storage block.

Step 3. Click the Actions menu (  ) next to the storage block.

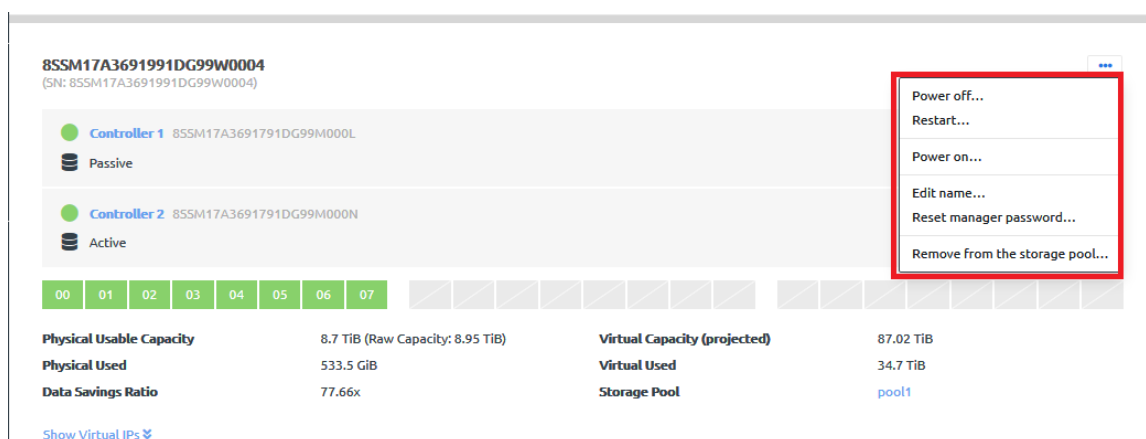


Figure 190. Storage block Actions menu on Hardware page

You can perform the following actions for a storage block:

Action	Description
Power off	<ol style="list-style-type: none"> <li>1. Click <b>Power off...</b></li> <li>2. Review the list of application instances that will be affected when the storage block is powered off. Select shut down or force shut down for each instance as appropriate.</li> <li>3. Click <b>Continue</b>.</li> </ol>
Restart	<ol style="list-style-type: none"> <li>1. Click <b>Restart...</b></li> <li>2. Review the list of application instances that will be affected when the storage block is restarted. Select shut down or force shut down for each instance as appropriate.</li> <li>3. Click <b>Continue</b>.</li> </ol>
Power on	<p>Click <b>Power on...</b></p> <p>The storage block will immediately power on.</p>

Action	Description
Edit name	<ol style="list-style-type: none"> <li>1. Click <b>Edit name....</b></li> <li>2. Enter a new name for the storage block.</li> </ol> <p><b>Note:</b> The new name must be unique across all storage blocks in your ThinkAgile CP environment.</p> <ol style="list-style-type: none"> <li>3. Click <b>Update.</b></li> </ol>
Reset manager password	<p>The manager account password is stored and used locally to access the storage controllers via a VNC console or an SSH session.</p> <ol style="list-style-type: none"> <li>1. Click <b>Reset manager password....</b></li> <li>2. Enter a new password.</li> <li>3. Click <b>Reset Password.</b></li> </ol> <p><b>Note:</b> The updated password is pushed to the physical storage. Hardware passwords are not stored in ThinkAgile CP.</p> <p>If you need to reset the hardware management (BMC) password, see the following topic:</p> <p><a href="#">“Manage a stack” on page 26</a></p>
Remove from the storage pool	<ol style="list-style-type: none"> <li>1. Click <b>Remove from the storage pool....</b></li> </ol> <p><b>Note:</b> A storage block can only be removed from a storage pool if all application instances using the storage pool are deleted.</p> <ol style="list-style-type: none"> <li>2. Click <b>Remove from the storage pool.</b></li> </ol>

## Manage storage pools

**Infrastructure admin** users can perform actions on storage pools, such as renaming a storage pool, adding storage blocks, connecting to a migration zone, or deleting a storage pool.

**Note:** For more information about user roles in ThinkAgile CP, see the following topic:[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

Complete the following steps to manage storage pools.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.

Step 2. In the ThinkAgile CP Cloud Controller management portal, perform one of the following steps:

- On the Dashboard page, scroll down to the list of storage pools in your ThinkAgile CP infrastructure. Then on the storage pool for which you want to view details, click **Properties**.

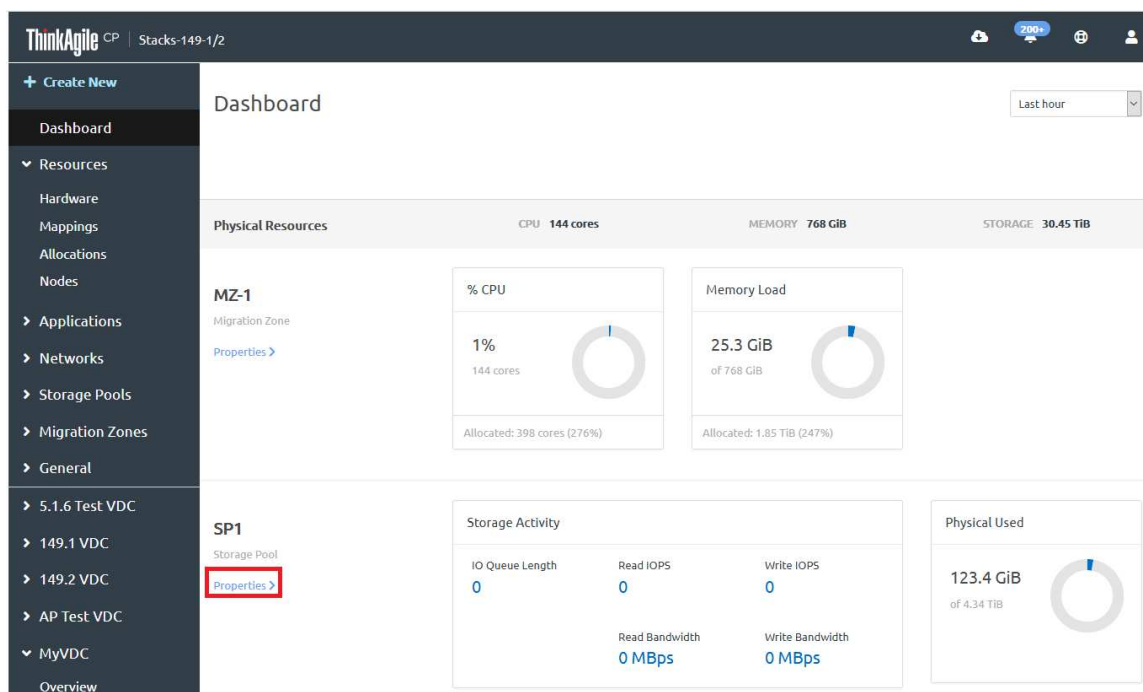


Figure 191. Storage pool properties on the Dashboard

- In the left navigation menu under Storage Pools, click the storage pool for which you want to view details.

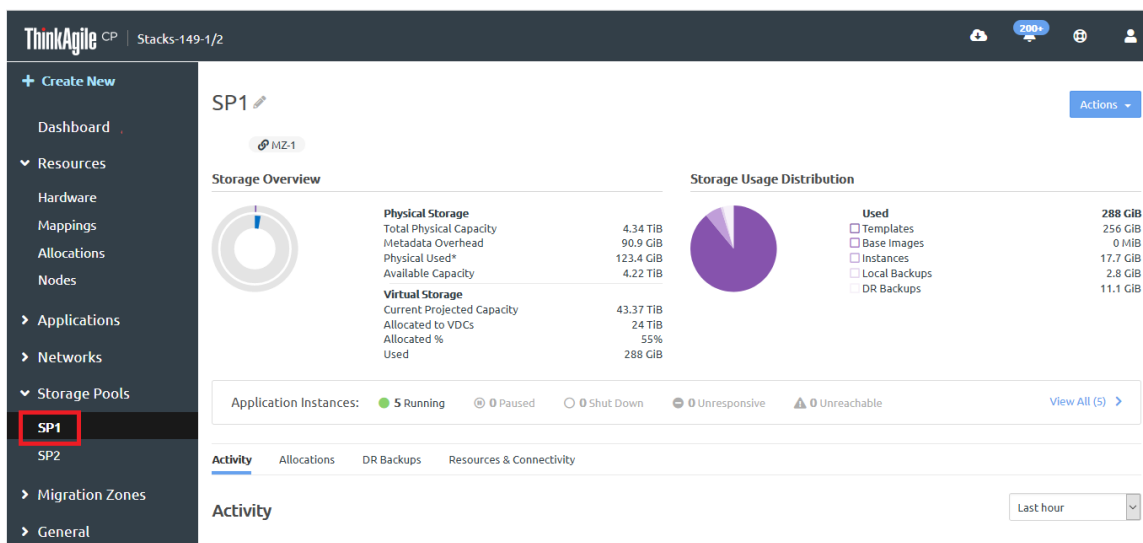


Figure 192. Select storage pool from navigation menu

Step 3. Click **Actions** to display the list of actions that can be performed on the storage pool.

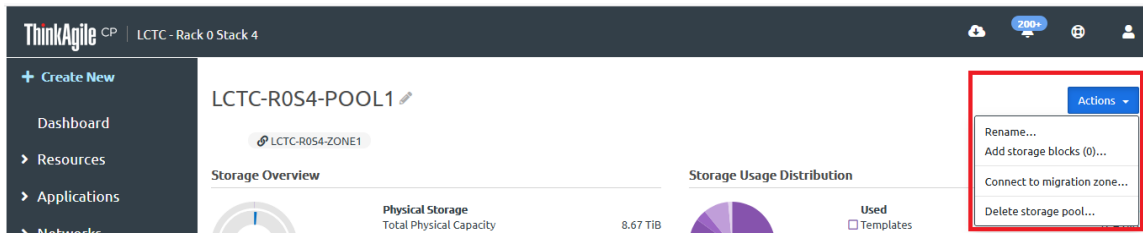


Figure 193. Select storage pool from navigation menu

You can perform the following actions for a storage pool:

Action	Description
Rename	Change the name of the storage pool. The new name must be unique across all of the storage pools in our organization.
Add storage blocks	Select a block from the list of unassigned storage blocks and click <b>Add to Storage Pool</b> .
Connect to migration zone	Choose a migration zone to which the storage pool will be connected.  For more information about migration zones, see the following topic:  <a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-compute-migration-zones.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-compute-migration-zones.html</a>
Delete storage pool	Remove a storage pool.

## Compute nodes

A compute node is a physical compute resource containing CPU and memory. Up to four compute nodes can be housed in a compute block.

The ThinkAgile CP Cloud Controller management console displays an abstraction of each compute block, along with each node within the enclosure on the Hardware Stack page.



Figure 194. Compute nodes within a compute block

## View compute nodes

**Infrastructure admin** and **infrastructure viewer** users can view information about the compute nodes that are associated with an organization.

### Notes:

- For more information about user roles in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

- **Infrastructure viewer** users cannot make changes to the information.

Refer to the following topics for more information:

- “View compute node details” on page 189
- “View compute node metrics” on page 190

## View compute node details

**Infrastructure admin** and **infrastructure viewer** users can view details about a compute node.

Complete the following steps to view compute node details.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** or an **infrastructure viewer** user.
- Step 2. In the left navigation, expand Resources and click **Hardware** to display the Hardware Stack page.
- Step 3. Scroll down to the Compute Block section and click the compute node for which you want to see details.

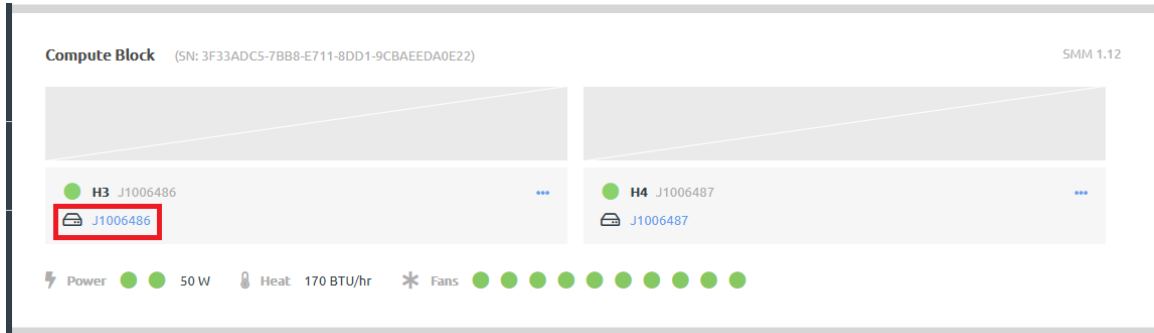


Figure 195. Compute node properties on the Hardware Stack page

- Step 4. Click the Information tab to see the details.

Activity **Information**

### Properties

Migration Zone	LCTC-R054-ZONE1	L1TF Mitigation	Full
Compute Category	Default	Compute Node OS	TACP Compute OS - Guardian Edition
Compute Tags	None	Compute Service	Version 5.1.2.04448
Description	None	Firmware	See Versions
Date Registered	Oct 13, 2020		Reset Manager Password


### Hardware

Serial Number	J1006486	Memory	128 GiB (4 x 32GB 2666MHz DDR4)
CPU 1	10 cores Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz 2200 MHz (32°C)	CPU 2	10 cores Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz 2200 MHz (26°C)

### Network

IP Address	10.212.25.5	MAC Address	08:94:ef:5f:c5:36
Netmask	255.255.255.0	Gateway	10.212.25.254
DNS Server	10.240.0.10		

Figure 196. Information tab on compute node details page

**Infrastructure admin** users can change some compute node properties, such as the compute category or description. Click the edit icon (  ) next to the property.

For more information about compute categories, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/getting-started-compute-categories-and-tags.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-compute-categories-and-tags.html)

## View compute node metrics

**Infrastructure admin** and **infrastructure viewer** users can view metrics about a compute node, such as CPU usage, memory usage, and network activity.

Complete the following steps to view compute node metrics.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** or an **infrastructure viewer** user.
- Step 2. In the left navigation, expand Resources and click **Hardware** to display the Hardware Stack page.
- Step 3. Scroll down to the Compute Block section and click the compute node for which you want to see details.



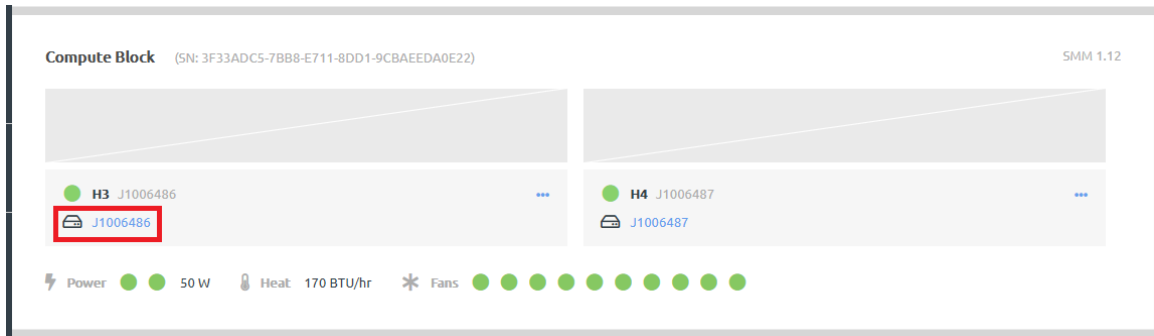


Figure 197. Compute node properties on the Hardware Stack page

Step 4. The Activity tab shows the metrics that are available.



Figure 198. Activity tab on compute node details page

On the Activity tab, the following charts are displayed:

- **%CPU**. Displays the average CPU utilization of the compute node, including hypervisor usage.
- **Memory Load**. Displays data currently held in memory by running and paused instances on the compute node, as well as hypervisor usage.
- **Network Read Bandwidth**. The amount of data received (in MBps) from the network.
- **Network Write Bandwidth**. The amount of data transmitted (in MBps) to the network.

You can choose to display this activity over different time frames ranging from the last hour to the last year.

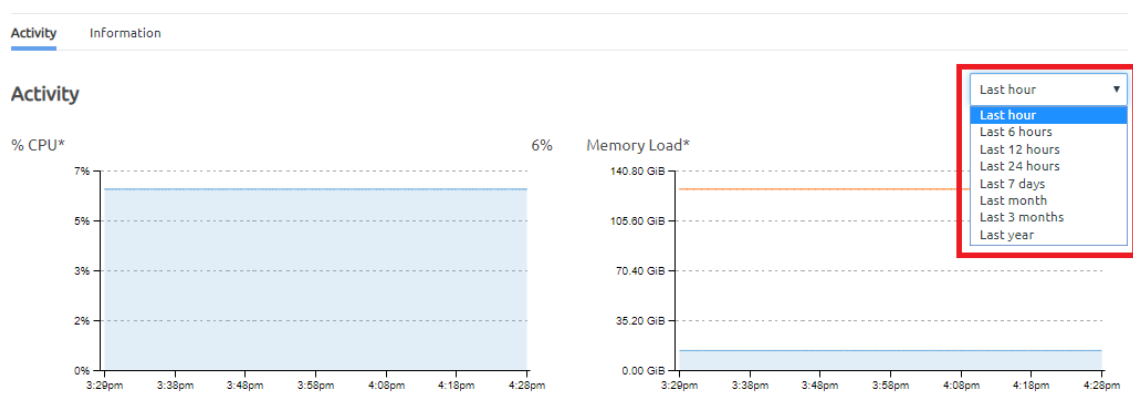


Figure 199. Compute node metrics timeframes

CPU and RAM allocation are currently used to determine how instances are distributed to compute nodes. The underlying algorithm used by the engine is shown below. The output of the algorithm is the compute allocation factor, which indicates how available a compute node is to run the instance; a compute node with the lowest allocation factor will be selected to run the instance.

**Total allocated CPUs after the instance is started =**

$$\begin{aligned} & (\text{CPUs allocated to instances running on this compute node}) + \\ & (\text{CPUs allocated to other instances starting on this compute node}) + \\ & (\text{CPUs allocated to the instance}) \end{aligned}$$

**Total allocated memory after the instance is started =**

$$\begin{aligned} & (\text{Memory allocated to instances running on this compute node}) + \\ & (\text{Memory allocated to other instances starting on this compute node}) + \\ & (\text{Memory allocated to the instance}) \end{aligned}$$

**Compute allocation factor =**

$$\frac{\text{Total allocated CPUs after the instance is started}}{\text{Maximum available CPUs on compute node}} + \frac{(\text{Total allocated memory after the instance is started}) \times (\text{Maximum available CPUs on compute node})}{\text{Maximum available memory on compute node}}$$

**Note:** Application instances can be manually placed on a particular compute node by using compute categories and tags. For information about categories and tags, see the following topic:


[“Manage categories and tags” on page 243](#)

## Manage compute nodes

**Infrastructure admin** users can perform actions on compute nodes, such as restarting a compute node. The actions that are available for a compute node vary, depending on the state of the node.

Complete the following steps to manage compute nodes.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.
- Step 2. In the left navigation, expand Resources and click **Hardware** to display the Hardware Stack page.

Step 3. Scroll down to the Compute Block section and click the Actions menu (  ) for the compute node that you want to manage.

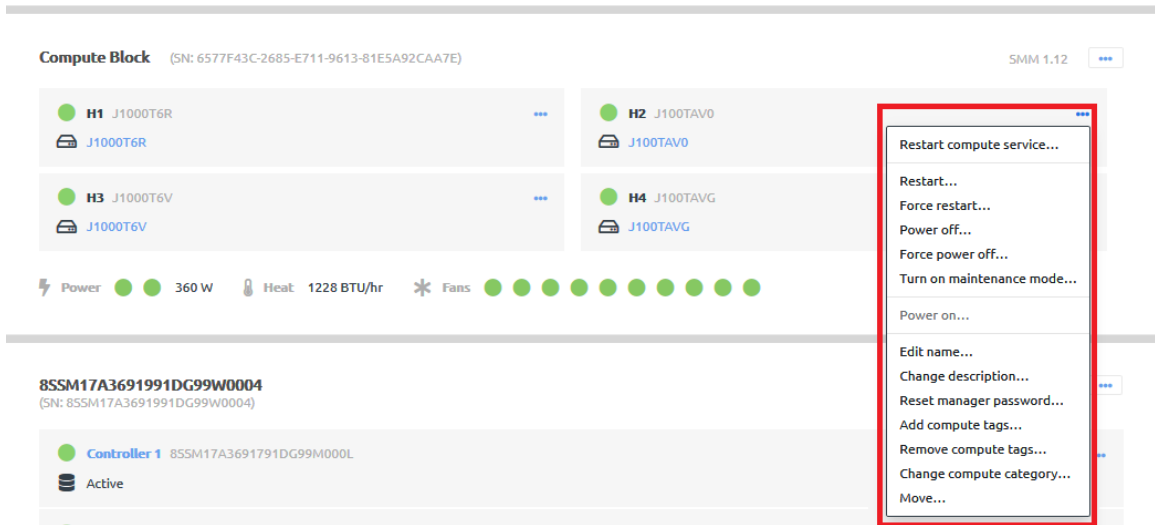


Figure 200. Compute node Actions menu on Hardware page

You can perform the following actions for a compute node:

Action	Description
Restart compute service	<p>Click <b>Restart compute service</b> to restart the ThinkAgile CP software that is running on the compute node.</p> <p>You do not need to move workloads before restarting the compute service. The hardware will not be restarted. However, the compute node and instance might show as unreachable in the portal for a brief time.</p>
Restart	<p>Click <b>Restart</b> to restart the compute node. You are prompted to choose how application instances will be affected. You can choose from the following action plans:</p> <ul style="list-style-type: none"> <li>• <b>Migrate.</b> ThinkAgile CP will attempt to migrate the instance to another compute node that meets its compute requirements.</li> <li>• <b>Relax profile &amp; migrate.</b> ThinkAgile CP will remove compute category and tag requirements from the instance's compute profile. ThinkAgile CP will then attempt to migrate the instance to an available compute node in the current virtual datacenter and migration zone.</li> <li>• <b>Shut down.</b> ThinkAgile CP will shut down the instance.</li> <li>• <b>Force shut down.</b> ThinkAgile CP will force shut down the application instance.</li> </ul> <p><b>Note:</b> When you click <b>Continue</b>, ThinkAgile CP attempts to perform the selected action plan. If the action fails, you are asked to select a different action plan.</p>
Force restart	<p>Click <b>Force restart</b> to restart the compute node forcefully. ThinkAgile CP will force all running application instances on the compute node to shut down.</p>

Action	Description
Power off	<p>Click <b>Power off</b> to shut down the compute node. You are prompted to choose how application instances will be affected. You can choose from the following action plans:</p> <ul style="list-style-type: none"> <li>• <b>Migrate.</b> ThinkAgile CP will attempt to migrate the instance to another compute node that meets its compute requirements.</li> <li>• <b>Relax profile &amp; migrate.</b> ThinkAgile CP will remove compute category and tag requirements from the instance's compute profile. ThinkAgile CP will then attempt to migrate the instance to an available compute node in the current virtual datacenter and migration zone.</li> <li>• <b>Shut down.</b> ThinkAgile CP will shut down the instance.</li> <li>• <b>Force shut down.</b> ThinkAgile CP will force shut down the application instance.</li> </ul> <p><b>Note:</b> When you click <b>Continue</b>, ThinkAgile CP attempts to perform the selected action plan. If the action fails, you are asked to select a different action plan.</p>
Force power off	<p>Click <b>Force power off</b> to power off the compute node forcefully. ThinkAgile CP will force all running application instances on the compute node to shut down.</p>
Turn on maintenance mode	<p>Click <b>Turn on maintenance mode</b> to move the compute node into maintenance mode. You are prompted to choose how application instances will be affected. You can choose from the following action plans:</p> <ul style="list-style-type: none"> <li>• <b>Migrate.</b> ThinkAgile CP will attempt to migrate the instance to another compute node that meets its compute requirements.</li> <li>• <b>Relax profile &amp; migrate.</b> ThinkAgile CP will remove compute category and tag requirements from the instance's compute profile. ThinkAgile CP will then attempt to migrate the instance to an available compute node in the current virtual datacenter and migration zone.</li> <li>• <b>Shut down.</b> ThinkAgile CP will shut down the instance.</li> <li>• <b>Force shut down.</b> ThinkAgile CP will force shut down the application instance.</li> </ul> <p><b>Note:</b> When you click <b>Continue</b>, ThinkAgile CP attempts to perform the selected action plan. If the action fails, you are asked to select a different action plan.</p> <p>For more information about enabling maintenance mode, see the following topic:</p> <p><a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/enable_maintenance_mode.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/enable_maintenance_mode.html</a></p>
Turn off maintenance mode	<p>Click <b>Turn off maintenance mode</b> to move the compute node out of maintenance mode.</p> <p>For more information about disabling maintenance mode, see the following topic:</p> <p><a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/disable_maintenance_mode.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/disable_maintenance_mode.html</a></p>
Power on	<p>Click <b>Power on</b> to start the compute node immediately.</p>
Edit name	<p>Click <b>Edit name</b> to change the name of the compute node.</p> <p><b>Note:</b> The compute node name must be unique across all compute nodes in your cloud infrastructure.</p>

Action	Description
Change description	Click <b>Change description</b> to change the description of the compute node.
Reset manager password	<p>The manager account password is stored and used locally to access the compute node via a VNC console or an SSH session.</p> <ol style="list-style-type: none"> <li>1. Click <b>Reset manager password</b> to change the password for the manager account.</li> <li>2. Enter a new password.</li> <li>3. Click <b>Reset Password</b>.</li> </ol> <p><b>Note:</b> The updated password is pushed to the physical storage. Hardware passwords are not stored in ThinkAgile CP.</p> <p>If you need to reset the hardware management (XCC) password, see the following topic:</p> <p><a href="#">“Manage a stack” on page 26</a></p>
Add compute tags	<p>Click <b>Add compute tags</b> to add one or more compute tags to a compute node.</p> <p>For more information about compute tags, see the following topic:</p> <p><a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-compute-concepts.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-compute-concepts.html</a></p>
Remove compute tags	<p>Click <b>Remove compute tags</b> to remove a compute tag from a compute node. You are prompted to choose how application instances will be affected. You can choose from the following action plans:</p> <ul style="list-style-type: none"> <li>• <b>Migrate.</b> ThinkAgile CP will attempt to migrate the instance to another compute node that meets its compute requirements.</li> <li>• <b>Relax profile &amp; migrate.</b> ThinkAgile CP will remove compute category and tag requirements from the instance's compute profile. ThinkAgile CP will then attempt to migrate the instance to an available compute node in the current virtual datacenter and migration zone.</li> <li>• <b>Shut down.</b> ThinkAgile CP will shut down the instance.</li> <li>• <b>Force shut down.</b> ThinkAgile CP will force shut down the application instance.</li> </ul> <p><b>Note:</b> When you click <b>Continue</b>, ThinkAgile CP attempts to perform the selected action plan. If the action fails, you are asked to select a different action plan.</p>

Action	Description
Change compute category	<p>Click <b>Change compute category</b> to change the compute category for a compute node. To change the compute category for a compute node successfully,</p> <p><b>Note:</b> You cannot change a compute category for a node while application instances are running on the compute node. Before attempting to change a compute category, put the compute node into maintenance mode (turn on maintenance mode).</p> <p>After clicking <b>Change compute category</b>:</p> <ol style="list-style-type: none"> <li>1. Select a new compute category for the compute node.</li> <li>2. Indicate how ThinkAgile CP should reduce the original compute category's allocations (left column).</li> <li>3. Indicate how ThinkAgile CP should distribute the updated compute category's allocations (right column).</li> <li>4. Click <b>Change Compute Category</b>.</li> </ol> <p>For more information about compute categories, see the following topic:  <a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/what-are-compute-categories.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/what-are-compute-categories.html</a></p>
Move	<p>Click <b>Move</b> to move a compute node to a new migration zone. To move a compute node from its original migration zone successfully, your infrastructure must have sufficient unused resources in that migration zone.</p> <p><b>Note:</b> You cannot change a migration zone for a node while application instances are running on the compute node. Before attempting to change the migration zone, put the compute node into maintenance mode (turn on maintenance mode).</p>

## Migration zones

A migration zone provides a way to organize a collection of resources virtually and consists of a defined set of compute nodes and connectivity to storage. One compute node can belong to one migration zone, and migration zones can connect to one or more storage nodes.

Essentially, a migration zone acts as a boundary around a set of compute nodes; that is, compute nodes are organized into migration zones. A compute node must be added to a migration zone for it to host application instances.

Application instances can migrate among nodes within a migration zone but cannot migrate to nodes outside of a migration zone. When an instance migrates from one compute node to another within a migration zone there is no downtime with continuous service availability and complete transaction integrity. When an instance starts in a particular migration zone, it will only utilize the compute nodes in that zone.

For a migration zone to support application instances, it must be connected to at least one storage pool. The resources in a migration zone must also be allocated to at least one virtual datacenter before they can be used to run application instances.

In the ThinkAgile CP Cloud Controller, you can manage accessibility between migration zone and storage pool pairs by defining Mappings. This prevents deploying applications using an incorrect migration zone and storage pool combination. (By default, all migration zones are allowed to access all storage pools.)

## View migration zones

**Infrastructure admin** and **infrastructure viewer** users can view information about migration zones, which are virtual groupings of compute nodes for use by application instances.

### Notes:

- For more information about user roles in ThinkAgile CP, see the following topic:  
[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)
- **Infrastructure viewer** users cannot make any changes to the information.

For an overview of migration zones, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/getting-started-compute-migration-zones.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/getting-started-compute-migration-zones.html)

Refer to the following topics for more information about working with migration zones:

- “View migration zone details” on page 197
- “View migration zone metrics” on page 198

## View migration zone details

**Infrastructure admin** and **infrastructure viewer** users can view details about a migration zone.

Complete the following steps to view compute node details.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** or an **infrastructure viewer** user.
- Step 2. In the left navigation, expand Migration Zones and click the migration zone to display the details page for that migration zone.

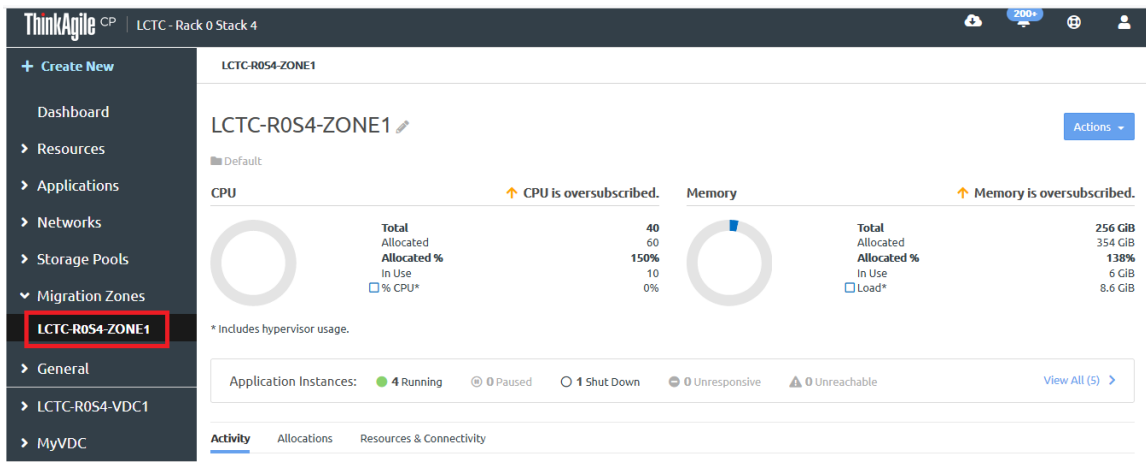


Figure 201. Migration zone details page

- Step 3. Click the Allocations tab to see the compute categories associated with the migration zone and the virtual datacenters to which the migration zone is allocated.

Activity **Allocations** Resources & Connectivity

### From Compute Categories

Category	CPU (Cores)					Memory				
	Total	Allocated	(%)	In Use	% CPU*	Total	Allocated	(%)	In Use	Load *
Default	40	60	(150%)	10	0%	256 GiB	354 GiB	(138%)	6 GiB	6.3 GiB

\* Include hypervisor usage.

### To Virtual Datacenters

Datacenter	CPU (Cores)			Memory		
	Allocated	In Use	% CPU**	Allocated	In Use	Load**
LCTC-R054-VDC1	40	6	0%	254 GiB	4 GiB	1.4 GiB
MyVDC	20	4	0%	100 GiB	2 GiB	856 MiB

\*\* Does not include hypervisor usage.

Figure 202. Allocation tab on migration zone details page

Step 4. Click the Resources & Connectivity tab to see the storage pools and compute nodes associated with the migration zone.

### Connected Storage Pools [Manage Resource Connectivity >](#)

This migration zone is connected to the following storage pool(s). Virtual datacenters are able to run applications from the connected storage pool(s) in this migration zone.

Storage Pool	
LCTC-R054-POOL1	<a href="#">Disconnect</a>
LCTC-R054-POOL2	<a href="#">Disconnect</a>

### Nodes | 2 [+ Add nodes](#)

Name	IP Address	Migration Zone	Compute Category	CPU		Memory (GiB)		NW BW (MBps)		
				Total	% CPU	Total	Load*	Read	Write	
J1006486	10.212.25.5	LCTC-R054-ZONE1	Default	20 cores	0%	128 GiB	2.3 GiB	0	0	***
J1006487	10.212.25.4	LCTC-R054-ZONE1	Default	20 cores	1%	128 GiB	6.3 GiB	0	0	***

\* Includes hypervisor usage.

Figure 203. Resources & Connectivity tab on migration zone details page

**Infrastructure admin** users can click **Manage Resource Connectivity** to view the Infrastructure Mappings page, disconnect storage pools from the migration zone, or manage the compute nodes associated with the migration zone.

### View migration zone metrics

**Infrastructure admin** and **infrastructure viewer** users can view metrics about a migration zone, such as CPU usage and, memory usage.

Complete the following steps to view compute node metrics.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** or an **infrastructure viewer** user.



Step 2. In the left navigation, expand Migration Zones and click the migration zone to display the migration zone details page.

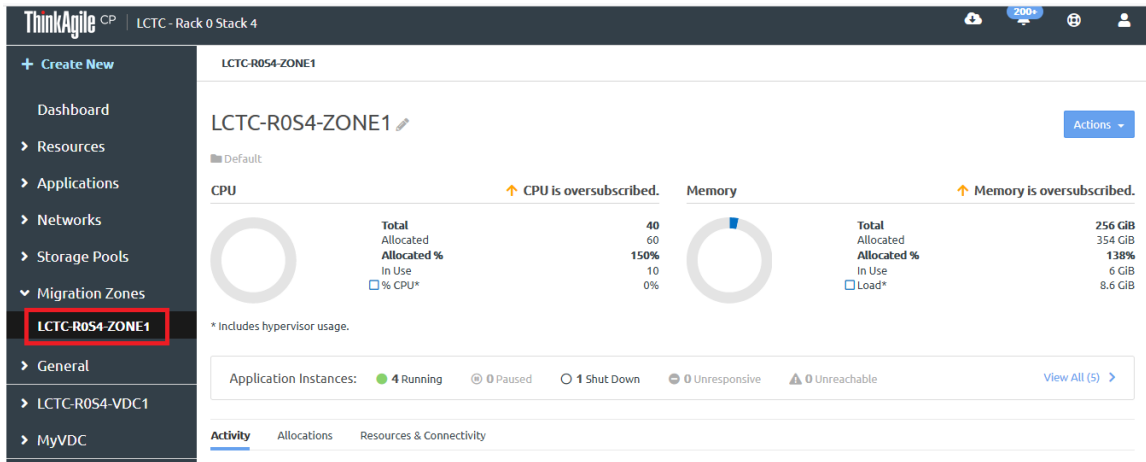


Figure 204. Migration zone details page

Step 3. The Activity tab shows the metrics that are available.

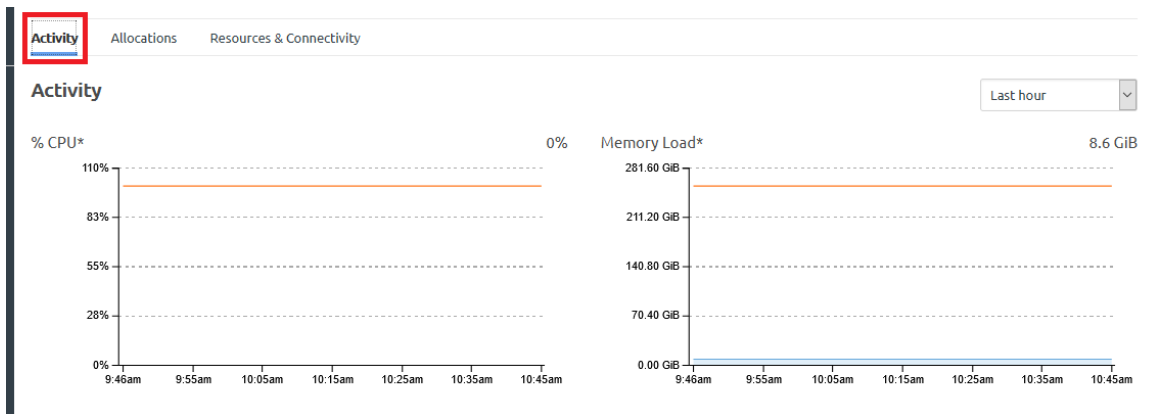


Figure 205. Activity tab on migration zone details page

On the Activity tab, the following charts are displayed:

- **%CPU.** The average CPU utilization of the compute node, including hypervisor usage.
- **Memory Load.** The amount of data currently held in memory by running and paused instances on the compute node, as well as hypervisor usage.

You can choose to display this activity over different time frames ranging from the last hour to the last year.

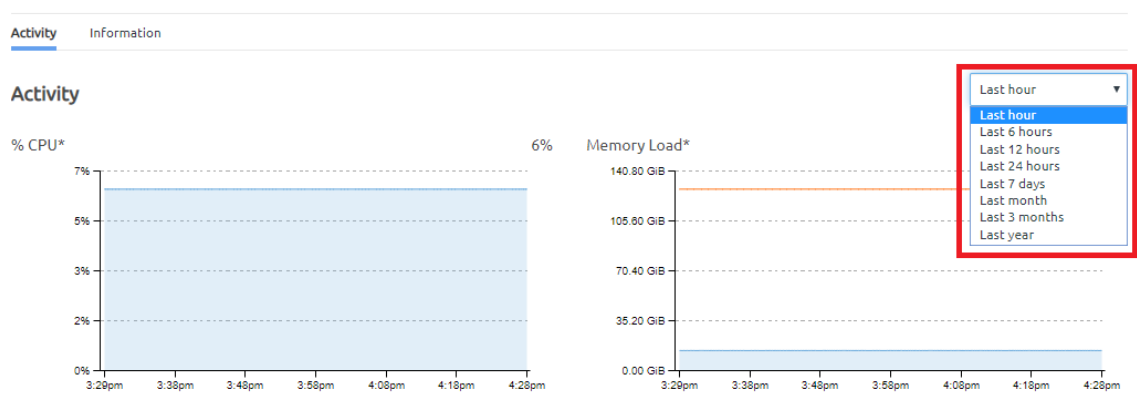


Figure 206. Compute node metrics timeframes

## Manage migration zones

**Infrastructure admin** users can perform actions on migrations zones, such as adding a compute node to the migration zone, renaming a migration zone, and deleting a migration zone.

Complete the following steps to manage migration zones.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.
- Step 2. In the left navigation, expand Migration Zones and click the migration zone to display the migration zone details page.

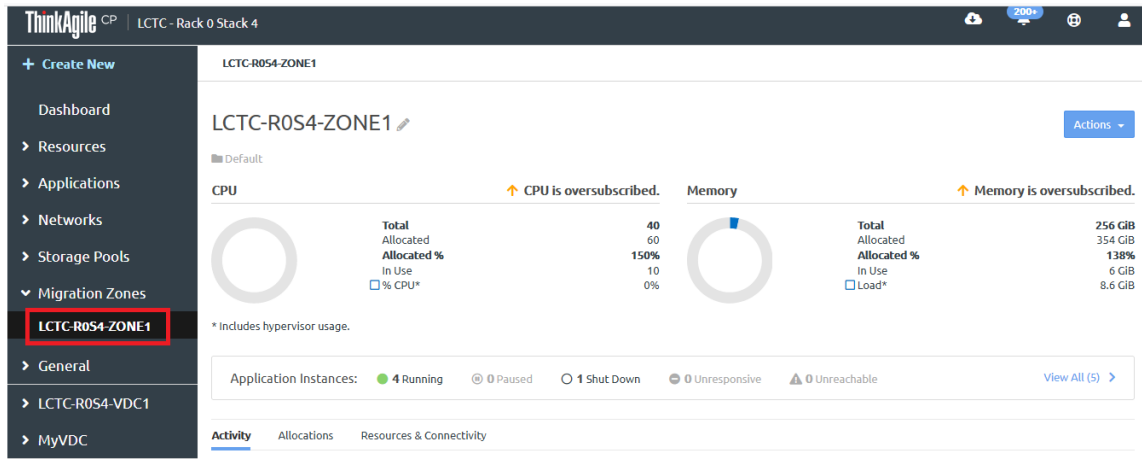


Figure 207. Migration zone details page

- Step 3. Click the Actions menu (  ).

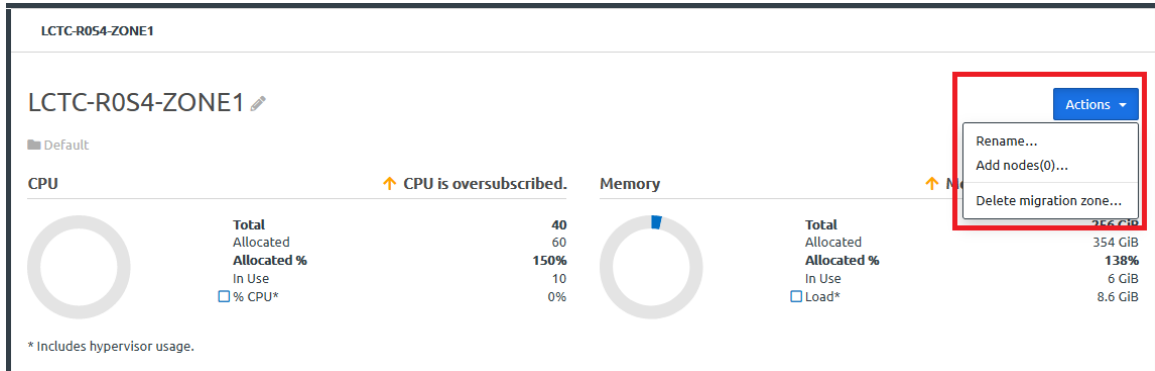


Figure 208. Compute node Actions menu on Hardware page

You can perform the following actions on a migration zone:

Action	Description
Rename	<p>Complete the following steps to rename a migration zone:</p> <ol style="list-style-type: none"> <li>1. Click <b>Rename</b>.</li> <li>2. In the Rename Migration Zone dialog, enter a new name.</li> </ol> <p><b>Note:</b> The name must be unique across all migration zones in your ThinkAgile CP environment.</p> <ol style="list-style-type: none"> <li>3. Click <b>Update</b>.</li> </ol>
Add nodes	<p>Complete the following steps to add one or more compute nodes to the migration zone:</p> <ol style="list-style-type: none"> <li>1. Click <b>Add nodes</b>.</li> <li>2. Select the nodes that you want to add to the migration zone.</li> <li>3. Click <b>Add Nodes</b>.</li> </ol> <p><b>Note:</b> Because a node can only belong to one migration zone, ThinkAgile CP only displays a list of unassigned nodes. If you want to add a node that is currently assigned to another migration zone, move the node to another migration zone. For more information, see the following topic:</p> <p><a href="#">“Manage compute nodes” on page 192</a></p>
Delete migration zone	<p>Complete the following steps to delete a migration zone:</p> <ol style="list-style-type: none"> <li>1. Click <b>Delete migration zone</b>.</li> <li>2. In the Delete Migration Zone dialog, click <b>Delete migration zone</b>.</li> </ol> <p><b>Note:</b> Before deleting a migration zone, make sure that there are no application instances using the migration zone. For each application instance, shut down the instance and change to another migration zone.</p>

## Connect a migration zone to a storage pool

**Infrastructure admin** users can connect a migration zone to a storage pool.

Complete the following steps to connect a migration zone to a storage pool.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.
- Step 2. In the left navigation, expand **Resources** and click **Mappings** to display the Infrastructure Mappings page.

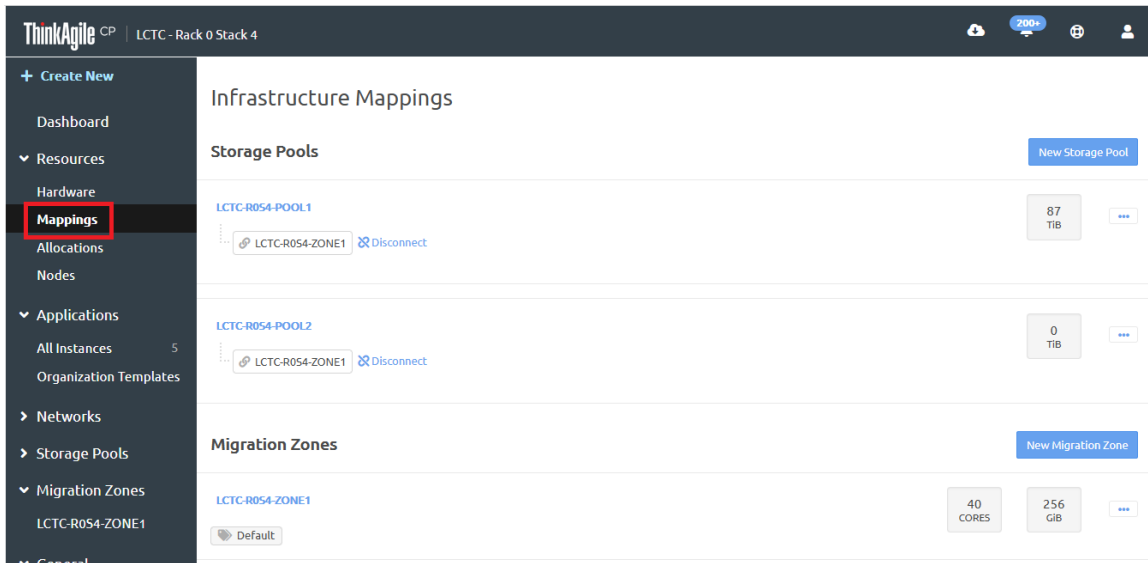



Figure 209. Infrastructure mappings page

Step 3. Click the Actions menu (  ); then click **Connect to migration zone**.

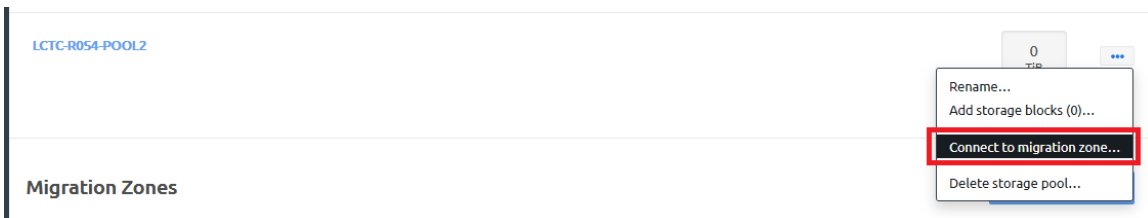


Figure 210. Connect to migration zone option

Step 4. In the Connect to Migration Zone dialog, choose the migration zone and click **Connect to Migration Zone**.

The storage pool is connected to the migration zone.

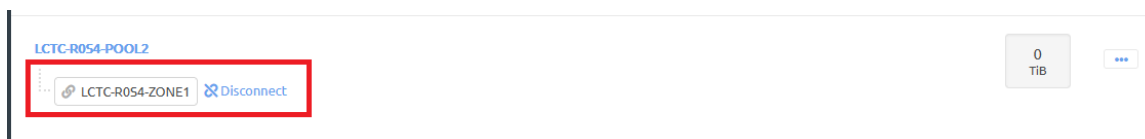


Figure 211. Storage pool connected to the migration zone

## Delete a migration zone from a storage pool

**Infrastructure admin** users can delete a migration zone from a storage pool.

Complete the following steps to delete a migration zone to a storage pool.

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **Infrastructure admin** user.
- Step 2. In the left navigation, expand **Migration Zones** and click the migration zone to display the details for that migration zone.

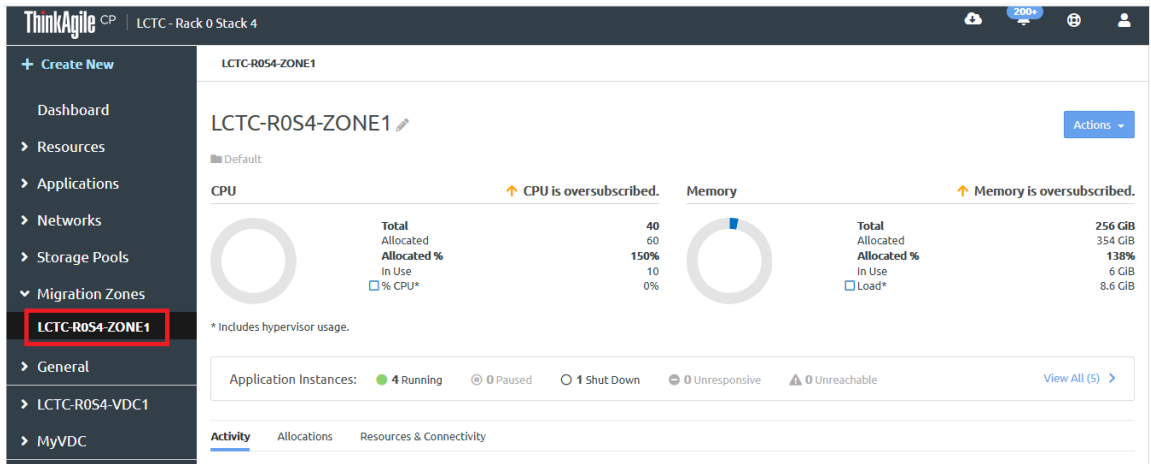


Figure 212. Migration zone details page

Step 3. Click the **Resources & Connectivity** tab to see the storage pools and compute nodes associated with the migration zone.

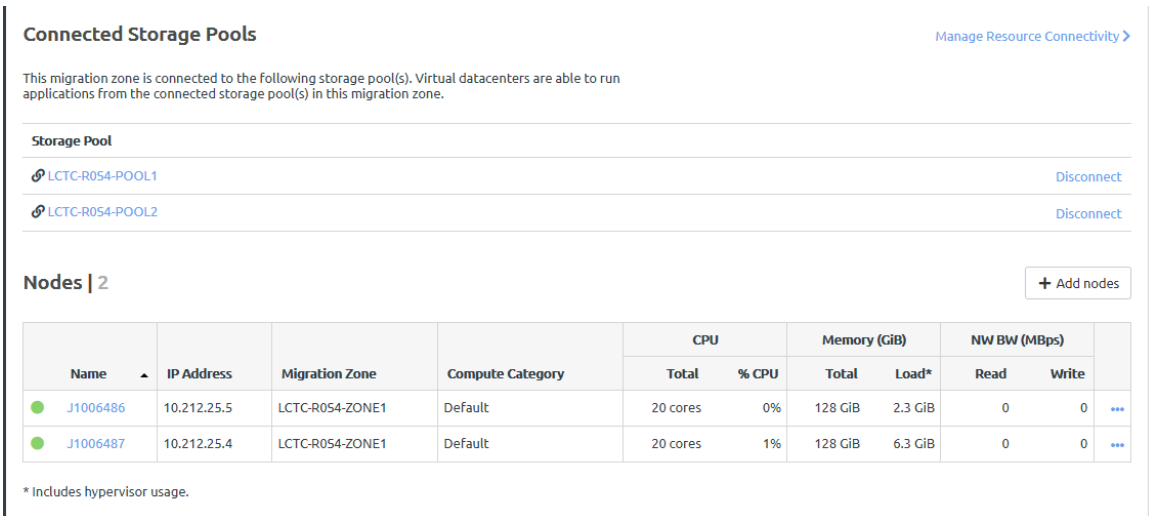


Figure 213. Resources & Connectivity tab on migration zone details page

Step 4. Click **Disconnect** for the storage pool to be disconnected.

Step 5. In the Disconnect migration zone dialog, choose how applications will be shut down. Then click **Continue**.

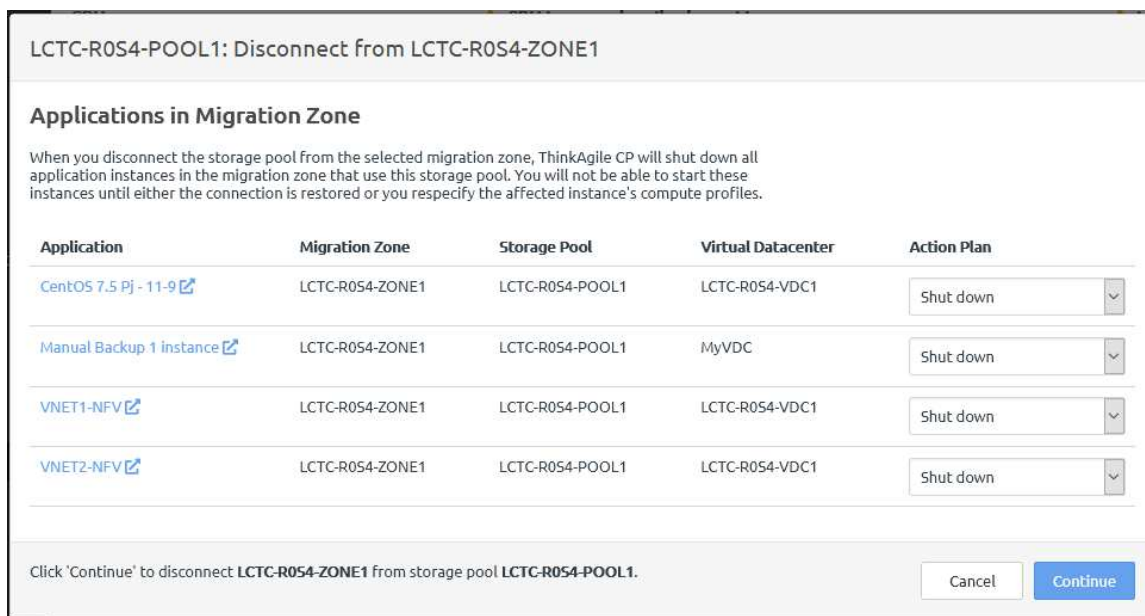


Figure 214. Disconnect from storage pool dialog

The storage pool is disconnected from the migration zone.

## Working with virtual datacenters

A virtual datacenter is a logical grouping of compute and storage resources allocated from one or more migration zones and one or more storage pools.

In ThinkAgile CP, the virtual datacenter is the ultimate organizing construct to manage allocations. **Infrastructure admin** users can create specific datacenters for users that include the precise allocation of compute, storage, and network resources they need. Your users can allocate storage and create as many applications as they need without assistance from a storage or virtualization administrator.

VM instances are deployed in virtual datacenters, and a virtual datacenter must have both compute and storage allocations before it can be used to deploy instances.

For additional information about virtual datacenters, see the following topic:

[Virtual datacenters](#)

## Creating Virtual Datacenters

**Infrastructure admin** users can create new virtual datacenters and allocate resources to those virtual datacenters in the ThinkAgile CP Cloud Controller.

**Note:** For more information about user roles in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

Complete the following steps to create a new virtual datacenter:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user.
- Step 2. To launch the VDC creation process, use one of the following methods:

- From the left-side navigation menu, select **+ Create New** and then click on **New Virtual Datacenter....** The New Virtual Datacenter page opens.

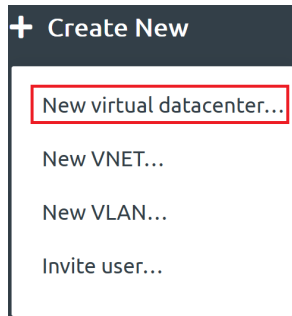


Figure 215. Create new virtual datacenter option

- From the left-side navigation menu, expand **Resources**, and click **Allocations**. From the Allocations page, click **New Virtual Datacenter**.

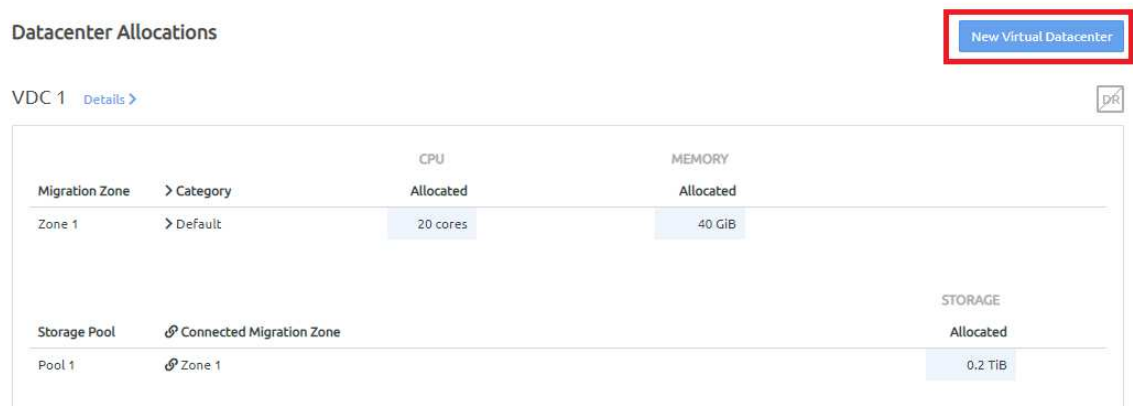


Figure 216. New Virtual Datacenter button

Step 3. Enter a name for the new VDC.

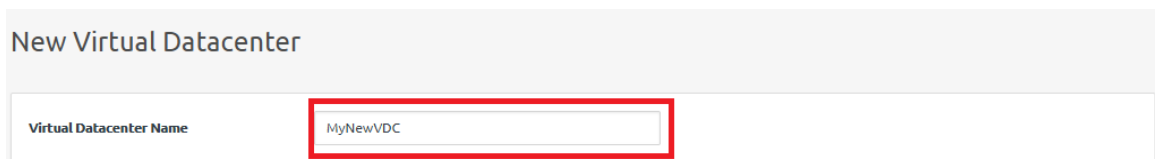


Figure 217. New Virtual Datacenter Name

**Note:** This name must be unique across all virtual datacenters in your ThinkAgile CP Cloud Controller infrastructure.

Step 4. Allocate resources to your new VDC.

**Note:** The Resources Summary section is provided for your reference to show the resources that are available for allocation. It displays your available resources per migration zone and storage pool. Resources in migration zones are organized by category.

**Resources Summary**

Resources available for allocation are summarized below. Total CPU, memory, and storage allocations can be oversubscribed (>100%).

Migration Zone	Category	CPU			MEMORY		
		Total	Allocated	(%)	Total	Allocated	(%)
LCTC-R054-ZONE1	Default	40 cores	60 cores	(150%)	254 GiB	354 GiB	(139%)

Storage Pool	Connected Migration Zone	STORAGE		
		Total	Allocated	(%)
LCTC-R054-POOL1	LCTC-R054-ZO...	86.71 TiB	96.71 TiB	(112%)
LCTC-R054-POOL2	LCTC-R054-ZO...	0 MiB	0 TiB	(-)

Figure 218. Resources Summary

- a. Under the Datacenter Allocation section, allocate compute resources (CPU cores and Memory) from one or more compute categories within the migration zone(s). Enter the number of cores and the amount of memory in GiB.

**Datacenter Allocation**

Migration Zone	Category	CPU	MEMORY
		Allocated	Allocated
LCTC-R054-ZONE1	Default	20 cores	50 GiB

Figure 219. CPU cores and memory allocation

**Attention:** Compute allocations must include both CPU cores and memory from the same compute category.

- b. Allocate storage resources from the listed storage pool(s) by entering an amount in TiB.

**Note:** To enable quick DR backups, you must allocate resources to at least two storage pools. For more information about disaster recovery, see the following topic: [“Manage quick DR backups” on page 288](#)

Storage Pool	Connected Migration Zone	STORAGE	
		Allocated	
LCTC-R054-POOL1	LCTC-R054-ZO...	10	TiB
LCTC-R054-POOL2	LCTC-R054-ZO...	0	TiB

Figure 220. Storage allocation

Step 5. By default, the Chat Support widget is disabled for **VDC manager** and **VDC viewer** users. You can enable the Chat Support widget by selecting the **Enable support widget for VDC users** checkbox.

For more information about the Chat Support widget, see the following topic:



[“Enabling the chat support widget” on page 231](#)

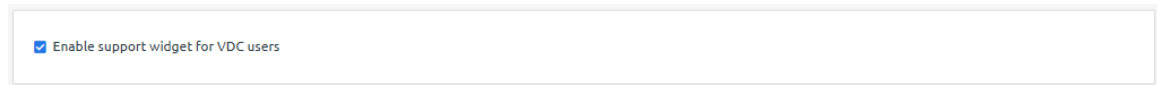
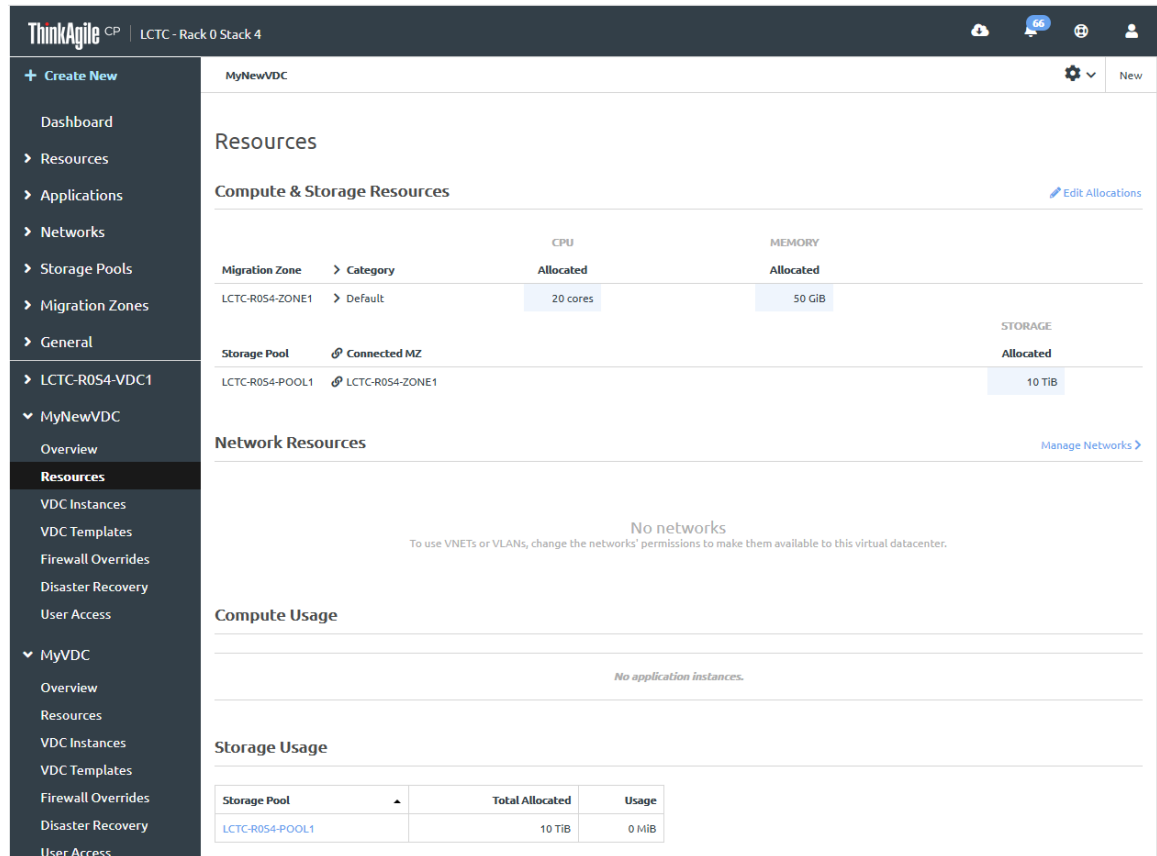


Figure 221. Enable Chat Support widget

Step 6. Click **Create Virtual Datacenter**.

The new VDC is created.



The screenshot shows the 'Resources' page for a new VDC named 'MyNewVDC'. The page is divided into several sections:

- Compute & Storage Resources:** A table showing allocated resources for a migration zone.
- Network Resources:** A section indicating that no networks are currently available for the VDC.
- Compute Usage:** A section indicating that no application instances are currently running.
- Storage Usage:** A table showing the total allocated storage and current usage for the storage pool.

Migration Zone	Category	CPU Allocated	MEMORY Allocated
LCTC-R054-ZONE1	Default	20 cores	50 GiB

Storage Pool	Connected MZ	STORAGE Allocated
LCTC-R054-POOL1	LCTC-R054-ZONE1	10 TiB

Storage Pool	Total Allocated	Usage
LCTC-R054-POOL1	10 TiB	0 MiB

Figure 222. New VDC resources page

Step 7. Before you can run application instances (VMs) on the new VDC, you must allocate network resources (VLANs or VNETs) to the VDC.


For more information about creating VLANs or VNETs, see the following topic:

[“Networking” on page 112](#)

a. Click **Manage Networks**.

No networks

To use VNETs or VLANs, change the networks' permissions to make them available to this virtual datacenter.

- b. To assign a specific VLAN or VNET to the new VDC, click on the **Actions** menu (  ) next to it. Then select **Assign virtual datacenters...** from the drop-down menu.

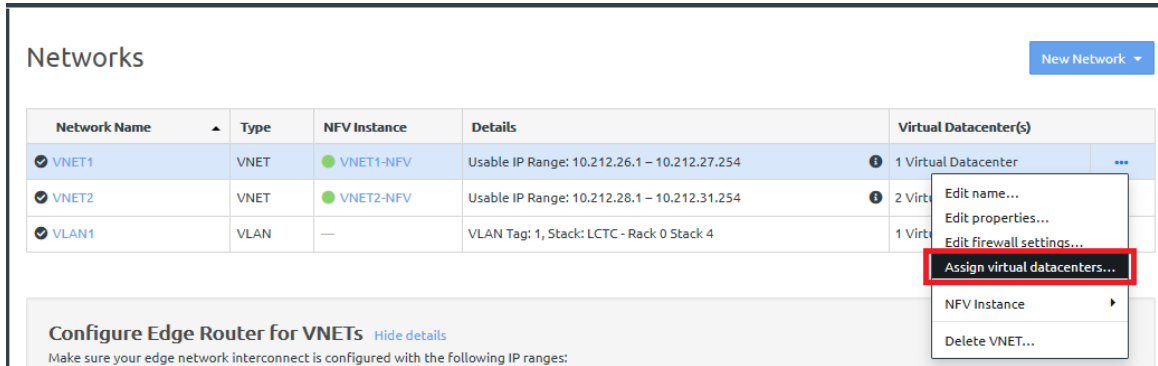
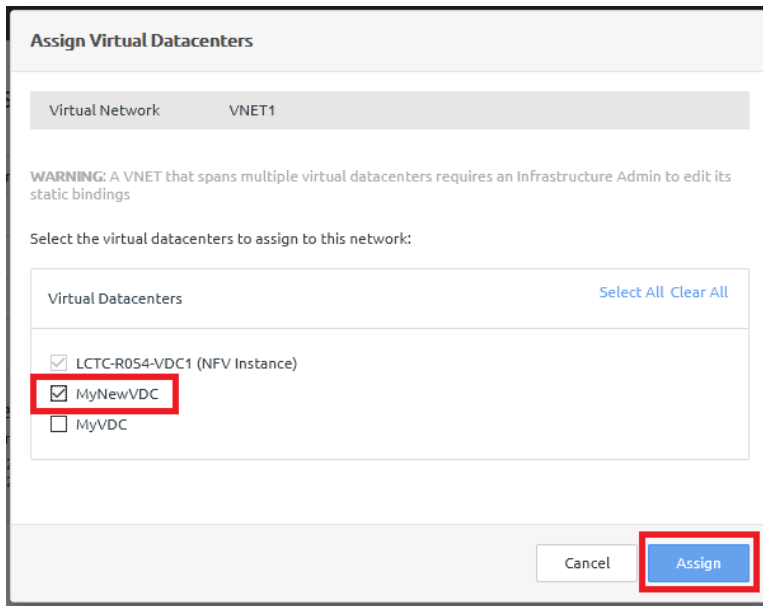


Figure 223. Assign virtual datacenters option on Networks page

- c. A dialog box opens. Select the checkbox next to the new VDC to assign it to the specified VNET or VLAN. Then click **Assign**.



Verify that the network resource allocation is successful. From the left-side navigation menu, expand the menu for the newly created VDC and click **Resources**. The VLAN or VNET you selected appears in the Network Resources section.

Network Resources				<a href="#">Manage Networks &gt;</a>
Network Name	Type	NFV Instance	Details	
<input checked="" type="checkbox"/> VNET1	VNET	<span style="color: green;">●</span> VNET1-NFV	Usable IP Range: 10.212.26.1 – 10.212.27.254	

Figure 224. VDC Network Resources

## Viewing virtual datacenter information

The ThinkAgile CP Cloud Controller management portal allows you to easily view the virtual datacenters to which you have access in your ThinkAgile CP environment. This includes statistics and metrics related to CPU, memory, and storage as well as resource allocation and usage information.

**Infrastructure admin** and **infrastructure viewer** users can view datacenter information for all datacenters that are created for an organization. **VDC manager** and **VDC viewer** users can view only the datacenters to which they have been assigned.

Refer to the following topics:

- [“Viewing virtual datacenter details” on page 209](#)
- [“View virtual datacenter allocations” on page 212](#)

## Viewing virtual datacenter details

A virtual datacenter (VDC) is a logical grouping of compute and storage resources allocated from one or more migration zones and one or more storage pools, usually to a business unit in an organization. In the ThinkAgile CP environment, the virtual datacenter is the ultimate organizing construct to manage allocations and help you manage your application instances (virtual machines).

Complete the following steps to view the details for a virtual datacenter:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, click to select and expand the virtual datacenter you want to view, and then click **Overview** to view the Overview page.

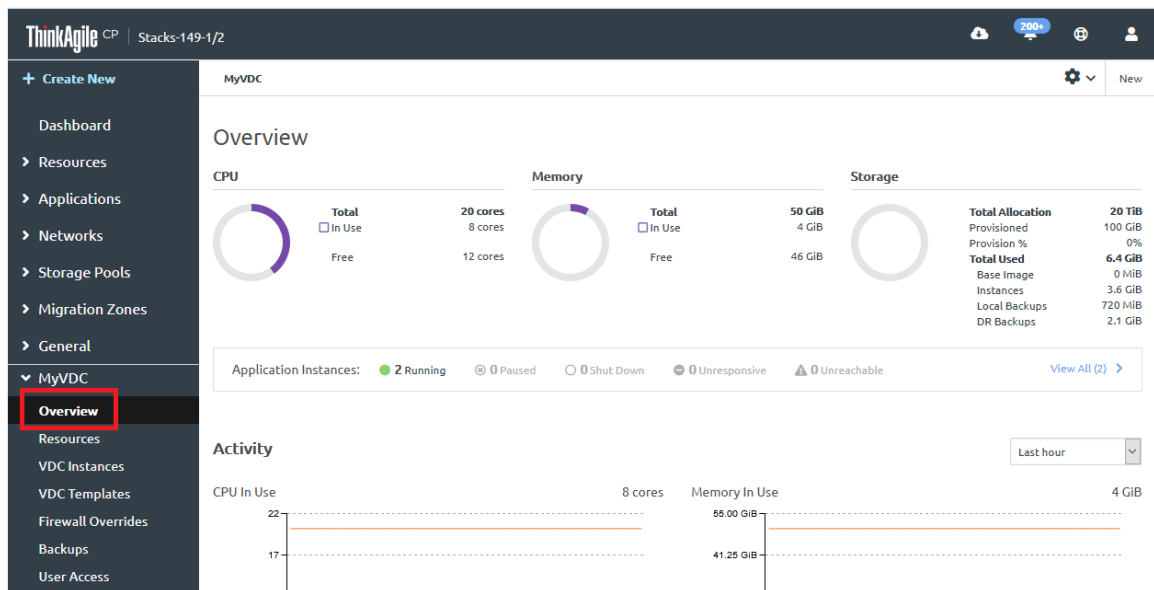


Figure 225. The VDC Overview page

Step 3. At the top of the Overview page, you can view resource utilization for the VDC.

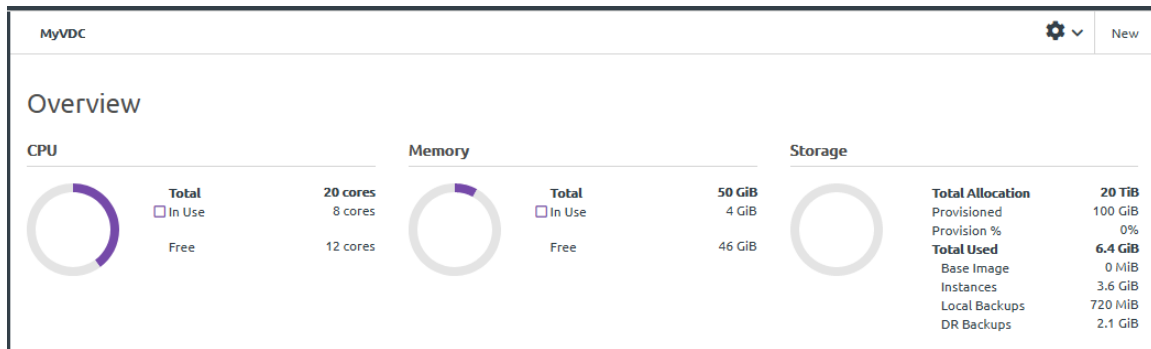


Figure 226. VDC resource utilization

- **CPU.** The processors allocated to the virtual datacenter from migration zones. This is broken down into CPU in use by application instances and free CPU.
- **Memory.** The memory allocated to the virtual datacenter from migration zones. This is broken down into memory in use by application instances and free memory.
- **Storage.** The storage allocated to the virtual datacenter from storage pools. The amount of storage allocated and provisioned to application instances from the virtual datacenter is shown. If the provisioned storage is greater than the allocated storage, the storage pool is *over-provisioned*. In addition, the storage is broken down into how it is used ( for base images, for application instances, or local backups, and for quick DR backups).

Step 4. Next to Application Instances, you can view the number of application instances in this virtual datacenter that are Running, Paused, Shutdown, Unresponsive, or Unreachable.

**Note:** **Infrastructure admin** users and **Infrastructure viewer** users can click **View All** to view all application instances in this virtual datacenter.



Figure 227. VDC application instances

Step 5. In the Activity section, you can view the following charts that show recent activity in the virtual datacenter. You can adjust the time interval displayed in the Activity charts from the last hour up to the last year.



Figure 228. VDC activity details

- **CPU in Use.** The number of CPU cores allocated to this VDC and the number of CPU cores in use by all running and paused instances in this virtual datacenter. You can mouse over this interactive chart to view more granular detail down to the minute.
- **Memory in Use.** The total provisioned memory allocated to this VDC, in gigabytes, and the amount of memory currently in use. Unit of measure is GB. You can mouse over this interactive chart to view more granular detail down to the minute.
- **Network Read Bandwidth.** Amount of data received from the network.
- **Network Write Bandwidth.** Amount of data transmitted to the network.
- **Total Storage Used.** The storage used by all instances in this virtual datacenter, in bytes, including backups (local backups and quick DR backups). This does not include the base image. You can mouse over this interactive chart to view more granular detail down to the minute.
- **IO Queue Length.** Number of outstanding I/O requests to the disk(s).
- **Storage Read Bandwidth.** Data transferred outbound from the disk(s) to the node.
- **Storage Write Bandwidth.** Data transferred inbound from the node to the disk(s).

**Note:** For more information about the storage activity charts, see the following topic:

[“View storage pool details” on page 168](#)

## View virtual datacenter allocations

You can view the resource allocations for virtual datacenters.

Log in to the ThinkAgile CP Cloud Controller. Then, complete one of the following steps to view compute and storage resource allocations for a virtual datacenter.

- In the left navigation menu of ThinkAgile CP Cloud Controller, under Resources, click **Allocations**. Resources available for allocation are summarized at the top of this page.

**Note:** To view the Allocations page, you must be logged in as an **infrastructure admin** or **infrastructure viewer** user.

The screenshot shows the 'Allocations' page in the ThinkAgile CP Cloud Controller. The left navigation menu has 'Allocations' highlighted. The main content area is titled 'Allocations' and includes a 'Resources Summary' section. Below this, there are three tables: CPU, MEMORY, and STORAGE.

Migration Zone	Category	CPU			MEMORY		
		Total	Allocated	(%)	Total	Allocated	(%)
MZ-1	Default	144 cores	398 cores	(276%)	762 GiB	1.85 TiB	(249%)

Storage Pool	Connected Migration Zone	STORAGE		
		Total	Allocated	(%)
SP1	MZ-1	43.34 TiB	24 TiB	(55%)
SP2	MZ-1	261.05 TiB	24 TiB	(9%)

Figure 229. Example of Resource Summary section

Scroll down to Datacenter Allocations to see the allocations per virtual datacenter. This includes CPU and Memory allocations per migration zone and compute category as well as Storage allocations per storage pool and connection migration zone. You can click **Details** to navigate to the Overview page of this virtual datacenter and view datacenter details.

The screenshot shows the 'MyVDC Details' page. It features three tables: CPU, MEMORY, and STORAGE, showing allocations for a specific virtual datacenter.

Migration Zone	Category	CPU		MEMORY	
		Allocated	Allocated		
MZ-1	Default	20 cores	50 GiB		

Storage Pool	Connected Migration Zone	STORAGE	
		Allocated	Allocated
SP1	MZ-1	10 TiB	10 TiB
SP2	MZ-1	10 TiB	10 TiB

Figure 230. Example Virtual Datacenter Allocations

- In the left navigation menu, click to select and expand the specific virtual datacenter for which you want to view allocations, and then click **Resources**. The Resources page shows available resources as well as the current allocations for the virtual datacenter. Compute resources are listed first by migration zone, then by compute category within each migration zone. Storage resources are listed by storage pool.

**Note:** If you are logged in as a **VDC manager** or **VDC viewer** user, you can only see the VDCs to which you have access.

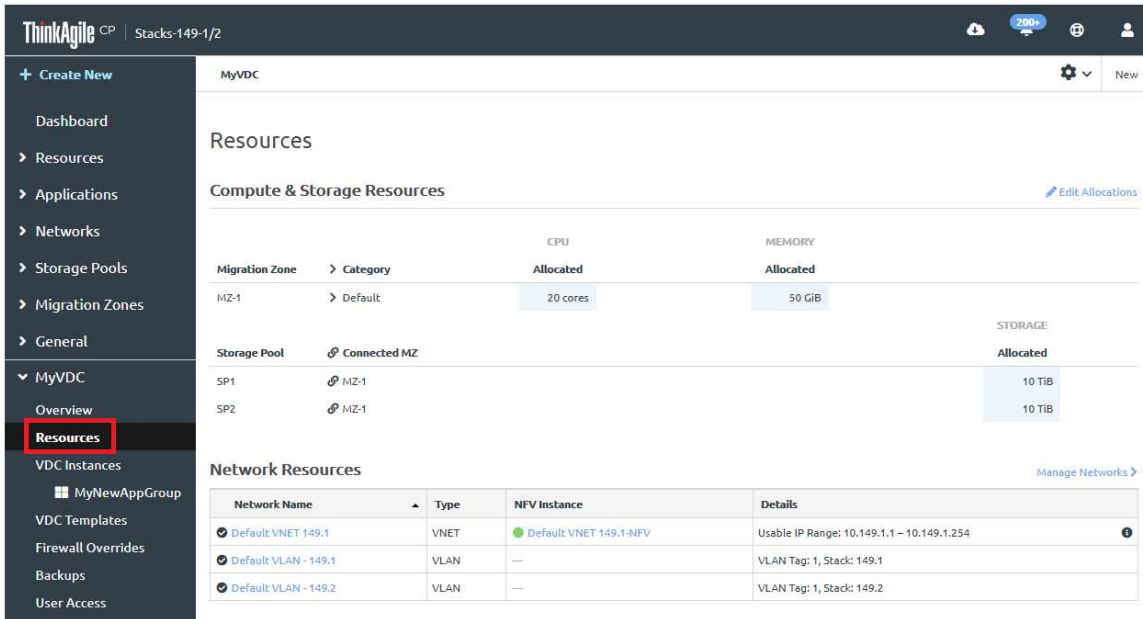


Figure 231. Resources page for a VDC

## Viewing virtual datacenter instances

You can view all application instances that are currently created within the VDC.

Complete the following steps to view the application instances in the VDC:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, click to select and expand the virtual datacenter you want to view, and then click **VDC Instances** to view the VDC Instances page.

**Note:** **Infrastructure admin** users and **Infrastructure viewer** users can click **View All** from the Overview page to display this page.

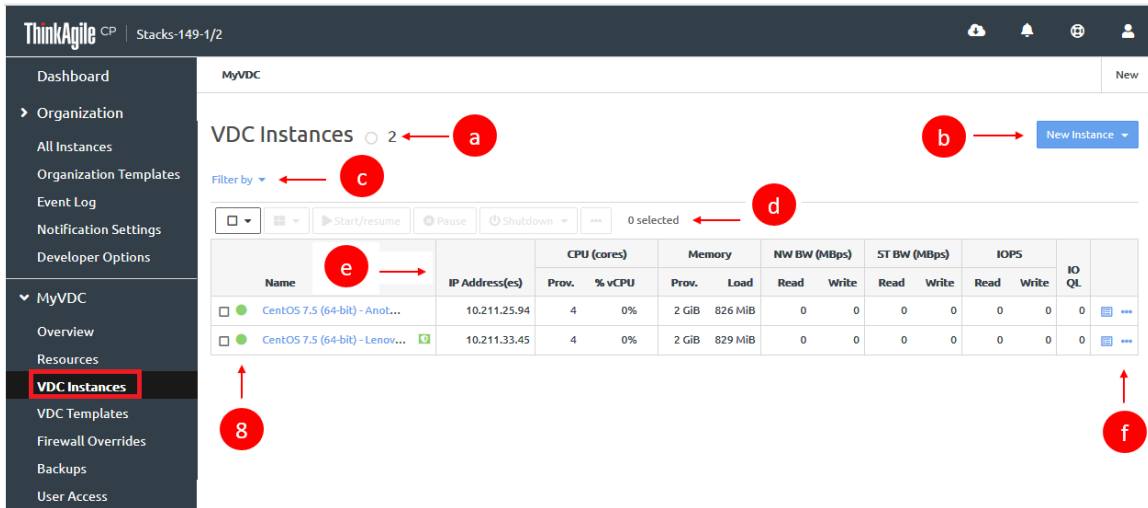


Figure 232. The VDC Overview page

- a. View the number of application instances within the VDC.
- b. Click **New Instance** to create a new application instance from an installer or template.

You must be logged in as an **infrastructure admin** user or a **VDC manager** user to create new application instances.

For more information about creating a new application instance, see the following topic:

[“Create and deploy applications” on page 28](#)

- c. Click **Filter by** to filter this list by instance status, such as running, paused, or shut down) or by DR status (if enabled).
- d. View the count of currently selected instances and select one or more instances in the list.

You can perform actions on the selected application instances from the top of the table. You can perform actions such as:

- Stopping and starting an instance
- Pausing an instance
- Deleting an instance

For more information about the actions that can be performed on an instance, see the following topic:

[“Manage application instances” on page 42](#)

- e. View the following information in the list of applications.

Column in Applications List	Description
Name	The name of the application instance.
IP Address(es)	The IP address(es) of the application instance.
CPU Provisioned	The number of cores/amount of CPU provisioned to this instance. This value is entered when the application instance is created.







Column in Applications List	Description
% vCPU	The average virtual CPU utilization on the cores provisioned to this application instance as reported by the instance.
% CPU	The average CPU utilization on the cores provisioned to this application instance as reported by the node (hypervisor).
Memory Provisioned	The amount of memory provisioned to this instance (in GB). This value is entered when you create the application instance.
Memory Load	The amount of data (in bytes) currently held in memory by this instance. This is the memory usage from the application perspective.
NW BW (MBps) Read	Network Read Bandwidth. The amount of data received (in MBps) from the network.
NW BW (MBps) Write	Network Write Bandwidth. The amount of data transmitted (in MBps) to the network.
ST BW (MBps) Read	Storage Read Bandwidth. The amount of data transferred (in MBps) outbound from the disk(s) to the node.
ST BW (MBps) Write	Storage Write Bandwidth. The amount of data transferred (in MBps) inbound from the node to the disk(s).
IOPS Read	The number of read requests per second to the disk(s).
IOPS Write	The number of write requests per second to the disk(s).
IO QL	IO Queue Length. The number of outstanding IO requests to the disk(s).







- f. From the Actions menu, perform actions on the application instance, such as connecting to the console. For more information about the actions you can perform on application instances, see the following topic:



[“Manage application instances” on page 42](#)

- g. View the current state of the application instance.

An application instance can be in one of the following states:

Icon	State	Description
	Running	The instance is operational after a successful start or restart. (Instances do not have to run a guest agent; therefore, an instance can show <i>running</i> before the guest agent starts or the instance is fully booted).
	Paused	The instance is reachable but is paused. Application instances continue to use memory resources while paused.
	Shutdown	The instance has been properly shut down.
	Unresponsive	<p>The instance was not shut down by a user, but the guest agent in the instance is not responding to ThinkAgile CP Cloud Controller.</p> <p><b>Note:</b> When some Windows- and Linux-based application instances are launched in ThinkAgile CP, a guest agent might be installed, which periodically communicates with the platform. If ThinkAgile CP is unable to communicate with the agent on the instance, the instance will move to the unreachable state. The instance itself may be working, but the guest agent is unreachable.</p> <p>The VM might be functioning normally; the management of the host by ThinkAgile CP is the issue.</p> <p>If you restart the instance, this issue will resolve. If you do not want to restart the instance, but require assistance, you should contact ThinkAgile CP Support.</p>

Icon	State	Description
	Unreachable	<p>The compute node host on which the instance is running, is no longer responding to health checks from the ThinkAgile CP Cloud Controller. This would indicate a host level issue.</p> <p>The VM might be functioning normally; the management of the host by ThinkAgile CP is the issue.</p>
	Working/ Changing state	The instance is in the process of changing from one state to another.
	NFV instance	<p>The application instance is running as a custom NFV instance.</p> <p>For more information about custom NFV appliances, see the following topic:</p> <p><a href="https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/create-a-custom-nfv-appliance.html">https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/create-a-custom-nfv-appliance.html</a></p>
	Temporary revert	<p>The instance has been reverted, and the reversion has not been made permanent. The following actions are not available until the revert is made permanent:</p> <ul style="list-style-type: none"> <li>• Take a backup</li> <li>• Automatic local backups</li> <li>• Create template</li> <li>• vDisk and vNIC management</li> </ul>
	Compatibility Mode	<p>The instance is running in compatibility mode.</p> <p>For more information about compatibility mode, see the following topic:</p> <p><a href="#">“Understand instance modes” on page 67</a></p>
	Quick DR backups available	Quick DR backups are available at the DR location for this application instance.

Icon	State	Description
	Replicating	Disaster recovery is enabled and quick DR backups are currently transferring to the disaster recovery location.
	Protected	DR is enabled and all quick DR backups have replicated or transferred to the disaster recovery location.

## Viewing virtual datacenter templates

You can view all templates that are available to the VDC.

**Note:** Templates stored in the VDC Templates store are available only to this VDC. Templates stored in the Organization Templates store are available to all VDCs within the organization. For more information about application templates, see the following topic:

[“Application templates” on page 95](#)

Complete the following steps to view the templates that have been loaded into the VDC store:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, click to select and expand the virtual datacenter you want to view, and then click **VDC Templates** to view the VDC Templates page.

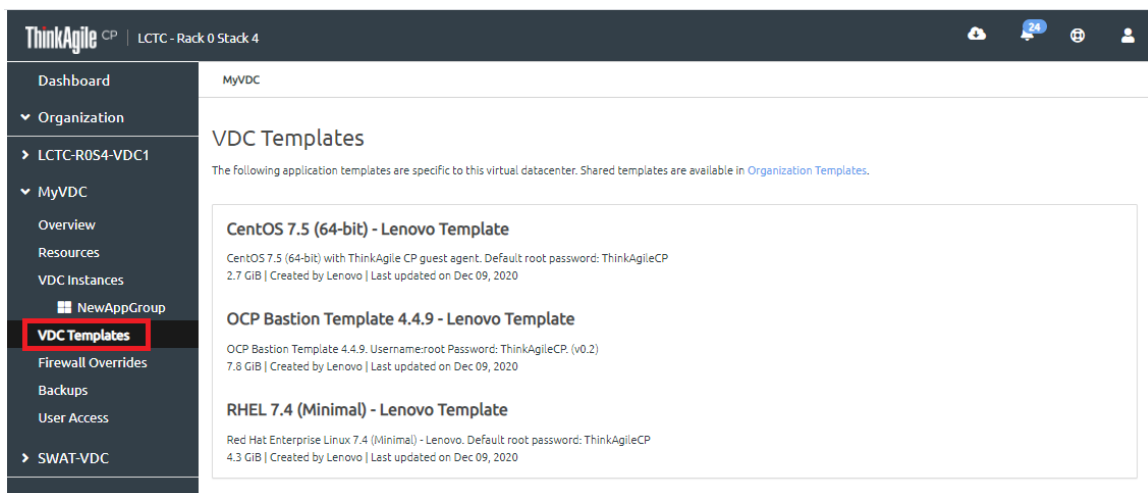


Figure 233. VDC Templates store

## Creating a firewall override

A firewall override can be used to override any existing firewall profiles for a specific VDC. **Infrastructure admin** users and **VDC manager** users can set up firewall overrides.

For more information about firewall profiles, see the following topic:

[“Manage firewall profiles” on page 156](#)

Complete the following steps to set up a firewall override:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, click to select and expand the virtual datacenter you want to view, and then click **Firewall overrides** to view the Firewall Overrides page.

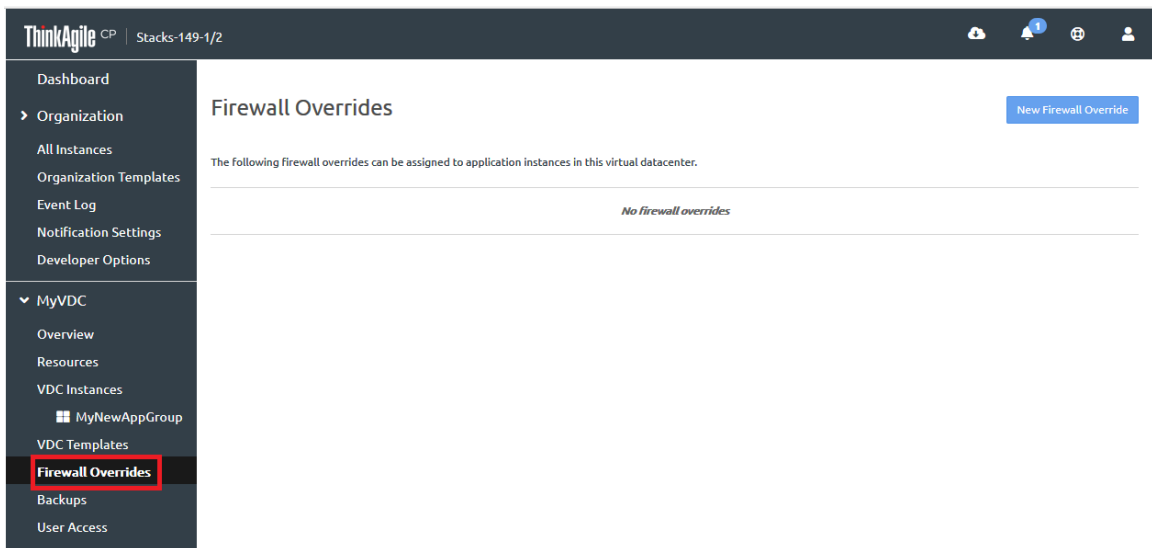


Figure 234. Firewall Overrides page

- Step 3. Click **New Firewall Override** to display the New Firewall Override dialog.

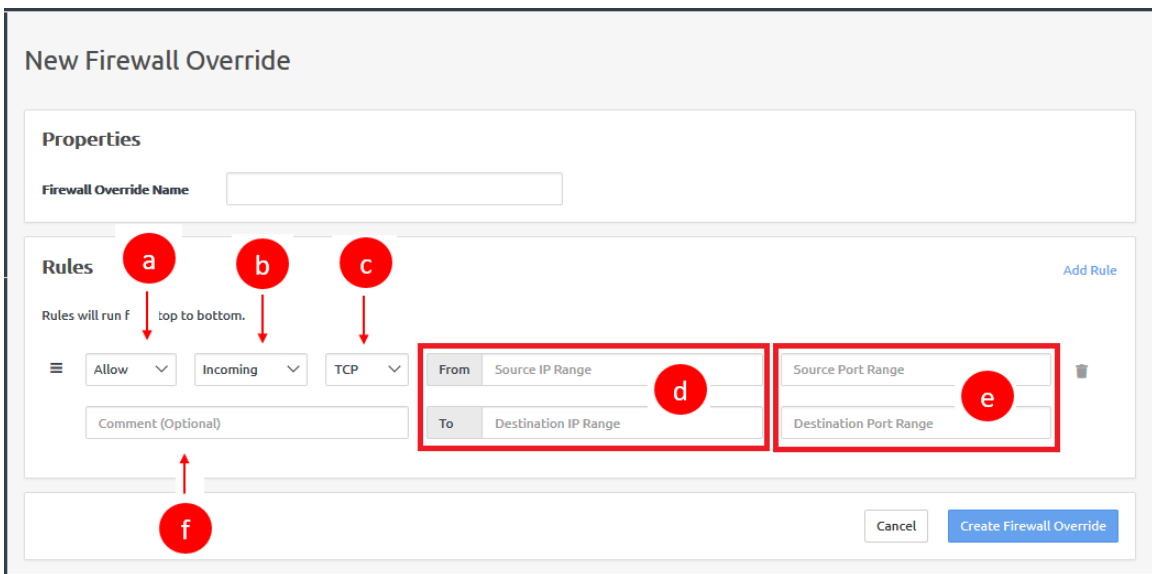


Figure 235. New Firewall Overrides dialog

- Step 4. In the Firewall Override Name field, enter a name for the firewall override.
- Step 5. Click **Add Rule** to add a new rule to the firewall override as needed.
- Step 6. Define the rule as follows:
  1. In the first drop-down, select the type of rule as **Allow**, **Drop**, or **Reject**.

2. In the second drop-down, select the type of traffic to apply the rule to as either **Incoming** or **Outgoing**.
3. In the third drop-down, select the traffic protocol type as **All**, **TCP**, **UDP**, or **ICMP**.
4. For the fields, From Source IP Range and To Destination IP Range, you can enter an IP range in the format 198.168.100-198.168.0.100 or 198.168.0.100, or you can leave the fields blank for all IPs.
5. For the Source Port Range and Destination Port Range fields, you can enter a port range in the format 1-65535 or 65535, or you can leave the fields blank for all ports.
6. For the Comment field, you can enter a comment for this rule. (optional)

Step 7. Add all necessary rules. Then, click **Create Firewall Override**.

The firewall override is added for the VDC.

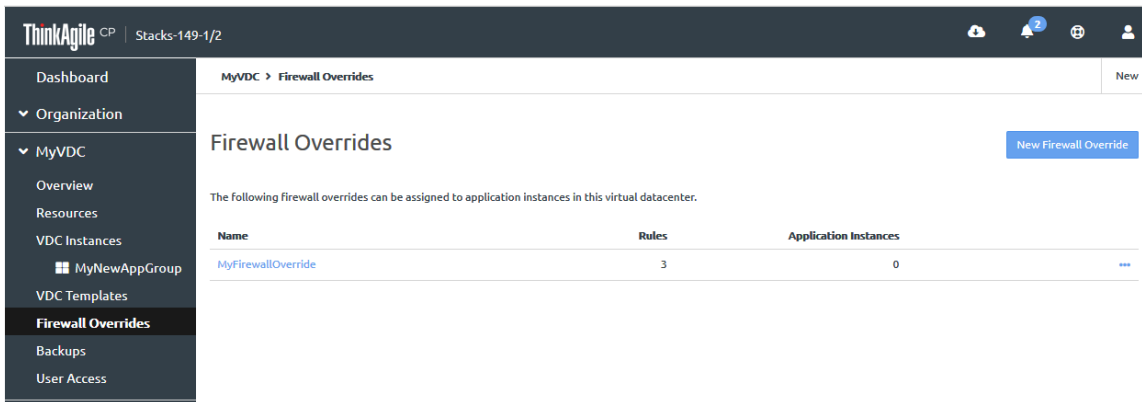


Figure 236. Firewall override added

Click the Actions menu (  ) to the right of the firewall override to rename the override, update the rules, or delete the override.

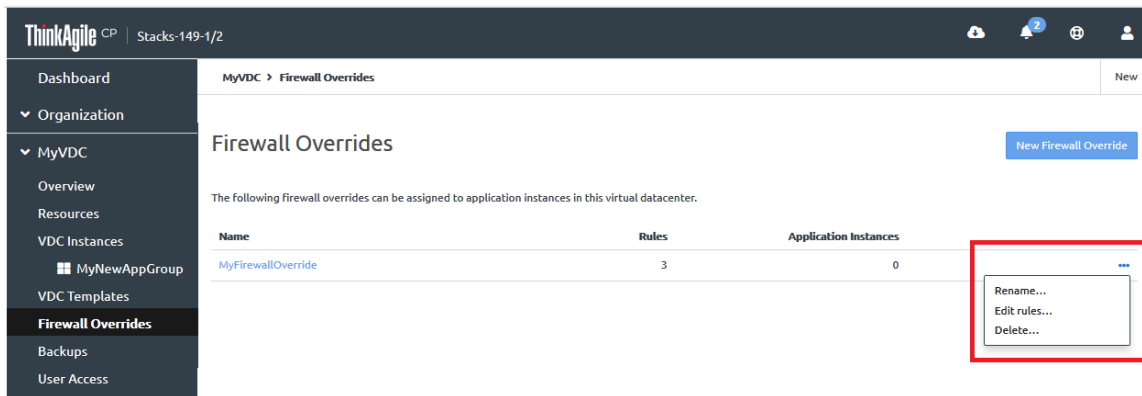


Figure 237. Firewall override Actions menu

## Registering an external backup repository

Before you can save application instance backups to an external backup repository, you must first register that repository. However, you must first register the repository with ThinkAgile CP. You must be logged in as an **infrastructure admin** user or a **VDC manager** user to register an external backup repository.

You can register an Amazon S3 bucket or any Amazon S3-compliant repository (any repository that utilizes the Amazon S3 authentication mechanisms, such as region, access key, secret key, and bucket).

The external repository must exist before it can be registered with ThinkAgile CP. For information about setting up Amazon S3 buckets, see the following topic:

<https://docs.aws.amazon.com/AmazonS3/latest/user-guide/create-bucket.html>

Complete the following steps to register an external backup repository:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, click to select and expand the virtual datacenter for which you want to add the external repository. Then click **Backups** to view the Backups page.

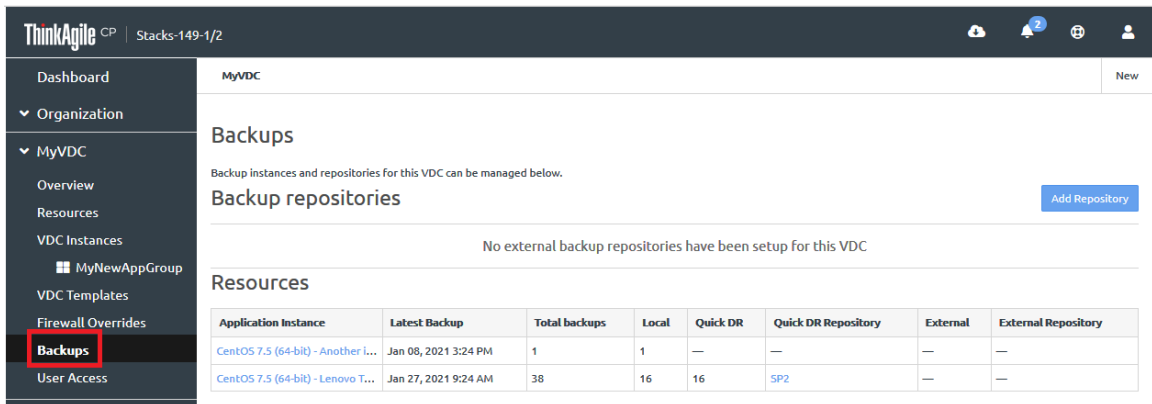


Figure 238. VDC Backups page

The Backups shows a summary listing of all external backup repositories and all application instance backups for the VDC.

- Step 3. Click **Add Repository**.
- Step 4. On the Getting Started page, click **Next**.
- Step 5. Fill in the details for the external repository.

Figure 239. VDC Backups page

- a. The account URL for an Amazon S3 account is displayed by default. If you are using a different external repository, enter the URL for that repository.
- b. Specify the region where the storage bucket is located. If you are using an Amazon S3 account, the region is shown on the Buckets page of the Amazon S3 console.
- c. Specify the access key.
- d. Specify the secret key. If you are using Amazon S3, the access key and the secret key can be created on the Your Security Credentials page of the Amazon S3 console.
- e. Specify the name of an existing bucket.

Step 6. Click **Next** to display the Create Repository dialog. If you are using Amazon S3, the credentials are validated.

Step 7. Enter the name to be used for the external repository and, optionally, fill in a description. Then click **Create**.

The backup repository is listed on the **Backups** page.



Repository	Latest Backup	Backups	App Instance	Actions
My Backup Repo	—	0	0	...

Application Instance	Latest Backup	Total backups	Local	Quick DR	Quick DR Repository	External	External Repository
CentOS 7.5 (64-bit) - Lenovo T...	Feb 08, 2021 10:06 AM	1	1	—	—	—	—
Ubuntu-18.04.1 - Lenovo Tem...	Feb 08, 2021 10:09 AM	1	1	—	—	—	—

Figure 240. Backup repositories listing

After registering the backup repository, you can specify the repository when you set up external backups for an application instance. For more information about enabling and managing external backups, see the following topic:

[“Manage external backups” on page 305](#)

## Viewing virtual datacenter users

You can view the list of **VDC manager** and **VDC viewer** users for a virtual datacenter. You can click the Last Name column to sort the list of users.

Complete the following steps to view virtual datacenter users

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, expand the virtual datacenter for which you want to view the users, and click **User Access** to display the User Access page.

The following figure shows the page that is displayed if you are logged in as a **VDC manager** or **VDC viewer** user.

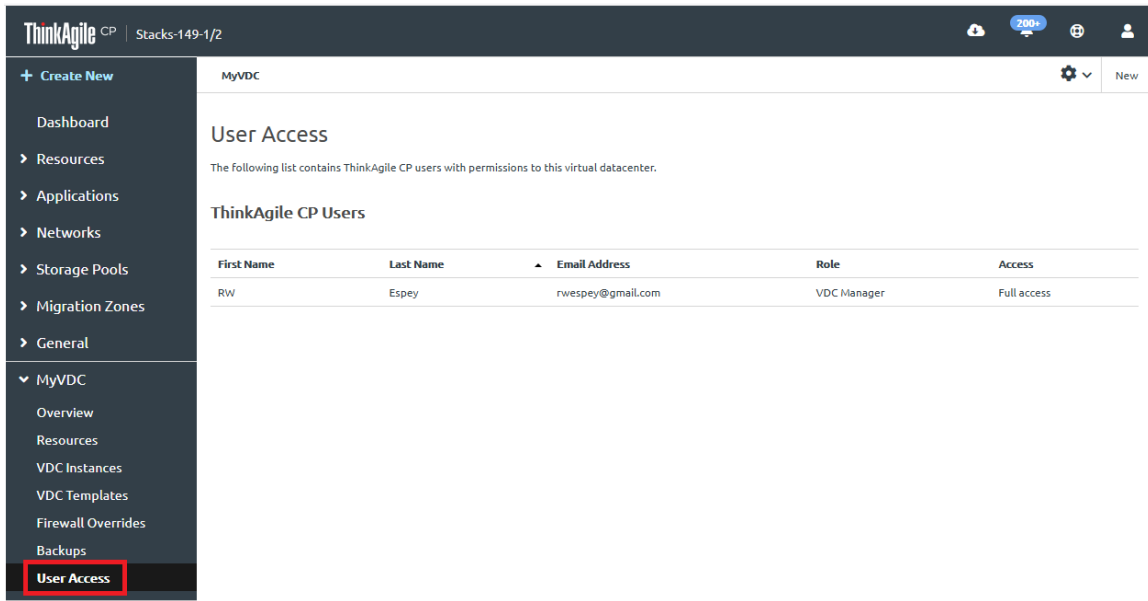


Figure 241. VDC user access – VDC manager or VDC viewer user

Step 3. If you are logged in as a **infrastructure viewer** user, you will see the **Manage Users** link, which you can click to view all users for an organization.

For information about viewing and managing users for an organization, see the following topic:

[“Manage self-service” on page 248](#)

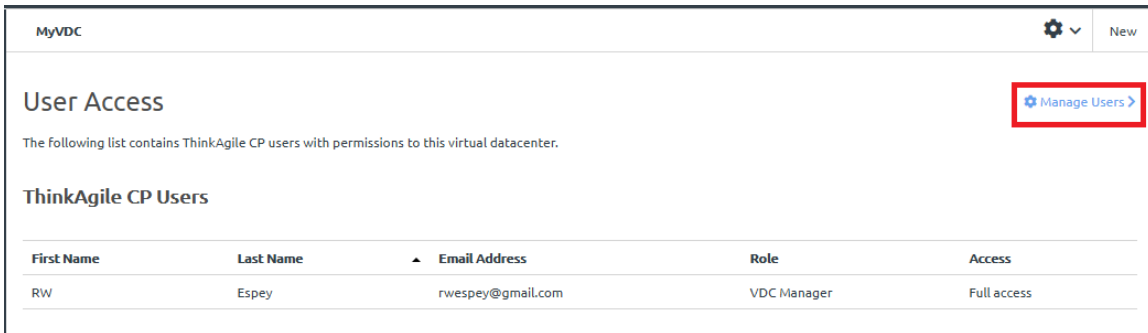


Figure 242. VDC user access – infrastructure viewer user

Step 4. If you are logged in as a **infrastructure admin** user, you will see the **Enable support widget for VDC users** check box in addition to the **Manage Users** link.

For information about the chat support widget, see the following topic:

[“Enabling the chat support widget” on page 231](#)

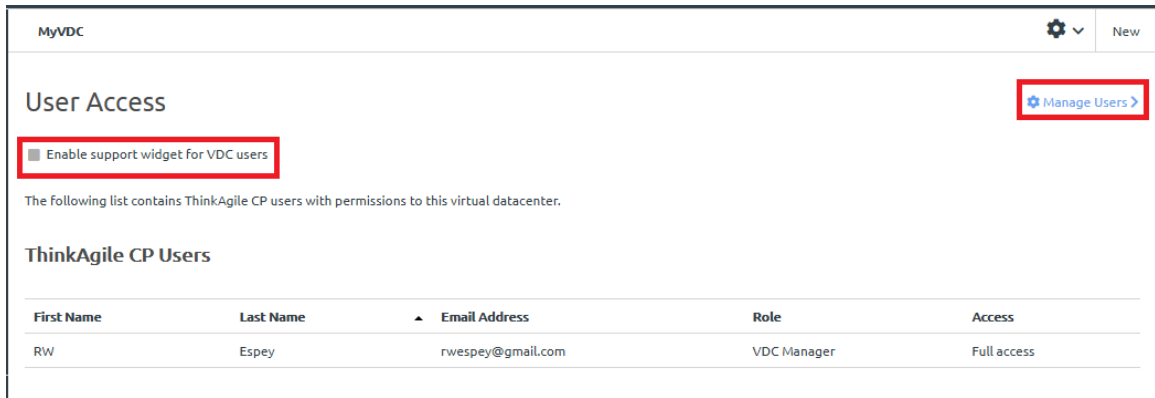


Figure 243. VDC user access – infrastructure admin user

## Managing virtual datacenters

**Infrastructure admin** users can perform a variety of actions on virtual datacenters, such as renaming, deleting, and changing allocations for a virtual datacenter.

**Note:** **Infrastructure viewer**, **VDC manager**, and **VDC viewer** users can see information about virtual datacenters, but these users cannot actually make changes to virtual datacenters.

For more information about user roles in ThinkAgile CP, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/self-service.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/self-service.html)

Refer to the following topics:

- “Renaming a virtual datacenter” on page 225
- “Changing allocations for a virtual datacenter” on page 227
- “Deleting a virtual datacenter” on page 229
- “Enabling the chat support widget” on page 231

### Renaming a virtual datacenter

**Infrastructure admin** users can rename a virtual datacenter.

Complete the following steps to rename a virtual datacenter:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, expand the virtual datacenter you want to rename, and then click **Overview** to view the VDC Overview page.

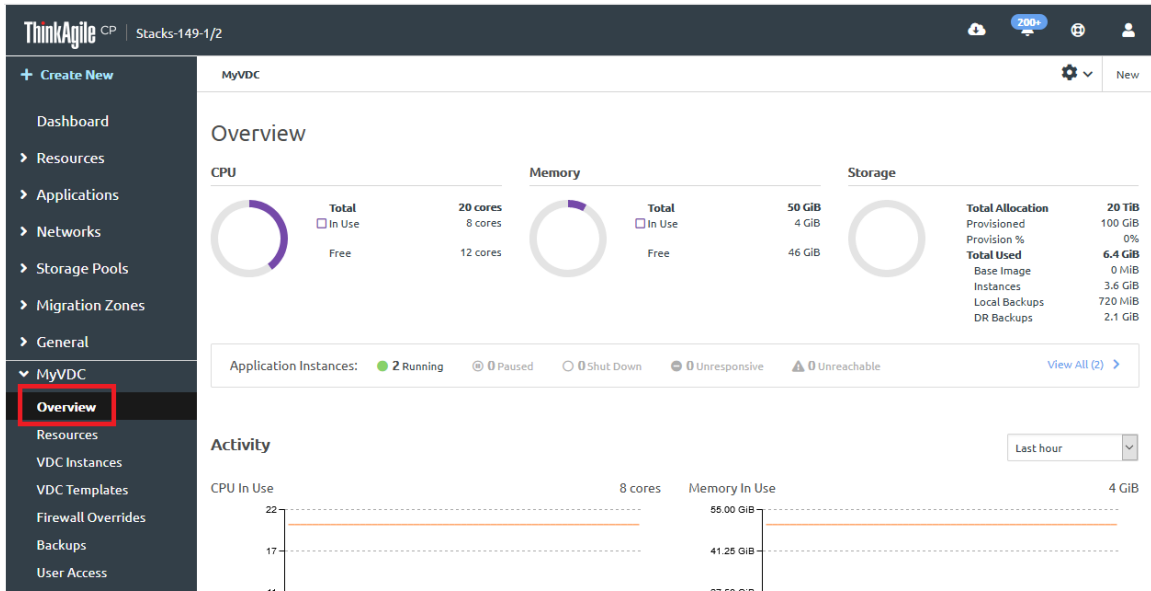


Figure 244. VDC Overview page

Step 3. On the Actions drop-down menu in the upper right corner of the page, click **Rename**.

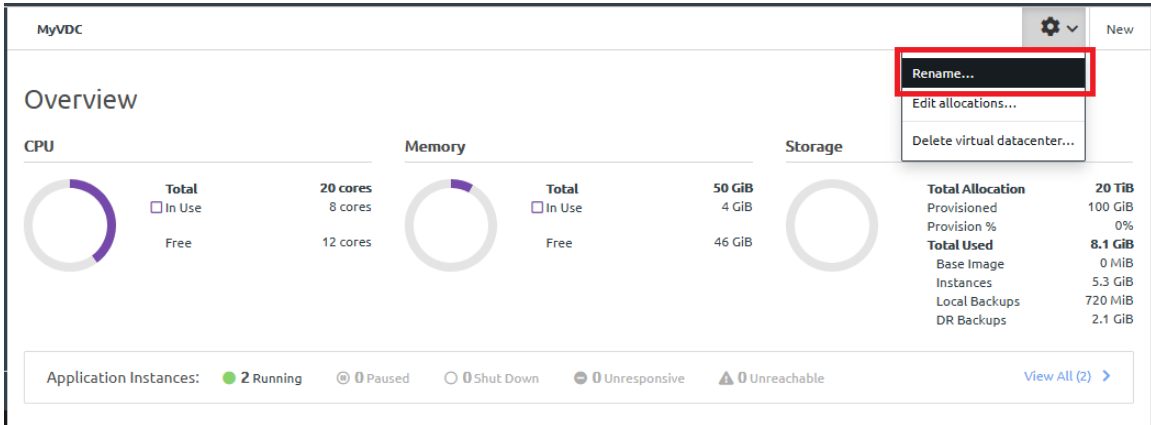


Figure 245. Rename VDC option

Step 4. Enter a new name for the virtual datacenter. Click **Update**. This name must be unique across all virtual datacenters in your infrastructure.

**MyVDC: Rename Virtual Datacenter**

Enter a unique name for the virtual datacenter.

**Virtual Datacenter Name**

Figure 246. Rename Virtual Datacenter dialog

The VDC name is updated.

**Note:** You might need to refresh the page for the updated name to appear in the left navigation.

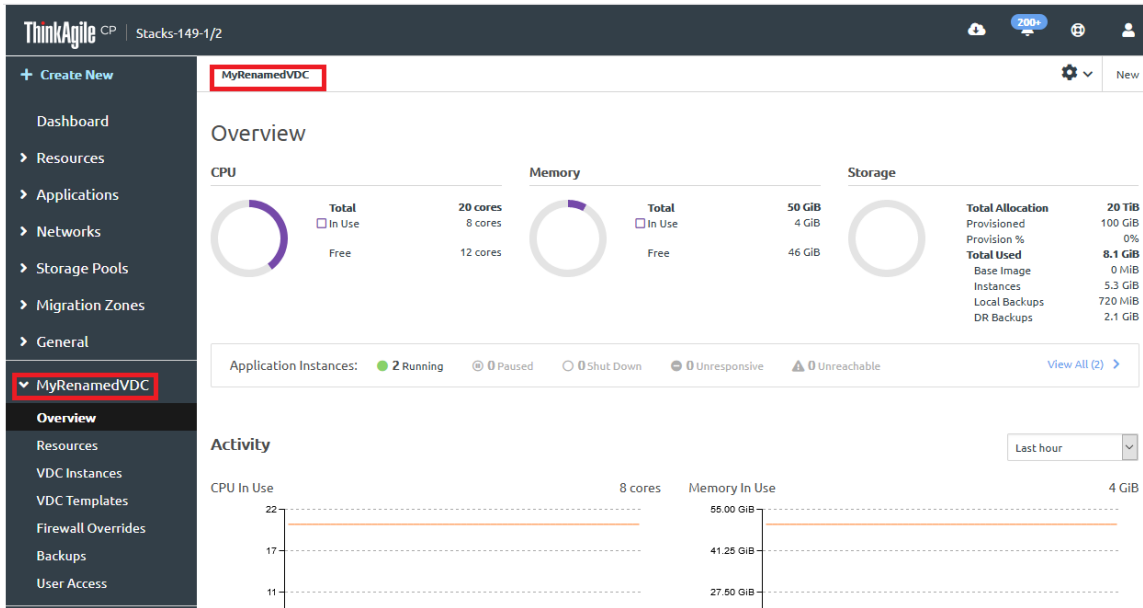


Figure 247. Renamed Virtual Datacenter

## Changing allocations for a virtual datacenter

**Infrastructure admin** users can modify the compute and storage allocations for a virtual datacenter.

Complete the following steps to change the allocations for a virtual datacenter:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, expand the virtual datacenter you want to rename, and then click **Overview** to view the VDC Overview page.

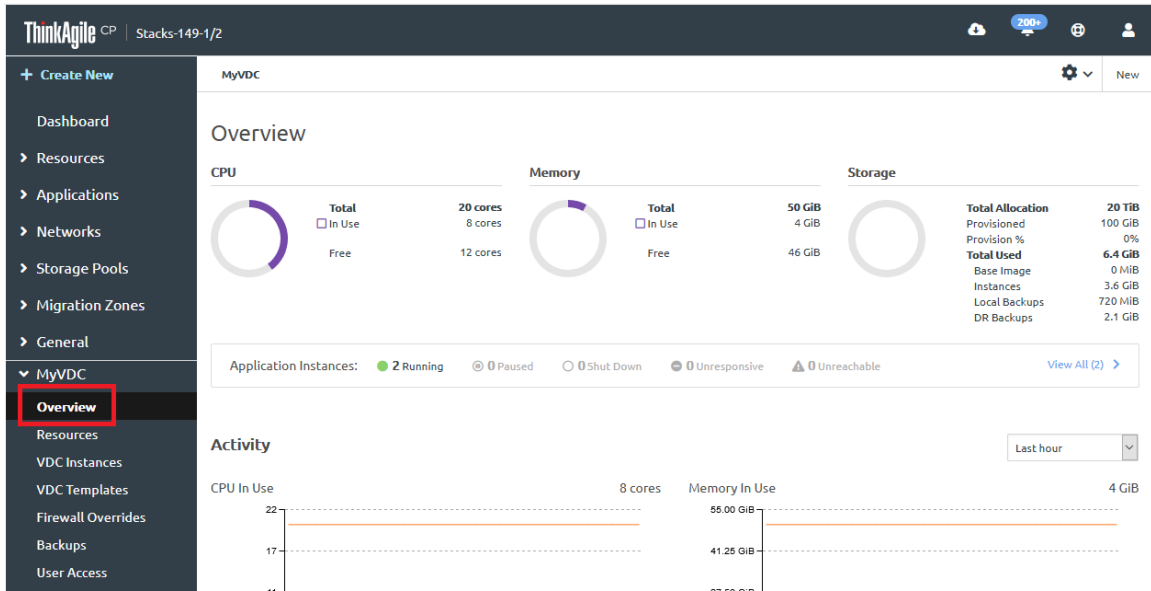


Figure 248. VDC Overview page

Step 3. On the Actions drop-down menu in the upper right corner of the page, select **Edit Allocations**.

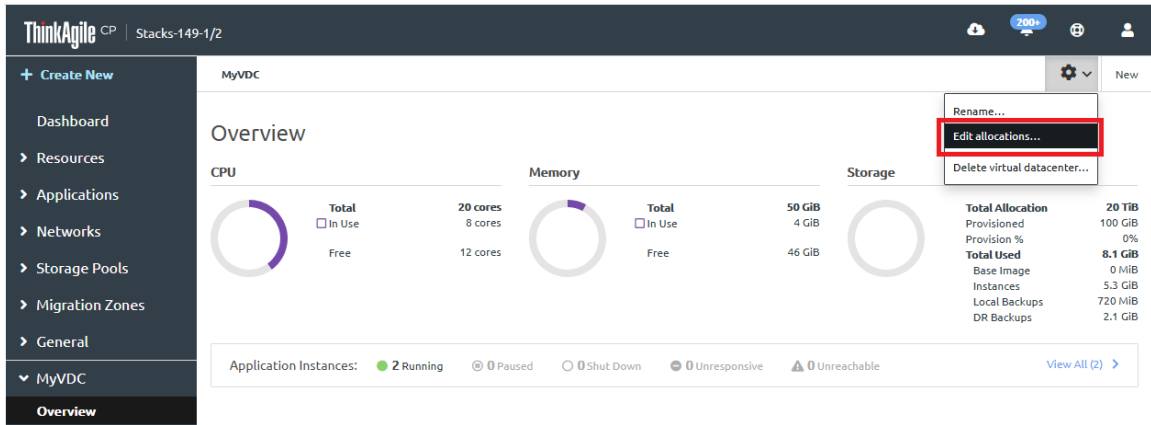


Figure 249. Edit VDC allocations option

- Step 4. Scroll down the list of VDCs to find the VDC for which you want to modify the allocations.
- Under the Datacenter Allocation section, modify compute resources (CPU cores and Memory) from one or more compute categories within the migration zone(s). Enter the number of cores and the amount of memory in GiB.

MyVDC				DR
Migration Zone	Category	CPU	MEMORY	
		Allocated	Allocated	
MZ-1	Default	20 cores	50 GiB	
Storage Pool	Connected Migration Zone	STORAGE		
		Allocated		
SP1	MZ-1	10	TiB	
SP2	MZ-1	10	TiB	

Figure 250. CPU cores and memory allocation

**Attention:** Compute allocations must include both CPU cores and memory from the same compute category.

- b. Modify storage resources from the listed storage pool(s) by entering an amount in TiB.

**Note:** To enable quick DR backups, you must allocate resources to at least two storage pools. For more information about disaster recovery, see the following topic: [“Manage quick DR backups” on page 288](#)

MyVDC				DR
Migration Zone	Category	CPU	MEMORY	
		Allocated	Allocated	
MZ-1	Default	20 cores	50 GiB	
Storage Pool	Connected Migration Zone	STORAGE		
		Allocated		
SP1	MZ-1	10	TiB	
SP2	MZ-1	10	TiB	

Figure 251. Storage allocation

Step 5. Click **Save changes**.

The VDC allocations are updated.

## Deleting a virtual datacenter

**Infrastructure admin** users can delete a virtual datacenter.

**Note:** This action cannot be undone.

Before you can delete a virtual datacenter, you must first remove all application instances in the VDC. For more information about removing application instances, see the following topic:

[“Manage application instances” on page 42](#)

Complete the following steps to delete a virtual datacenter:

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. In the left navigation menu, expand the virtual datacenter you want to rename, and then click **Overview** to view the VDC Overview page.

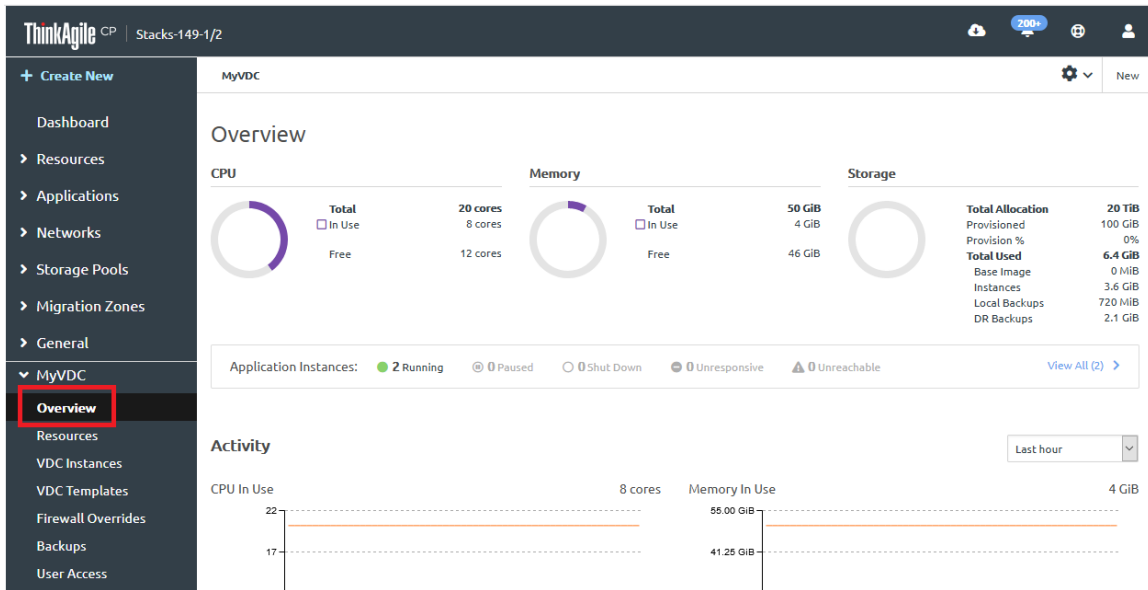


Figure 252. VDC Overview page

Step 3. On the Actions drop-down menu in the upper right corner of the page, select **Delete virtual datacenter**.

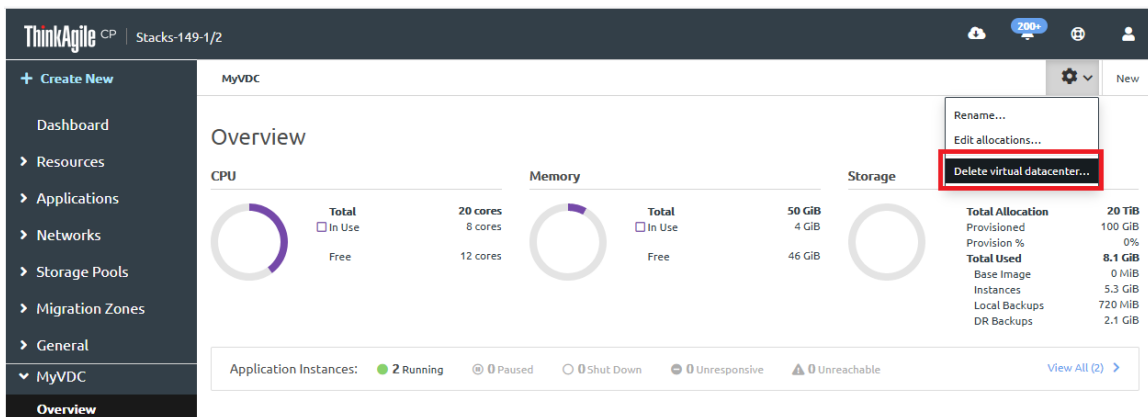


Figure 253. Delete VDC option

Step 4. In the Confirmation dialog box, click **Delete Virtual Datacenter**.



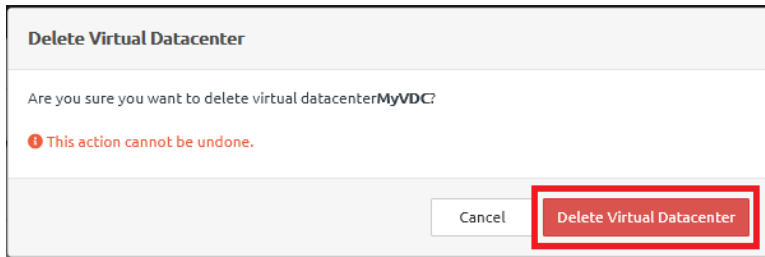


Figure 254. Delete VDC confirmation dialog

The VDC is deleted, and it no longer appears in the left navigation.

## Enabling the chat support widget

The chat support widget is a chat interface that allows a user to connect directly to Lenovo Support. This provides a simple and quick method to contact Lenovo Support and request help with any issues or concerns you might encounter.

**Infrastructure admin** users can choose to enable this widget for an existing virtual datacenter or when creating a new virtual datacenter. If enabled, it is enabled for all users associated with a virtual datacenter.

### Chat support for existing virtual datacenters

The chat support widget can also be enabled or disabled for existing virtual datacenters. Complete the following steps to enable the chat support widget:

1. Log in to the ThinkAgile CP Cloud Controller.
2. In the left navigation menu, expand the virtual datacenter for which you want to view the users, and click **User Access** to display the User Access page.
3. Click **Enable support widget for VDC users** to enable chat support

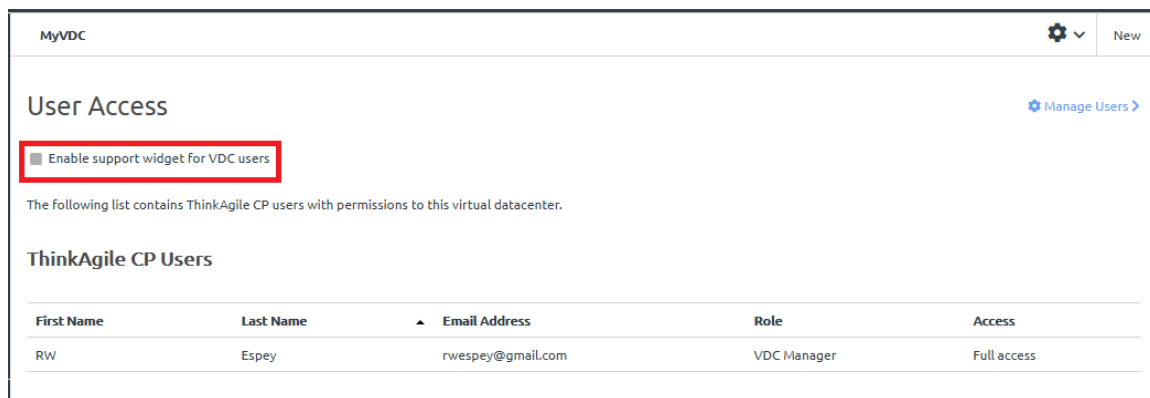
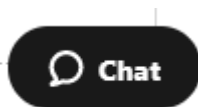


Figure 255. Enabling chat support for an existing datacenter

The Chat button appears on all pages in the ThinkAgile CP Cloud Controller



## Chat support for new virtual datacenters

By default, when creating a new virtual datacenter, the chat support widget is disabled, which means that users cannot directly contact Lenovo Support. To enable the chat support widget, click **Enable support widget for VDC users** when creating a new virtual datacenter. For more information about creating a virtual datacenter, see the following topic:

[“Creating Virtual Datacenters” on page 204](#)

Migration Zone		CPU		MEMORY	
> Category	Allocated	Allocated		Allocated	
MZ1	> Default	0	cores	0	GIB
MZ2	> Default	0	cores	0	GIB

Storage Pool		STORAGE	
Connected Migration Zone	Allocated	Allocated	
SP1	MZ1, MZ2	0	TIB
SP2	MZ1, MZ2	0	TIB

Enable support widget for VDC users

Cancel Create Virtual Datacenter

Figure 256. Enabling chat support when creating a new virtual datacenter

## Managing application groups

**Infrastructure admin** users and **VDC manager** users can create application groups to group application instances together that belong to the same virtual datacenter. (Application group names must be unique in a given virtual datacenter.) You can then easily view information for the instances in the group by selecting and viewing the application group from the left navigation menu in the ThinkAgile CP Cloud Controller.

Refer to the following topics for information about managing application groups.

- [“Creating an application group” on page 232](#)
- [“Renaming an application group” on page 234](#)
- [“Deleting an application group” on page 236](#)
- [“Adding application instances to an application group” on page 238](#)
- [“Removing application instances from an application group” on page 240](#)

### Creating an application group

**Infrastructure admin** users and **VDC manager** users can create an application group for a virtual datacenter.

Complete the following steps to create an application group:

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. In the left navigation menu, expand the virtual datacenter for which you want to create an application group, and then click **Overview** to view the VDC Overview page.

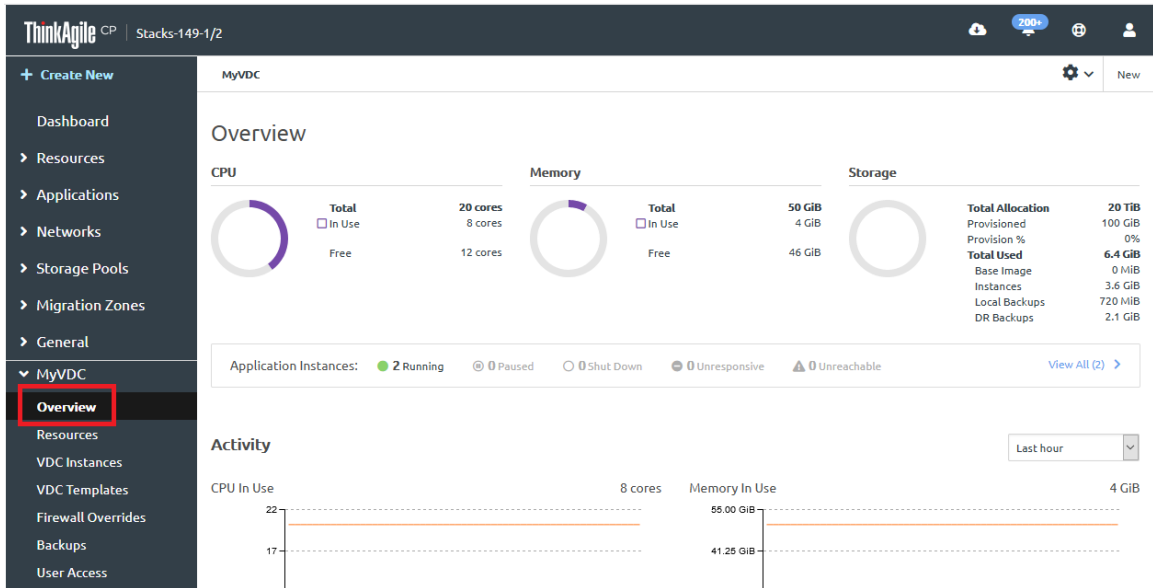


Figure 257. VDC Overview page

Step 3. Click **New** → **New application group**.

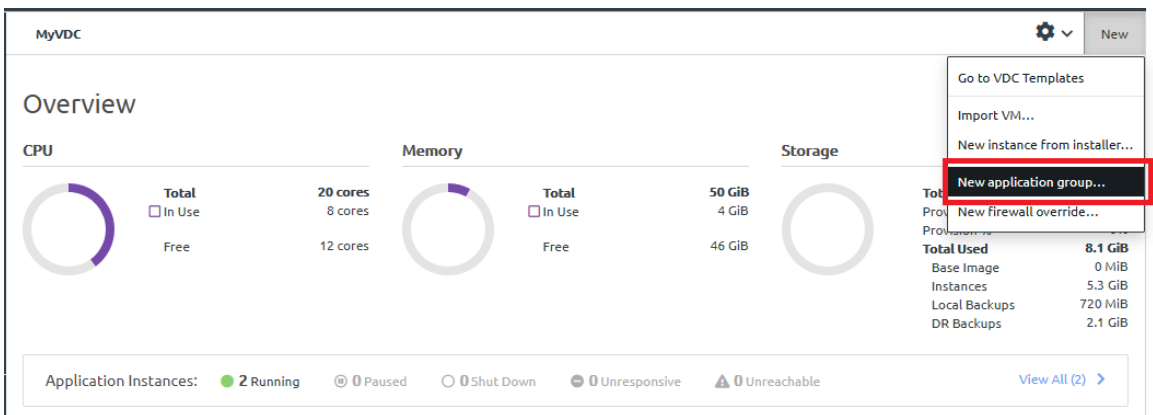


Figure 258. New application group option

Step 4. Enter a name for the application group, and then click **Create Group**. This name should be a unique name within the virtual datacenter.

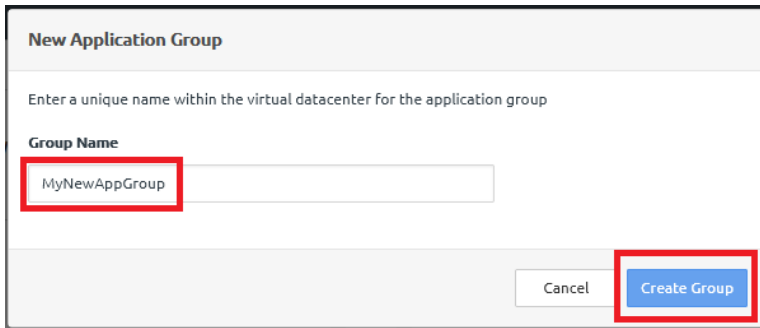


Figure 259. New Application Group dialog box

The new application group is displayed in the left navigation.

**Note:** You might need to refresh the page to update the left navigation.

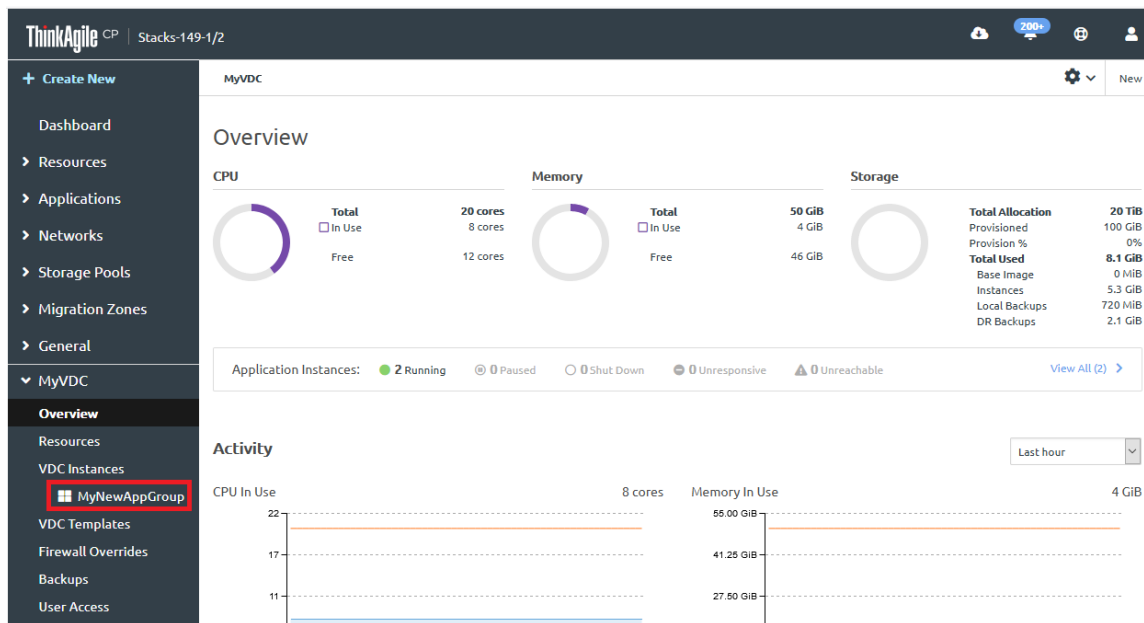


Figure 260. New application group

## Renaming an application group

**Infrastructure admin** users and **VDC manager** users can rename an application group.

Complete the following steps to rename an application group:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, expand the virtual datacenter for which you want to create an application group, and then click the application group (under VDC Instances) to be renamed.

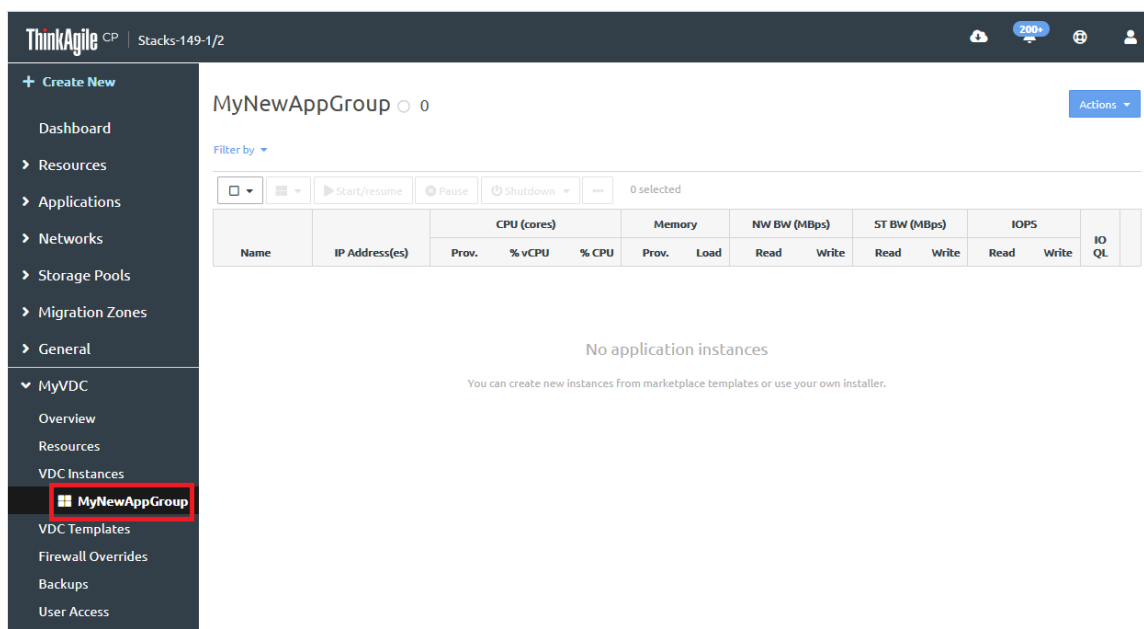


Figure 261. Application group page

- Step 3. Under the expanded virtual datacenter in the left navigation menu, select the application group that you want to rename.
- Step 4. On the Actions menu, click **Rename Application Group**.

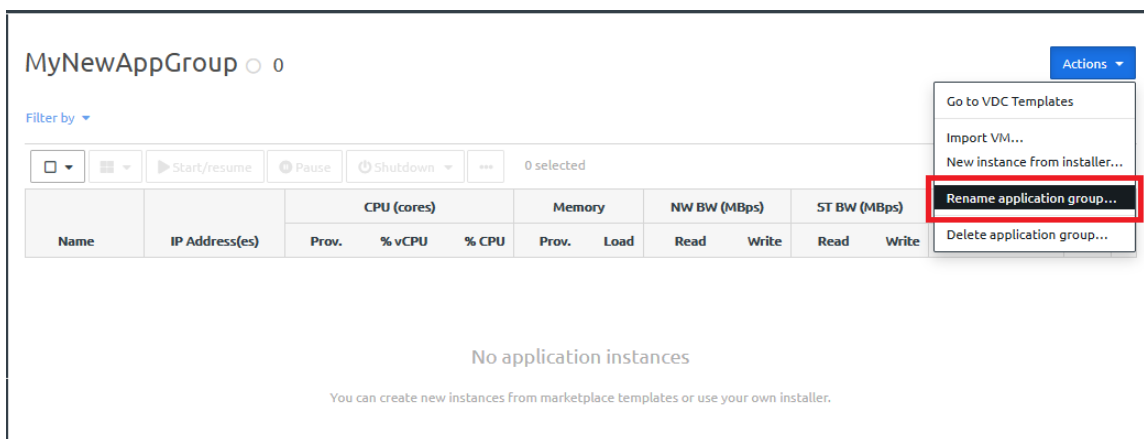


Figure 262. Rename Application Group action

- Step 5. In the Rename Application Group dialog, enter a new name; then click **Update**.

**Note:** The name must be unique for application groups in the virtual datacenter

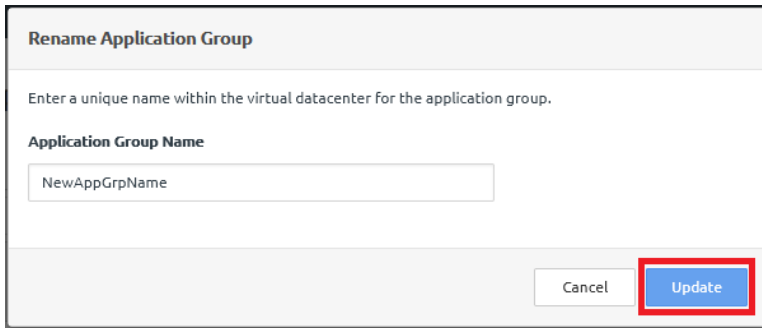


Figure 263. Rename Application Group dialog box

The application group is renamed.

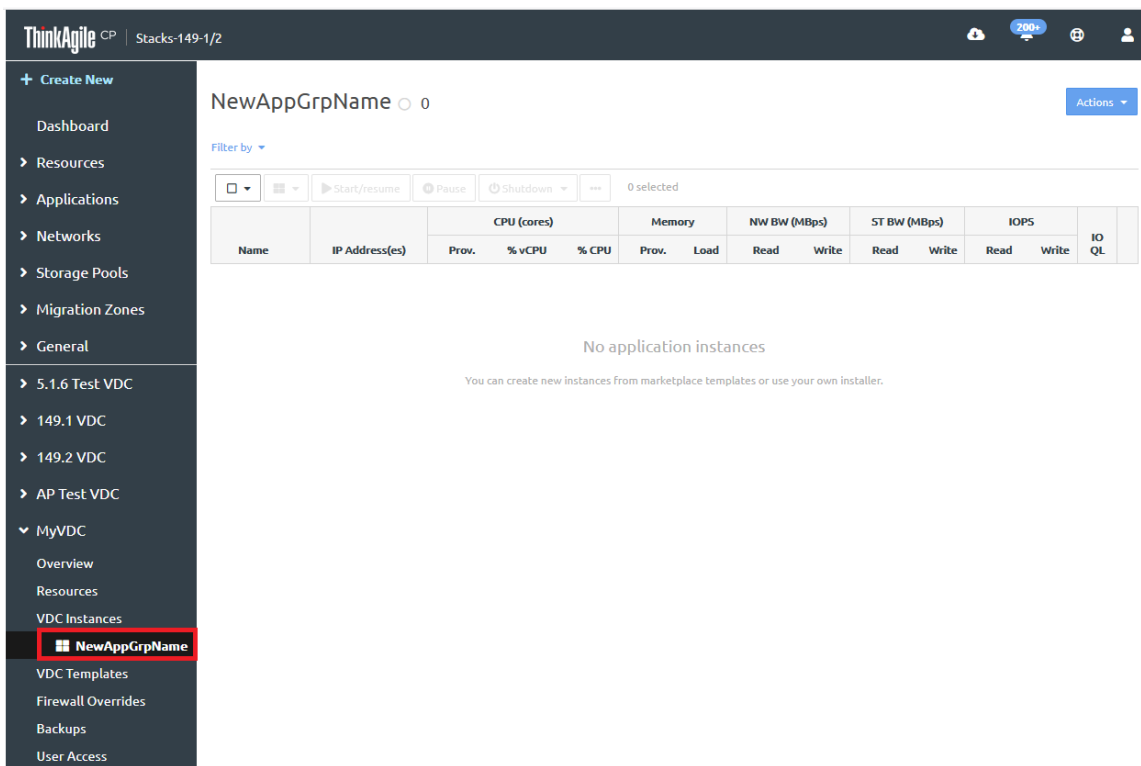


Figure 264. Renamed application group

## Deleting an application group

**Infrastructure admin** users and **VDC manager** users can delete an application group.

**Note:** Deleting an application group deletes the group, but it does **not** delete the applications instances that are in that group. For information about deleting application instances, see the following topic:

[“Manage application instances” on page 42](#)

Complete the following steps to delete an application group:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu, expand the virtual datacenter for which you want to delete an application group, and then click the application group (under VDC Instances) to be deleted.

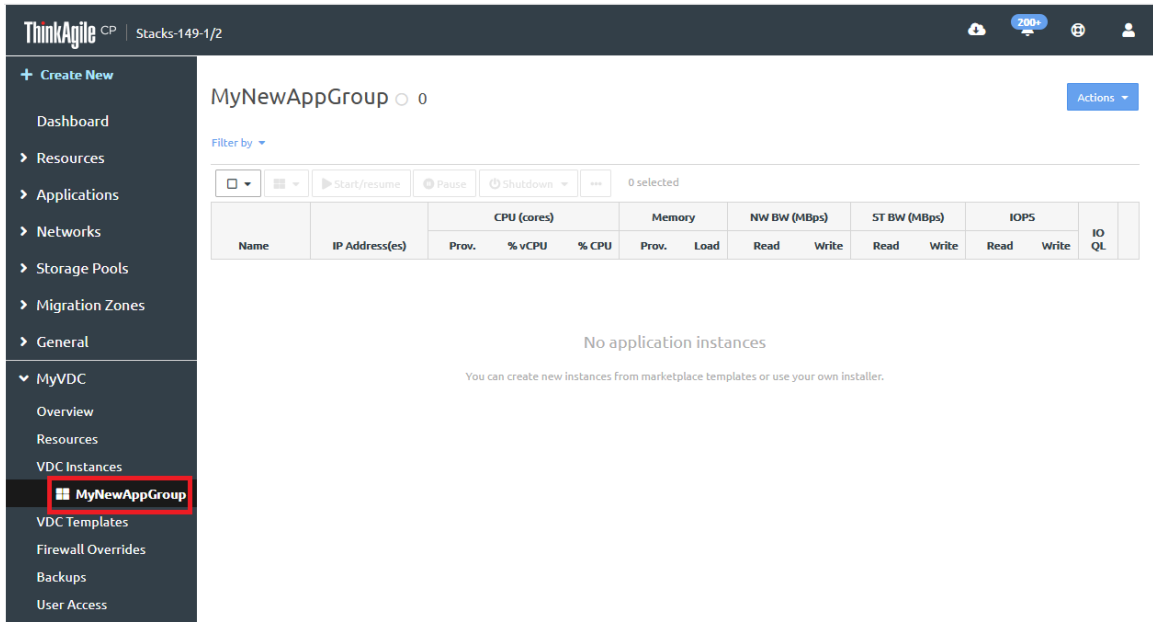


Figure 265. Application group in the left menu

Step 3. On the Actions menu, click **Delete Application Group**.

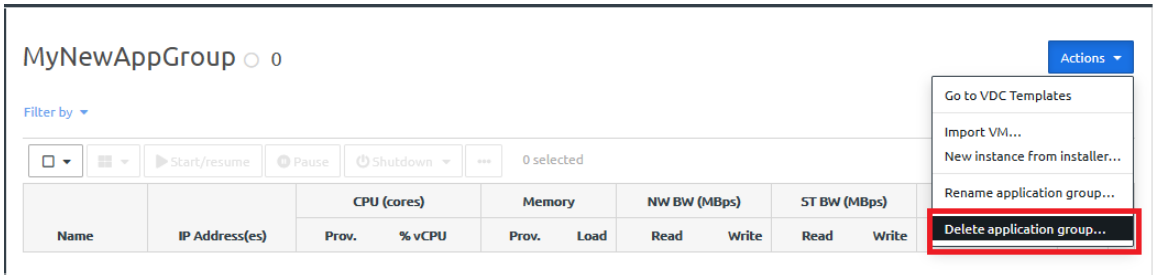


Figure 266. Delete Application Group action

Step 4. In the Remove Application Group dialog box, click **Remove Group**.

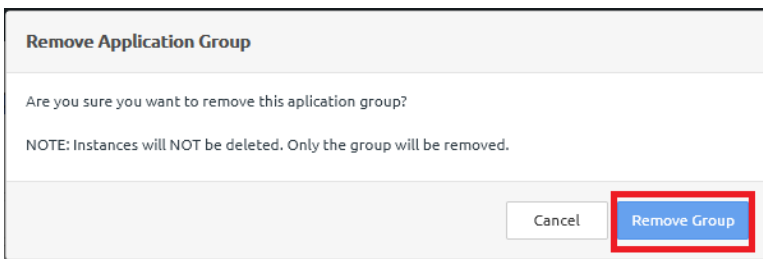


Figure 267. Remove Application Group dialog box

The application group is deleted.

**Note:** You might need to refresh the page to update the left navigation.

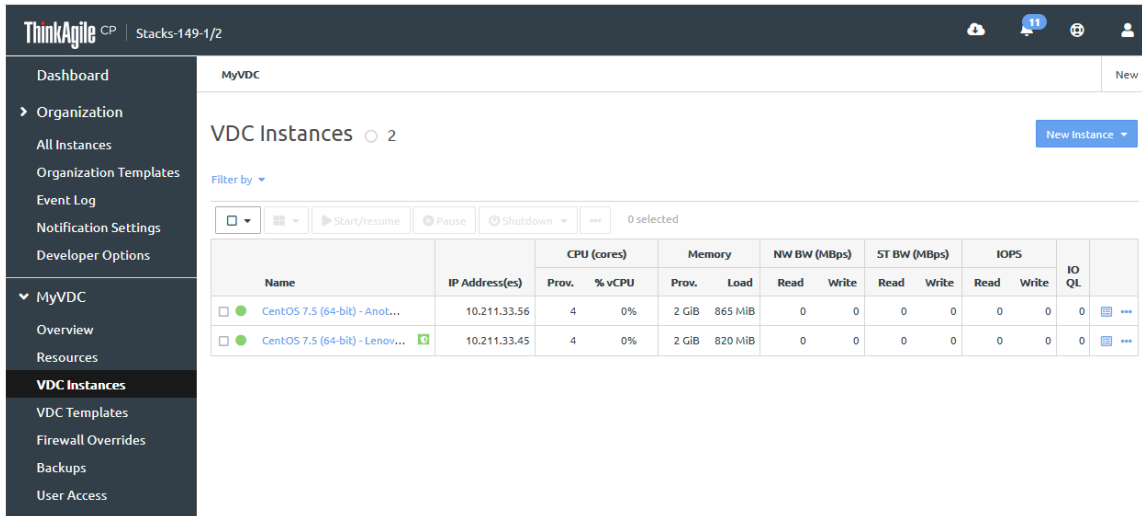


Figure 268. Deleted application group

## Adding application instances to an application group

**Infrastructure admin** users and **VDC manager** users can add application instances to an application group from the VDC Instances page.

Alternatively, you can select the application group for an instance with you initially create the instance. For more information about creating application instances, see the following topic:

[“Create and deploy applications” on page 28.](#)

Complete the following steps to add existing application instances to an application group.

Step 1. Log in to the ThinkAgile CP Cloud Controller.

Step 2. In the left navigation menu of the ThinkAgile CP Cloud Controller, navigate to the virtual datacenter that contains the application instances that you want to add to an application group. Then click **VDC Instances**.

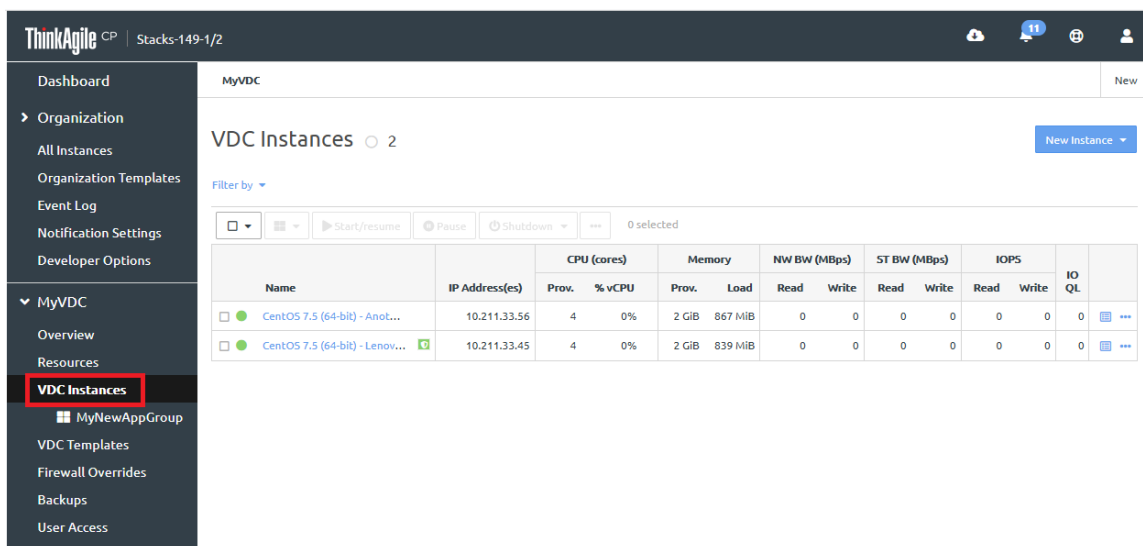


Figure 269. VDC Instances page



Step 3. Select the application instance or instances that will be added to the application group.

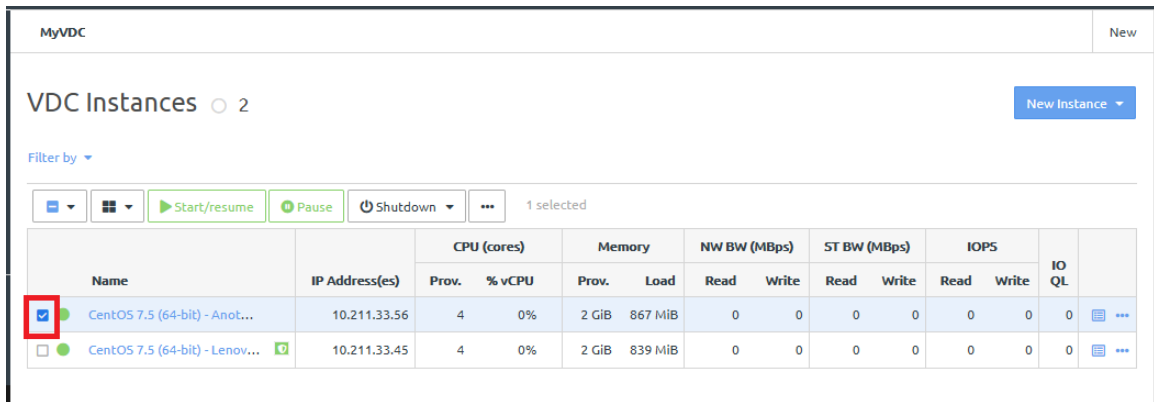


Figure 270. Selecting an application instance

Step 4. On the group actions menu, select the application group to which to assign the instance.

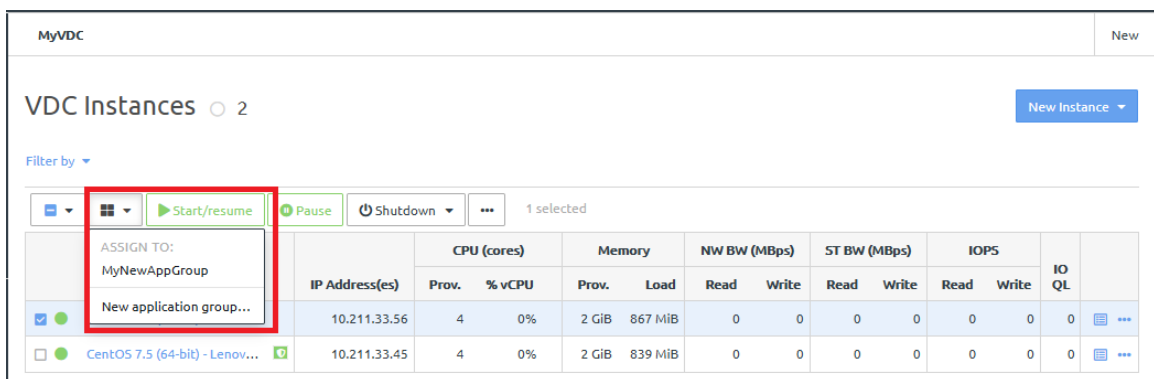


Figure 271. Choosing an application group

- If you choose an existing application group (such as NetAppGroup), you receive a confirmation message that the instance was added to the group.
- You can also choose to create a new application group. If you click **New application group**, you can enter a new group name in the New Application Group dialog.

Navigate to the application group page to see that the application has been added to the application group.

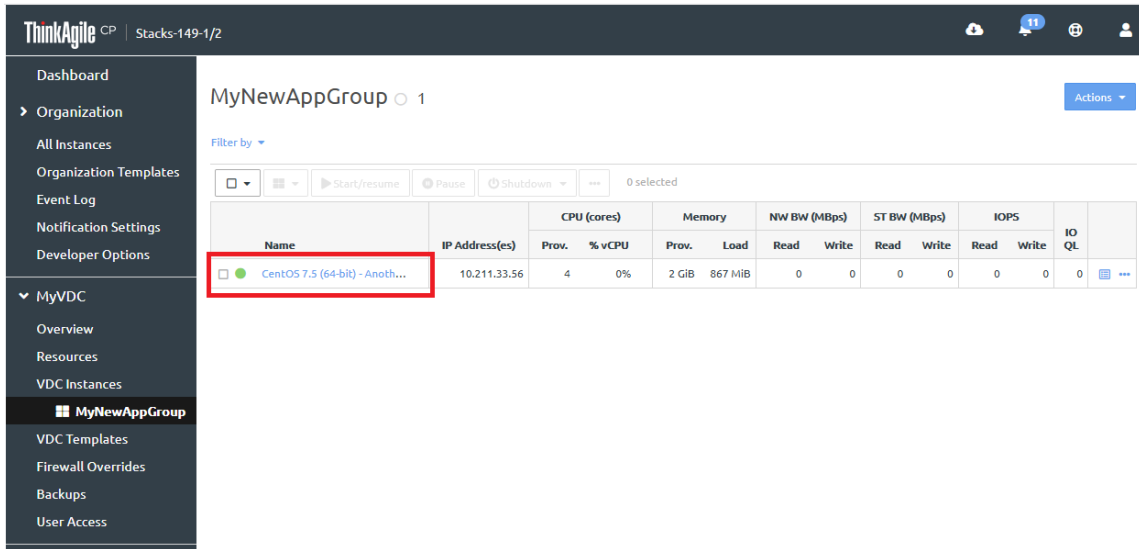


Figure 272. Application added to application group

## Removing application instances from an application group

Infrastructure admin users and VDC manager users can remove application instances from an application group.

Complete the following steps to remove an application instance from an application group:

- Step 1. Log in to the ThinkAgile CP Cloud Controller.
- Step 2. In the left navigation menu of the ThinkAgile CP Cloud Controller, navigate to the virtual datacenter that contains the application group from which you want to remove instances. Then click the application group in the left navigation.

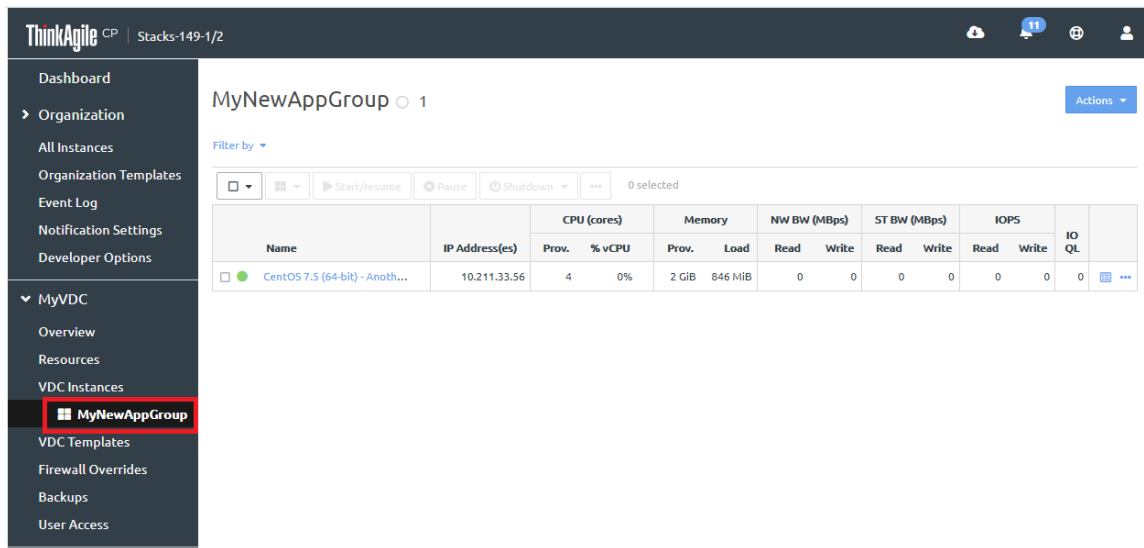


Figure 273. Application group page

- Step 3. Select the application instance or instances that will be removed from the application group.

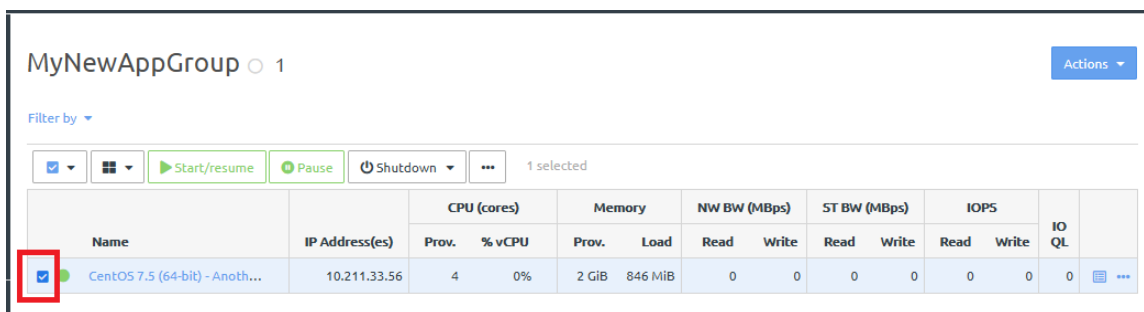


Figure 274. Selecting an application instance to remove

Step 4. On the group actions menu, click **Remove from group**.

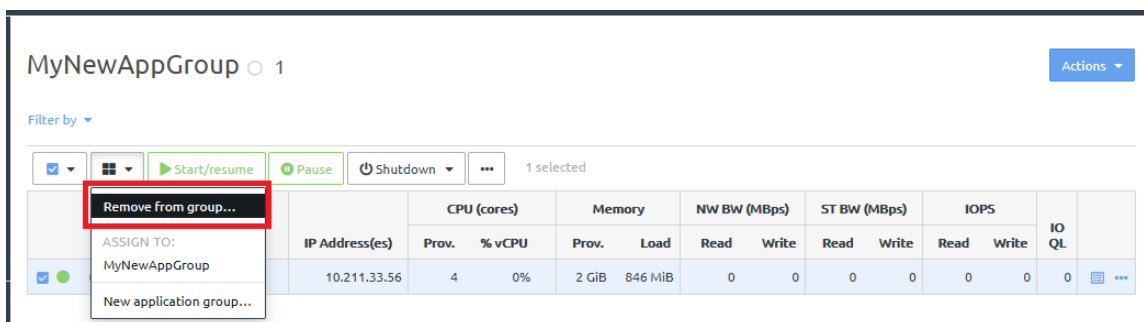


Figure 275. Remove from application group option

You can also choose to move the application instance to another existing group or to create a new application group into which to move the application instance.

The application instance is removed from the application group.

**Note:** The application instance itself still exists in the virtual datacenter. It is just removed from this particular application group.

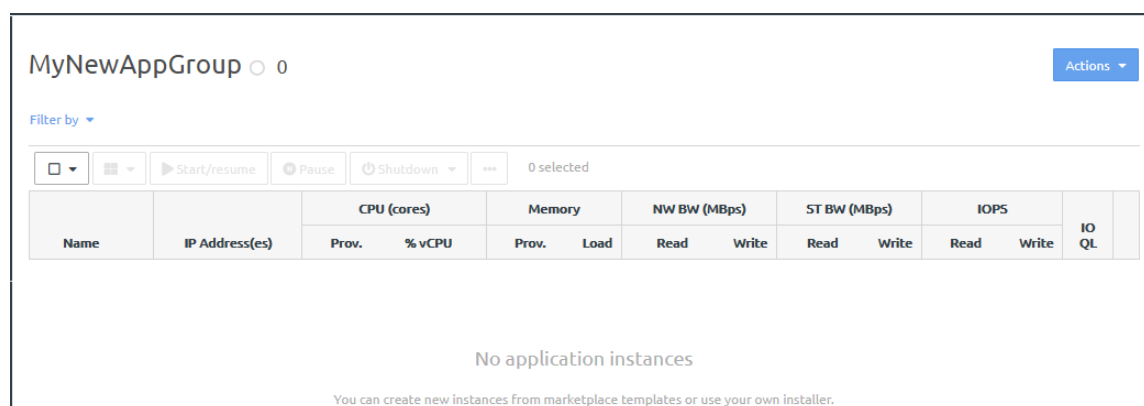


Figure 276. Application group page with group removed

## Manage your infrastructure

The topics in this section of the administration guide describe the tasks available for managing your infrastructure, which can be accessed in the left navigation menu of the Cloud Controller UI under the General heading.

### View events

You can easily view system event notifications for your infrastructure.

#### Notes:

- Events that are displayed in the Event Log are based on permissions for the current user role.
- Event timestamps are displayed in your local time zone.

Step 1. In the left navigation area, under General, click **Event Log**, or in the upper right corner of the ThinkAgile CP Cloud Controller user interface, click the Bell icon.

**Note:** The number of new Web notifications is displayed on the Bell icon. When you click this number the count is cleared.

The Event Log page opens, displaying system events. New web events are displayed with a temporary highlight, and the number on the Bell icon is cleared.

Step 2. You can filter the list of events by selecting the category of events to display in the **Show** menu, selecting the number of events to display per page, or by entering a date from which to display events.

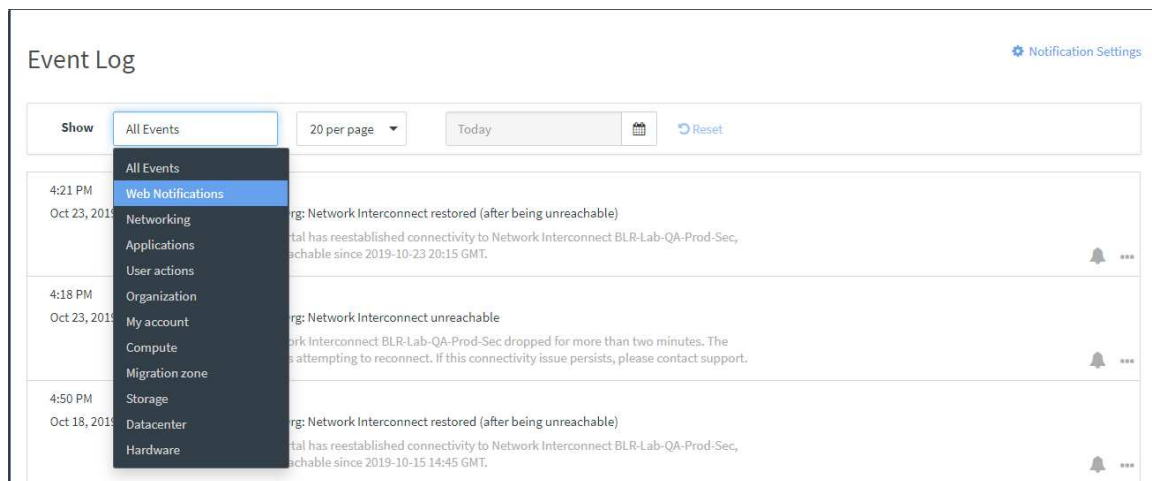


Figure 277. View Infrastructure Events

To modify notification settings, click **Notification Settings** or select the bell icon or ... next to an event. See this [“Manage notifications” on page 242](#) for information about modifying notification settings.

### Manage notifications

You may want to review notification settings to enable or disable Web, email, and SMS notifications for events across your infrastructure. Notification settings can be modified for the following categories: Organization, Account, Networking, Compute, Migration Zone, Storage, Datacenter, Applications, User Actions, or Hardware.

**Note:** Notifications management and the notifications that are displayed are based on permissions for the current user role.

Step 1. In the left navigation area, under General, click **Notification Settings**.

Step 2. On the Notification Settings page, in the **Show** menu, select the category of notifications you want to manage.

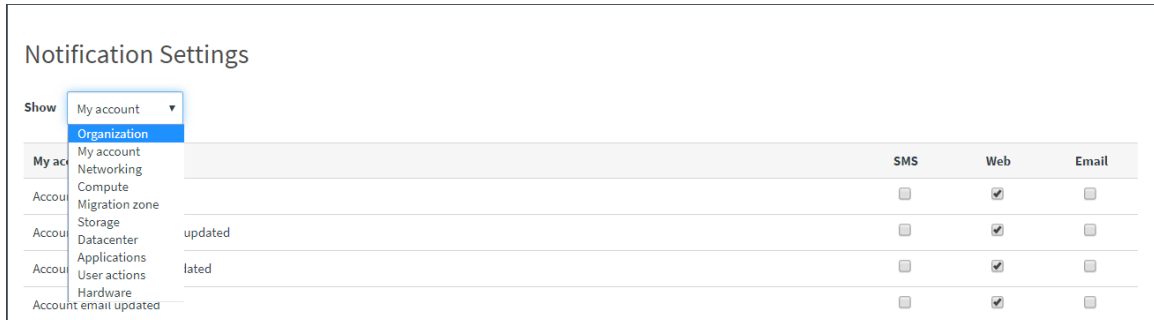


Figure 278. Select Notification Category

Step 3. In the notification list, next to the notification you want to modify, select Web, Email, and SMS to turn notifications on or off as applicable

## Manage categories and tags

Compute Categories and Tags are used to specify which application instances run on a compute node. An instance can be migrated from one compute node to another by modifying the compute category or tags of the instance.

Migrating an instance from one compute node to another involves zero downtime, continuous service availability, and transaction integrity. The ThinkAgile CP Cloud Controller VNC console to an instance uses a URL that includes the compute node's IP address. When an instance migrates to a new compute node, the VNC console will automatically close since the URL is no longer valid, and reopening it will open a URL including the new compute node's IP address.

Refer to the following topics:

- [“What are compute categories?” on page 243](#)
- [“Add a compute category” on page 244](#)
- [“Rename a compute category” on page 244](#)
- [“Delete a compute category” on page 245](#)
- [“What are compute tags?” on page 246](#)
- [“Add a compute tag” on page 246](#)
- [“Rename a compute tag” on page 247](#)
- [“Delete a Compute Tag” on page 248](#)

## What are compute categories?

Compute categories are used to organize compute resources for allocation to virtual datacenters. If needed, you may also restrict an application instance to run only on nodes in a specific compute category. Compute resources are allocated to virtual datacenters by category. When you create or edit allocations for a virtual datacenter, you enter the amount of CPU and memory to allocate from each category, rather than from individual compute nodes.

Each compute node must belong to exactly one compute category. A compute node category can be changed only if no application instances are running on it. In the Compute Restraints portion of an application instance profile, the instance can be configured to run on compute nodes in any category, or only on compute nodes in a specific category.

An instance's compute category can be changed while the instance is running. For example, if an instance is running on a compute node in Category1 and the instance's category is changed to Category2, the instance will automatically migrate to a compute node in Category2. In the ThinkAgile CP management console, the instance will appear to shut down, then start on the other compute node; however, the instance will actually remain running throughout the migration.

## Add a compute category

Follow these steps to add a compute category.

- Step 1. In the left navigation menu, under General, click **Compute Categories**.
- Step 2. On the Compute Categories page, enter a new name for a compute category and click **Add**.

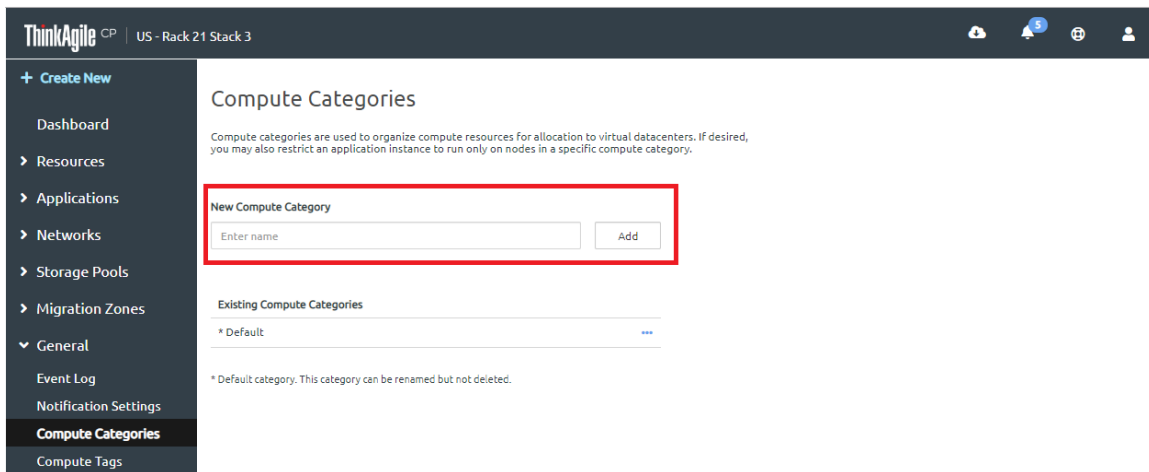


Figure 279. Add a Compute Category

The new category will appear in the Existing Compute Categories list.

## Rename a compute category

Follow these steps to rename a compute category.

- Step 1. In the left navigation menu, under General, click **Compute Categories**.
- Step 2. On the Compute Categories page, under Existing Compute Categories, click the Actions menu (...) next to the category you want to rename.
- Step 3. Select **Rename**.

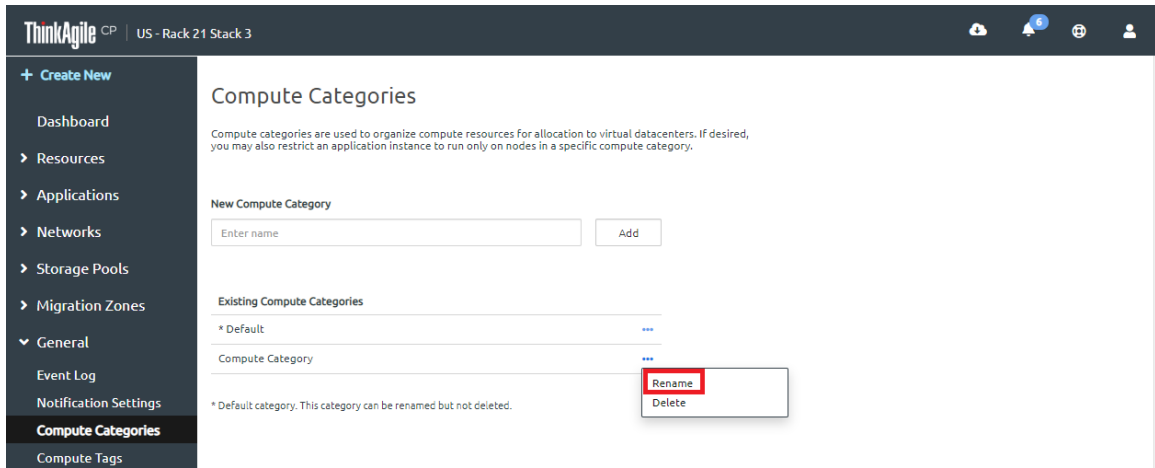


Figure 280. Select Rename

- Step 4. In the Rename Compute Category dialog box, enter a new Compute Category name, and then click **Update**.

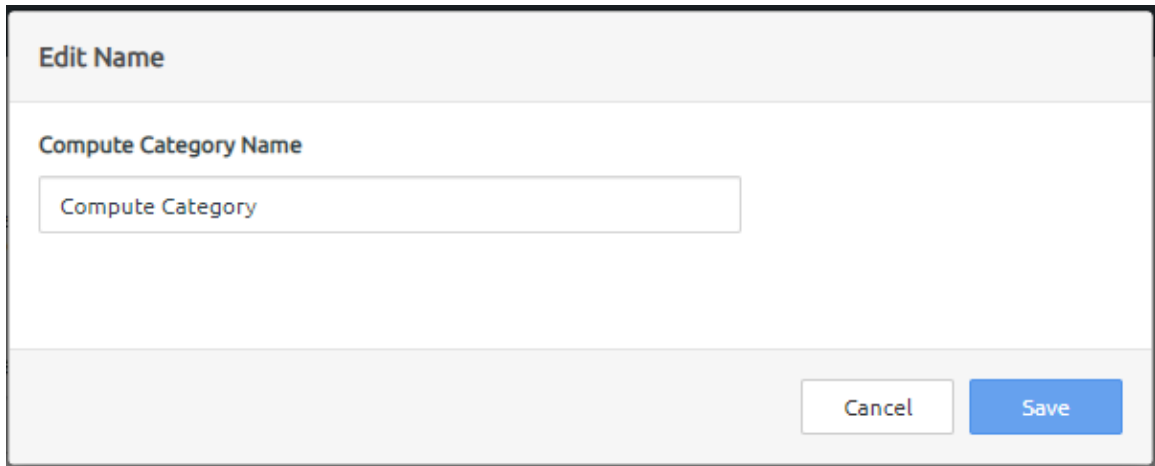


Figure 281. Rename Compute Category

## Delete a compute category

Follow these steps to delete a compute category.

This action cannot be undone.

- Step 1. In the left navigation menu, under General, click **Compute Categories**.
- Step 2. On the Compute Categories page, under Existing Compute Categories, click the Actions menu (...) next to the category you want to delete.
- Step 3. Select **Delete**.

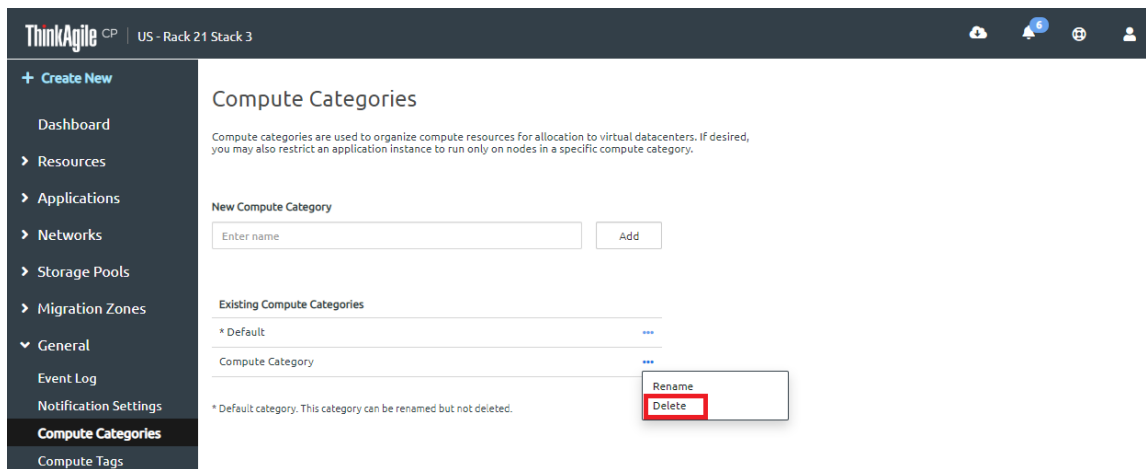


Figure 282. Select Delete

Step 4. In the confirmation dialog box, click **Delete Compute Category**.

**Note:** You cannot delete the Default category, which is designated by \* in the list.

## What are compute tags?

Compute tags are used by application instances and nodes to determine which nodes are eligible to run an application. If an instance lists compute tags in its resource profile, only nodes with all of those compute tags will be able to run that instance.

Whereas each compute node must belong to exactly one compute category, compute nodes and application instances can have any number of compute tags.

An instance can run on any compute node that has at least the same tags as the instance. That is, if an instance has tags Tag1 and Tag2, it can run on any compute node that also has tags Tag1 and Tag2, regardless of any additional tags that compute node has. However, that instance cannot run on a compute node that has Tag1 but not Tag2 or vice-versa.

Compute tags can be added to or removed from a compute node while instances are running on the node. When removing compute tags, you will be asked to select one of the following action plans for affected instances:

- **Migrate:** ThinkAgile CP Cloud Controller will attempt to migrate the instance to another compute node that meets its compute requirements.
- **Relax profile:** ThinkAgile CP Cloud Controller will remove the tag requirements from the instance's compute profile.
- **Shut down:** ThinkAgile CP Cloud Controller will shut down the instance.
- **Force shut down:** ThinkAgile CP Cloud Controller will force shut down the instance.

Compute tags can also be added to or removed from an application instance while it is running. If the instance is running on a compute node that lacks the new tag, the instance will automatically migrate to a compute node that has the required tags. In the ThinkAgile CP Management console, the instance will appear to shut down, then start on the other compute node; but the instance will actually remain running throughout the migration.

## Add a compute tag

Follow these steps to add a compute tag.



- Step 1. In the left navigation menu, under General, click **Compute Tags**.
- Step 2. On the Compute Tags page, enter a new name for a compute tag and click **Add**.

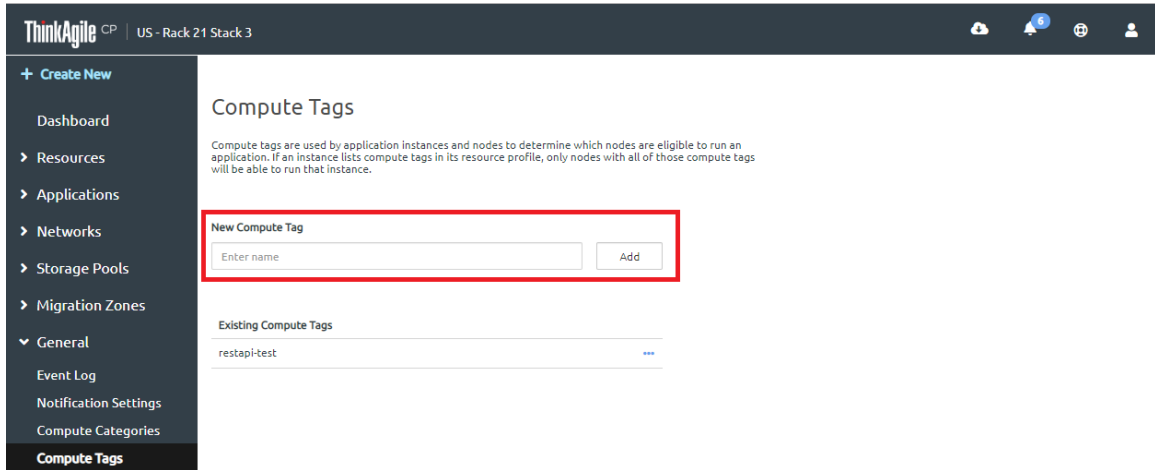


Figure 283. Add a Compute Tag

The new tag will appear in the Existing Compute Tags list.

## Rename a compute tag

Follow these steps to rename a compute tag.

- Step 1. In the left navigation menu, under General, click **Compute Tags**.
- Step 2. On the Compute Tags page, under Existing Compute Tags, click the Actions men (...) next to the tag you want to rename.
- Step 3. Select **Rename**.

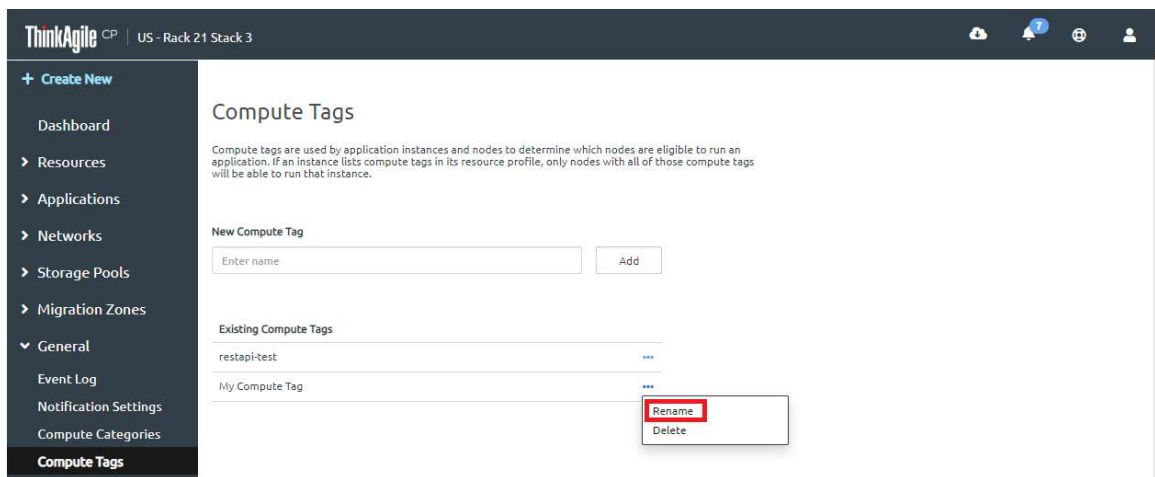


Figure 284. Select Rename

- Step 4. In the Rename Compute Tag dialog box, enter a new Compute Tag name, and then click **Update**

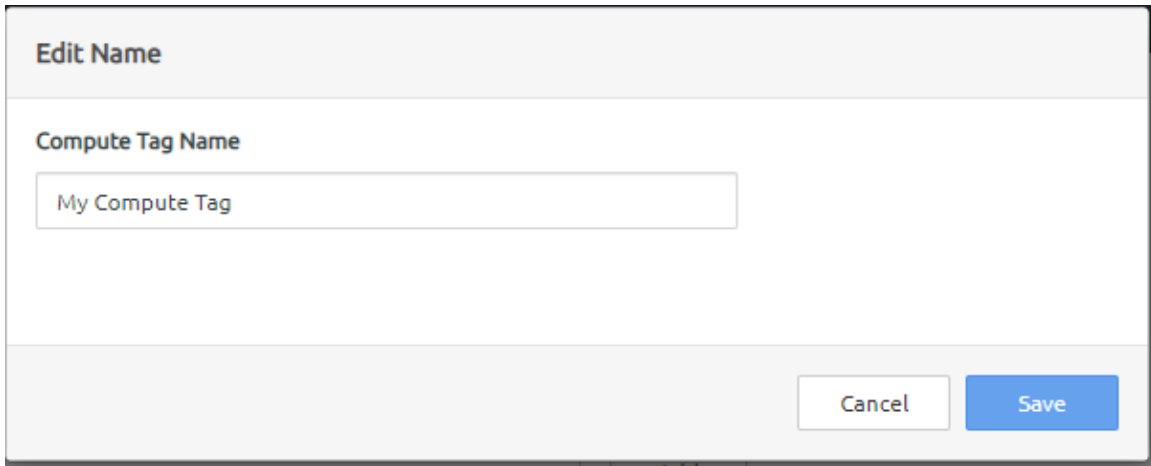


Figure 285. Rename Compute Tag

## Delete a Compute Tag

Follow these steps to delete a compute tag.

This action cannot be undone.

- Step 1. In the left navigation menu, under General, click **Compute Tags**.
- Step 2. On the Compute Tags page, under Existing Compute Tags, click the Actions men (...) next to the tag you want to delete.
- Step 3. Select **Delete**.

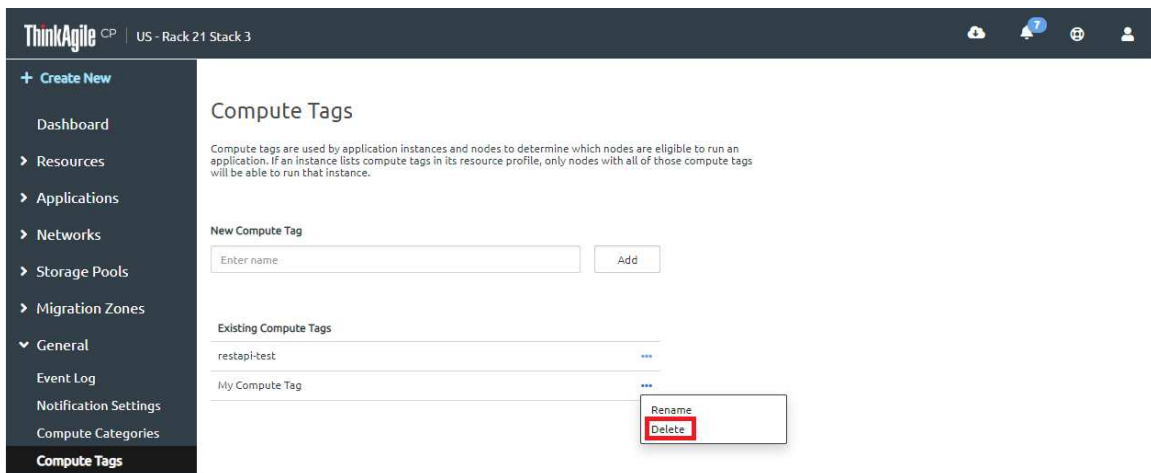


Figure 286. Select Delete

- Step 4. In the confirmation dialog box, click **Delete Compute Tag**.

## Manage self-service

ThinkAgile CP offers role-based access control and access management for administrators of ThinkAgile CP Cloud Controller. An Infrastructure Administrator can apportion resources of the private cloud into virtual data centers (VDCs) and delegate administration rights and privileges to those VDCs.

For a description of the different types of infrastructure users and roles in ThinkAgile CP, see [Self service](#).

Refer to the following topics for information about managing administrator users in ThinkAgile CP Cloud Controller.

- “Invite users” on page 249
- “View users” on page 251
- “Edit user access level” on page 251
- “Remove a user from an organization” on page 253

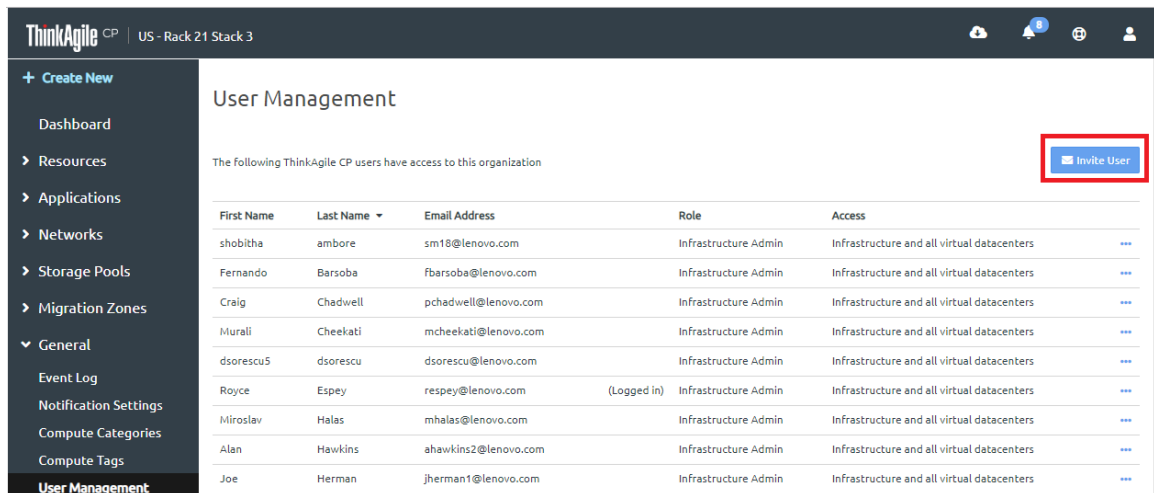
**Note:** Depending on your role, you may not have access to all features and functionality described below.

Also note that users may not edit their own access level or remove themselves from the organization; only another Infrastructure Admin of that organization can perform these operations.

## Invite users

Follow these steps to invite users to the ThinkAgile CP Cloud Controller management portal.

- Step 1. In the left navigation menu, click **User Management**. The User Management page opens.
- Step 2. On the User Management page, click the **Invite User** button.



The screenshot shows the ThinkAgile CP User Management interface. The left sidebar contains a navigation menu with options like Dashboard, Resources, Applications, Networks, Storage Pools, Migration Zones, and General. The main content area is titled 'User Management' and displays a table of users. A red box highlights the 'Invite User' button in the top right corner of the user list area.

First Name	Last Name	Email Address	Role	Access
shobitha	ambore	sm1@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Fernando	Barsoba	fbarsoba@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Craig	Chadwell	pchadwell@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Murali	Cheekati	mcheekati@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
dsiorescu5	dsiorescu	dsiorescu@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Royce	Espey	respey@lenovo.com	(Logged in) Infrastructure Admin	Infrastructure and all virtual datacenters
Miroslav	Halas	mhalas@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Alan	Hawkins	ahawkins2@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Joe	Herman	jherman1@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters

Figure 287. Invite User

- Step 3. In the Invite ThinkAgile CP user dialog box, enter an email address for the new user as this user will receive an email invitation to join the organization.

**Invite ThinkAgile CP User**

Please enter an email address for the new ThinkAgile CP user. This person will get an invitation to join this organization.

Email Address

ACCESS LEVEL  Assign later

User Role

Infrastructure Admin Infrastructure Viewer VDC Manager VDC Viewer

User Access

This user will have full access to the infrastructure and all virtual datacenters

Cancel Send Invitation

Figure 288. Invite User

Step 4. Select the role for this user. You may select one of the following roles:

- **Infrastructure Admin** – Has full access to the infrastructure and all virtual datacenters (VDCs).
- **Infrastructure Viewer** – Has read-only access to the infrastructure and all VDCs, as well as the ability to create API tokens.
- **VDC Manager** – Has full access to selected VDCs. Under User Access, you can select the VDCs to which you want to give this user access.
- **VDC Viewer** – Has read-only access to selected VDCs. Under User Access, you can select the VDCs to which you want to give this user read-only access.

**Notes:**

- You may also select the Assign Later checkbox if you prefer to wait to assign the role to the user. The user will have no access to any domains in the organization.
- For VDC Manager and VDC Viewer roles, the Chat Support widget is disabled by default when creating a new virtual datacenter. For more details, see [“Enabling the chat support widget” on page 231](#).

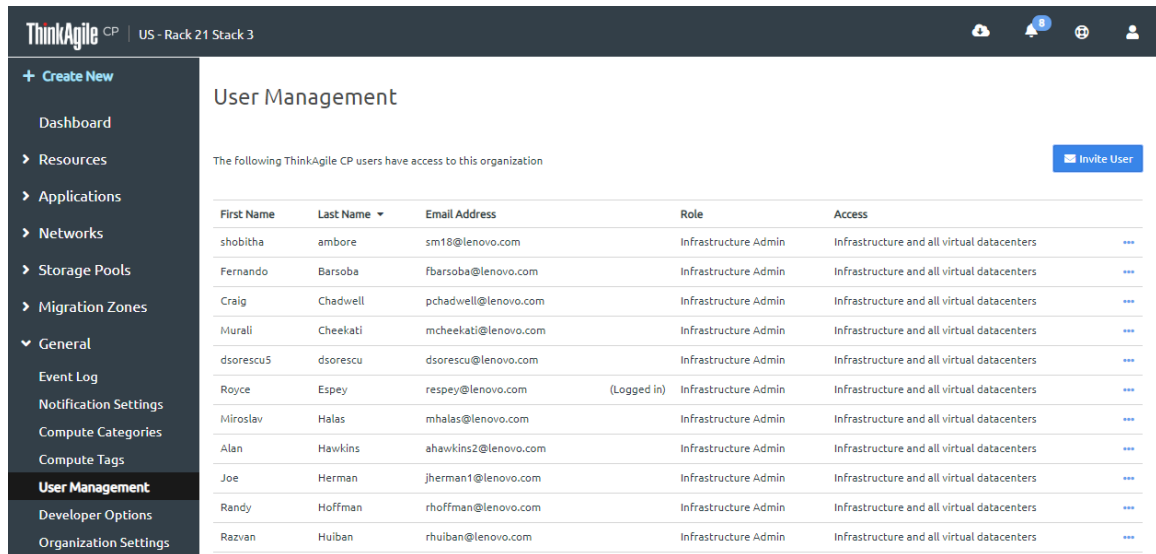
Step 5. Click **Send Invitation** or **Generate Link** as appropriate for your organization. If you click Generate Link, you will see the link for the user to use to join the organization.

**Note:** If you need to re-send the invitation to the user, you will see a **Reinvite** link next to the user in the list on the User Management page.

## View users

Follow these steps to view the ThinkAgile CP users in the current organization.

- Step 1. In the left navigation menu, click **User Management**. The User Management page opens showing a list of users who have access to the current organization. This page lists users by First name, Last name, Email address, Role, and Access. Depending on your role, you may see the logged in status and invitation status, as applicable.



The following ThinkAgile CP users have access to this organization

First Name	Last Name	Email Address	Role	Access
shobitha	ambore	sm18@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Fernando	Barsoba	fbarsoba@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Craig	Chadwell	pchadwell@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Murali	Cheekati	mcheekati@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
dsoreescu5	dsoreescu	dsoreescu@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Royce	Espey	respey@lenovo.com	(Logged in) Infrastructure Admin	Infrastructure and all virtual datacenters
Miroslav	Halas	mhalas@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Alan	Hawkins	ahawkins2@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Joe	Herman	jherman1@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Randy	Hoffman	rhoffman@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Razvan	Huiban	rhuiban@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters

Figure 289. User Management Page

- Step 2. To view the names of the virtual datacenters to which a user has access, hover the mouse over the Access entry for a user.
- Step 3. You can click the Last Name heading to sort the user list by the Last Name column.

## Edit user access level

Follow these steps to edit the access level/role for a user.

- Step 1. In ThinkAgile CP Cloud Controller, navigate to the User Management page.
- Step 2. On the User Management page, click the action menu next to the user you want to edit, and then select **Edit Access Level**.

The following ThinkAgile CP users have access to this organization

First Name	Last Name	Email Address	Role	Access
shobitha	ambore	sm18@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Fernando	Barsoba	fbarsoba@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Craig	Chadwell	pchadwell@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Murali	Cheekati	mcheekati@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
dsoreescu5	dsoreescu	dsoreescu@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Royce	Espey	respey@lenovo.com (Logged in)	Infrastructure Admin	Infrastructure and all virtual datacenters
Miroslav	Halas	mhalas@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Alan	Hawkins	ahawkins2@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters
Joe	Herman	jherman1@lenovo.com	Infrastructure Admin	Infrastructure and all virtual datacenters

Figure 290. Select Edit Access Level from the Action menu

The Edit Access Level dialog box opens.

**Edit Access Level**

**THINKAGILE CP USER**

Name: Royce Espey  
Email Address: respey@lenovo.com

ACCESS LEVEL: None

**User Role**

Infrastructure Admin | Infrastructure Viewer | VDC Manager | **VDC Viewer**

**User Access**

Give this user read-only access to the following virtual datacenters

Virtual Datacenters Select All Clear All

- VDC 1
- VDC\_BLR
- nradulet REST API call test

Cancel **Update**

Figure 291. Edit Access Level dialog box

Step 3. In the Edit Access Level dialog box, select and modify the new user role for this user. You may select one of the following roles:

- **Infrastructure Admin** – Has full access to the infrastructure and all virtual datacenters (VDCs).
- **Infrastructure Viewer** – Has read-only access to the infrastructure and all VDCs, as well as the ability to create API tokens.
- **VDC Manager** – Has full access to selected VDCs. Under User Access, you can select the VDCs to which you want to give this user access.
- **VDC Viewer** – Has read-only access to selected virtual datacenters. Under User Access, you can select the VDCs to which you want to give this user read-only access.

Step 4. Click **Update**.

### Remove a user from an organization

Follow these steps to remove a user from the current organization in ThinkAgile CP Cloud Controller.

Step 1. In ThinkAgile CP Cloud Controller, navigate to the User Management page.

Step 2. In the User Management page, click the action menu next to the user you want to remove, and then select **Remove from Organization**.

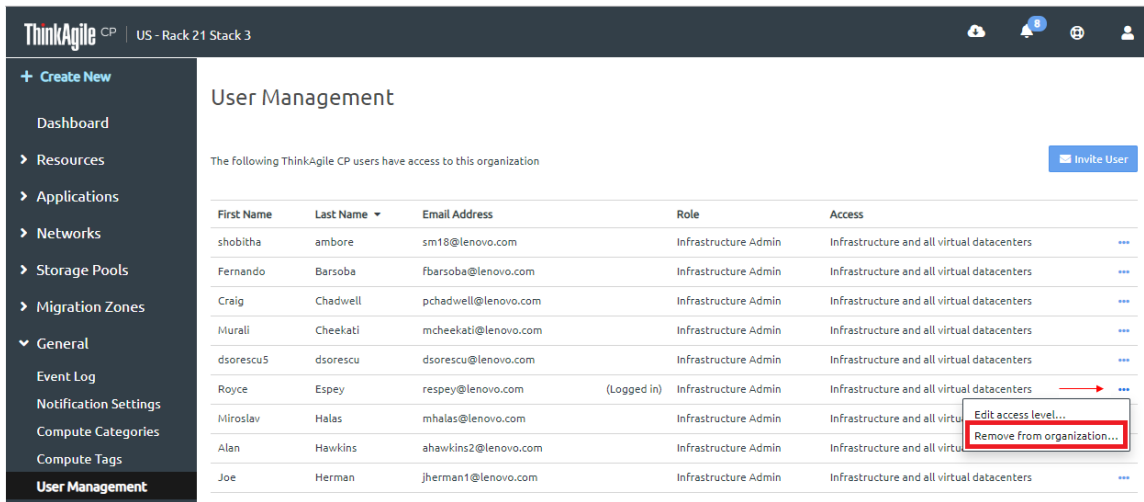


Figure 292. Select Remove from Organization on the Action menu

Step 3. Click **Remove User** in the confirmation dialog box.

## Manage developer options

In ThinkAgile CP, API tokens are used for authentication via developer scripts. The ThinkAgile CP Web Services API requires a security token to use the API. The purpose is to inform the API that the bearer of the token has been authorized to access the API and to perform a specific action.

The API token is tied to the role and organization for a user account. It is valid only for the ThinkAgile CP Cloud Controller on which it was created.

For more information about the ThinkAgile CP Web Services API, see <https://manage.cp.lenovo.com/swagger-ui.html>.

### Notes:

- Infrastructure Admins can manage their own API tokens and can also manage the API tokens of other users in the organization.
- Infrastructure Viewers can manage their own API tokens but can only view the API tokens of other users in the organization.
- VDC Managers/Viewers can only manage their own API tokens.

Refer to the following topics:

- [“View API Tokens” on page 254](#)
- [“Issue an API token” on page 255](#)
- [“Copy an API token” on page 256](#)
- [“Edit an API token” on page 257](#)
- [“Delete an API token” on page 258](#)

## View API Tokens

You can view API tokens from Developer Options in the ThinkAgile CP Cloud Controller.



Step 1. To view API tokens, in the left navigation menu, under General, click **Developer Options**.

The Developer Options page displays the API tokens issued to the current and (depending on user role) other users in the current organization, including the following information: Token ID, Date Issued, User issued to (with email address and role), and description of the token.

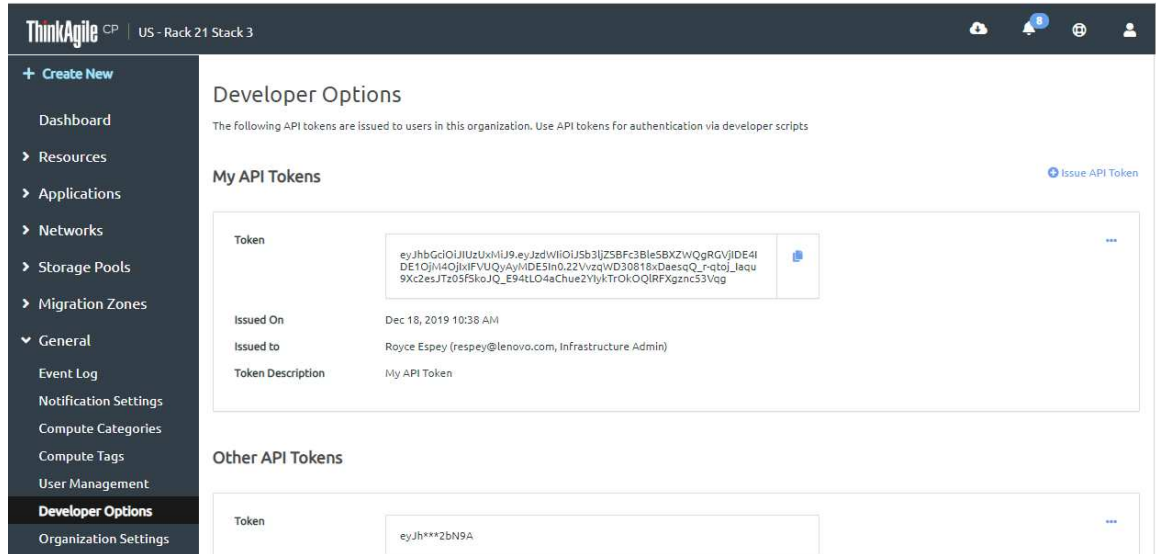


Figure 293. Example Developer Options page

**Note:** Infrastructure Admins can manage their API tokens and can also manage the API tokens of other users in the organization. Infrastructure Viewers can manage their API tokens but can only view the API tokens of other users in the organization. VDC Managers/Viewers can only manage their own API tokens.

## Issue an API token

Follow these steps to issue an API token.

- Step 1. In the left navigation menu, under General, click **Developer Options**.
- Step 2. On the Developer Options page, click **Issue API Token**.



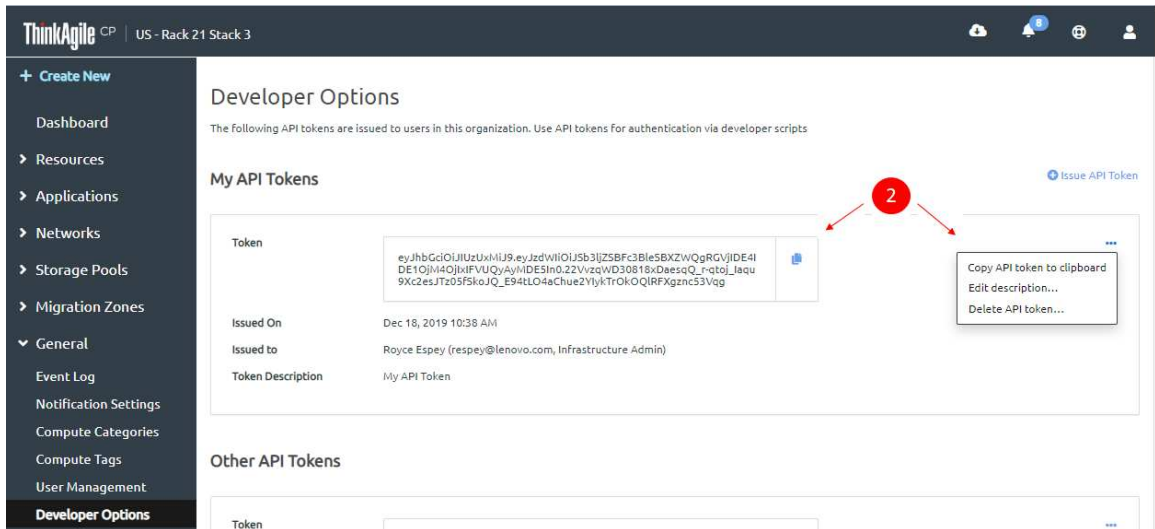


Figure 296. Copy API Token

## Edit an API token

Follow these steps to edit the description for an API Token.

- Step 1. In the left navigation menu, under General, click **Developer Options**.
- Step 2. On the Developer Options page, on the Actions (...) menu, click **Edit Description**.

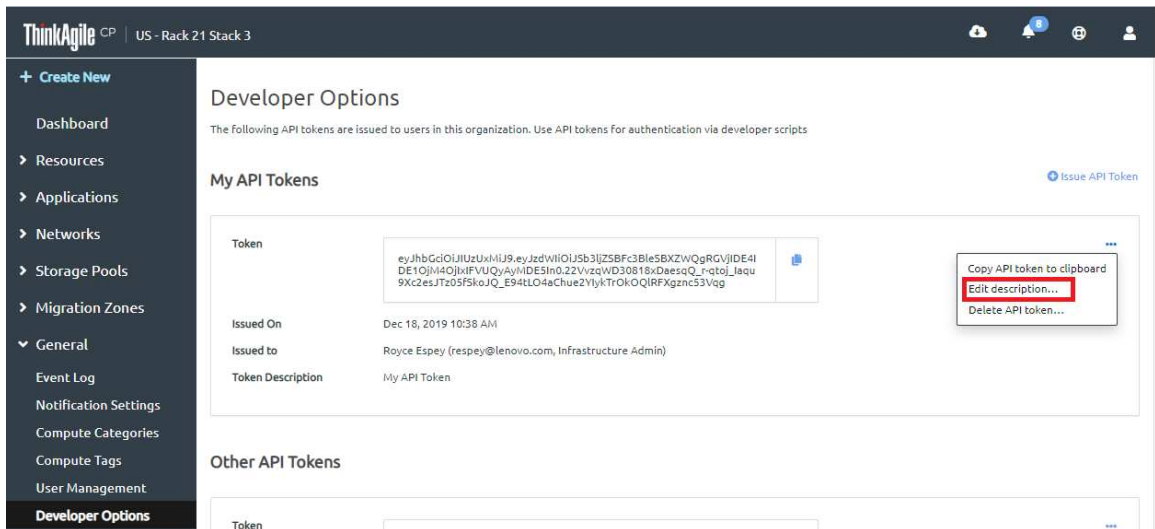


Figure 297. Edit API Token

- Step 3. In the Edit API Token dialog box, enter a new description and click **Update**.

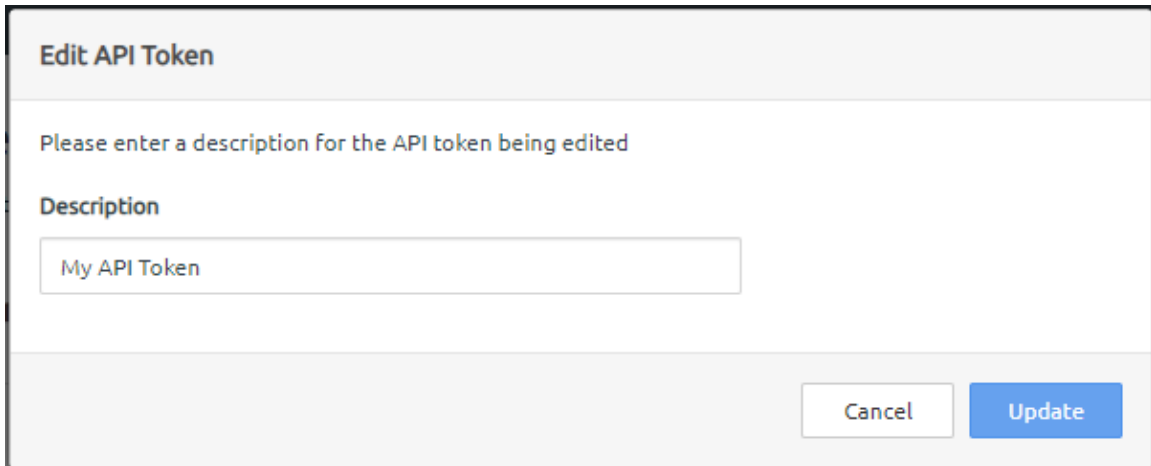


Figure 298. Enter a new API Token description

## Delete an API token

Follow these steps to delete an API Token.

- Step 1. In the left navigation menu, under General, click **Developer Options**.
- Step 2. On the Developer Options page, on the Actions (...) menu, click **Delete API Token**.

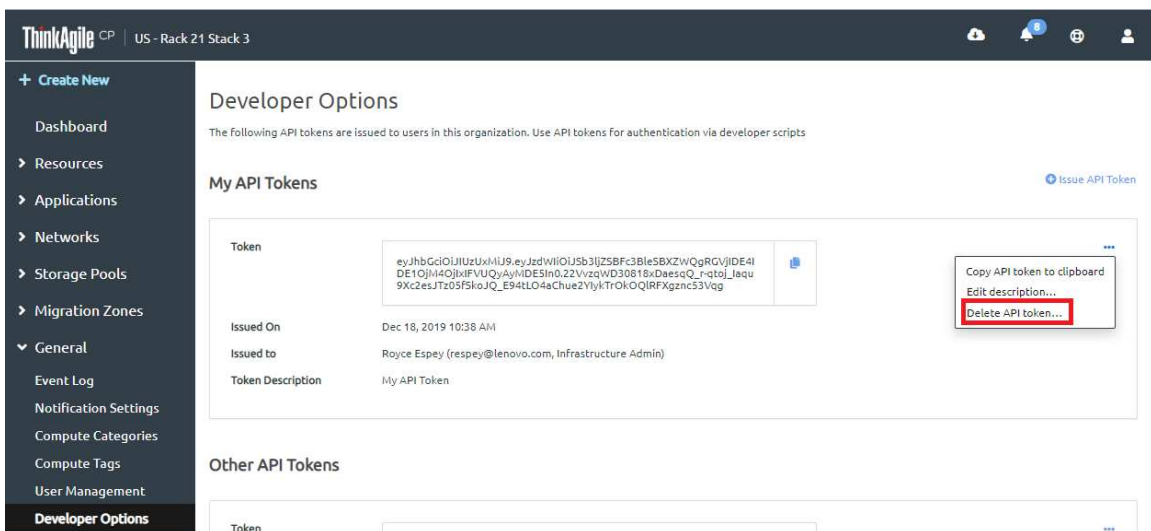


Figure 299. Delete API Token

- Step 3. In the confirmation dialog box, click **Delete API Token**.

**Note:** After removing a token, there will be a slight delay until the token is revoked.

## Manage organizations

An organization provides a way to organize and manage your ThinkAgile CP hardware resources. Creating multiple organizations is useful if you have a need to keep independent hardware stacks; for example, if you are a managed service provider and are responsible for managing multiple independent hardware stacks belonging to different clients. You can view, modify, manage and create new organizations for your ThinkAgile CP infrastructure.

Refer to the following topics.

- “View Organization Settings” on page 259
- “Modify Organization Settings” on page 259
- “View Organizations” on page 259
- “Create an Organization” on page 260

**Note:** Infrastructure Admins can modify organization settings. An Infrastructure viewer can view the current organization settings but not edit them. All other roles have the option to "Go to an Organization."

## View Organization Settings

Follow these steps to view organization settings for the current organization.

- Step 1. In the left navigation menu, under General, click **Organization Settings**.
- Step 2. Under Stacks you can download certificate files (PEM or PFX) files for the stacks in your organization as needed.

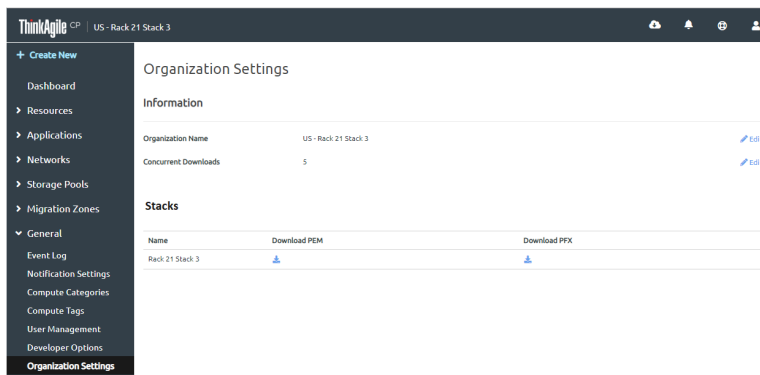


Figure 300. Organization Settings

## Modify Organization Settings

You can modify organization settings from Organization Settings in the ThinkAgile CP Cloud Controller.

- Step 1. To modify organization settings for the current organization, in the left navigation menu, under General, click **Organization Settings**.
- Step 2. Click **Edit** next to the organization name to edit the Organization name, In the Edit Name dialog box, enter a new name and click **Save**.
- Step 3. Click **Edit** next to the number of Concurrent Downloads to edit the number of concurrent downloads of templates allowed at any given time. In the Edit Concurrent Downloads dialog box, enter the number of concurrent downloads and click **Save**.
- Step 4. Under Stacks you can download certificate files (PEM or PFX) files for the stacks in your organization as needed.

## View Organizations

You can view organizations within the ThinkAgile CP Cloud Controller.

- Step 1. In the upper right corner of the ThinkAgile CP Cloud Controller management portal, click **User Account → Manage Organizations**.

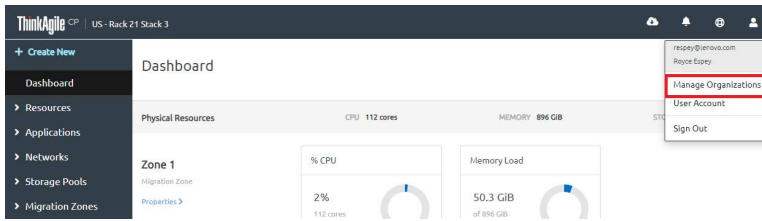


Figure 301. Select Manage Organizations

Step 2. The Manage Organizations page opens, displaying the organizations to which you have access.

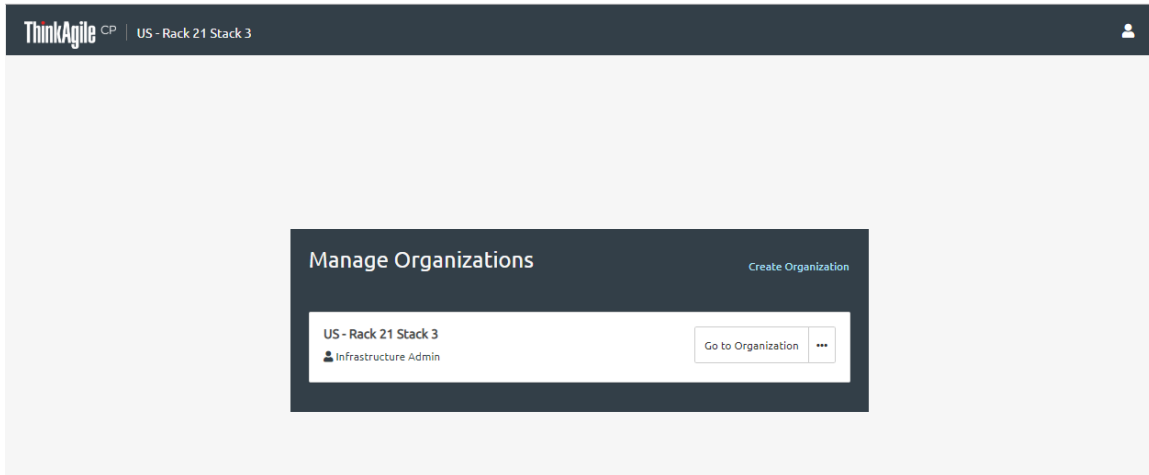


Figure 302. Manage Organizations

Step 3. If you have multiple organizations, click **Go to an Organization** next to the organization to which you want to navigate. The Dashboard page for that organization will open.

## Create an Organization

Follow these steps to create an organization.

Step 1. In the upper right corner of the ThinkAgile CP Cloud Controller management portal, click the User Account icon, and then select **Manage Organizations**.

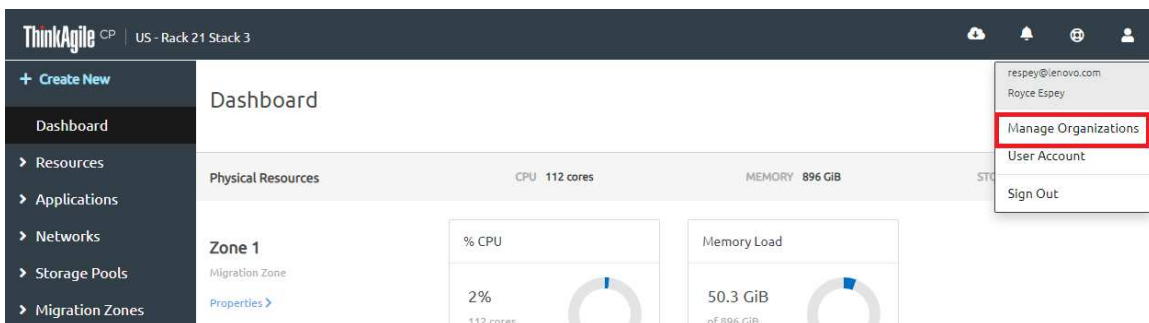


Figure 303. Select Manage Organizations

Step 2. The Manage Organizations page opens, displaying the organizations to which you have access.

Step 3. Click **Create Organization**.

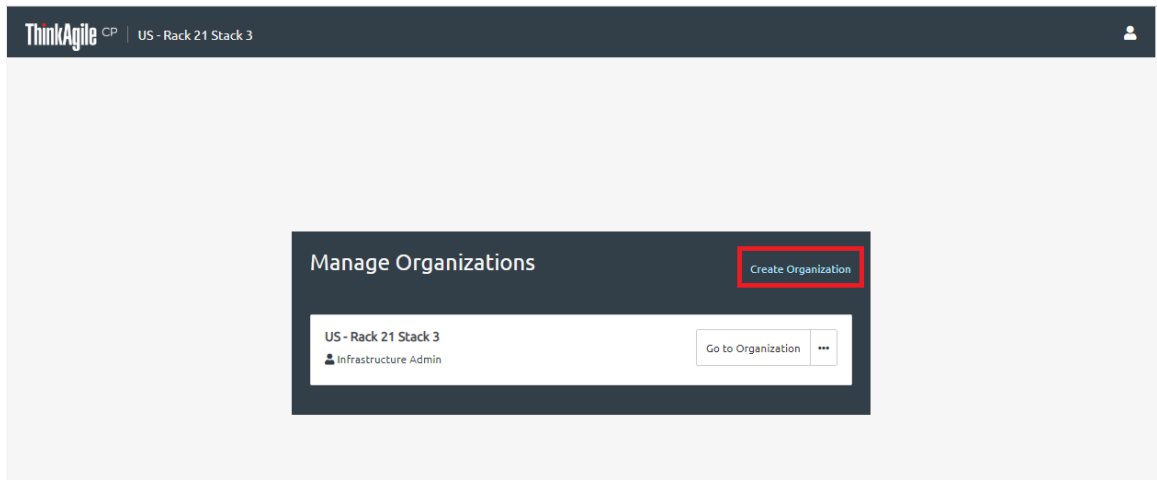


Figure 304. Select Create Organization

Step 4. In the New Organization dialog box, enter a name for the new organization and click **Create**.



Figure 305. Create New Organization

## Manage your ThinkAgile CP account

You can modify your account information for your ThinkAgile CP Cloud Controller user account.

Refer to the following topics:

- [“Change account information” on page 261](#)
- [“Delete the account” on page 263](#)
- [“Review active sessions” on page 264](#)

For information about adding administrator users, see the topic, [“Manage self-service” on page 248](#).

### Change account information

Follow these steps to change your account information.

Step 1. In the upper right corner of the ThinkAgile CP Cloud Controller management portal, click the User Account icon, and then select **User Account**.

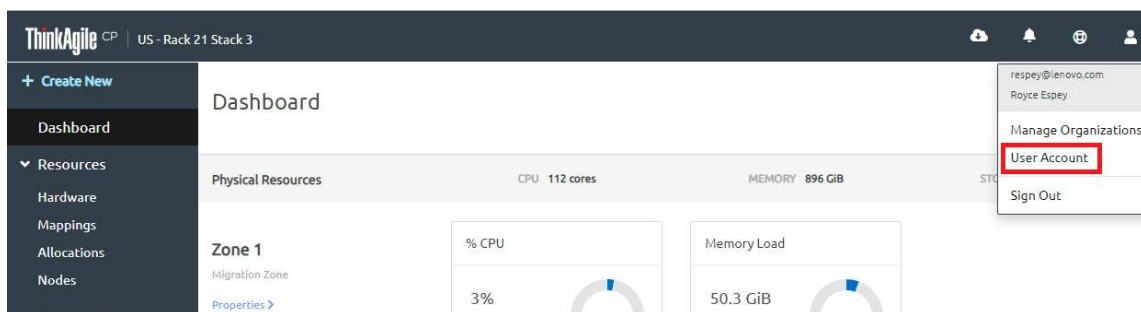


Figure 306. Select User Account

The User Account page opens.

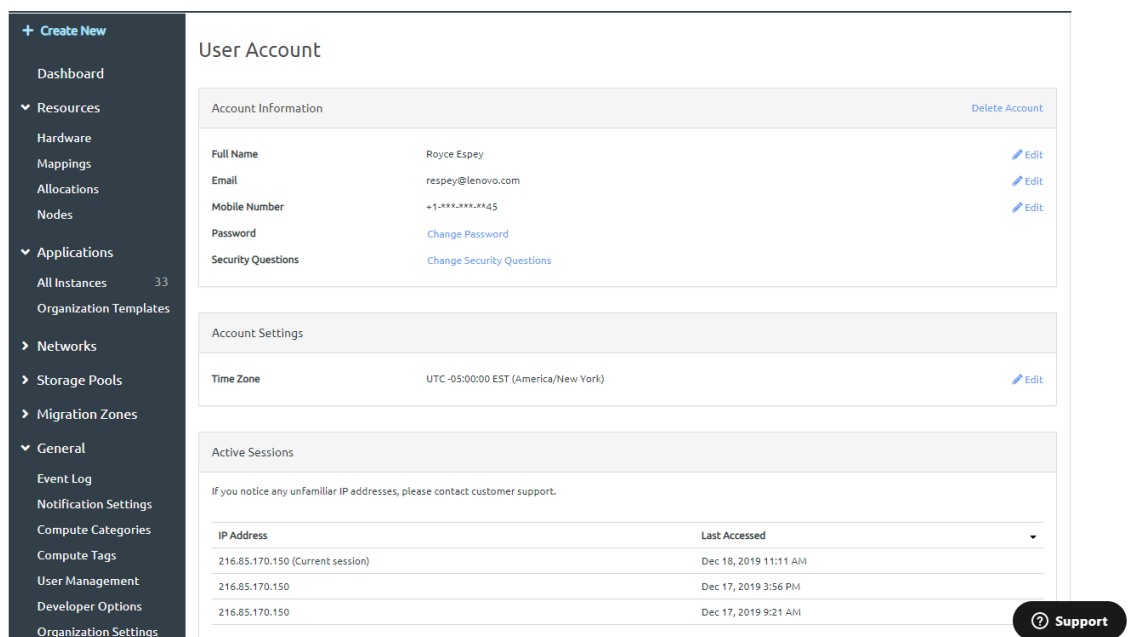


Figure 307. User Account page

- Step 2. To change the account name, do the following:
- Next to your Name, click **Edit**.
  - In the Name dialog box, enter the new First Name and Last Name as needed
  - Click **Update**.

- Step 3. To change the e-mail address, do the following:

**Notes:**

- The e-mail address is used for logging in and to receive designated notifications from the system.
- The e-mail address is also used for two-factor authentication for the user account. For example, to receive a security code that you will enter to log in or to confirm password resets.
  - Next to your e-mail address, click **Edit**.
  - In the Change E-mail dialog box, enter the old e-mail address.
  - Enter a new e-mail address and confirm the new e-mail address.



- d. Enter the password associated with the account.
- e. Click **Send Verification E-mail**. A verification e-mail will be sent to the new e-mail address.
- f. You must click the link in the verification e-mail to validate your identity before the e-mail address is changed.

Step 4. To change the mobile phone number, do the following:

**Note:** The mobile phone number is used for two-factor authentication for the user account. For example, to receive a security code that you will enter to log in or to confirm password resets.

- a. Next to Mobile Number, click **Edit**.
- b. In the Change Mobile dialog box, enter the old mobile number.
- c. Enter the new mobile number and confirm the new mobile number.
- d. Enter the password for the account.
- e. Click **Send Verification E-mail**. A verification e-mail will be sent to the new e-mail address.
- f. You must click the link in the verification e-mail to validate your identity before the e-mail address is changed.

Step 5. To change the account password, do the following:

- a. Next to Password, click **Change Password**.
- b. Enter the old password.
- c. Enter the new password and confirm the new password.

Password requirements are:

- At least 10 characters long
  - At least 1 special character (e.g., ~!@#)
  - At least 1 numeral
- d. Click **Send Verification E-mail**. A verification e-mail will be sent to your e-mail address. You must click the link in the verification e-mail to validate your identity before the password is changed.

Step 6. To change security questions, next to Security Questions, do the following:

- a. Click **Change Security Questions**.
- b. In the Change Security Questions dialog box, select the three security questions for the account and enter the corresponding answers.
- c. Enter the password for the account.
- d. Click **Update**.

Step 7. To change the time zone for the account do the following:

- a. Under Account Settings, next to Time zone, click **Edit**.
- b. In the Time Zone dialog box, select a new time zone and then click **Update**.

## Delete the account

Follow these steps to delete your account.

This operation cannot be undone.

Step 1. In the upper right corner of the ThinkAgile CP Cloud Controller management portal, click the User Account icon, and then select **User Account**

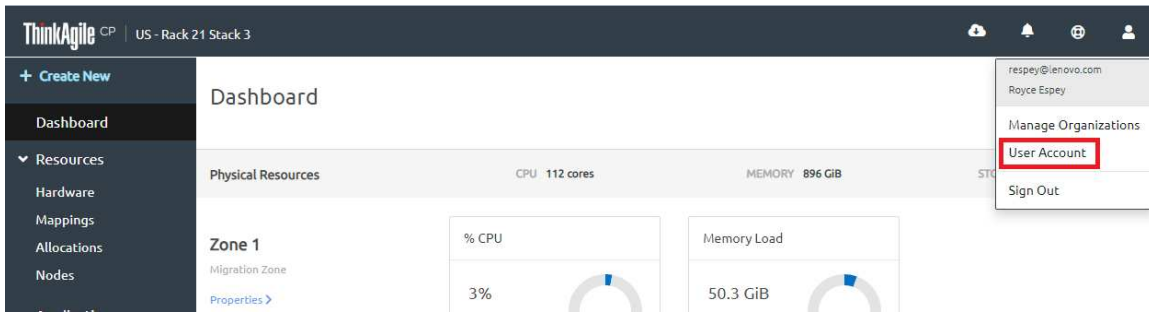


Figure 308. Select User Account

The User Account page opens.

Step 2. To delete the account, click **Delete Account**.

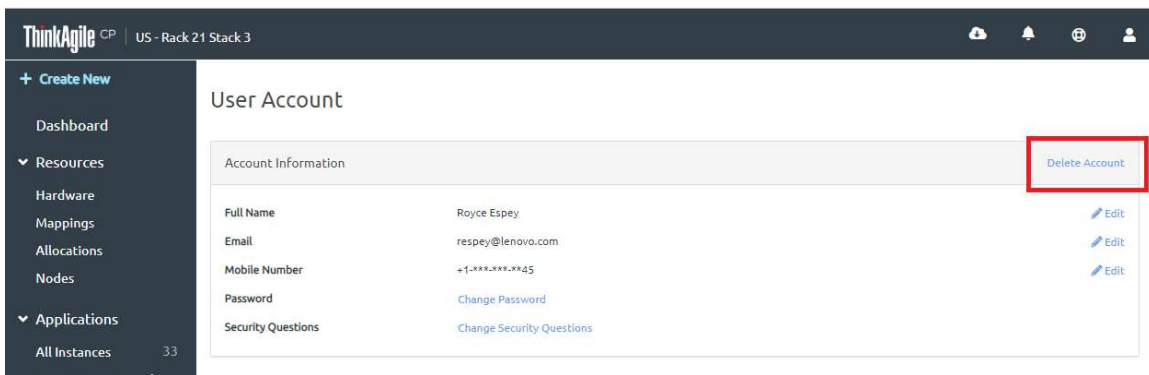


Figure 309. Delete User Account

The User Account page opens.

Step 3. In the confirmation dialog box, click **Delete.Account**.

## Review active sessions

Follow these steps to review your user sessions

Step 1. In the upper right corner of the ThinkAgile CP Cloud Controller management portal, click the User Account icon, and then select **User Account**

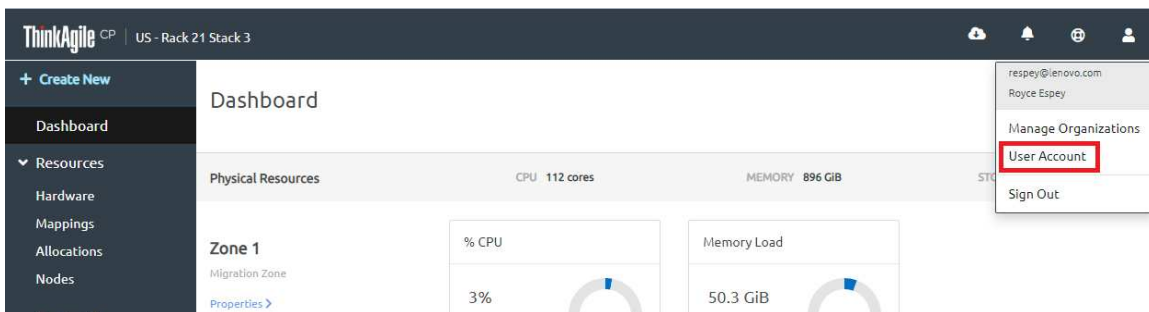


Figure 310. Select User Account

The User Account page opens.

Step 2. Under Active Sessions, you can view a list of sessions the user was logged in by IP address and date last accessed.

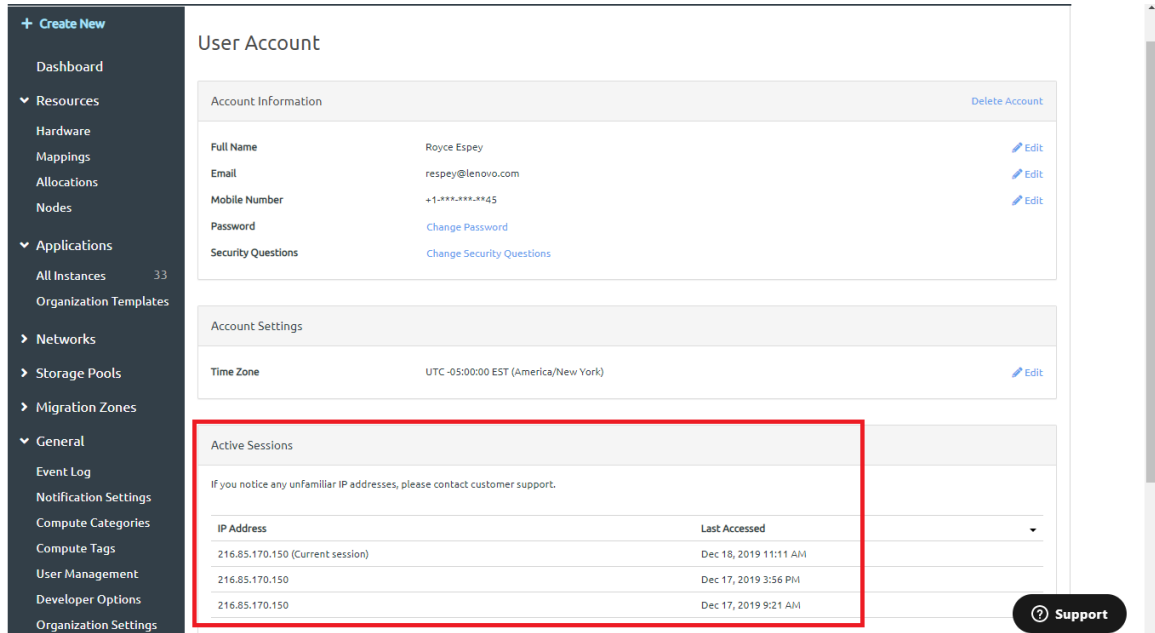


Figure 311. Active Sessions

## System reporting

This article describes the information that is collected from a customer environment for diagnostic and troubleshooting purposes in the event of an issue.

### Notes:

- The information described below is collected automatically (if not stated otherwise) and is stored on the system locally. Working with the customer, Lenovo Support engineers obtain this information via a manual remote session for troubleshooting and diagnostic purposes.
- The data uploaded as part of the system report is covered by the ThinkAgile CP [Privacy Policy](#).

ThinkAgile CP collects the following information:

- [“System Logs” on page 265](#)
- [“Crash Dumps” on page 266](#)
- [“System status information” on page 266](#)
- [“Metadata Information” on page 267](#)

## System Logs

Each component produces a log of actions performed. These files are essential for debugging purposes since they provide a clear picture of all of the actions as well as general system state information at a given moment of time.

The log files consist of:

- Messages: `/var/log/messages`
- Virtual Machine logs (which require manual collection): `/var/log/libvirt/qemu/`
- (Optional) Logs from within the Virtual Machine (which require manual collection)

## Crash Dumps

In case of a crash, a dump file of the process is generated. The information within the dump file is crucial for identifying the issue and localizing the cause of the crash.

## System status information

System status information is collected to help analyze the overall system state at a given period of time. It helps diagnose general system issues that may have happened in parallel and could be a contributing factor to the issue that the product experiences.

The following information is collected:

- On CentOS/Red Hat Enterprise Linux (Compute and Storage Controllers):  
/usr/sbin/ip addr show  
/usr/bin/cat /proc/cpuinfo  
/usr/bin/cat /proc/meminfo  
/usr/bin/cat /proc/cmdline  
/usr/bin/df -h  
/usr/bin/lsblk -o +UUID  
/usr/sbin/lvs  
/usr/sbin/pvdisplay  
/usr/sbin/iscsiadm -m session  
/usr/bin/cat /etc/mstab  
/usr/bin/dmesg  
/usr/bin/uname -a  
/usr/sbin/lsmmod  
/usr/sbin/iptables-save  
/usr/sbin/dmsetup ls  
/usr/sbin/dmsetup table  
/usr/sbin/dmsetup info -c  
/bin/ls -l /dev/mapper  
/bin/sqlite3 /metadata/StorageController.db 'select \* from storage\_block\_information';  
/bin/head -c 4096 /dev/md/md50  
/bin/head -c 4096 /dev/md/md50p2  
/bin/head -c 4096 /dev/mapper/vdo  
/bin/cat /proc/mdstat  
/bin/ps aux | grep cloud  
/bin/ls -l /metadata/DR\_certs/  
/bin/netstat -nptl  
/usr/bin/systemctl status tacp-compute-controller -l  
/usr/bin/systemctl status tacp-storage-controller -l  
/usr/bin/systemctl status iptables -l  
/usr/bin/systemctl status firewalld -l  
/usr/bin/cat /etc/tacp/controller\_uuid  
/usr/bin/cat /etc/tacp/appliance\_serial\_tag  
/usr/bin/cat /sys/module/kvm\_intel/parameters/nested  
journalctl --list-boots
- On DEBIAN (Network Controller):  
/sbin/ip addr show  
/bin/cat /proc/cpuinfo  
/bin/cat /proc/meminfo  
/bin/df -h/bin/lsblk -o +UUID  
/bin/cat /etc/mstab/bin/dmesg  
/bin/uname -a  
/sbin/lsmmod  
/sbin/iptables-save  
/usr/sbin/service tacp-network-controller status  
/bin/netstat -anp  
/usr/bin/version  
/usr/sbin/license --show  
/bin/cat /etc/tacp/controller\_uuid

```
/bin/cat /etc/tacp/appliance_serial_tag
```

- On ALL systems:  
/usr/bin/free  
/usr/bin/ls -ld /etc/mstab  
/usr/bin/uptime  
/bin/ps auxf  
/usr/sbin/dmidecode

## Metadata Information

Metadata includes the component name, current version, and the timestamp of the moment when the error reporting information gathering occurred.

---

## Backups and disaster recovery

ThinkAgile CP provides integrated backup and disaster recovery functionality for your VM instances.

On the Backups tab for a VM instance, **infrastructure admin** users and **VDC manager** users can manage local backups (manual or automatic), quick DR backups, or external backups.

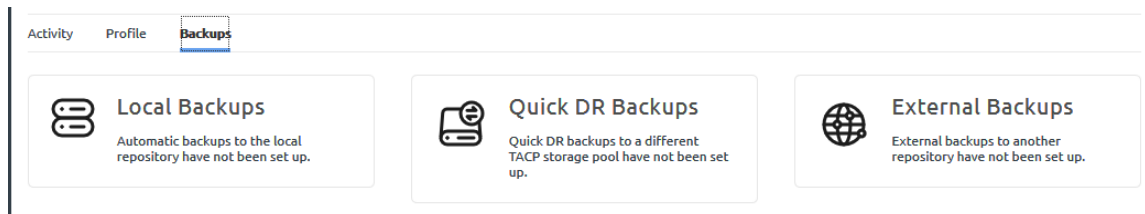


Figure 312. Options for VM instance backups

- **Local backups.** Local backups are stored to a storage pool that is accessible from the VM instance. You can choose to automate local backups at specific intervals and automate long local backups are retained. In addition, you can choose to manually back up a VM instance.

Local backups are used as the source for quick DR backups and external backups, if those functions are enabled.

For more information about setting up and managing local backups, see the following topic:

[“Manage local backups for an application instance” on page 269](#)

- **Quick DR backups.** If enabled, a quick DR backup is stored in a second storage pool that is available to the VM instance whenever an automated local backup occurs. You can choose how many quick DR backups to retain.

For more information about setting up and managing quick DR backups, see the following topic:

[“Manage quick DR backups” on page 288](#)

- **External backups.** If enabled, a backup is stored in an external repository. You can choose how many external backups are kept and how long those backups are retained. In addition, you can store backups in multiple external repositories.

**Note:** Before you set up an external backup for an application instance, you must register the external repository with ThinkAgile CP.

For more information about setting up and managing external backups, see the following topic:

[“Manage external backups” on page 305](#)

ThinkAgile CP also includes a function called *Clone and Attach*, which allows you to clone a vDisk or a backup vDisk from one VM and attach it to the same or a second VM.

In addition, ThinkAgile CP supports third-party, agent-based backup tools, such as Veeam. For more information about third-party backup support, see the following topic:

[“Third-party backup” on page 319](#)

## Application-consistent backups

You can create application-consistent backups if your application instance supports Windows Volume Shadow Copy Service (VSS) or if your application instance supports application quiescing.

You can create application-consistent backups with ThinkAgile CP in the following scenarios:

- **Scenario 1:** Your application instance runs on a Windows server, and it supports Windows Volume Shadow Copy Service (VSS)

When you take a backup of a virtual machine (VM), the application instance acts as a VSS requester. VSS automatically quiesces the application instance before the backup is taken and "un-quiesces" it afterwards, making the backup application-consistent. If the application instance is a database, you can roll it forward by replaying the database logs.

- **Scenario 2:** Your application instance provides a means to be put in a storage-consistent state (that is, application quiescing).

For application instances that do not support VSS or for non-Windows applications, you can create an application-consistent backup with ThinkAgile CP by invoking a script that quiesces the application or puts it in a storage-consistent state. ThinkAgile CP provides the pre- and post-backup creation hooks to call such scripts.

### Note:

In scenarios outside of the two listed above, you will be creating a crash-consistent backup of the application, which is a point-in-time backup image. A point-in-time database backup cannot be rolled forward by replaying the database logs.

### Invoke pre- and post-backup scripts

You can specify pre- and post-backup scripts that can be invoked in an application instance when a backup is taken. The scripts must be created with the following names and locations:

- Windows pre-backup script:

`C:\Program Files\tacp\Hooks\PreSnapshot.bat`

- Windows post-backup script:

`C:\Program Files\ta\Hooks\PostSnapshot.bat`

- Linux pre-backup script:

`/etc/tacp/hooks/pre-snapshot`

- Linux post-backup script:

`/etc/tacp/hooks/post-snapshot`

### Example

To create an application-consistent backup for an Oracle database running on Linux, there is no VSS support. ThinkAgile CP can call your pre-backup script to put the database in a backup-consistent state by

putting all tablespaces in backup mode, and then it can call your post-backup script to take them out of backup mode.

### Example pre-backup script (which puts the tablespace in backup mode)

In the VM to be backed up, you can put the pre-snapshot script here:

```
/etc/tacp/hooks/pre-snapshot

sqlplus -s <admin>/<password> << EOF
set echo off;
set heading off;
alter database begin backup;
exit;
EOF
```

### Example post-backup script (to return the database to a normal performance state)

You can put the post-backup script here:

```
/etc/tacp/hooks/post-snapshot

sqlplus -s <admin>/<password> << EOF
set echo off;
set heading off;
alter database end backup;
exit;
EOF
```

## Manage local backups for an application instance

In the ThinkAgile CP Cloud Controller, **infrastructure admin** users and **VDC manager** users can take a local backup of the current instance, revert to an earlier backup of an instance, or manage existing backups for the instance. Additionally, you can copy a local backup to an external repository if that repository has been registered with the ThinkAgile CP Cloud Controller.

You can choose to take backups manually, or you can choose to automate local backups.

Refer to the following topics.

- [“Enable automatic local backups” on page 269](#)
- [“Create a local backup manually” on page 274](#)
- [“Restore an instance from a local backup” on page 275](#)
- [“Create an instance from a local backup” on page 278](#)
- [“Copy a backup to an external repository” on page 282](#)
- [“Rename a backup” on page 283](#)
- [“View vDisks for a backup” on page 284](#)
- [“Delete a local backup” on page 285](#)
- [“Delete all local backups” on page 287](#)

### Enable automatic local backups

You can enable automatic local backups and configure a regular interval for when local backups will be taken for your application instances. A maximum of 1,024 local backups for an instance is supported, based on the backup interval and the backup retention settings.

Automatic local backups are stored in the storage pool assigned to the VDC. These backups are also used as the source when you enable quick DR or external backups. If you do not enable automatic local backups, manual local backups will be used as the source for quick DR backups or external backups.

**Note:** In ThinkAgile CP, Release 5.1.5, you cannot specify the number of backups to be kept.

Complete the following steps to enable automatic local backups:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click **Set Up Backups**.

The screenshot shows the 'Backups' tab for a CentOS 7.5 (64-bit) - Lenovo Template instance. The instance is running. The interface displays resource usage for CPU, Memory, and Storage. Below the resource usage, there are three sections: Local Backups, Quick DR Backups, and External Backups, each with a message indicating that backups have not been set up. At the bottom, there is a 'Backups' table with one entry: 'Initial Application Snapshot (from template)' taken on 'Oct 20, 2020 8:15 AM'. A 'Set Up Backups...' button is highlighted with a red box.

Name	Time	Location	Actions
Initial Application Snapshot (from template)	Oct 20, 2020 8:15 AM		...

Figure 313. Set up backups button

- Step 4. On the Backup Settings Overview page, click **Next**.



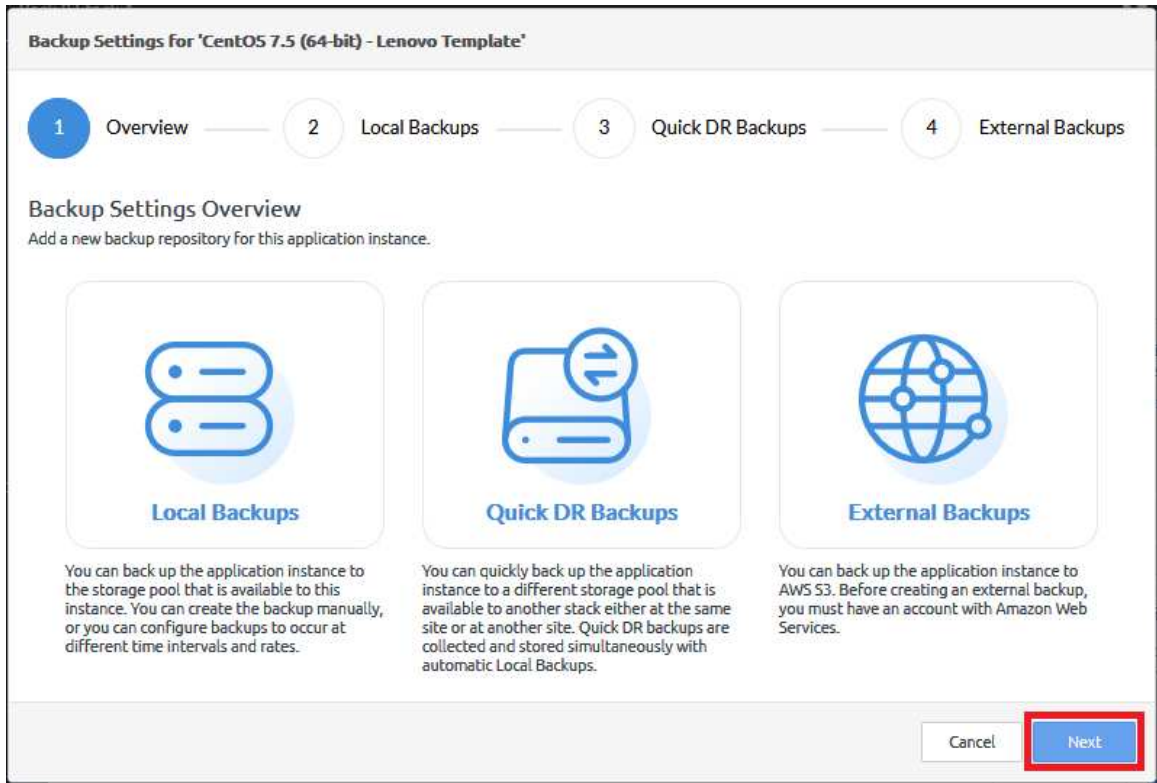


Figure 314. Backup Setting Overview

Step 5. On the Local Backups page, configure the following options:

**Note:** In ThinkAgile CP Release 5.1.5, backup interval settings and retention settings have changed. If you created automatic backups for an instance with an earlier release of ThinkAgile CP (before Release 5.1.5), the backup interval settings and retention settings you specified will continue to work until you choose to update those settings. However, if you set up backups for a new instance, you must use the updated backup interval settings and retention settings.

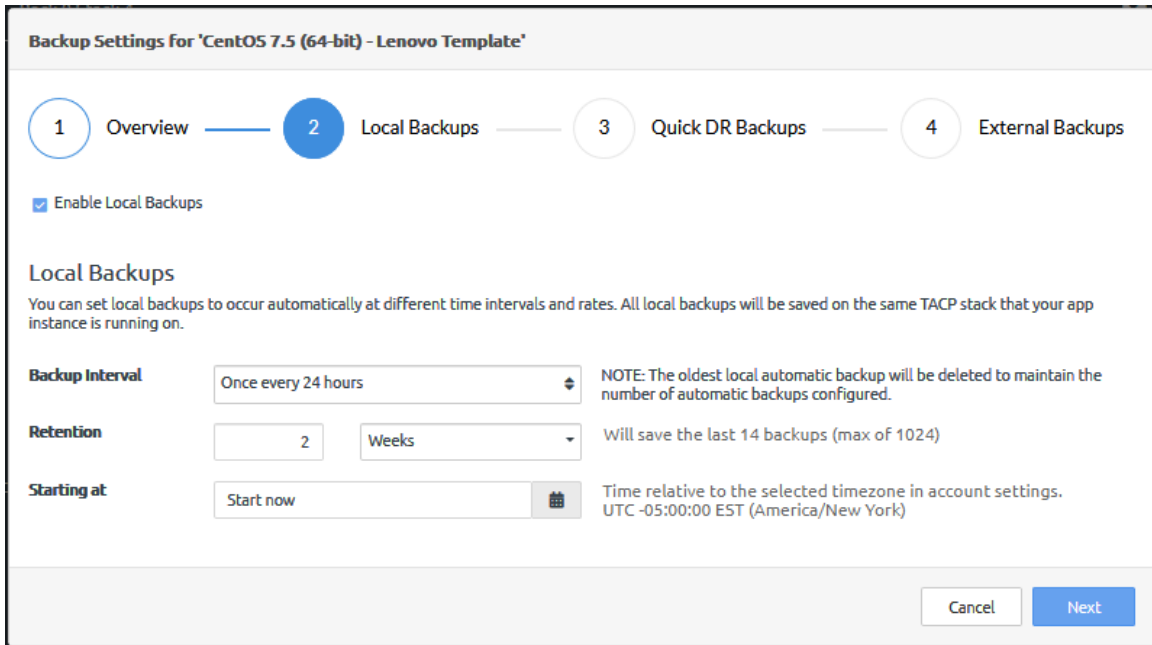
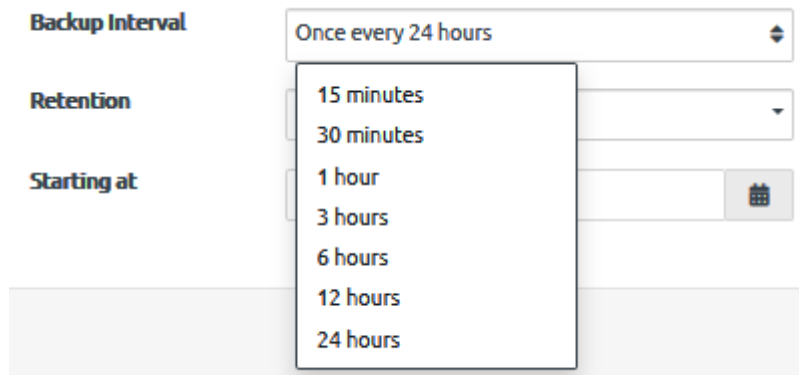


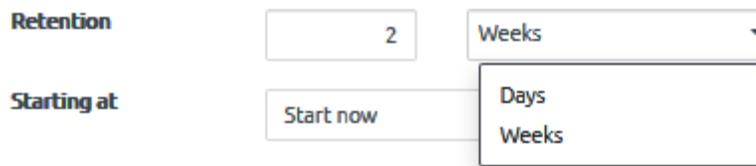
Figure 315. Local Backups

- a. Validate that **Enable Local Backups** is selected.
- b. Choose how often backups should occur.

You can choose from 15 minutes up to 24 hours.

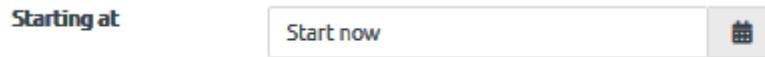


- c. Choose how long backups should be kept.



- d. Specify when the local backups should begin.

The default is to start as soon as you complete the backup wizard. Click **Start now** to choose a specific time to begin creating backups.



**Note:** The time is relative to the timezone specified in account settings.

Step 6. Click **Next**.

The Quick DR Backups page is displayed. Click **Next**.

For information about enabling local backups, see the following topic:

[“Enable quick DR backups for an instance” on page 291](#)

Step 7. The External Backups page is displayed. Click **Next** again.

For information about enabling external backups, see the following topic:

[“Enable external backups for an instance” on page 305](#)

Step 8. Click **Save** to save your configuration.

The Local Backups configuration is displayed. Because **Start Now** was specified as the time to begin taking local backups, the first automatic backup is displayed.

MyVDC > CentOS 7.5 (64-bit) - Lenovo Template ⚙️ New

Instance is running

### CentOS 7.5 (64-bit) - Lenovo Template 📄 Actions

Any None

#### CPU

Provisioned: 4 cores  
% vCPU: 0%  
% CPU: 0%

#### Memory

Provisioned: 2 GiB  
Load: 268 MiB

#### Storage

Provisioned: 50 GiB  
Total Used: 9.2 GiB  
Instance: 4 GiB  
Local Backups: 2.4 GiB  
DR Backups: 2.8 GiB

#### Local Backups

Next Backup: 23 h, 58 m  
Interval: ~ 24 h  
Retention limit: 2 wk

#### Quick DR Backups

Quick DR backups to a different TACP storage pool have not been set up.

#### External Backups

External backups to another repository have not been set up.

Back Up Now...Set Up Backups...⋮

Name	Time	Location	Actions
Automatic Snapshot 1	Oct 20, 2020 9:26 AM	📁	⋮
Initial Application Snapshot (from template)	Oct 20, 2020 8:15 AM	📁	⋮

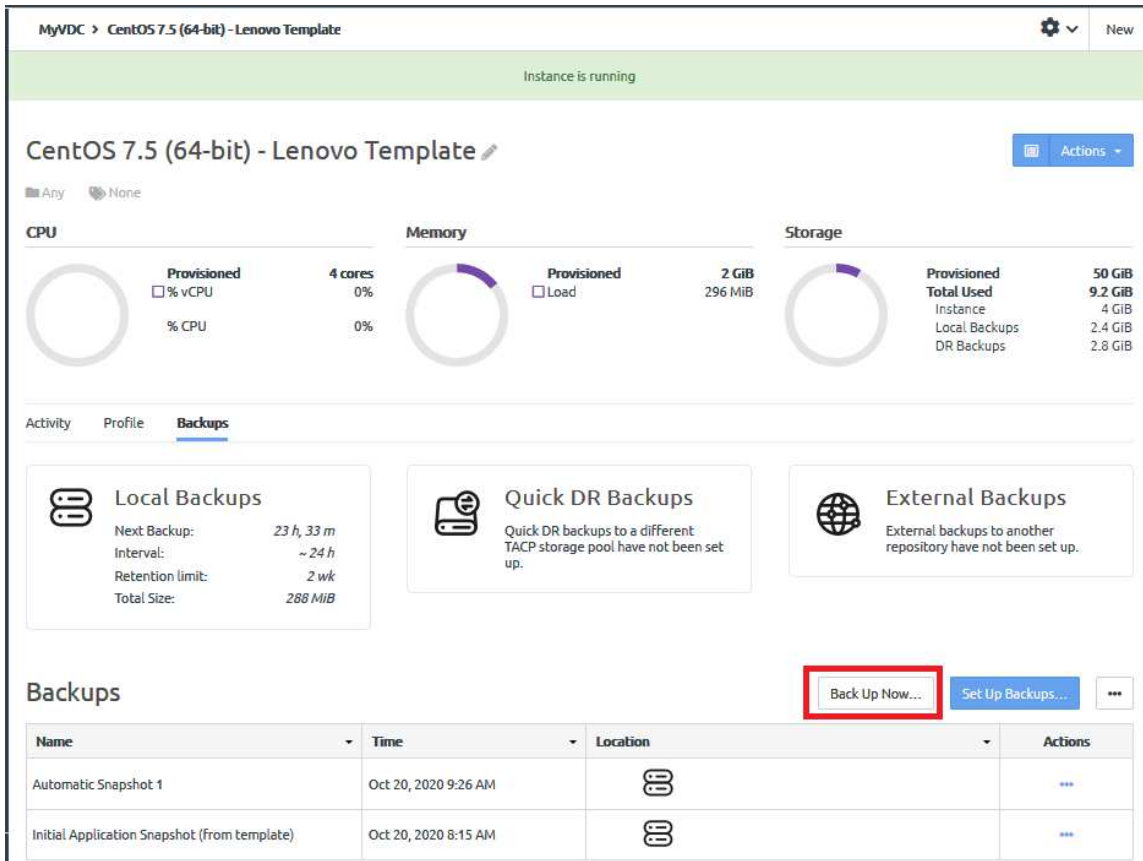
Figure 316. Local Backups configuration completed

## Create a local backup manually

When an application instance is first created, a manual backup of that instance is created. However, you can choose to create additional backups manually.

Complete the following steps to create a local backup manually:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click **Back Up Now**.

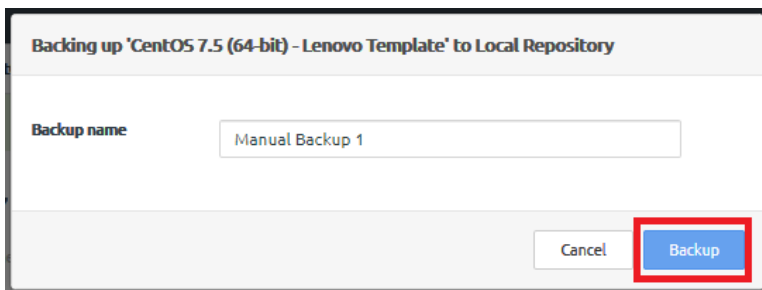


The screenshot shows the 'Backups' tab for a CentOS 7.5 (64-bit) - Lenovo Template instance. The instance is running. The CPU, Memory, and Storage sections show resource usage. The Backups section includes options for Local Backups, Quick DR Backups, and External Backups. A table lists existing backups, and a 'Back Up Now...' button is highlighted with a red box.

Name	Time	Location	Actions
Automatic Snapshot 1	Oct 20, 2020 9:26 AM		...
Initial Application Snapshot (from template)	Oct 20, 2020 8:15 AM		...

Figure 317. Back Up Now button

- Step 4. Enter a name for the backup. This name must be unique across all backups for this instance.
- Step 5. Click **Backup**.



The screenshot shows the 'Backing up 'CentOS 7.5 (64-bit) - Lenovo Template' to Local Repository' dialog box. The 'Backup name' field contains 'Manual Backup 1'. The 'Backup' button is highlighted with a red box.

Figure 318. Backing Up dialog

The backup is displayed in the Backups list.

**Note:** Manual backups are not affected by the retention period selected for automatic backups, if configured. Manual backups must be deleted manually.

The screenshot shows the VMware vSphere interface for a CentOS 7.5 (64-bit) - Lenovo Template instance. The instance is running. The Backups tab is selected, showing backup configuration and a list of backups. The 'Manual Backup 1' entry is highlighted in red.

Name	Time	Location	Actions
Manual Backup 1	Feb 09, 2021 2:44 PM	Local Backups	...
Automatic Snapshot 1	Feb 09, 2021 2:35 PM	Local Backups	...
Initial Application Snapshot (from template)	Feb 08, 2021 10:06 AM	Local Backups	...

Figure 319. Backups list with manual backup added

## Restore an instance from a local backup


When you restore an instance from a backup, you are reverting the instance to an earlier local backup version, either an automated local backup or a manual local backup.

**Notes:** When you restore an instance from a backup, you must restore from a local backup. You cannot restore an instance directly from quick DR backup or an external backup. Instead, for these types of backups, you create a new instance.

- For more information about creating a new instance from a quick DR backup, see the following topic: [“Restore or start an instance from a quick DR backup” on page 298](#)
- For more information about creating a new instance from an external backup, see the following topic: [“Restore an instance from an external backup” on page 313](#)

Complete the following steps to restore an instance from a local backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. Click the action menu (  ) for the local backup that you want to restore. Then click **Restore**.

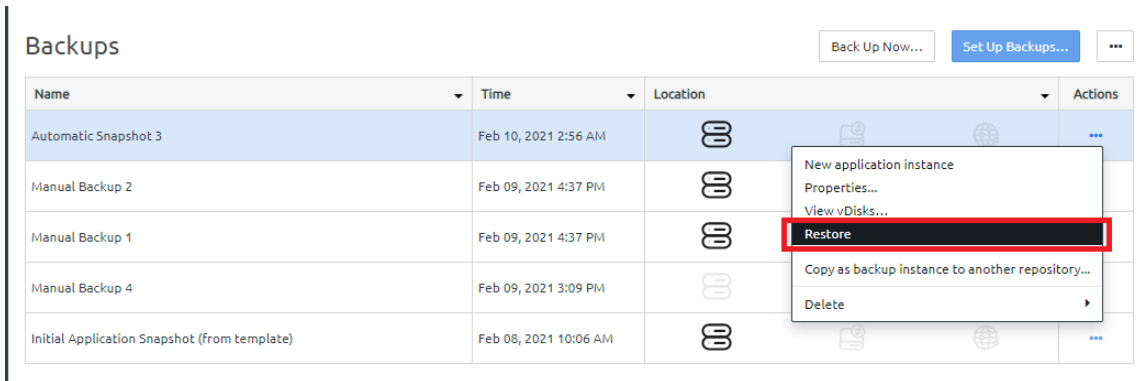


Figure 320. Restore option on the backup Actions menu

Step 4. On the Restore Backup Instance dialog, click **Restore**.

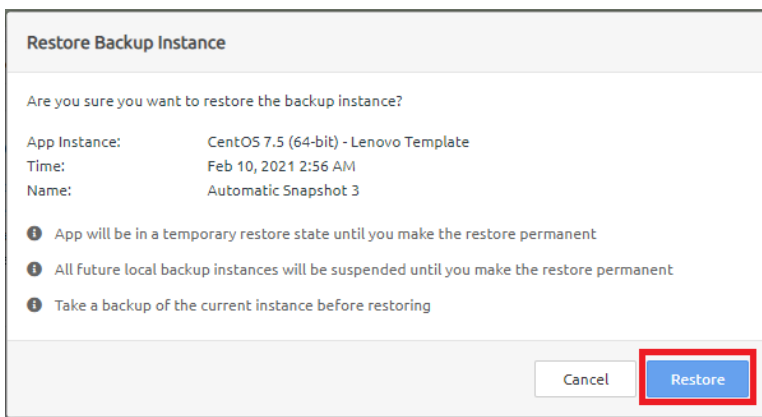


Figure 321. Restore backup instance dialog

Step 5. A backup of the instance is created before the restore process begins.

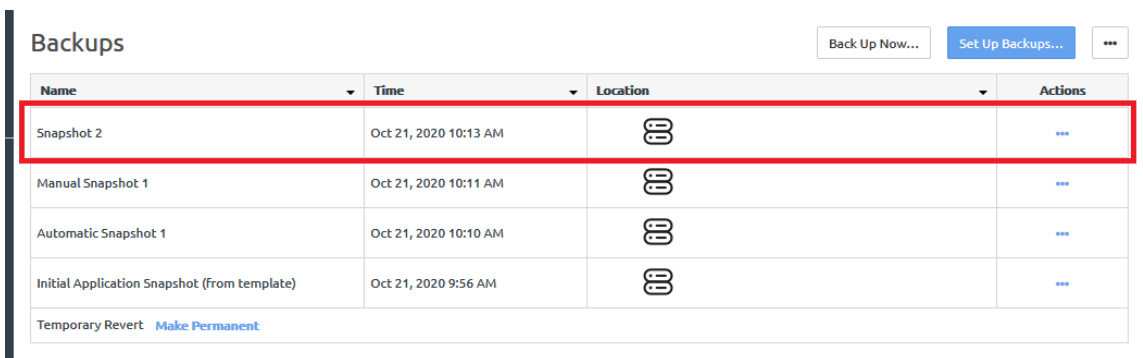


Figure 322. Backup created before restore begins

Step 6. The instance is in a temporary restored state.

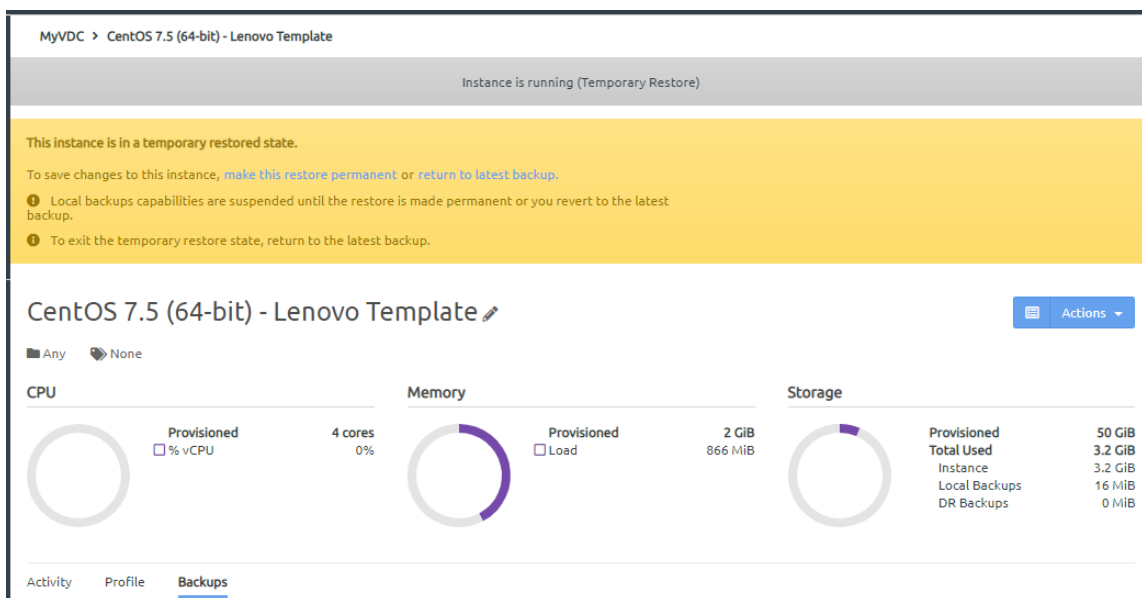
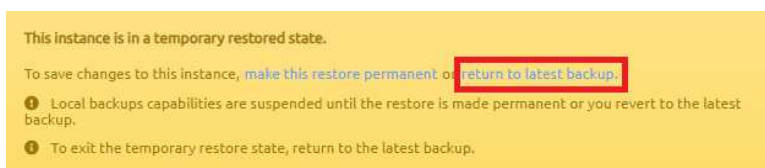


Figure 323. Restore backup instance dialog

**Note:** No backups will be deleted. All backups are suspended until you make the restore permanent.

Step 7. Choose to return to the latest backup or to make the change permanent.

- Click **return to latest backup** to cancel the restore process.



1. On the Return to Latest Backup dialog, click **Return to Backup**.

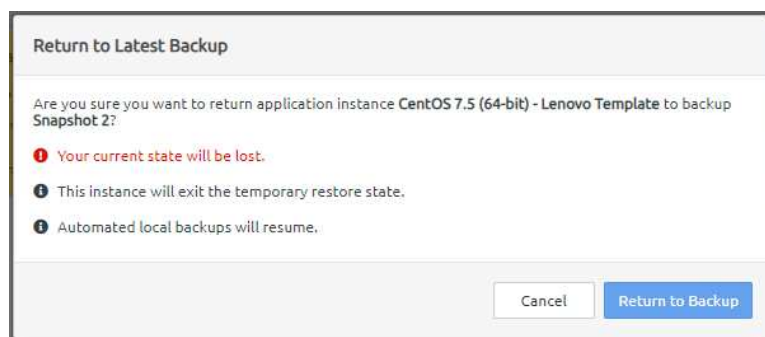
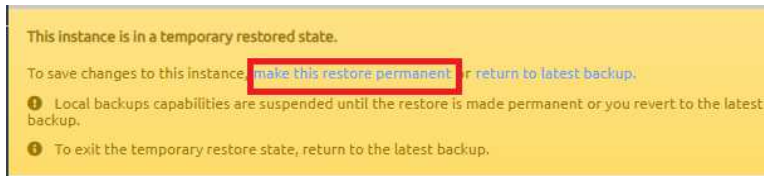


Figure 324. Return to Latest Backup dialog

2. The instance is restored to the backup that was created before the restore process started.
- Click **make this revert permanent** to continue the restore process.



1. On the Make Revert Permanent dialog, click **Make Permanent**.

**Note:** You might need to refresh your browser window after clicking **make this revert permanent**.

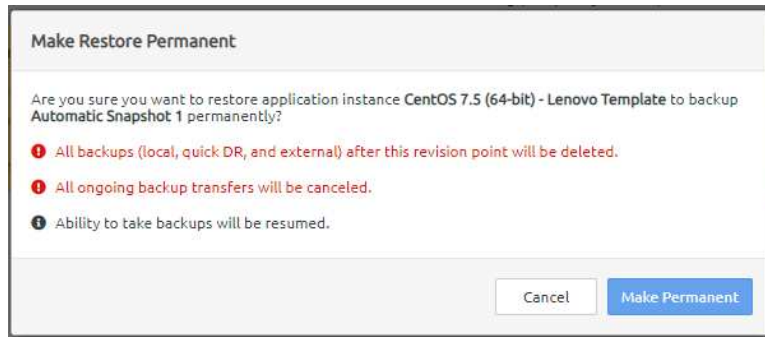


Figure 325. Restore Backup Instance dialog

2. The restore process is complete. The VM instance has been restored from the backup.

## Create an instance from a local backup

ThinkAgile CP allows you to easily create an instance from an existing local backup (created either automatically or manually). The state of the new instance is the same as the state of the original instance when the backup was created.

Complete the following steps to create a new instance from an existing local backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the action menu ( **...** ) for the local backup for which you want to create an instance. Then click **New application instance**.

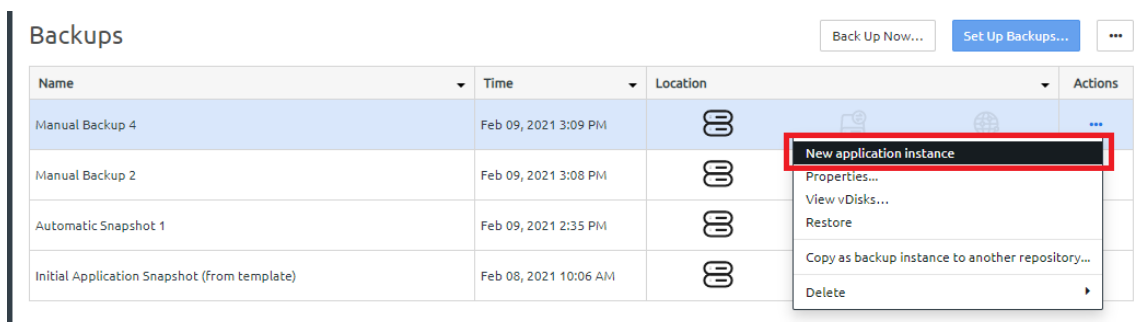
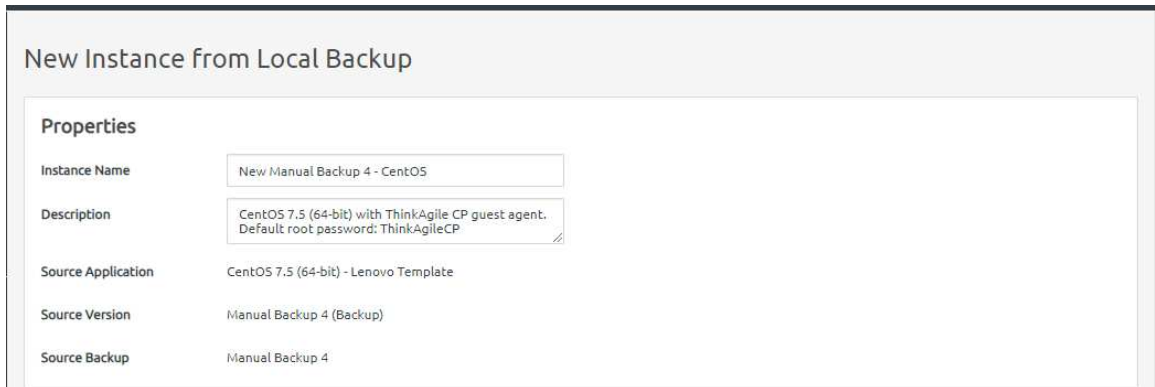


Figure 326. New application instance option on the backup Actions menu

- Step 4. If either a quick DR backup or an external backup exists for this instance, you are prompted to choose the backup to be used when creating a new instance. Choose the local backup and click **Create**.



- Step 5. The New Instance from Local Backup page is displayed. In the Properties section of the page, enter a name (required) and a description (optional) for the new application instance. The new name must be unique across all application instances in the associated virtual datacenter.



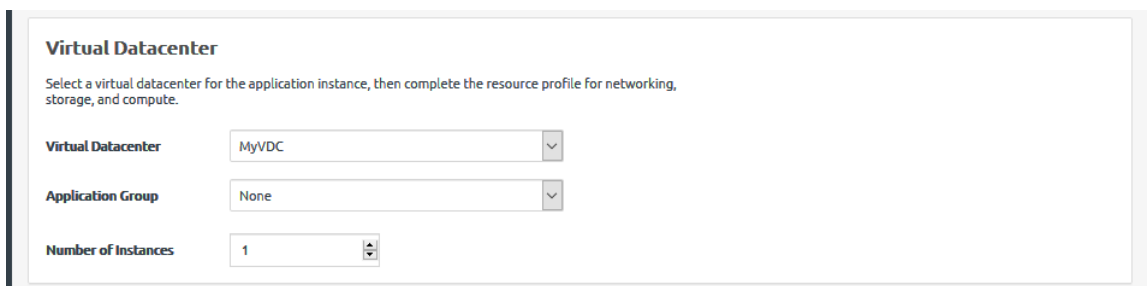
New Instance from Local Backup

**Properties**

Instance Name	New Manual Backup 4 - CentOS
Description	CentOS 7.5 (64-bit) with ThinkAgile CP guest agent. Default root password: ThinkAgileCP
Source Application	CentOS 7.5 (64-bit) - Lenovo Template
Source Version	Manual Backup 4 (Backup)
Source Backup	Manual Backup 4

Figure 327. New Instance from Local Backup dialog

- Step 6. In the Virtual Datacenter section, complete the following:



**Virtual Datacenter**

Select a virtual datacenter for the application instance, then complete the resource profile for networking, storage, and compute.

Virtual Datacenter	MyVDC
Application Group	None
Number of Instances	1

Figure 328. New instance from local backup - Virtual Datacenter

- Select the virtual datacenter where the instance should reside and get resources. The virtual datacenter selection determines the migration zone and storage pool resources available for the application instance.
- Optionally, select an application group (which are used to organize application instances in a virtual datacenter) and then specify the number of instantiations you want to include in this group.

For more information about application groups, see the following topic:

[“Managing application groups” on page 232](#)

- If you want to create more than one instance, enter the number of instances in the box provided (for example, if you were creating multiple Splunk indexers).

- Step 7. Configure the settings for the compute and networking resources.

**Note:** The new instance will be created in the same storage pool where the local backup is located.

### Storage

Storage Pool: RO 151.5 Pool

Storage Provisioning

vDisk Name	Size	IOPS Limit	Bandwidth Limit
Disk 0	50 GiB	—	—

### Compute

Provisioning: 4 cores, 2 GiB

Migration Zone: RO 151.5 MZ

[Compute Constraints](#)

### Network

Configure at least one virtual network interface controller (vNIC) to specify the instance's network settings. [Add vNIC](#)

vNIC	Networking Mode	Network	Firewall Profile	Firewall Override	Mac Address
vNIC 0	VLAN	RO 151.5 VLAN	—	—	Automatic

Boot Order: Disk 0 > Network (vNIC 0)

Network Sysprep:  Perform network sysprep  
Reset all NICs to DHCP in instance's OS.

Figure 329. New instance from local backup - Resources

- Define the VM provisioning for this instance by specifying the CPU (number of cores) and memory (in GB).
- Select the migration zone from which the application instance will get its compute resources.
- If the instance requires a specific compute category or tag, expand **Compute Constraints** and add the category and tags.
- Select a networking mode for the instance and select a virtual network from the drop-down menu.
- Edit the Boot Order if needed. The application instance will attempt to boot in the sequence you define.
- Click **Perform network sysprep** if needed to reset all NICs to DHCP in the instance operating system.

Step 8. Configure the settings for the new instance.

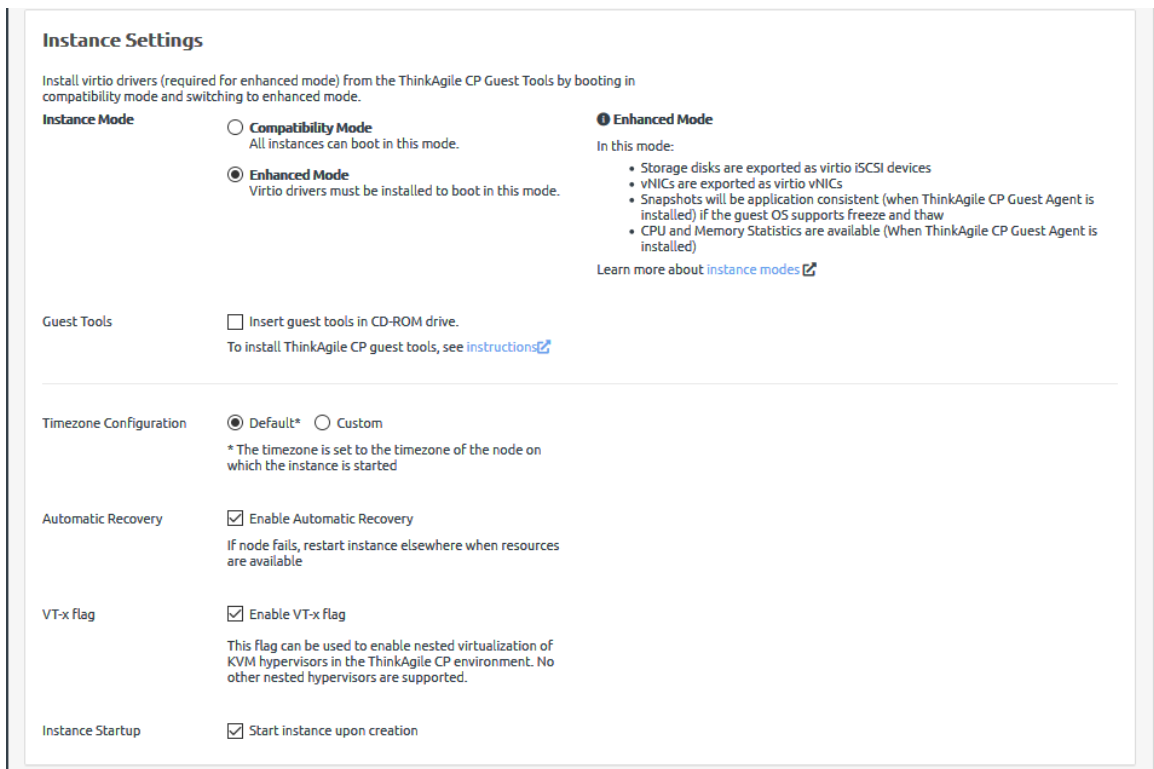


Figure 330. New instance from local backup - Instance Settings

- a. Choose the instance mode.

**Note:** The instance mode defaults to the source instance when creating an instance from a backup. For more information about these modes, see the following topic:

[“Understand instance modes” on page 67](#)

1. **Compatibility Mode.** All instances can boot in this mode.
2. **Enhanced Mode.** Virtio drivers must be installed to boot in this mode.

- b. Click **Insert guest tools in CD-ROM** to insert guest tools.

For more information about guest tools, see the following topic:

[“Install guest agent tools” on page 68](#)

- c. Determine the time zone to be used for the instance.

1. **Default.** The time zone is set to the time zone of the node on which the instance starts.
2. **Custom.** You can set the time zone for the application instance by selecting the time zone area and location.

**Note:** Linux instances should use Default or the UTC time zone, rather than a custom local time zone.

- d. Make sure that **Enable Automatic Recovery** is selected to enable automatic recovery, which specifies to restart the instance where resources are available if the node fails.
- e. Make sure that **Enable VT-x flag** is selected to enable nested virtualization of KVM hypervisors in your ThinkAgile CP environment.

- f. Make sure that **Start instance upon creation** is selected to have the instance started when it is created.

Step 9. Click **Create Instance**.

The new instance is listed on the VDC Instance page for your VDC:

MyVDC New

VDC Instances ○ 4 New Instance ▾

Filter by ▾

Start/resume Pause Shutdown 0 selected

Name	IP Address(es)	CPU (cores)		Memory		NW BW (Mbps)		ST BW (Mbps)		IOPS		IO QL	
		Prov.	% vCPU	Prov.	Load	Read	Write	Read	Write	Read	Write		
CentOS 7.5 (64-bit) - Lenov...	10.241.56.140	4	0%	2 GiB	282 MiB	0	0	0	0	0	0	0	ⓘ ⋮
External Backup - Ubuntu-...	10.241.56.172	4	0%	4 GiB	648 MiB	0	0	0	0	0	0	0	ⓘ ⋮
New Manual Backup 4 - Ce...	10.241.56.179	4	0%	2 GiB	282 MiB	0	0	0	0	0	2	0	ⓘ ⋮
Ubuntu-18.04.1 - Lenovo T...	10.241.56.143	4	0%	4 GiB	1.9 GiB	0	0	0	0	0	0	0	ⓘ ⋮

Figure 331. VDC Instances page

## Copy a backup to an external repository

You can copy a backup to an external repository even if you do not have external backups enabled. However, the external repository must be registered with the ThinkAgile CP Cloud Controller.

**Note:** If the ThinkAgile CP Cloud Controller software is at Release 5.1.6 or greater and the hardware (storage) is at Release 5.1.5 or lower, this function is not available (it is greyed out).

Complete the following steps to copy a backup to an external repository:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the action menu (⋮) for the local backup that you want to copy. Then click **Copy as backup instance to another repository**.

Backups Back Up Now... Set Up Backups... ⋮

Name	Time	Location	Actions
Manual Backup 4	Feb 09, 2021 3:09 PM	Ⓜ	ⓘ ⋮
Manual Backup 2	Feb 09, 2021 3:08 PM	Ⓜ	ⓘ ⋮
Automatic Snapshot 1	Feb 09, 2021 2:35 PM	Ⓜ	ⓘ ⋮
Initial Application Snapshot (from template)	Feb 08, 2021 10:06 AM	Ⓜ	ⓘ ⋮

- New application instance
- Properties...
- View vDisks...
- Restore
- Copy as backup instance to another repository...
- Delete

Figure 332. Copy backup to external repository option on the backup Actions menu

- Step 4. In the Copy as backup instance to another repository dialog, choose which repository to use and the type of backup.

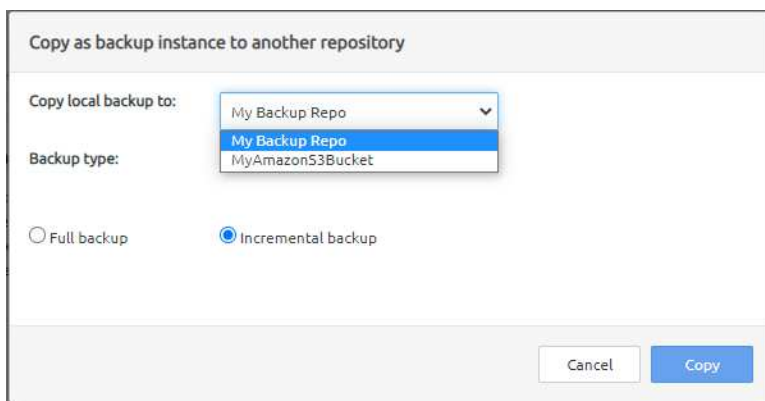


Figure 333. Copy backup to external repository dialog

Choose the type of backup:

- **Full backup.** A complete version of the backup is copied to the external repository.
- **Incremental backup.** Any updates made to the backup since it was last copied to the repository are copied to the external repository.

Step 5. Click **Copy**.

**Note:** If multiple repositories are available, you can copy the backup instance to more than one repository. After clicking **Copy**, simply click **Copy as backup instance to another repository** again and choose a different repository. You do not need to wait on the first copy to complete before copying the instance to another repository.

The external backup icon is displayed for the backup:










Name	Time	Location	Actions
Manual Backup 4	Feb 09, 2021 3:09 PM		
Manual Backup 2	Feb 09, 2021 3:08 PM		
Automatic Snapshot 1	Feb 09, 2021 2:35 PM		
Initial Application Snapshot (from template)	Feb 08, 2021 10:06 AM		

Figure 334. Results of a manual copy to an external repository

## Rename a backup

You can rename a backup for an instance.

Complete the following steps to rename a backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the action menu (  ) for the local backup that you want to rename. Then click **Properties**.

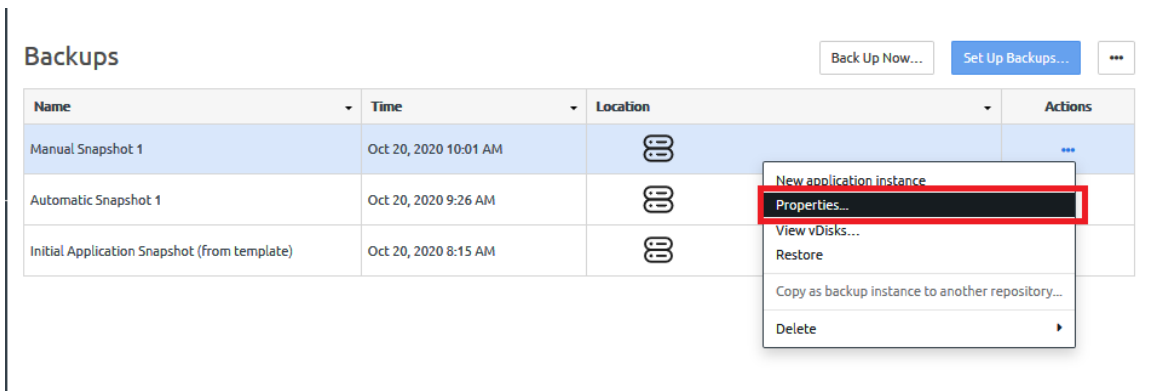


Figure 335. Properties option on the backup Actions menu

Step 4. In the Backup Properties dialog, enter a new name for the backup. This name must be unique across all backups for this instance.

**Note:** Renaming the backup will also rename any quick DR backup and external backup copies that are associated with this backup.

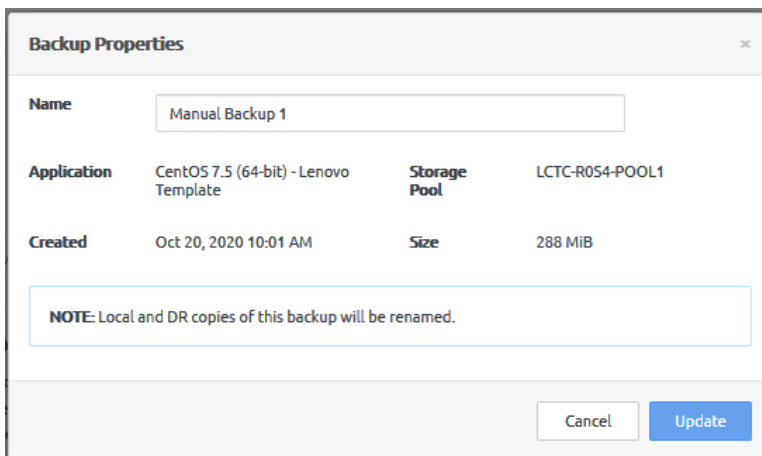


Figure 336. Backup properties dialog

Step 5. Click **Update**.

**Note:** If quick DR backups are enabled, the backup name will change in the local and disaster recovery locations.

## View vDisks for a backup

Viewing vDisks for an instance backup is helpful if you want to clone and attach a vDisk.

Complete the following steps to view vDisks for a backup:

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.

Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. Click the actions menu ( **...** ) for the local backup for which you want to view vDisks. Then click **View vDisks**.

**Note:** If quick DR backups are enabled, you will be prompted to choose which vDisk to view.

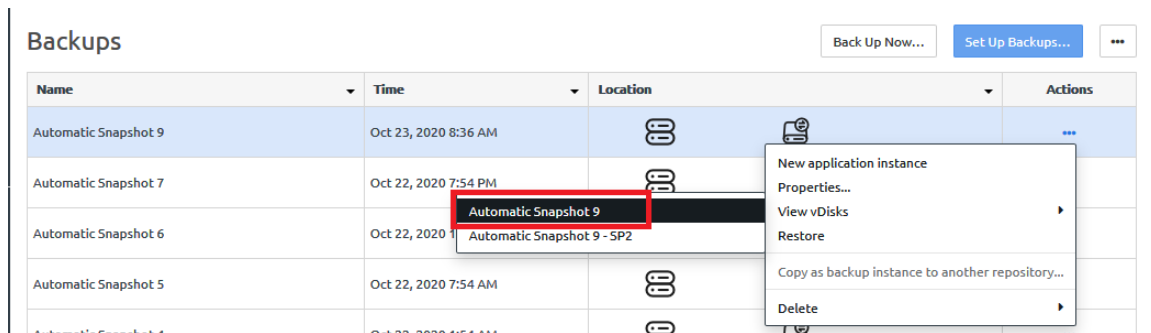


Figure 337. View vDisks option on the backup Actions menu

Step 4. View the vDisks.

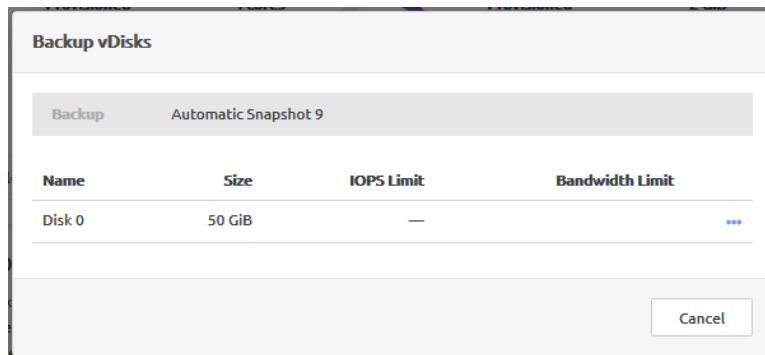


Figure 338. Backups vDisks dialog

You can use the actions menu ( ) to clone and attach vDisks.

- For procedural information related to cloning and attaching a vDisk, see the following topic: [“https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/clone-and-attach-a-vdisk.html”](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/clone-and-attach-a-vdisk.html) on page
- For an overview of cloning and attaching a vDisk, see the following topic: [“https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/technical-brief-clone-and-attach-a-vdisk.html”](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/technical-brief-clone-and-attach-a-vdisk.html) on page

## Delete a local backup


You can delete a local backup.

### Notes:

- You cannot delete the initial local backup that was created when the VM instance was created from a template.
- If an external backup exists for the latest local backup, you cannot delete the local backup (even if you disable external backups). Instead, you must first delete the external backup before deleting the latest local backup.

Complete the following steps to delete a local backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. Click the action menu (  ) for the local backup that you want to delete. Then click **Delete**.

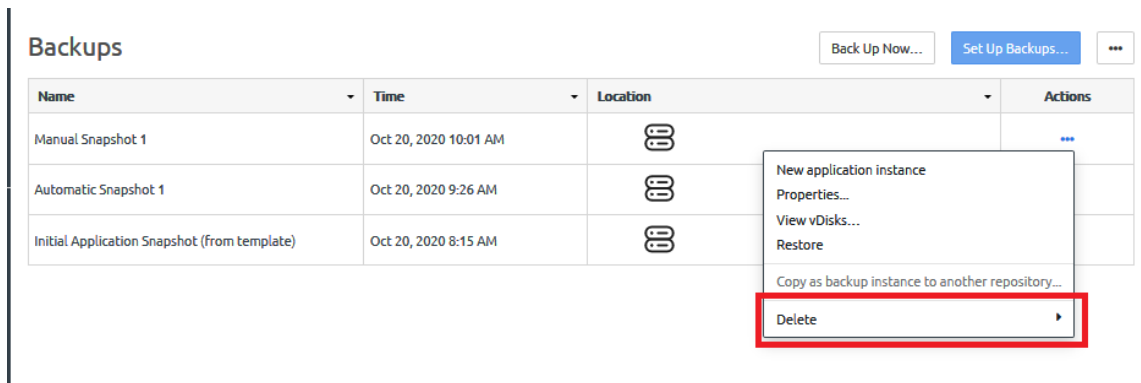


Figure 339. Delete a local backup

Step 4. Choose whether to delete this local backup or all versions of this backup.

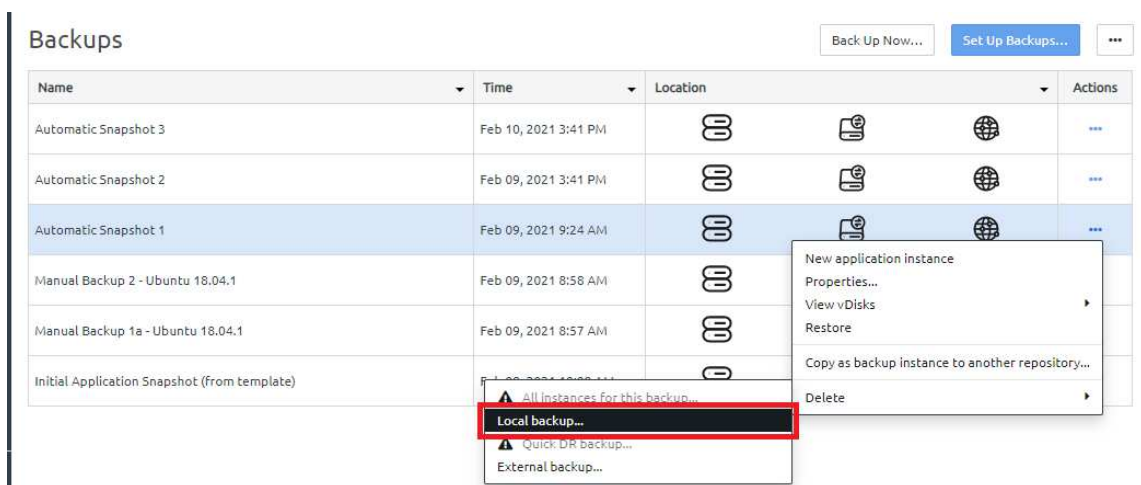


Figure 340. Backup delete options

Choose from the following options:

- **All instances for this backup.** If you have a local backup, a quick DR backup, and a external backup, this option deletes all versions of this backup. However, quick DR backups must be disabled before the backups can be deleted.
- **Local backup.** Delete the selected backup.

**Notes:**

- The quick DR backup option is available only if a quick DR backup exists.

For more information about quick DR backups, see the following topic:

[“Manage quick DR backups” on page 288](#)

- The external backup option is available only if an external backup exists.

For more information about external backups, see the following topic:

[“Manage external backups” on page 305](#)



Step 5. In the confirmation dialog box, click **Delete**.

The local backup might take a few minutes to delete. While it is being deleted a red x will appear next to the icon. When the local backup has been deleted, the local backup icon will no longer be bold for this application instance. Quick DR backup or external backup copies are not affected.

Name	Time	Location	Actions
Automatic Snapshot 3	Feb 10, 2021 3:41 PM		...
Automatic Snapshot 2	Feb 09, 2021 3:41 PM		...
Automatic Snapshot 1	Feb 09, 2021 9:24 AM		...
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM		...
Manual Backup 1a - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM		...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM		...

Figure 341. Backups table with local backup icon removed

## Delete all local backups

You can choose to delete all local backups, whether the backups were created automatically or manually.

**Important:** Deleting all local backups cannot be undone.

Complete the following steps to remove all local backups.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.

Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. On the Backups page action menu ( ), click **Delete all Local Backups**

Name	Time	Location	Actions
Automatic Snapshot 3	Feb 10, 2021 3:41 PM		...
Automatic Snapshot 2	Feb 09, 2021 3:41 PM		...
Automatic Snapshot 1	Feb 09, 2021 9:24 AM		...
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM		...
Manual Backup 1a - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM		...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM		...

Figure 342. Delete all local backups option from the Backups Actions menu

Step 4. In the confirmation dialog box, click **Delete All Backups**.

All local backups, except for the initial backup that was created when the instance was created, will be deleted. The local backups might take a few minutes to be deleted. When they are deleted, the local backup icon will no longer be bold for an application instance. Quick DR or external backup copies are not affected.

Backups

Back Up Now... Set Up Backups... ☰






















Name	Time	Location	Actions
Automatic Snapshot 3	Feb 10, 2021 3:41 PM	  	...
Automatic Snapshot 2	Feb 09, 2021 3:41 PM	  	...
Automatic Snapshot 1	Feb 09, 2021 9:24 AM	  	...
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM	   	...
Manual Backup 1a - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM	   	...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM	   	...

Figure 343. Backups table with local backup icons removed.

## Manage quick DR backups

ThinkAgile CP supports quick disaster recovery (DR) backups. Quick DR backups can be saved to different storage pools.

In the ThinkAgile CP Cloud Controller, you need to allocate two or more storage pools to a virtual datacenter to make disaster recovery available for the application instances in that virtual datacenter. You will then be able to enable disaster recovery for individual application instances as needed.

**Note:** A sophisticated capability called Clone and Attach is also provided, which allows you to clone a vDisk or a backup vDisk from one VM and attach it to the same or a second VM. The Clone and Attach function is fast and does not significantly impact storage consumption. For example, if you are running an SQL database in a VM, you can use this feature to clone and attach the database to a second VM where monthly or quarterly reporting can be run, without impacting user performance against the database.

For more information, see the following topic:

[“Clone and attach a vDisk” on page 70](#)

Refer to the following topics:

- [“Requirements for setting up quick DR backups” on page 288](#)
- [“Allocate storage for a virtual datacenter” on page 289](#)
- [“Enable quick DR backups for an instance” on page 291](#)
- [“Disable quick DR backups for an instance” on page 295](#)
- [“Restore or start an instance from a quick DR backup” on page 298](#)
- [“Delete a quick DR backup for an instance” on page 303](#)
- [“Delete all quick DR backups for an instance” on page 304](#)

## Requirements for setting up quick DR backups

Review the following requirements for setting up quick DR backups in the ThinkAgile CP Cloud Controller.

- Two storage pools that are both connected to the same virtual datacenter are required.
- A network route is required between storage blocks on each site. The network route must be set up so that the storage node IP addresses and the storage block virtual IP addresses can communicate.

### Notes:

- By default, all disaster recovery transfers occur over port 34341.
- To view the virtual IP address for the storage block, navigate to the storage block section of the Hardware page and click **Show Virtual IPs**.

The storage node IP addresses and the storage block virtual IP addresses are assigned via DHCP (not statically). Therefore, they are subject to change. If the network route is only set up between the current IP addresses and those IP addresses change, disaster recovery will fail. Because of this, you should consider setting up the route between the ThinkAgile CP Cloud Controller physical subnets.

- On the Hardware page under each router, click **Show Network Settings**; the IP Range under Router Physical Network is the range of IP addresses that should be used when creating network routes (that is, the Router Physical Network IP Range on one site should have a network route to the Router Physical Network IP Range on the other site.).

## Allocate storage for a virtual datacenter

Disaster recovery requires two storage pools to be connected to your virtual datacenter.

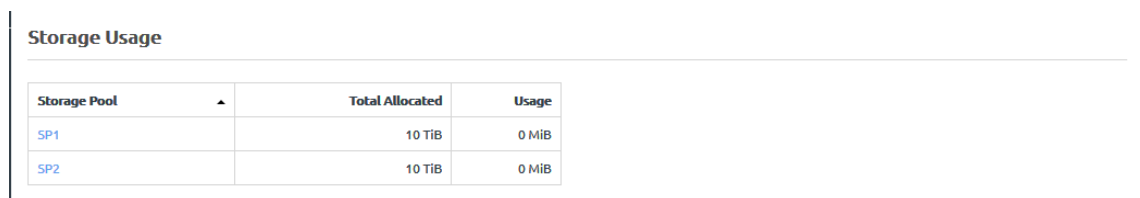
Follow these steps to edit the allocations for a virtual datacenter for which you want to enable disaster recovery.

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** user.

**Note:** **VDC manager** users can view the storage that is allocated to the VDC, but cannot edit those allocations.

Step 2. Click the Resources page for your virtual datacenter.

Step 3. Scroll down to the Storage Usage section to validate that you have two storage pools assigned to your virtual datacenter.



Storage Pool	Total Allocated	Usage
SP1	10 TiB	0 MiB
SP2	10 TiB	0 MiB

Figure 344. Resources page, Storage Usage section

Step 4. If you do not have two storage pools, you will need to add a second storage pool. Click **Edit Allocations**.

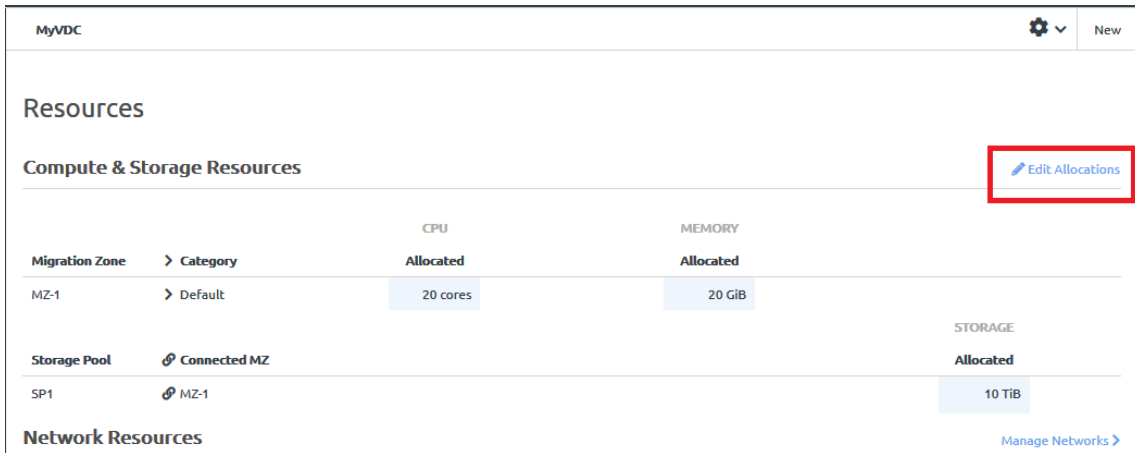


Figure 345. Edit allocations

Step 5. On the Edit Allocations page, scroll down to your virtual datacenter and allocate storage from two or more storage pools to this virtual datacenter.

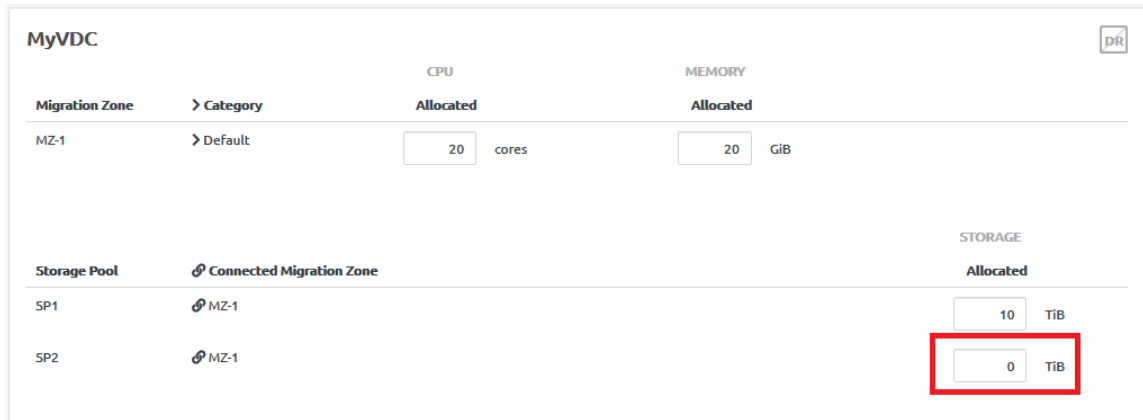


Figure 346. Edit Storage Allocation

Step 6. At the bottom of the page, click **Save Changes**.

MyVDC DR

Migration Zone	Category	CPU		MEMORY	
		Allocated		Allocated	
MZ-1	Default	20	cores	20	GiB

Storage Pool	Connected Migration Zone	STORAGE	
		Allocated	
SP1	MZ-1	10	TiB
SP2	MZ-1	10	TiB

Figure 347. Saving changes to the Allocations page

### Enable quick DR backups for an instance

When you enable quick DR backups for an instance, local backups (either automatic or manual) are copied to the storage pool that you specify. A local backup can be copied to multiple storage pools.

Complete the following steps to enable quick DR backups for an application instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click **Set Up Backups**.

MyVDC > CentOS 7.5 (64-bit) - Lenovo Template

Instance is running

### CentOS 7.5 (64-bit) - Lenovo Template

Any None

**CPU**

Provisioned 4 cores 0%  
% vCPU 0%  
% CPU

**Memory**

Provisioned 2 GiB 272 MiB  
Load

**Storage**

Provisioned 50 GiB  
Total Used 9.2 GiB  
Instance 4 GiB  
Local Backups 2.4 GiB  
DR Backups 2.8 GiB

Activity Profile **Backups**

**Local Backups**

Automatic backups to the local repository have not been set up.

**Quick DR Backups**

Quick DR backups to a different TACP storage pool have not been set up.

**External Backups**

External backups to another repository have not been set up.

**Backups** Back Up Now... **Set Up Backups...** ...

Name	Time	Location	Actions
Initial Application Snapshot (from template)	Oct 20, 2020 8:15 AM		...

Figure 348. Set up backups

Step 4. On the Backups overview page, click **Next**.

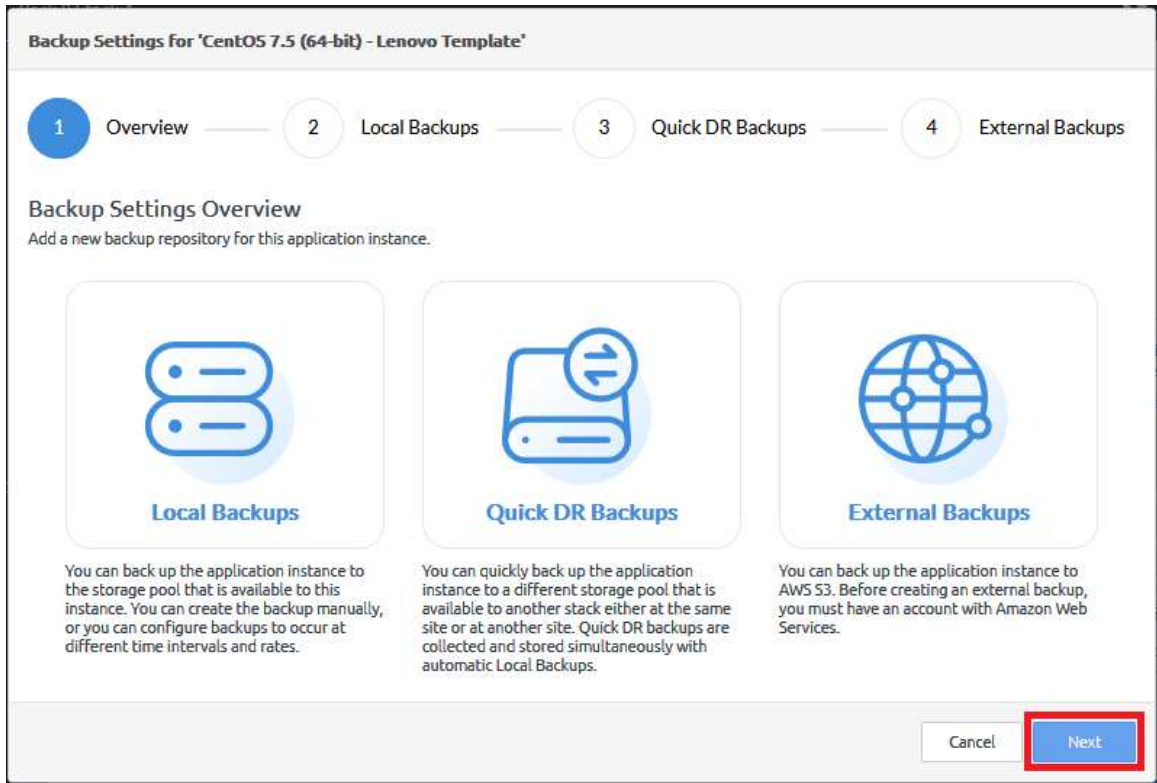


Figure 349. Backup Setting Overview

Step 5. The Local Backups page is displayed. Click **Next**.

For information about enabling local backups, see the following topic:

[“Enable automatic local backups” on page 269](#)

Step 6. The Quick DR Backups page is displayed.

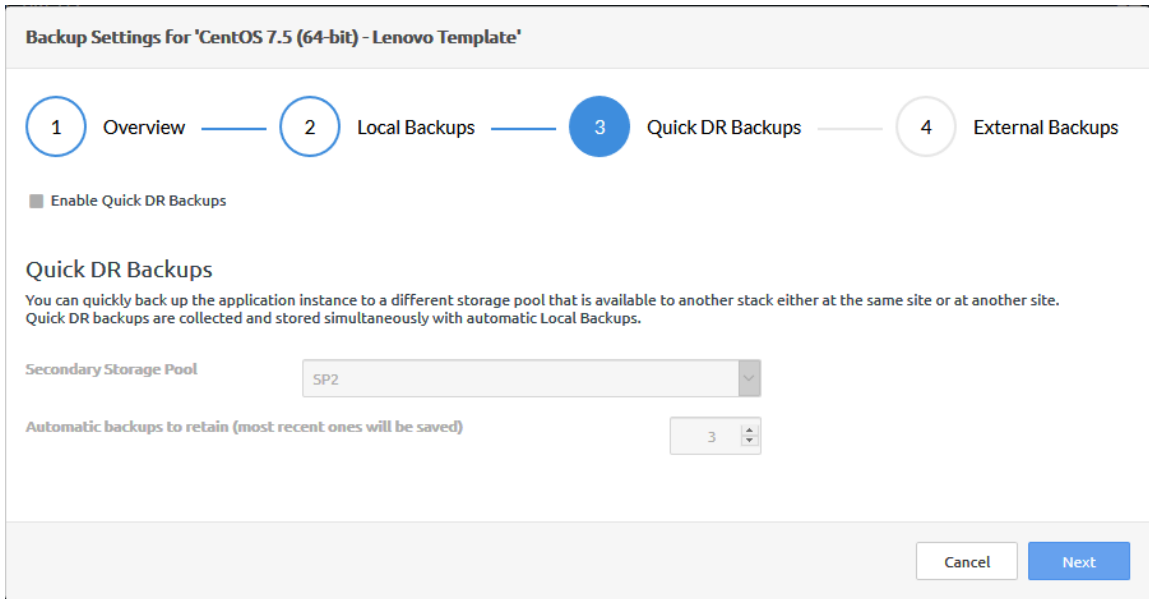
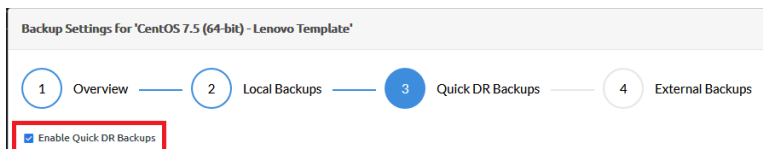


Figure 350. Quick DR Backups page

Step 7. On the Quick DR Backups page, configure the following settings.

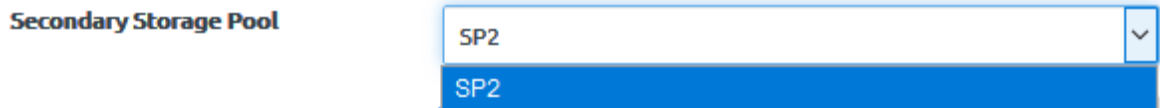
**Note:** In ThinkAgile CP, Release 5.1.5, you can enable quick DR backups, set the storage pool to be used, and specify the number of backups to keep. Additional settings, such as the length of time to maintain a quick DR backup; or the number of daily, weekly, or monthly backups to maintain are not available in Release 5.1.5.

a. Click **Enable Quick DR Backups**.

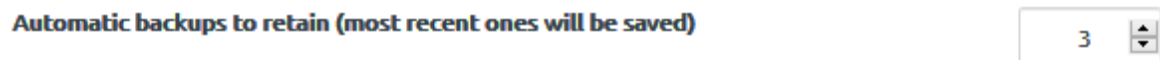


b. Specify the storage pool where the quick DR backups will be stored.

**Note:** You must be connected to two storage pools to set up quick DR backups.



c. Specify the number of backups to retain.



Step 8. Click **Next**.

The External Backups page is displayed. You can choose to configure external backups on AWS S3 or click **Next**.



For information about configuring external backups, see the following topic:

[“Manage external backups” on page 305](#)

Step 9. Click **Save** to save your changes.

Local backups are transferred to the secondary storage pool, up to the number you specified for number of automatic backups to retain. When the transfer is complete, the quick DR icon is displayed.

MyVDC > CentOS 7.5 (64-bit) - Lenovo Template

Instance is running

### CentOS 7.5 (64-bit) - Lenovo Template

Any None

**CPU** Provisioned 4 cores 0%  
% CPU 0%

**Memory** Provisioned 2 GiB 292 MiB  
Load

**Storage** Provisioned 50 GiB  
Total Used 9.2 GiB  
Instance 4 GiB  
Local Backups 2.4 GiB  
DR Backups 2.8 GiB

Activity Profile **Backups**

**Local Backups**

Next Backup: 5 h, 6 m  
Interval: ~ 6 h  
Retention limit: 2 wk


**Quick DR Backups**

Auto backups to retain: 3  
Repository: SP2

**External Backups**

External backups to another repository have not been set up.

Back Up Now... Set Up Backups... ⋮

Name	Time	Location	Actions
Initial Application Snapshot (from template)	Oct 21, 2020 9:56 AM		 ⋮

## Disable quick DR backups for an instance

Disabling quick DR backups does not remove any quick DR backups that have been created previously. After disabling quick DR backups, you can remove them individually or choose to remove all quick DR backups.

Complete the following steps to disable quick DR backups:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click **Set Up Backups**.

MyVDC > CentOS 7.5 (64-bit) - Lenovo Template

Instance is running

### CentOS 7.5 (64-bit) - Lenovo Template

Any None

#### CPU

Provisioned 4 cores 0%  
% vCPU 0%  
% CPU

#### Memory

Provisioned 2 GiB 272 MiB  
Load

#### Storage

Provisioned 50 GiB  
Total Used 9.2 GiB  
Instance 4 GiB  
Local Backups 2.4 GiB  
DR Backups 2.8 GiB

Activity Profile **Backups**

**Local Backups**

Automatic backups to the local repository have not been set up.

**Quick DR Backups**

Quick DR backups to a different TACP storage pool have not been set up.

**External Backups**

External backups to another repository have not been set up.

**Backups** Back Up Now... **Set Up Backups...** ...

Name	Time	Location	Actions
Initial Application Snapshot (from template)	Oct 20, 2020 8:15 AM		...

Figure 351. Set up backups

Step 4. On the Backups overview page, click **Next**.

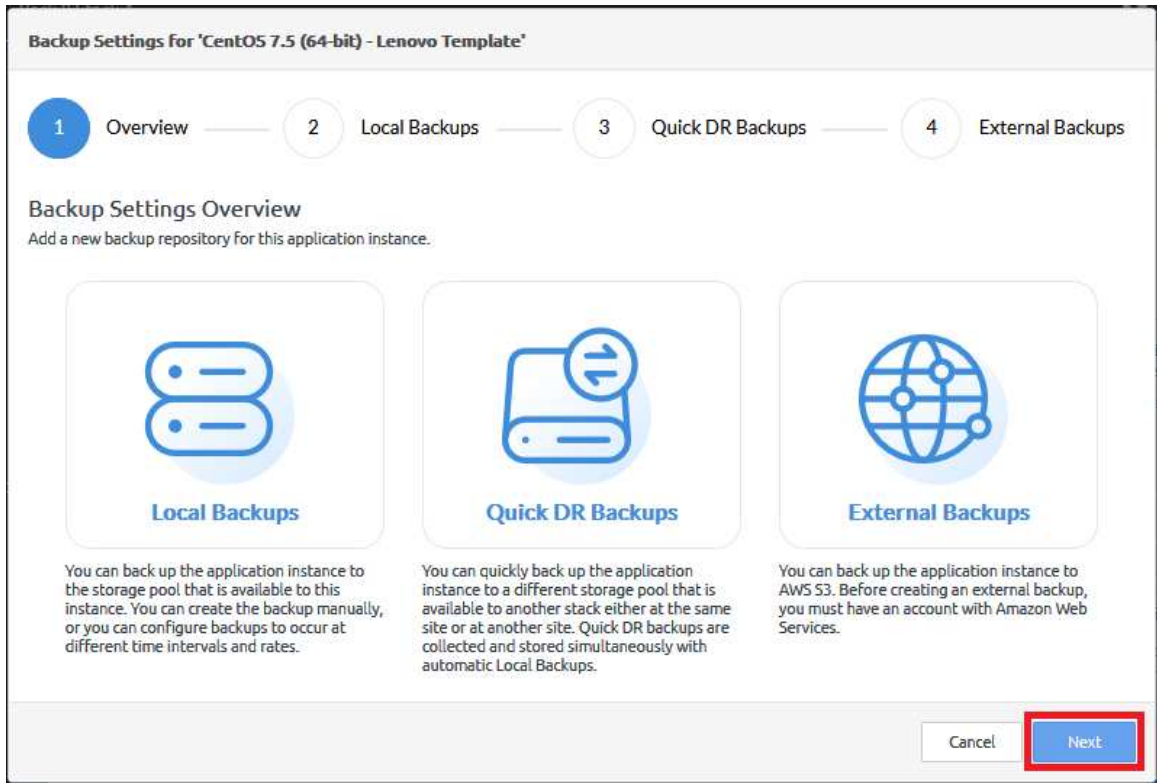


Figure 352. Backup Setting Overview

Step 5. The Local Backups configuration page is displayed. Click **Next** to display the Quick DR Backups page.

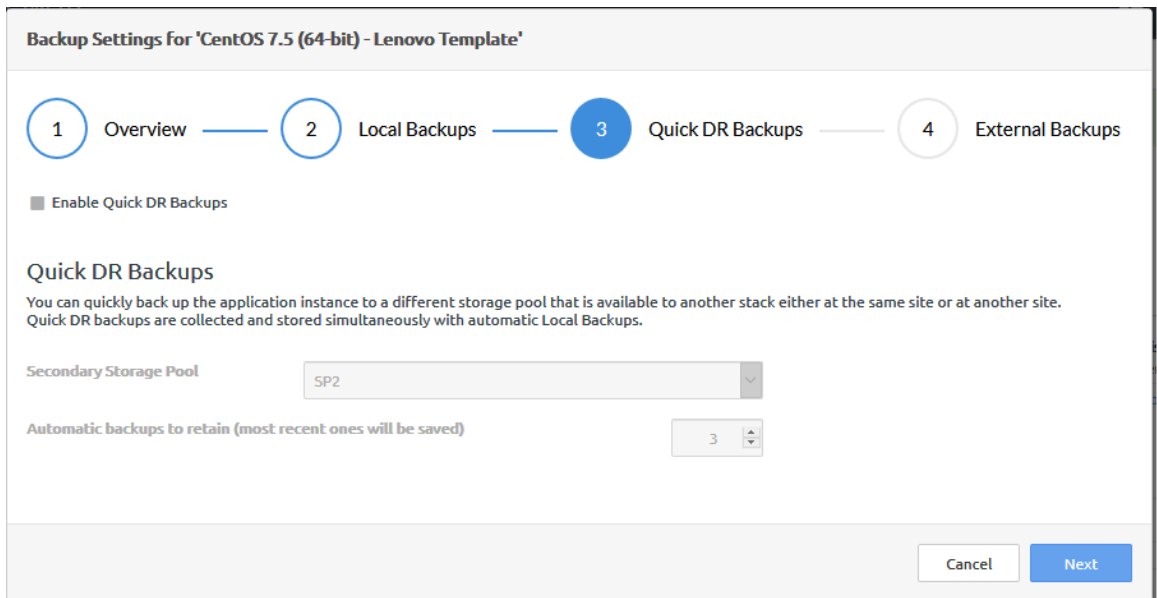
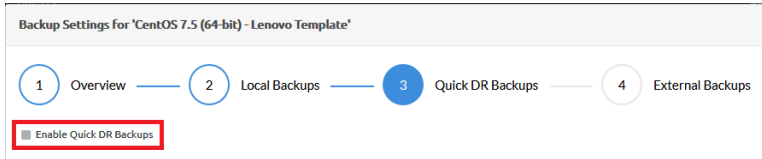


Figure 353. Quick DR Backups page

Step 6. On the Quick DR Backups page, deselect **Enable Quick DR Backups**.



Step 7. Click **Next**.

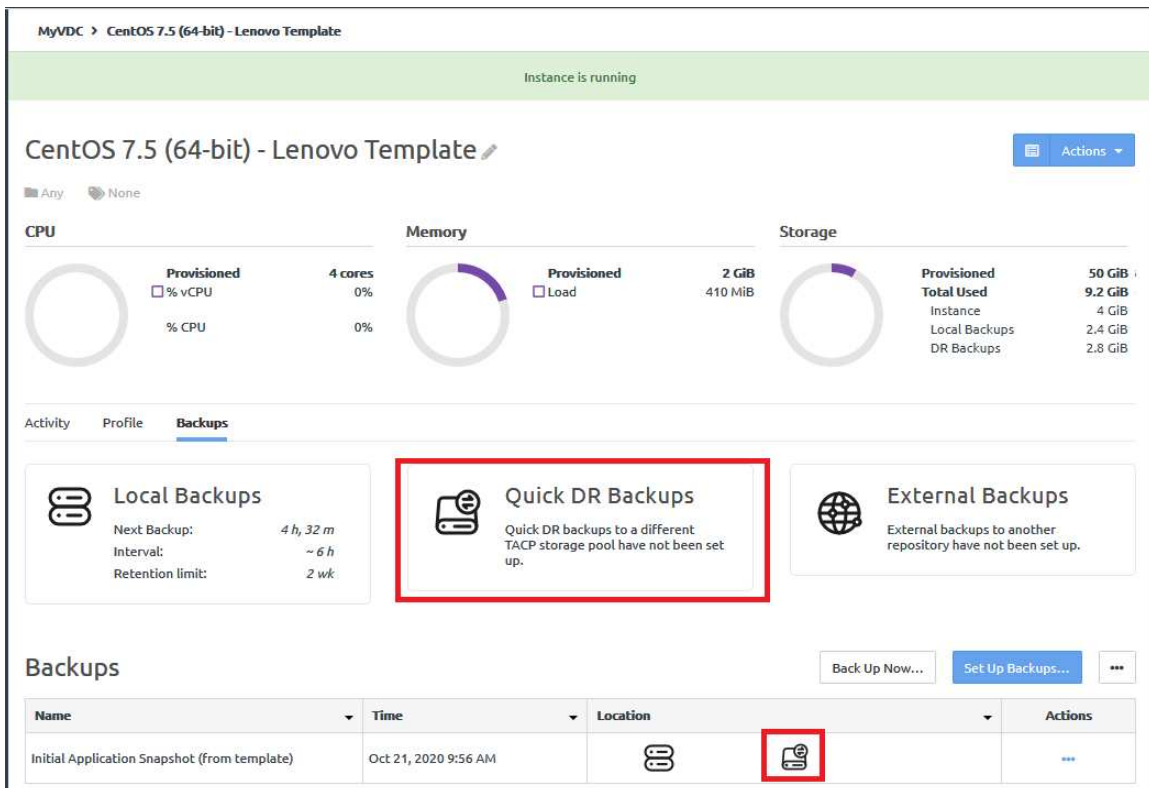
The External Backups page is displayed. You can choose to configure external backups on AWS S3 or click **Next**.

For information about configuring external backups, see the following topic:

[“Manage external backups” on page 305](#)

Step 8. Click **Save** to save your changes.

The Quick DR Backups section shows that quick DR backups have not been set up. However, any previously created quick DR backups remain.




## Restore or start an instance from a quick DR backup

To restore an instance from a quick DR backup, you actually create a new instance from the quick DR backup. The state of the new instance is the same state of the original instance when the quick DR backup was taken. You cannot directly restore an instance from a quick DR backup because the instance and the backup are in different storage pools.

Complete the following steps to create a new instance from a quick DR backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. Click the action menu (  ) for the quick DR backup that you want to restore. Then click **New application instance**.

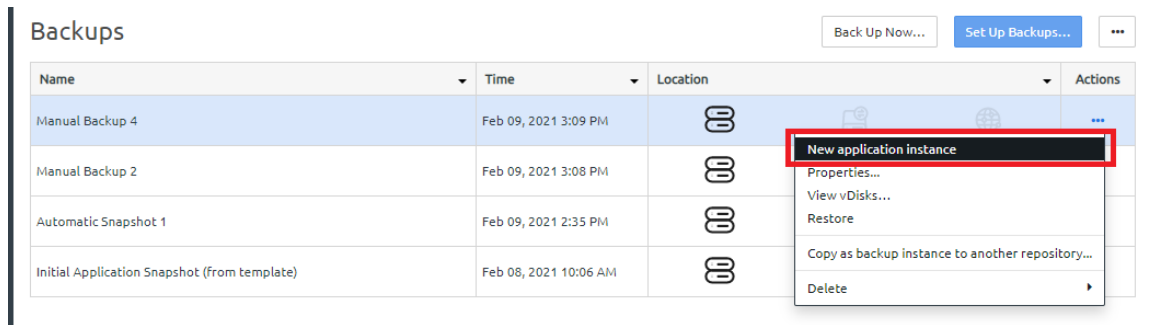


Figure 354. Backups action menu - new application instance option

Step 4. Choose the DR backup as the backup to be used for creating the new instance. Then click **Create**.

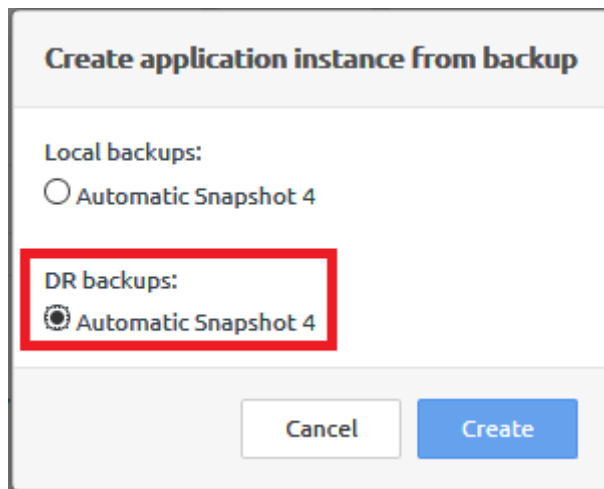


Figure 355. Create application instance from backup dialog

Step 5. In the Properties section of the page, enter a name (required) and a description (optional) for the new application instance. The new name must be unique across all application instances in the associated virtual datacenter.

**New Instance from DR Backup**

**Properties**

**Instance Name** Quick DR Backup - CentOS 7.5 (64-bit)

**Description** From Automatic Snapshot 4  
CentOS 7.5 (64-bit) with ThinkAgile CP guest agent.  
Default root password: ThinkAgileCP

**Source Application** CentOS 7.5 (64-bit) - Lenovo Template

**Source Version** Automatic Snapshot 4 (Backup)

**Source Snapshot** Automatic Snapshot 4

Figure 356. New Instance from DR Backup dialog - Properties section

Step 6. In the Virtual Datacenter section, configure the following fields:

**Virtual Datacenter**

Select a virtual datacenter for the application instance, then complete the resource profile for networking, storage, and compute.

**Virtual Datacenter** MyVDC

**Application Group** None

**Number of Instances** 1

Figure 357. New Instance from DR Backup dialog - Virtual Datacenter section

- a. Select the virtual datacenter where the instance should reside and get resources. The virtual datacenter selection determines the migration zone and storage pool resources available for the application instance.
- b. Optionally, select an application group (which are used to organize application instances in a virtual datacenter) and then specify the number of instantiations you want to include in this group.

For more information about application groups, see the following topic:

[“Managing application groups” on page 232](#)

- c. Specify the number of instances to be created.

Step 7. Configure the settings for the compute and networking resources.

**Note:** The new instance will be created in the same storage pool where the current quick DR backup is located.

**Storage**

Storage Pool SP2

**Virtual Disks (vDisks)**

Name	Size	IOPS Limit	Bandwidth Limit
Disk 0	50 GiB	—	—

**Compute**

Provisioning 4 cores 2 GiB

Migration Zone MZ-1

[Compute Constraints](#)

**Network**

Configure at least one virtual network interface controller (vNIC) to specify the instance's network settings. [Add vNIC](#)

vNIC	Networking Mode	Network	Firewall Profile	Firewall Override	Mac Address
vNIC 0	VNET	VNET	NONE	None	Automatic

**Boot Order** Disk 0 > Network (vNIC 0)

Network Sysprep  **Perform network sysprep**  
Reset all NICs to DHCP in instance's OS.

Figure 358. New Instance from DR Backup dialog - Resources section

- Define the VM provisioning for this instance by specifying the CPU (number of cores) and Memory in GB.
- Select the migration zone from which the application instance will get its compute resources.
- If the instance requires a specific compute category or tag, expand Compute Constraints and add the category and tags.
- Select a networking mode for the instance and select a virtual network from the drop-down menu.
- Edit the Boot Order if needed. The application instance will attempt to boot in the sequence you define.
- Click **Perform network sysprep** if needed to reset all NICs to DHCP in the instance operating system.

Step 8. Configure the settings for the new instance.

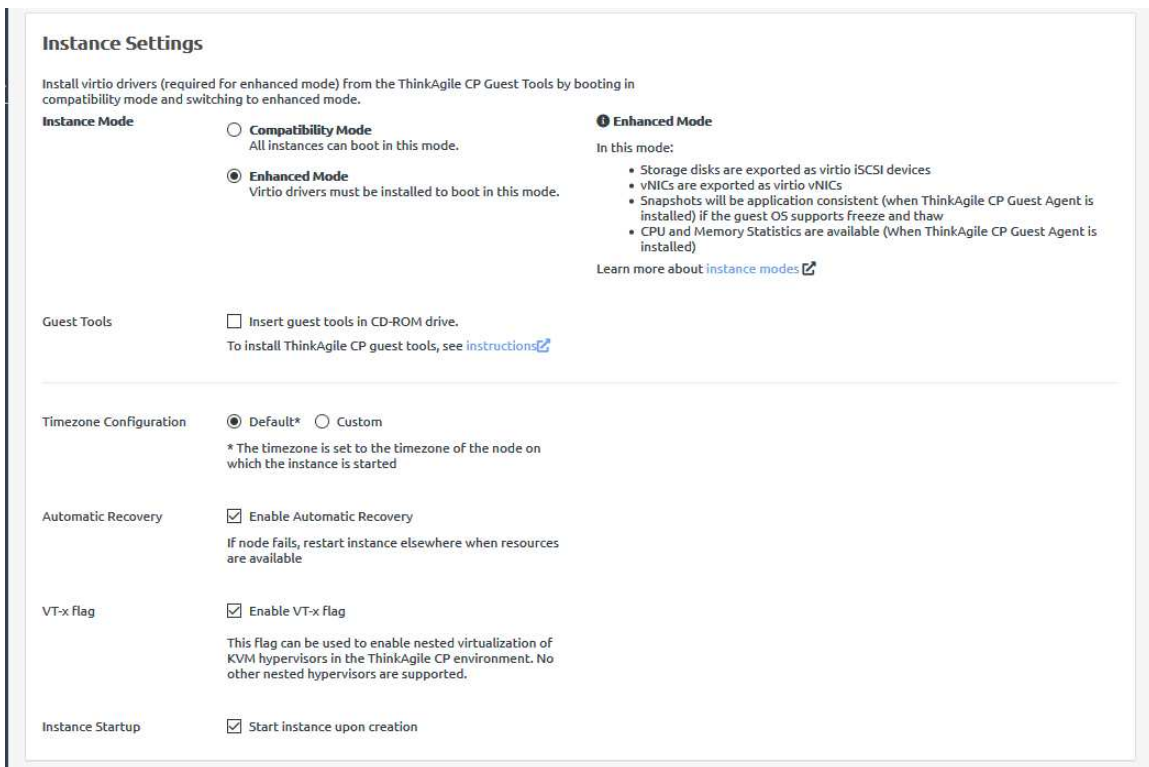


Figure 359. New Instance from DR Backup dialog - Instance Settings section

- a. Choose the instance mode.

**Note:** The instance mode defaults to the source instance when creating an instance from a quick DR backup. For more information about these modes, see the following topic:

[“Understand instance modes” on page 67](#)

1. **Compatibility Mode.** All instances can boot in this mode.
  2. **Enhanced Mode.** Virtio drivers must be installed to boot in this mode.
- b. Click **Insert guest tools in CD-ROM** to insert guest tools.

For more information about guest tools, see the following topic:

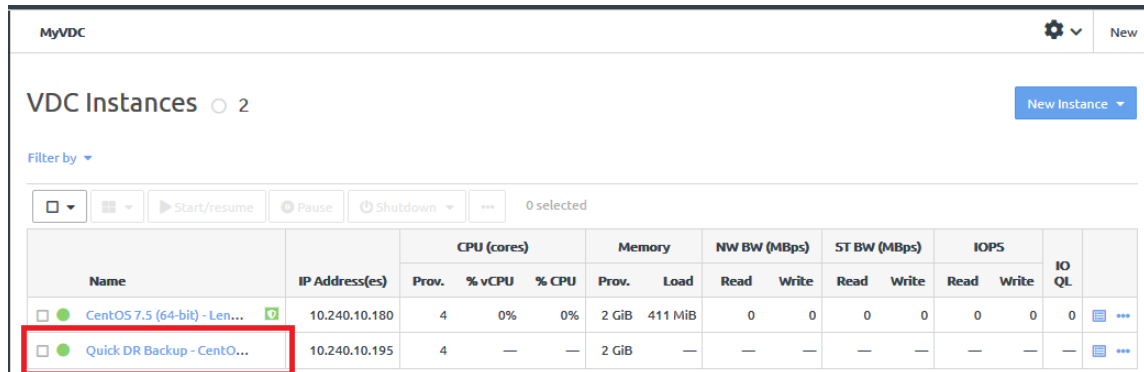
[“Install guest agent tools” on page 68](#)

- c. Determine the time zone to be used for the instance.
  1. **Default.** The time zone is set to the time zone of the node on which the instance starts.
  2. **Custom.** You can set the time zone for the application instance by selecting the time zone area and location.
- d. Make sure that **Enable Automatic Recovery** is selected to enable automatic recovery, which specifies to restart the instance where resources are available if the node fails.
- e. Make sure that **Enable VT-x flag** is selected to enable nested virtualization of KVM hypervisors in your ThinkAgile CP environment.
- f. Make sure that **Start instance upon creation** is selected to have the instance started when it is created.



Step 9. Click **Create Instance**.

The new instance is started and is listed on the VDC Instances page for your VDC.



Name	IP Address(es)	CPU (cores)			Memory		NW BW (MBps)		ST BW (MBps)		IOPS		IO QL	
		Prov.	% vCPU	% CPU	Prov.	Load	Read	Write	Read	Write	Read	Write		
CentOS 7.5 (64-bit) - Len...	10.240.10.180	4	0%	0%	2 GiB	411 MiB	0	0	0	0	0	0		...
Quick DR Backup - CentO...	10.240.10.195	4	—	—	2 GiB	—	—	—	—	—	—	—		...

Figure 360. VDC Instances page displaying new instance

## Delete a quick DR backup for an instance

Before you can delete a quick DR backup, you must disable quick DR backups.

For more information about disabling quick DR backups, see the following topic:

[“Disable quick DR backups for an instance” on page 295](#)

Complete the following steps to delete a quick DR backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the actions menu ( **...** ) for the quick DR backup to be deleted. Then click **Delete** → **Quick DR backup**.

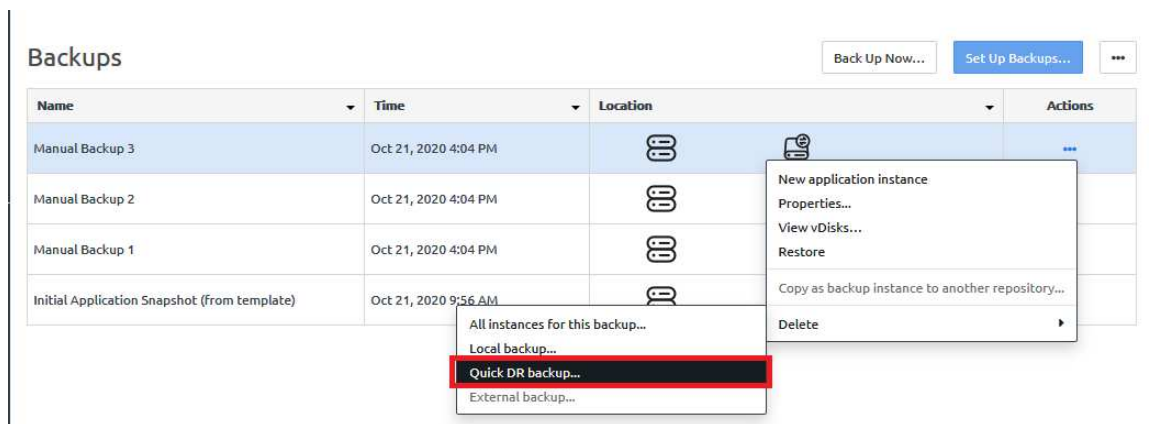


Figure 361. Backup actions menu - Delete Quick DR Backups option

- Step 4. On the Delete Quick DR Saved Backup confirmation dialog, click **Delete**.

The quick DR backup might take a few minutes to delete. While it is being deleted a red x will appear next to the icon. When the quick DR backup has been deleted, the quick backup icon will

no longer be bold for this application instance. Local backup or external backup copies are not affected.

The screenshot shows a table titled 'Backups' with columns: Name, Time, Location, and Actions. There are four rows of backup entries. The 'Actions' column for each row contains a 'DR' icon (two overlapping circles) and a 'Quick DR' icon (a document with a lightning bolt). The 'Quick DR' icon for the first row is highlighted with a red box, indicating it has been removed.

Name	Time	Location	DR Icon	Quick DR Icon	Actions
Manual Backup 3	Oct 21, 2020 4:04 PM		DR	Quick DR (highlighted)	...
Manual Backup 2	Oct 21, 2020 4:04 PM		DR	Quick DR	...
Manual Backup 1	Oct 21, 2020 4:04 PM		DR	Quick DR	...
Initial Application Snapshot (from template)	Oct 21, 2020 9:56 AM		DR	Quick DR	...

Figure 362. Backups table with quick DR backup icon removed.

### Delete all quick DR backups for an instance

You can delete all quick DR backups for an application instance.

**Note:** Quick DR backups must be disabled before you delete all quick DR backups.

Complete the following steps to delete all quick DR backups for an application instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the Backup actions menu ( **...** ); then click **Delete all DR backups**.

The screenshot shows the 'Backups' table with the actions menu open. The menu options are: 'Delete all local backups', 'Delete all DR backups' (highlighted with a red box), and 'Delete all external backups'. The table contains five rows of backup entries.

Name	Time	Location	DR Icon	Quick DR Icon	External Backup Icon	Actions
Automatic Snapshot 2	Feb 09, 2021 3:41 PM		DR	Quick DR		...
Automatic Snapshot 1	Feb 09, 2021 9:24 AM		DR	Quick DR		...
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM		DR	Quick DR	External Backup	...
Manual Backup 1a - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM		DR	Quick DR	External Backup	...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM		DR	Quick DR	External Backup	...

Figure 363. Backups actions menu - Delete all quick DR backups option

- Step 4. On the Delete All DR Backups confirmation dialog, click **Delete All Backups**.

**Important:** This action is permanent.

All quick DR backups are deleted and the DR backup icons are removed from the Backups table. The quick DR backups might take a few minutes to be deleted. When they are deleted, quick DR backup icons will no longer be bold for an application instance. Local backup or external backup copies are not affected.

Backups						
Name	Time	Location	Actions			
Automatic Snapshot 2	Feb 09, 2021 3:41 PM					...
Automatic Snapshot 1	Feb 09, 2021 9:24 AM					...
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM					...
Manual Backup 1a - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM					...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM					...

Figure 364. Backups page with all quick DR backup icons removed.

## Manage external backups

Backups can be saved to external Amazon S3-compliant repositories, if the repository has been registered with the ThinkAgile CP Cloud Controller.

For information about registering the repository, see the following topic:

[“Registering an external backup repository” on page 220](#)

Refer to the following topics:

- [“Enable external backups for an instance” on page 305](#)
- [“Disable external backup for an instance” on page 310](#)
- [“Restore an instance from an external backup” on page 313](#)
- [“Delete an external backup for an instance” on page 317](#)
- [“Delete all external backups for an instance” on page 318](#)

### Enable external backups for an instance

When you enable external backups for an application instance, ThinkAgile CP copies automatic local backups to the external repository that you specify.

When you enable external backups for an instance, local backups instances are copied to the external repository based on the intervals that you specify. If automatic local backups are enabled, they are used as the source for external backups. If automatic local backups are not enabled, manual local backups are used as the source. For more information about enabling automatic local backups, see the following topic:

[“Enable automatic local backups” on page 269](#)

#### Notes:

- If the ThinkAgile CP Cloud Controller software is at Release 5.1.6 or greater and the hardware (storage) is at Release 5.1.5 or lower, external backups cannot be enabled.
- The external backup repository must exist, and it must be registered with the ThinkAgile CP Cloud Controller. For more information about registering an external backup, see the following topic:

[“Registering an external backup repository” on page 220](#)

Complete the following steps to enable external backups for an application instance:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. Click **Set Up Backups**.

The screenshot shows the MyVDC console for an Ubuntu-18.04.1 instance. The instance is running. The console displays resource usage for CPU, Memory, and Storage. Below the resource usage, there are three cards for Local Backups, Quick DR Backups, and External Backups, all indicating that automatic backups have not been set up. At the bottom, there is a 'Backups' section with a table of existing backups and a 'Set Up Backups...' button highlighted with a red box.

MyVDC > Ubuntu-18.04.1 - Lenovo Template

Instance is running

### Ubuntu-18.04.1 - Lenovo Template

Any None

**CPU** Provisioned 4 cores 0% % vCPU

**Memory** Provisioned 4 GiB 1.9 GiB Load

**Storage** Provisioned 50 GiB Total Used 7.5 GiB Instance 7.5 GiB Local Backups 8 MiB DR Backups 0 MiB

Activity Profile **Backups**

**Local Backups**  
Automatic backups to the local repository have not been set up.

**Quick DR Backups**  
Quick DR backups to a different TACP storage pool have not been set up.

**External Backups**  
External backups to another repository have not been set up.

Back Up Now... **Set Up Backups...** ...

Name	Time	Location	Actions
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM	Local	Local External ...
Manual Backup 1 - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM	Local	Local External ...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM	Local	Local External ...

Figure 365. Set up backups

Step 4. On the Backups overview page, click **Next**.

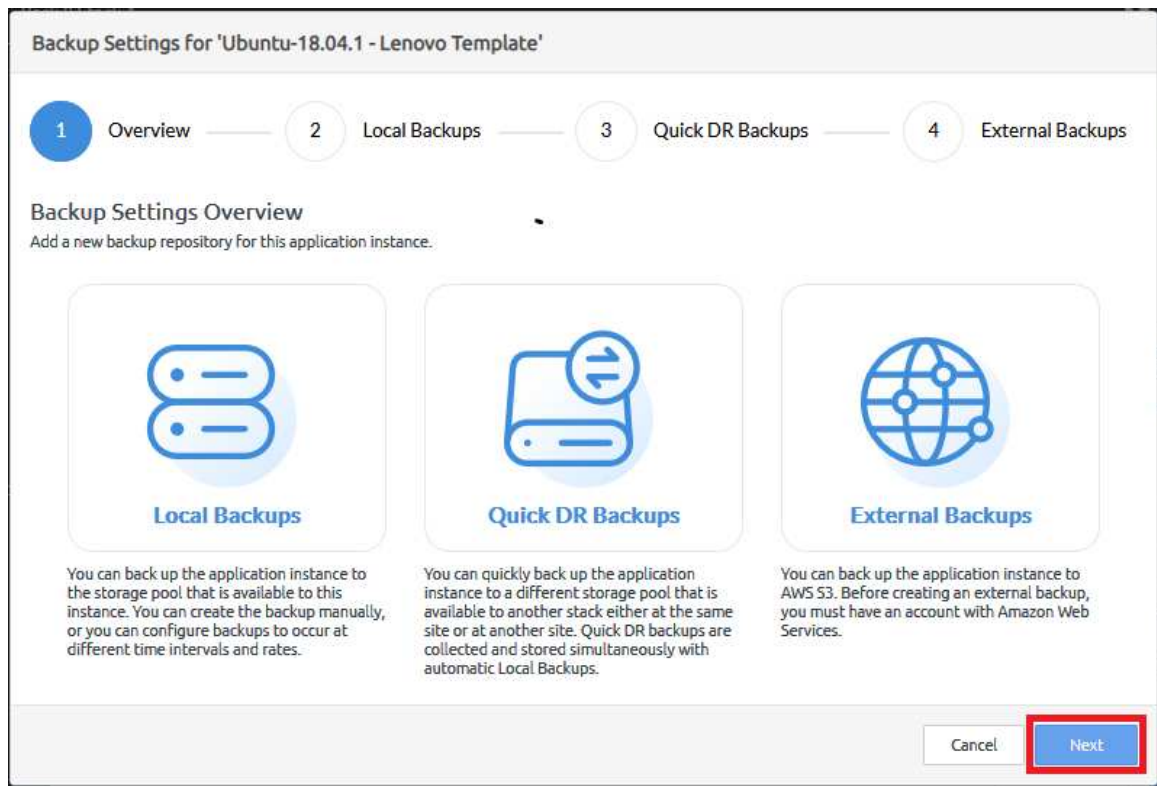


Figure 366. Backup Setting Overview

Step 5. The Local Backups page is displayed. Click **Next**.

For information about enabling local backups, see the following topic:

[“Enable automatic local backups” on page 269](#)

Step 6. The Quick DR Backups page is displayed. Click **Next**.

For information about enabling quick DR backups, see the following topic:

[“Enable quick DR backups for an instance” on page 291](#)

Step 7. The External Backups page is displayed.

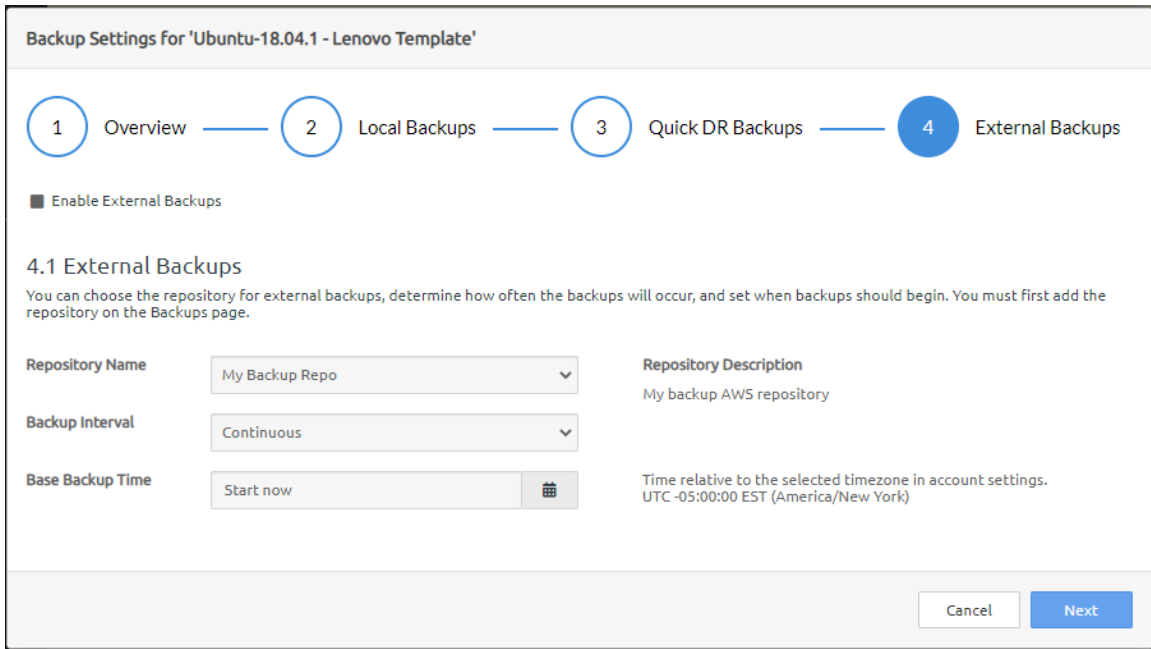
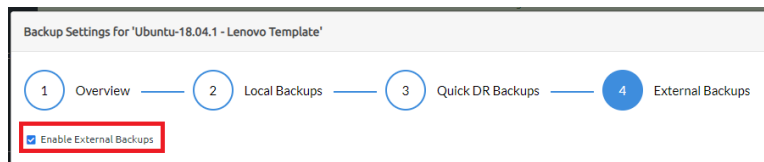


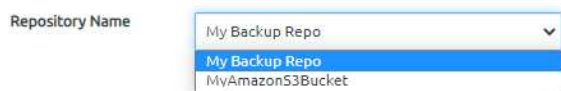
Figure 367. External Backups page

Step 8. On the External Backups page, configure the following settings.

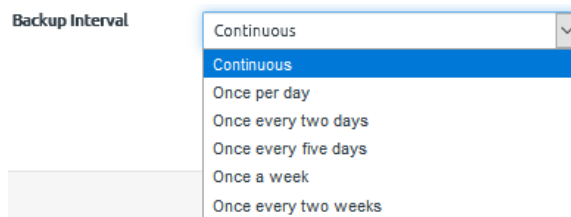
- a. Click **Enable External Backups**.



- b. Choose the name of the external repository where the backups will be stored.

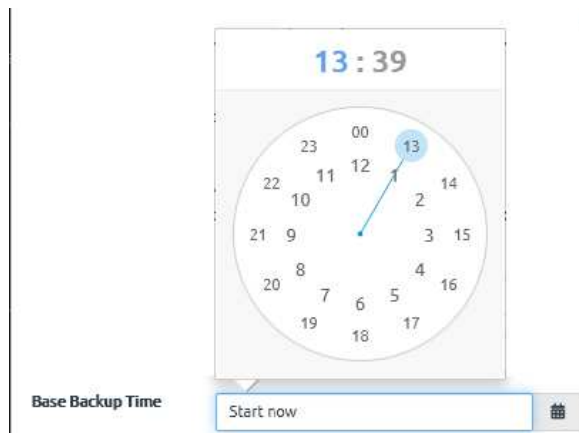


- c. Specify how often a backup should occur.



If you specify **Continuous**, an external backup is created whenever an automatic local backup is created. In this case, Base Backup Time is not available for selection.

- d. If you want the external backups to being immediately (start now), you need do nothing for the Base Backup Time. Otherwise, click **Start now** to choose a specific time relative to the time zone specified in account settings.



Step 9. Click **Next** to display the External Backups Retention settings page.

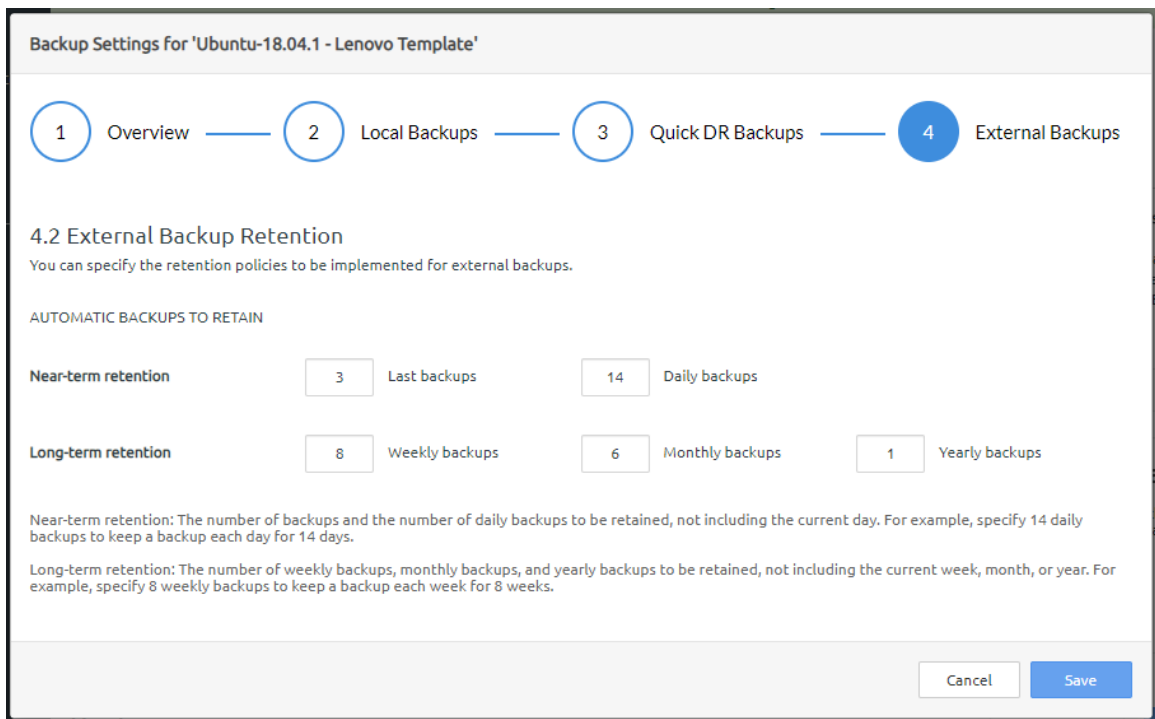


Figure 368. External Backups page

Specify the short-term and long-term retention policies.

**Note:** Backups that are copied to an external repository manually are not affected by the retention policies that you specify here. They have to be deleted manually.

For more information about manually copying a backup to an external repository, see the following topic:

[“Copy a backup to an external repository” on page 282](#)

- a. Specify the number of backups to be retained (last backups).
- b. Specify the number of daily backups to retain (daily backups). For example, if you want to keep daily backups for 7 days, specify 7.

- c. Specify the number of weekly backups to retain, not including the current week (weekly backups).
- d. Specify the number of monthly backups to retain, not including the current month (monthly backups).
- e. Specify the number of yearly backups to retain, not including the current year (yearly backups).

Step 10. Click **Save** to save your changes.

Local backups are transferred to the external repository based on the number of last backups that you specified. When the transfer is complete, the settings that you specified are displayed under External Backups and the external backup icon is displayed.

The screenshot displays the backup configuration for an instance named 'Ubuntu-18.04.1 - Lenovo Template'. The interface shows resource usage for CPU, Memory, and Storage. Under the 'Backups' tab, three backup types are visible: Local Backups, Quick DR Backups, and External Backups. The External Backups section is highlighted with a red box and shows the following settings:

- Interval: Continuous
- Manual Backups: 3
- Near-term retention: 3 for 14 d
- Long-term retention: 8 wk, 6 mo, 1 y
- Total Size: 1.7 GiB
- Repository: My Backup Repo

Below the settings is a table of backup records. The 'External Backups' column in the table is highlighted with a red box, showing globe icons for several backup entries:

Name	Time	Location	External Backup	Actions
Automatic Snapshot 1	Feb 09, 2021 9:24 AM	Local	External Backup (Globe)	...
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM	Local	External Backup (Globe)	...
Manual Backup 1 - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM	Local	External Backup (Globe)	...
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM	Local	External Backup (Globe)	...

## Disable external backup for an instance

Disabling external backups does not remove any external backups that have been created previously. After disabling external backups, you can remove them individually or choose to remove all external backups.

Complete the following steps to disable external backups:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click **Set Up Backups**.



MyVDC > Ubuntu-18.04.1 - Lenovo Template

Instance is running

## Ubuntu-18.04.1 - Lenovo Template ✎

Any None

**CPU**

Provisioned  % vCPU

4 cores  
0%

**Memory**

Provisioned  Load

4 GiB  
1.9 GiB

**Storage**

Provisioned

Total Used 50 GiB  
Instance 7.5 GiB  
Local Backups 40 MiB  
DR Backups 0 MiB

Activity Profile **Backups**

**Local Backups**

Next Backup: 23 h 42 m  
Interval: ~24 h  
Retention limit: 2 wk  
Total Size: 40 MiB

**Quick DR Backups**

Quick DR backups to a different TACP storage pool have not been set up.

**External Backups**

Interval: Continuous  
Manual Backups: 3  
Near-term retention: 3 for 14 d  
Long-term retention: 8 wk, 6 mo, 1 y  
Total Size: 1.7 GiB  
Repository: My Backup Repo

Backups Back Up Now... Set Up Backups... ...

Name	Time	Location	Actions
Automatic Snapshot 1	Feb 09, 2021 9:24 AM		<span>...</span>
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM		<span>...</span>
Manual Backup 1 - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM		<span>...</span>
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM		<span>...</span>

Figure 369. Set up backups

Step 4. On the Backups overview page, click **Next**.

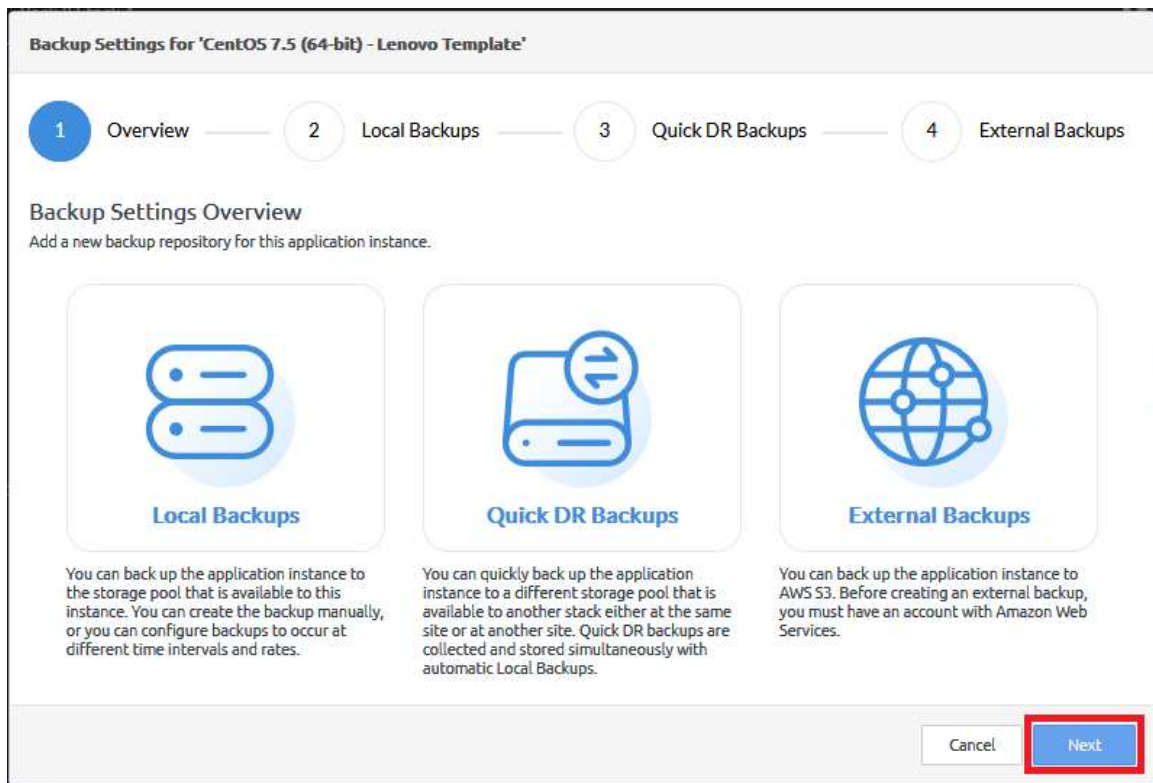
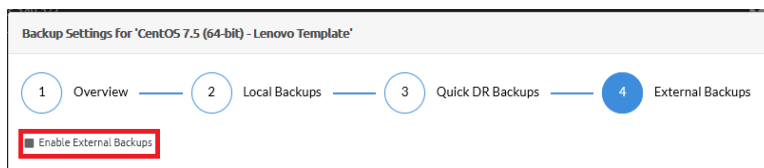


Figure 370. Backup Setting Overview

- Step 5. The Local Backups configuration page is displayed. Click **Next**.
- Step 6. The Quick DR Backups configuration page is displayed. Click **Next**.
- Step 7. The External Backups configuration page is displayed. Deselect **Enable External Backups**.



- Step 8. Click **Next**.
- Step 9. The External Backup Retention page is displayed. Click **Save** to save your changes.

The External Backups section shows that external backups have not been set up. However, any previously created external backups remain.

MyVDC > Ubuntu-18.04.1 - Lenovo Template New

Instance is running

## Ubuntu-18.04.1 - Lenovo Template Actions

Any None

**CPU**

Provisioned 4 cores  
% vCPU 0%

**Memory**

Provisioned 4 GiB  
Load 1.9 GiB

**Storage**

Provisioned 50 GiB  
Total Used 7.5 GiB  
Instance 7.5 GiB  
Local Backups 40 MiB  
DR Backups 0 MiB

Activity Profile **Backups**

**Local Backups**

Next Backup: 23 h 8 m  
Interval: ~ 24 h  
Retention limit: 2 wk  
Total Size: 40 MiB

**Quick DR Backups**

Quick DR backups to a different TACP storage pool have not been set up.

**External Backups**

External backups to another repository have not been set up.

Backups Back Up Now... Set Up Backups... ⋮

Name	Time	Location	Actions
Automatic Snapshot 1	Feb 09, 2021 9:24 AM	Local	Local External ⋮
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM	Local	Local External ⋮
Manual Backup 1 - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM	Local	Local External ⋮
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM	Local	Local External ⋮

## Restore an instance from an external backup

To restore an instance from an external backup, create a new instance from the external backup. The state of the new instance is the same state of the original instance when the external backup was taken.

Complete the following steps to create a new instance from an external backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the action menu ( ⋮ ) for the external backup that you want to restore. Then click **New application instance**.

Backups Back Up Now... Set Up Backups... ⋮

Name	Time	Location	Actions
Automatic Snapshot 1	Feb 09, 2021 9:24 AM	Local	Local External ⋮
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM	Local	Local External ⋮
Manual Backup 1 - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM	Local	Local External ⋮
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM	Local	Local External ⋮

**New application instance**

Properties...

View vDisks...

Restore

Copy as backup instance to another repository...

Delete

Figure 371. Backups action menu - new application instance option

Step 4. Choose the external backup and click **Create**.

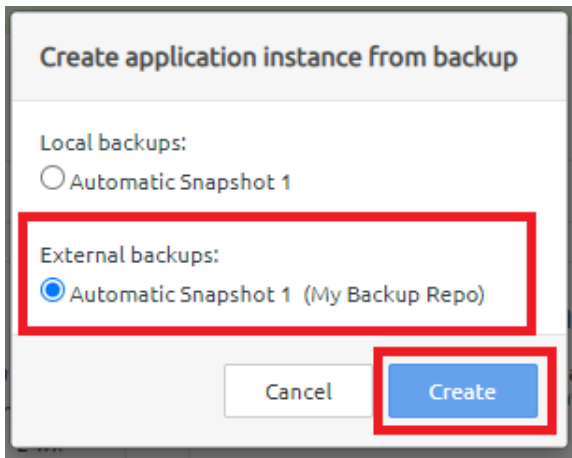


Figure 372. Create application instance from backup dialog

Step 5. In the Properties section of the page, enter a name (required) and a description (optional) for the new application instance. The new name must be unique across all application instances in the associated virtual datacenter.

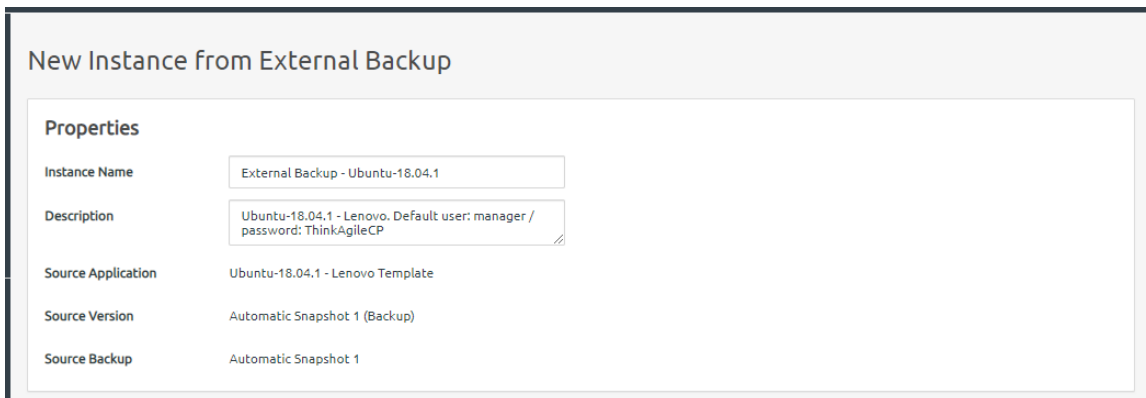


Figure 373. New Instance from External Backup dialog - Properties section

Step 6. In the Virtual Datacenter section, configure the following fields:

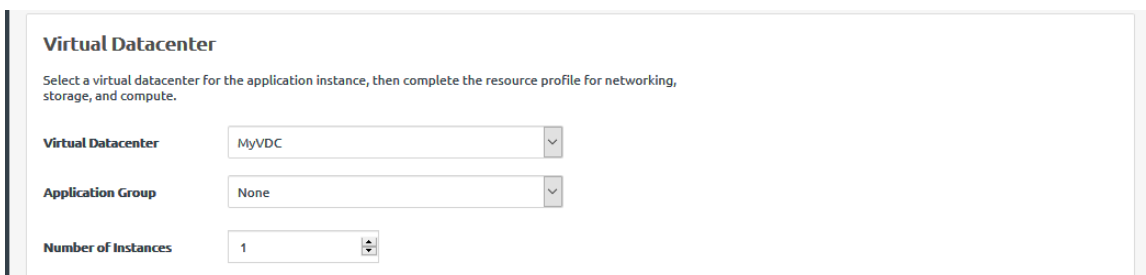


Figure 374. New Instance from External Backup dialog - Virtual Datacenter section

- a. Select the virtual datacenter where the instance should reside and get resources. The virtual datacenter selection determines the migration zone and storage pool resources available for the application instance.
- b. Optionally, select an application group (which are used to organize application instances in a virtual datacenter) and then specify the number of instantiations you want to include in this group.

For more information about application groups, see the following topic:

[“Managing application groups” on page 232](#)

- c. Specify the number of instances to be created.

Step 7. Configure the settings for the storage, compute, and networking resources.

**Storage**

Storage Pool: RO 151.5 Pool

Storage Provisioning

vDisk Name	Size	IOPS Limit	Bandwidth Limit
Disk 0	50 GiB	—	—

**Compute**

Provisioning: 4 cores, 4 GiB

Migration Zone: RO 151.5 MZ

[Compute Constraints](#)

**Network**

Configure at least one virtual network interface controller (vNIC) to specify the instance's network settings. [Add vNIC](#)

vNIC	Networking Mode	Network	Firewall Profile	Firewall Override	Mac Address
vNIC 0	VLAN	RO 151.5 VLAN	—	—	Automatic

**Boot Order**

Disk 0 > Network (vNIC 0)

**Network Sysprep**

Perform network sysprep  
Reset all NICs to DHCP in instance's OS.

Figure 375. New Instance from External Backup dialog - Resources section

- a. Define the VM provisioning for this instance by specifying the CPU (number of cores) and Memory in GB.
- b. Select the migration zone from which the application instance will get its compute resources.
- c. If the instance requires a specific compute category or tag, expand Compute Constraints and add the category and tags.
- d. Select a networking mode for the instance and select a virtual network from the drop-down menu.
- e. Edit the Boot Order if needed. The application instance will attempt to boot in the sequence you define.

- f. Click **Perform network sysprep** if needed to reset all NICs to DHCP in the instance operating system.

Step 8. Configure the settings for the new instance.

**Instance Settings**

Install virtio drivers (required for enhanced mode) from the ThinkAgile CP Guest Tools by booting in compatibility mode and switching to enhanced mode.

**Instance Mode**

**Compatibility Mode**  
All instances can boot in this mode.

**Enhanced Mode**  
Virtio drivers must be installed to boot in this mode.

**Enhanced Mode**

In this mode:

- Storage disks are exported as virtio iSCSI devices
- vNICs are exported as virtio vNICs
- Snapshots will be application consistent (when ThinkAgile CP Guest Agent is installed) if the guest OS supports freeze and thaw
- CPU and Memory Statistics are available (when ThinkAgile CP Guest Agent is installed)

[Learn more about instance modes](#)

**Guest Tools**

Insert guest tools in CD-ROM drive.  
To install ThinkAgile CP guest tools, see [instructions](#)

---

**Timezone Configuration**

Default\*  Custom

\* The timezone is set to the timezone of the node on which the instance is started

**Automatic Recovery**

Enable Automatic Recovery  
If node fails, restart instance elsewhere when resources are available

**VT-x flag**

Enable VT-x flag

This flag can be used to enable nested virtualization of KVM hypervisors in the ThinkAgile CP environment. No other nested hypervisors are supported.

**Instance Startup**

Start instance upon creation

Figure 376. New Instance from External Backup dialog - Instance Settings section

- a. Choose the instance mode.

**Note:** The instance mode defaults to the source instance when creating an instance from an external backup. For more information about these modes, see the following topic:

[“Understand instance modes” on page 67](#)

1. **Compatibility Mode.** All instances can boot in this mode.
2. **Enhanced Mode.** Virtio drivers must be installed to boot in this mode.

- b. Click **Insert guest tools in CD-ROM** to insert guest tools.

For more information about guest tools, see the following topic:

[“Install guest agent tools” on page 68](#)

- c. Determine the time zone to be used for the instance.

1. **Default.** The time zone is set to the time zone of the node on which the instance starts.
2. **Custom.** You can set the time zone for the application instance by selecting the time zone area and location.

- d. Make sure that **Enable Automatic Recovery** is selected to enable automatic recovery, which specifies to restart the instance where resources are available if the node fails.

- e. Make sure that **Enable VT-x flag** is selected to enable nested virtualization of KVM hypervisors in your ThinkAgile CP environment.
- f. Make sure that **Start instance upon creation** is selected to have the instance started when it is created.

Step 9. Click **Create Instance**.

The new instance is started and is listed on the VDC Instances page for your VDC.

Name	IP Address(es)	CPU (cores)		Memory		NW BW (Mbps)		ST BW (Mbps)		IOPS		IO QL
		Prov.	% vCPU	Prov.	Load	Read	Write	Read	Write	Read	Write	
CentOS 7.5 (64-bit) - Lenov...	10.241.56.140	4	0%	2 GiB	845 MiB	0	0	0	0	0	0	0
External Backup - Ubuntu...	10.241.56.172	4	0%	4 GiB	645 MiB	0	0	0	0	0	0	0
Ubuntu-18.04.1 - Lenovo T...	10.241.56.143	4	0%	4 GiB	1.9 GiB	0	0	0	0	0	0	0

Figure 377. VDC Instances page displaying new instance

## Delete an external backup for an instance

You can delete an external backup for an application instance.

For information about deleting all external backups for an instance, see the following topic:

[“Delete all external backups for an instance” on page 318](#)

Complete the following steps to delete an external backup:

- Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.
- Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.
- Step 3. Click the actions menu ( **...** ) for the external backup to be deleted. Then click **Delete** → **External backup**.

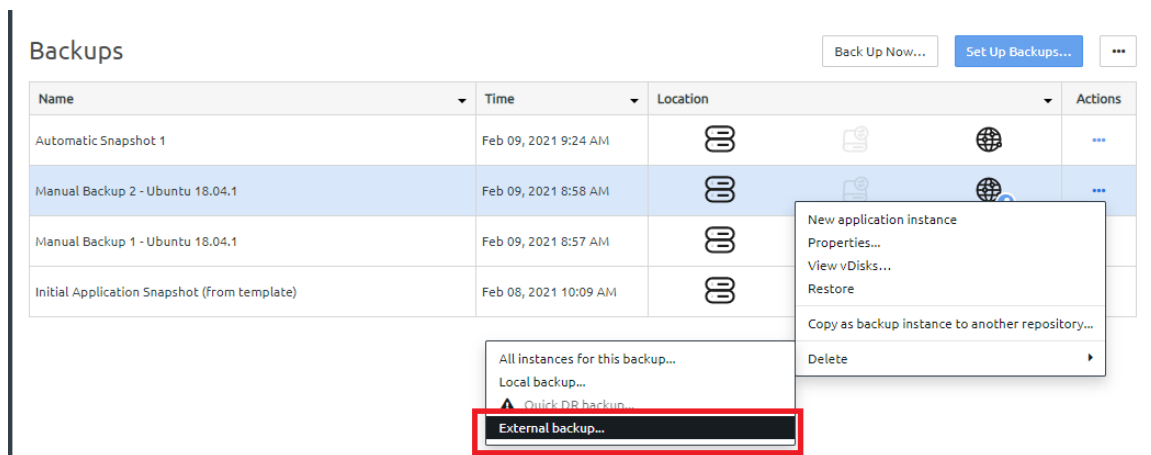


Figure 378. Backup actions menu - Delete external backup option

Step 4. On the Delete externally saved backup confirmation dialog, click **Delete**.

A red x is displayed for the external backup while the deletion is in progress.

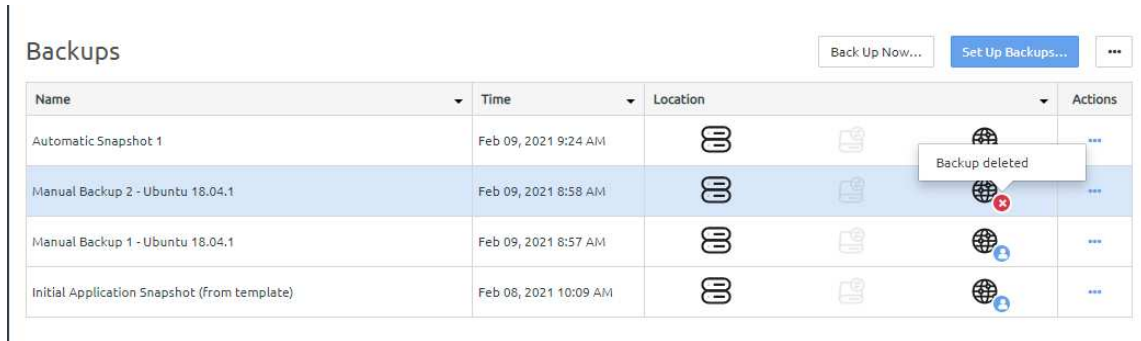


Figure 379. External backup deletion in progress.

The external backup might take a few minutes to delete. When the external backup is deleted, the red x will be removed and the external backup icon will no longer be bold for this application instance. Local backup and quick DR backup copies for the instance are not affected.

### Delete all external backups for an instance

You can delete all external backups for an application instance.

For information about deleting a single external backup for an instance, see the following topic:

[“Delete an external backup for an instance” on page 317](#)

Complete the following steps to delete all external backups for an application instance:

Step 1. Log in to the ThinkAgile CP Cloud Controller as an **infrastructure admin** or **VDC manager** user.

Step 2. Navigate to the details page for your application instance, and click the **Backups** tab.

Step 3. Click the Backup actions menu ( ); then click **Delete all external backups**.

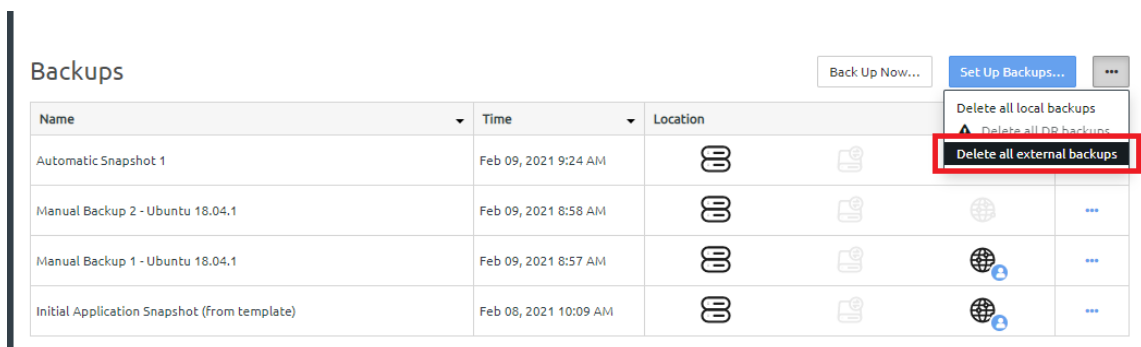


Figure 380. Backups actions menu - Delete all external backups option

Step 4. On the Delete All External Backups confirmation dialog, click **Delete All Backups**.

**Important:** This action is permanent.

All external backup icons are deleted. However, local backups and quick DR backups are not affected.



Backups				Back Up Now...	Set Up Backups...	...
Name	Time	Location	Actions			
Automatic Snapshot 1	Feb 09, 2021 9:24 AM				...	
Manual Backup 2 - Ubuntu 18.04.1	Feb 09, 2021 8:58 AM				...	
Manual Backup 1 - Ubuntu 18.04.1	Feb 09, 2021 8:57 AM				...	
Initial Application Snapshot (from template)	Feb 08, 2021 10:09 AM				...	

Figure 381. Backups page with all external backup icons removed.

## Third-party backup

For some customers, the backup and Disaster Recovery (DR) capabilities that are part of the ThinkAgile CP platform might be sufficient. For those who prefer to use third-party backup tools, ThinkAgile CP supports agent-based products, such as Commvault, Veeam, Rapid Recovery, and NetBackup.

### Use Quest Rapid Recovery

The instructions below describe how to use Quest Rapid Recovery for backup and recovery with ThinkAgile CP.

#### Back up a Windows Server 2012 R2 with Quest Rapid Recovery

When backing up a Windows Server 2012 R2 instance with Rapid Recovery, the ThinkAgile CP service should be stopped before taking a backup.

To automate this process, you can use Rapid Recovery pre- and post-transfer scripts as described in the following website:

#### [Quest Rapid Recovery Commands and Scripting Reference Guide](#)

- On the 2012 R2 agent, open notepad and enter `Stop-Service tacp;` and save the file as `C:\Users\All Users\AppData\Local\Temp\PreTransferScript.ps1`
- On the 2012 R2 agent, open notepad and enter `Start-Service tacp;` and save the file as `C:\Users\All Users\AppData\Local\Temp\PostTransferScript.ps1`

**Notes:** Only one backup solution should be used for an instance. If an instance is being backed up by Rapid Recovery, automatic local backups and quick DR backups by the ThinkAgile CP Cloud Controller should be turned off. For more information about local backups and quick DR backups, see the following topics:

- [“Manage local backups for an application instance” on page 269](#)
- [“Manage quick DR backups” on page 288](#)

#### Perform a Rapid Recovery restore

Follow these steps to inject drivers into the Universal Recovery Console to perform a Rapid Recovery bare metal restore.

- Step 1. Create a new instance from installer using the Rapid Recovery Boot CD. Make sure to allocate the same amount of compute and storage resources as the original instance.
- Step 2. Open the console to the new instance and launch the Universal Recovery Console.
- Step 3. Load the network driver.
- Step 4. Click **Force Load**.

- Step 5. In the popup dialog box, expand the volume labeled virtio-win-0.1.1.
- Step 6. Open the NetKVM folder, open the folder whose name matches the OS that is being restored, and then open the folder that matches the architecture that is being restored (amd64 for 64-bit, x86 for 32-bit).
- Step 7. Select netkvm.inf and click **OK**.
- Step 8. Load the storage driver.
- Step 9. Click **Force Load**.
- Step 10. In the popup dialog box, expand the volume labeled virtio-win-0.1.1.
- Step 11. Open the vioscsi folder, and then open the folder whose name matches the OS that is being restored.
- Step 12. Open the folder that matches the architecture that is being restored (amd64 for 64-bit, x86 for 32-bit).
- Step 13. Select **vioscsi.inf** and click **OK**.

Perform the remaining steps as outlined in the [Bare Metal Restore topics in the Quest Rapid Recovery documentation](#).

## Commvault 1-Touch Windows recovery

This topic walks you through the instructions for performing bare metal recovery using Commvault 1-Touch for Windows with ThinkAgile CP.

Refer to the following sections.

- [“Preparing for bare metal recovery with 1-Touch for Windows” on page 320](#)
- [“Connecting the ISO to a ThinkAgile CP application instance” on page 321](#)
- [“Interactive Restore” on page 322](#)

### Preparing for bare metal recovery with 1-Touch for Windows

Complete the following steps to prepare for bare metal recovery

You can download the ISO file from the [Commvault Cloud Services Web site](#).

To perform 1-Touch Recovery operations using Version 10 backups, see the Commvault documentation: [Upgrade Considerations for 1-Touch for Windows \(V10 to V11\)](#).

### Before You Begin

- You can add the drivers directly to the downloaded ISO file by using 1-Touch.exe. For more information, see these Commvault articles: [Adding Drivers to Windows Driver Manager](#) and [Adding Windows Drivers for NIC and Mass Storage Devices](#).
- If you are familiar with the drivers that you require to perform 1-Touch Recovery, you can add the drivers to the Cloud Services Web site. For more information, see [Adding Drivers to the Cloud Services Web Site](#).
- You can directly install the hot fixes to the source ISO file using 1-Touch.exe. For more information, see [Installing Hot Fixes to the Source ISO File](#).

### Download and Install 1-Touch ISO

1. Go to the [Commvault Store](#) page on the Cloud Services Web site. On the Commvault Store page, the software media items are displayed.
2. On the left side of the page, under the Version filter, click **Installer**.
3. Click the **Download** button next to the software media that you want to download. For a list of available installation media, see [Installation Media List](#).

For example, to download the 1-Touch ISO application for 64-bit Windows computers, look for 1-Touch-Windows-x64.iso (Windows Live CD) with the latest service pack.

The software media is downloaded to the location that you specified.

- If you downloaded the Download Manager, you will see the application executable along with the checksum file.
  - If you downloaded a software disc, you will see the .iso image of the disc.
  - Mount the .iso using an appropriate software (for example, MagicISO). Then, use the software media from the mount location.
4. Use the ISO image to boot the client by burning a live CD.

### **Connecting the ISO to a ThinkAgile CP application instance**

This section outlines how to boot a ThinkAgile CP application instance (or VM) from an ISO, which is accomplished by changing the libvirt media for a given ThinkAgile CP application instance and then intervening on the console for an instance.

### **Overview of the Process**

The high-level process is described as follows:

1. Stage the media on the compute controller on which the VM is running.
2. Use the iso-mount.py script to change the CD-ROM media on the VM from the ThinkAgile CP guest agent ISO to the locally-staged ISO.
3. Trigger a VM reboot. From the boot console, press the ESC key to select the CD-ROM as the boot device.

### **Prerequisites**

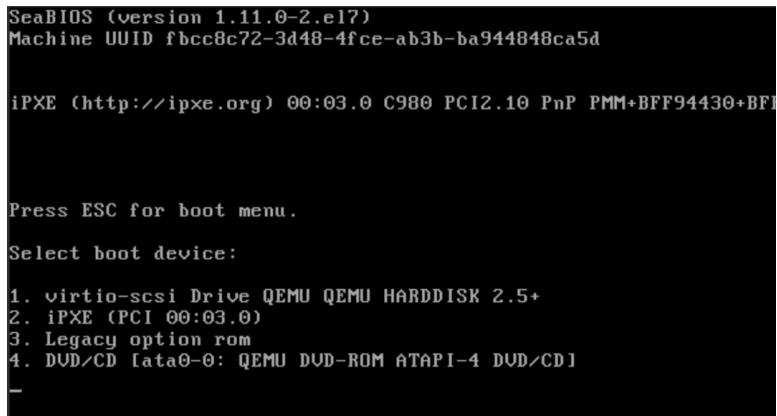
- A compute node specific tag defined in the ThinkAgile CP Cloud Controller. (This needs to be applied to the VM thus 'tying' it to the desired node. This is done because the ISO file needs to be located on the same compute node).
- A folder (such as, /iso) in which to copy the .iso file and the iso-mount.py script, which attaches it to the VM. This folder is located on the same compute node as the VM. You may need to change permissions (for example, chmod it to 755).
- The desired ISO file and the iso-mount.py script copied to the folder mentioned above (for example, /iso)

### **Procedure**

1. In the ThinkAgile CP Cloud Controller use compute tags to migrate the ThinkAgile CP application to a known location.
  - a. Identify or create a node-specific tag for the Migration Zone the Application is in, and apply that tag to the application.
  - b. Use the Node filters in the ThinkAgile CP Cloud Controller to confirm that any applicable migration has occurred.
2. Stage the ISO on the Compute controller:
  - a. SCP the ISO to the Compute controller and place it in a known location (for example, /iso). You can ssh as "manager" and then sudo as root.
  - b. Ensure the ISO is owned by root and is chmod'ed to 755 (This should be done for the folder /iso in our example as well.)
3. Run the iso-mount.py script on the Compute controller:
  - a. Download iso-mount.py to the same folder (for example, /iso) and chmod 750 to make it executable, and then run the script with the syntax:

```
./iso-mount.sh <vdc-name> <vm-name> <iso-filename>Example:./iso-mount.sh "MM Training"  
"Migration Manager Console" /tmp/centos-7-install.iso
```

- b. The media should be changed, and the new ISO should appear in the VM should it be booted.
4. Open a Console window and trigger a reboot to choose the DVD as the boot device:
  - a. Trigger a reboot, either via the ThinkAgile CP Cloud Controller or via a graceful reboot in the guest VM.
  - b. While the VM is booting, type ESC during the BIOS boot screen, and then you will see an option to choose the DVD as the boot device, as shown below:



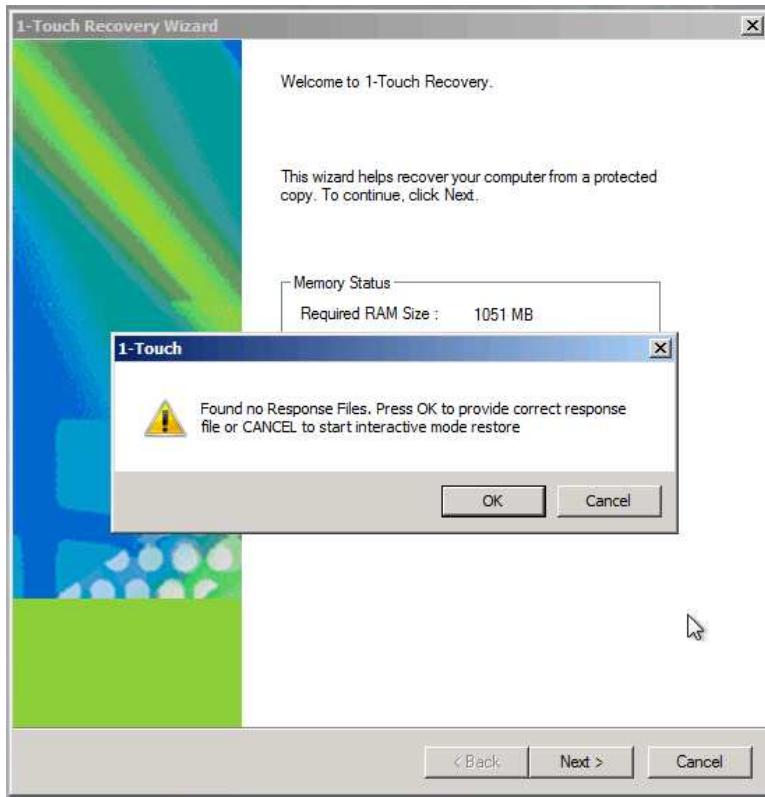
```
SeaBIOS (version 1.11.0-2.el7)  
Machine UUID fbcc8c72-3d48-4fce-ab3b-ba944848ca5d  
  
iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+BFF94430+BFF  
  
Press ESC for boot menu.  
Select boot device:  
1. virtio-scsi Drive QEMU QEMU HARDDISK 2.5+  
2. iPXE (PCI 00:03.0)  
3. Legacy option rom  
4. DVD/CD [ata0-0: QEMU DVD-ROM ATAPI-4 DVD/CD]  
_
```

- c. Choose the DVD and boot accordingly.
5. When done, go to the ThinkAgile CP Cloud Controller and insert guest tools, which will unmount your ISO and replace it with guest tools, as before.
  - a. You can now remove the staged ISO.
  - b. Remove tags as needed to allow the VM to migrate.

### Interactive Restore

Complete these steps to restore the client computer to another computer that has the same hardware and disk configuration as that of the backed up computer:

- Step 1. Use the 1-Touch Live CD to boot the client computer.
- Step 2. In the Language Selection Dialog dialog box, select a language from the list. To use the same language for the keyboard, select the **Use default keyboard for the selected language** check box and click **OK**. The 1-Touch Recovery Wizard starts. On the Welcome page, a warning message appears that says that the response files are not found.
- Step 3. Click **Cancel** to start the interactive restore.



Step 4. If you have a firewall configured between the client and the CommServe, select the checkbox, **There is a firewall between this client and the CommServe.**

Step 5. In the Client Group Name dialog box, type the name of the client computer group that you created with the firewall configuration and click **Next**.

For more information on creating a client computer group with Firewall, see the Commvault article:

[Firewall Configuration](#)

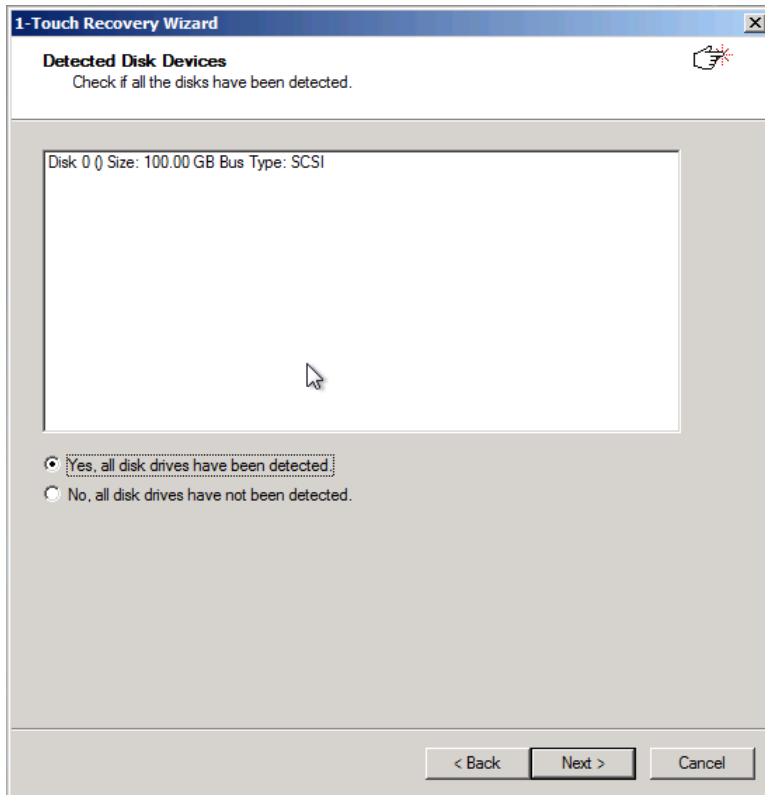
Step 6. (Skip this step if you do not have a firewall configured between the client and the CommServe.) In the Firewall Configuration page:

- a. In the CommServe client name box, enter the name of the CommServe client.
- b. In the CommServe Host Name box, enter the fully qualified domain name of the CommServe computer.
- c. Based on your firewall setting, choose one of the following:

If you have...	Then...
<p>established a port-forwarding at the gateway to forward incoming connections on specific ports to certain computers on the internal network or on specific ports</p>	<ol style="list-style-type: none"> <li>1. Select the option, <b>CommServe is reached through a port-forwarding gateway.</b></li> <li>2. In the Gateway hostname or IP address box, type the gateway hostname or the IP address.</li> <li>3. In the Gateway port number box, type the port number through which you can reach the CommServe.</li> </ol>
<p>port restrictions set up where any one of the two communicating computers can establish a one-to-one connection towards the other on specific ports</p>	<ol style="list-style-type: none"> <li>1. Select the option, <b>CommServe opens a direct connection to the client.</b></li> <li>2. In the Incoming port number box, type the incoming port number on which the CommServe will receive tunnel connections from the client.</li> </ol>
<p>a special proxy configuration where a dedicated iDataAgent is placed in a perimeter network, and the firewalls are configured to allow connections (from inside and outside networks) into the perimeter network</p>	<ol style="list-style-type: none"> <li>1. Select the option, <b>CommServe is reached through a proxy.</b></li> <li>2. In the Proxy client name box, type the name of the proxy client.</li> <li>3. In the Proxy hostname or IP address box, type the hostname or IP address of the proxy computer.</li> <li>4. In the Proxy port number box, type the port number through which the proxy computer can reach the CommServe.</li> </ol>

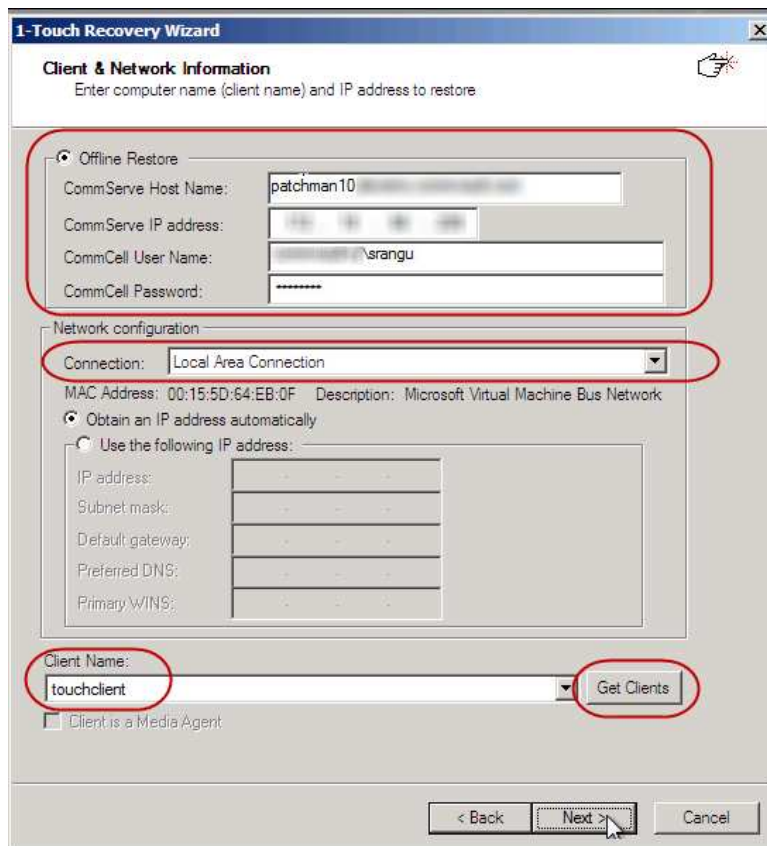
d. Click **Next**.

Step 7. On the Detected Disk Devices page, click **Yes, all disk drives have been detected**, and then click **Next**. If you do not see the required drivers, add the drivers to the downloaded ISO.

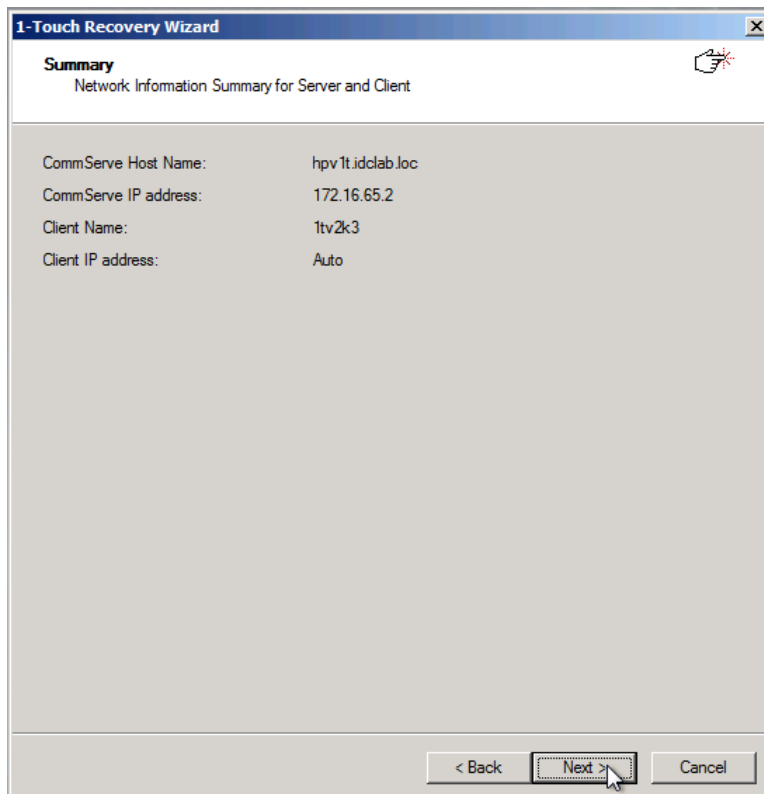


For more information on adding drivers, see the articles, [Adding Drivers to Windows Driver Manager](#) and [Adding Windows Drivers for NIC and Mass Storage Devices](#).

- Step 8. On the Client & Network Information page, make the following selections:
- Enter the CommServe Host Name and IP Address.
  - Enter the CommCell User Name and Password.
  - Select the Network Connection from the Connection drop-down menu.
  - Click **Get Clients** to get the list of all file system clients on which the system state backups have been performed.
  - In the Client Name list , select a client for which you want to perform the Interactive Restore.
  - Click **Next**.



Step 9. On the Summary page, click **Next**.



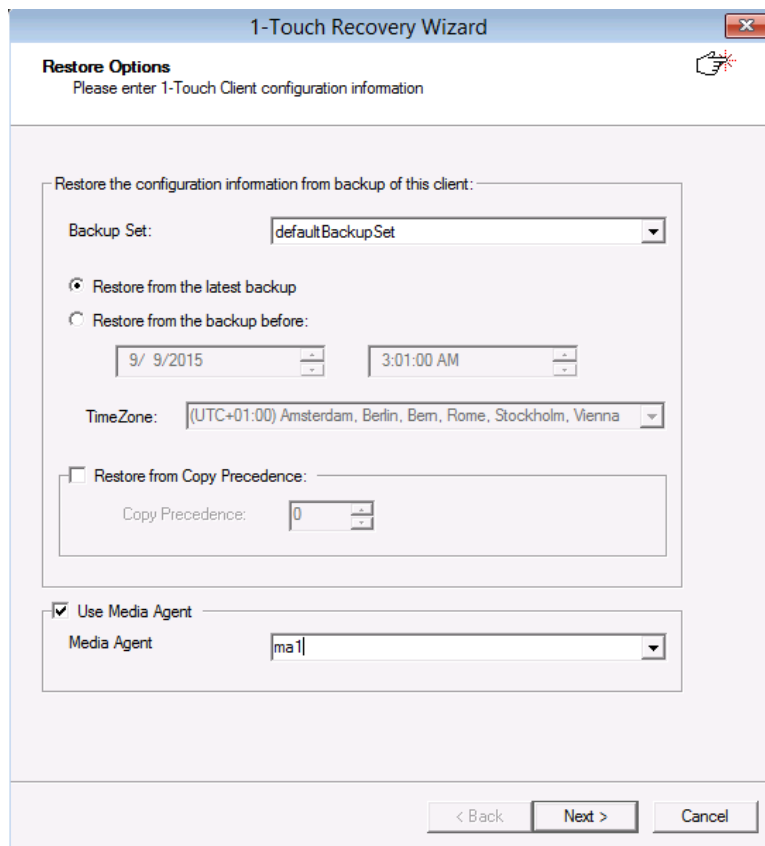


Step 10. On the Restore Options page, click **Next**.

**Notes:**

- By default, the client configuration backed up by the default backupset during most recent backup will be used to restore the client.
- You can select a different MediaAgent computer than the one used to perform system state backups. Select the **Use MediaAgent** check box and select a MediaAgent from the MediaAgent list.

Make sure that the **Allow restore jobs to use alternative MediaAgent and Drive Pool to access required media** parameter in the **Control Panel** is set to a value of 1. For more information on how to set the parameter, see [Media Management Configuration: Resource Manager](#).

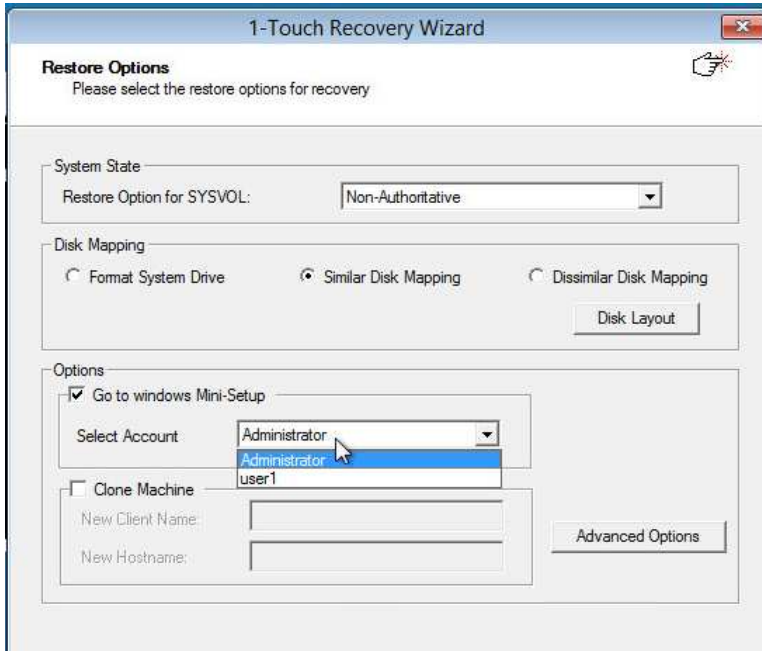


The screenshot shows the '1-Touch Recovery Wizard' window, specifically the 'Restore Options' page. The window title is '1-Touch Recovery Wizard' and the subtitle is 'Restore Options'. Below the subtitle, it says 'Please enter 1-Touch Client configuration information'. The main area contains several configuration options:

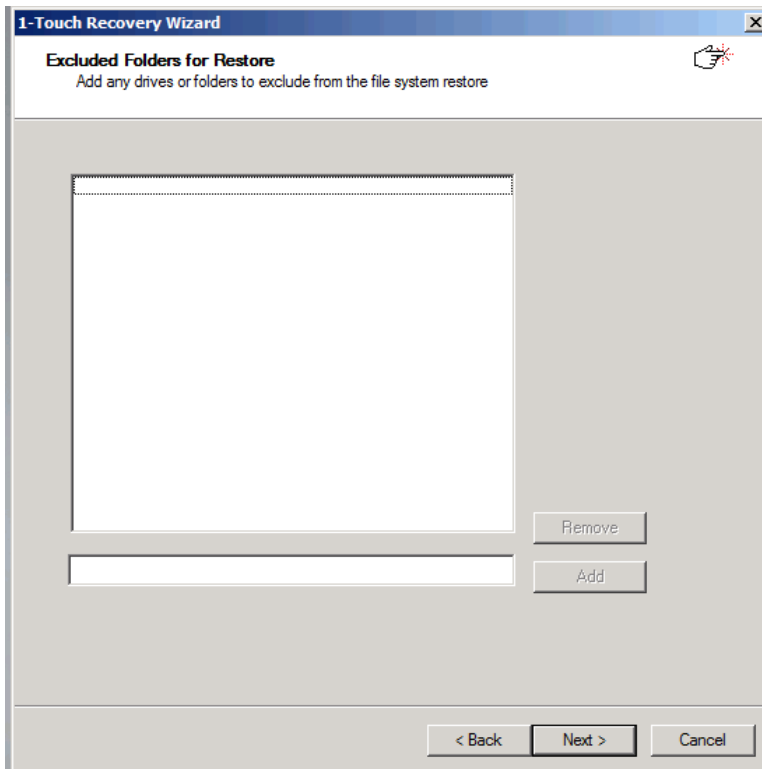
- Restore the configuration information from backup of this client:**
  - Backup Set:** A dropdown menu showing 'defaultBackupSet'.
  - Restore from the latest backup:** A radio button that is selected.
  - Restore from the backup before:** An unselected radio button with two date/time pickers below it: '9/ 9/2015' and '3:01:00 AM'.
  - TimeZone:** A dropdown menu showing '(UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna'.
  - Restore from Copy Precedence:** An unselected checkbox with a 'Copy Precedence' spinner set to '0'.
- Use Media Agent:** A checked checkbox with a 'Media Agent' dropdown menu showing 'ma1'.

At the bottom of the window, there are three buttons: '< Back', 'Next >', and 'Cancel'.

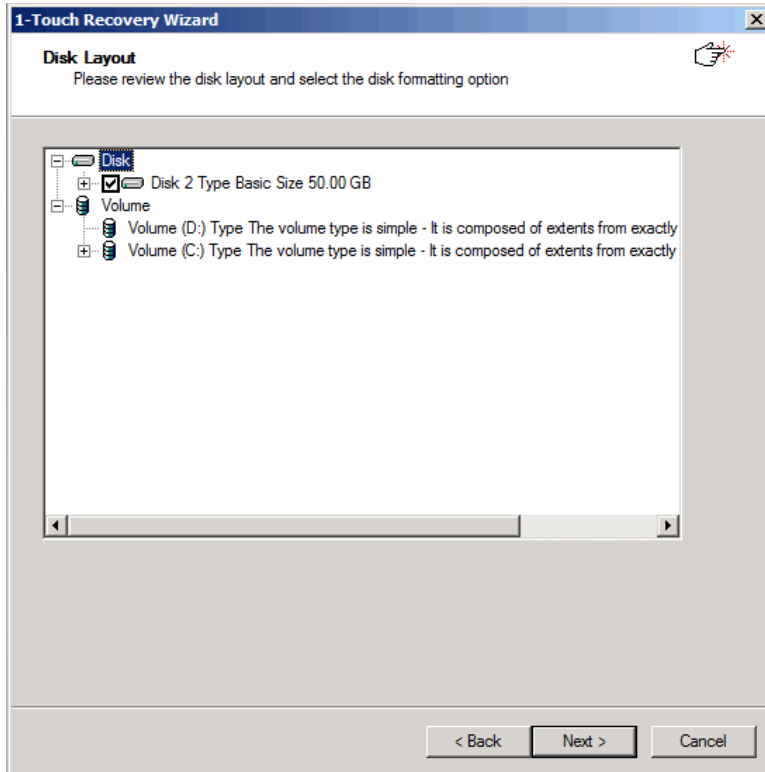
Step 11. On the Restore Options page, review the restore options, clear the checkbox, **Go to Windows Mini-Setup**, and then click **Next**.



Step 12. On the Excluded Folders for Restore page, if you want to exclude any folder or driver from the full system restore, enter the path of the folder or driver and click **Add**. Then, click **Next**.

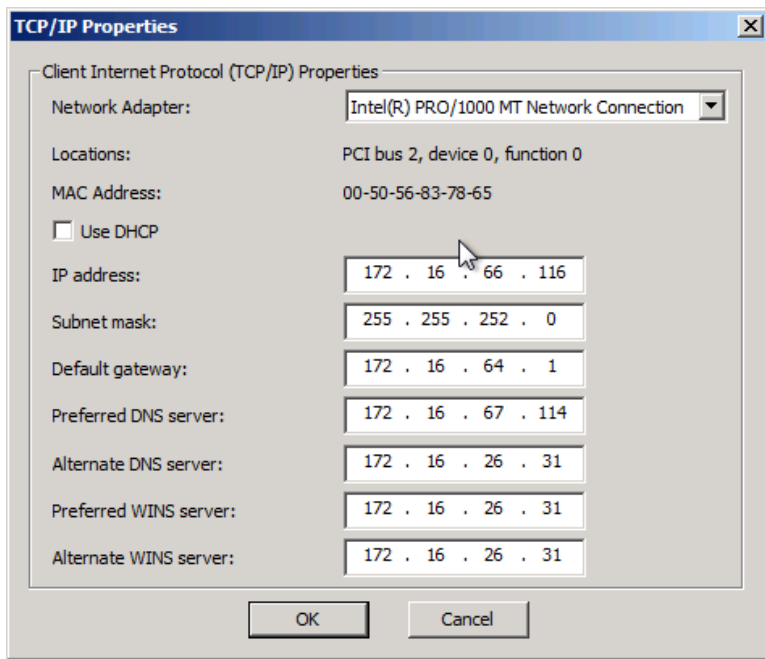


Step 13. On the Disk Layout page, click **Next**.

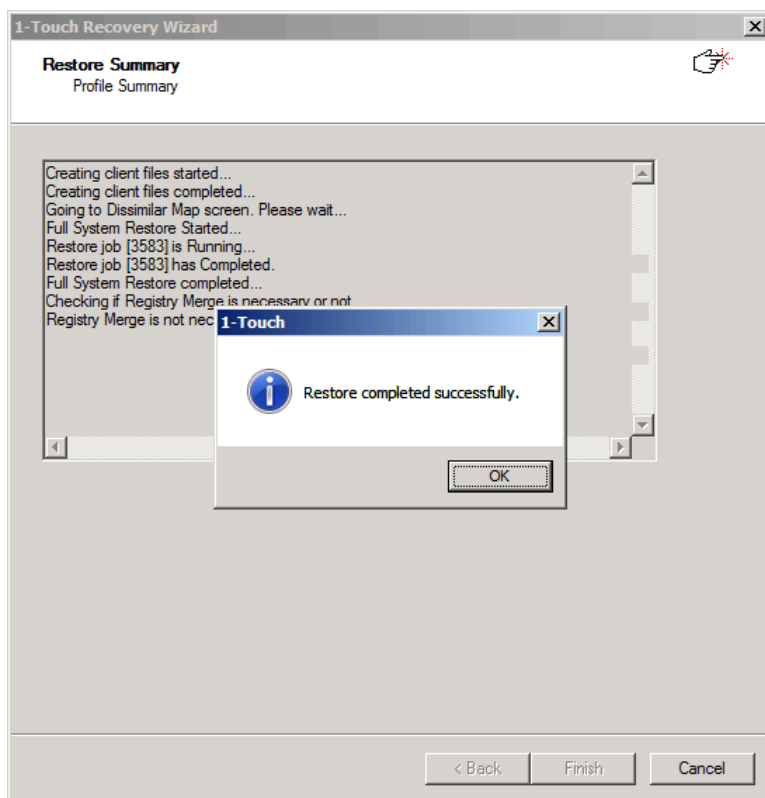


Step 14. In the TCP/IP Properties dialog box, review the Client Internet Protocol (TCP/IP) Properties, and click **OK**.

The full system restore starts.



Step 15. On the Restore Summary page, click **OK** on the success dialog box that appears after the restore completes.



Step 16. Remove the Live CD and restart the computer.

## Commvault 1-Touch Linux recovery

This topic document walks you through the instructions for performing recovery using Commvault 1-Touch for Linux with ThinkAgile CP.

Refer to the following topics.

- [“Prepare for recovery” on page 330](#)
- [“Boot from ISO” on page 331](#)
- [“Interactive Recovery” on page 332](#)

### Prepare for recovery

Complete these steps to prepare for Commvault 1-Touch Linux recovery.

You first should download the ISO file from the [Commvault Cloud Services website](#)

### Install 1-Touch ISO

Follow these steps to download and install the 1-Touch ISO.

1. Go to the [Commvault Store](#) page on the Cloud Services web site. On the Commvault Store page, the software media items are displayed.
2. On the left side of the page, under the MEDIA KITS filter, click 1-Touch.
3. Click the Download button next to the software media that you want to download. For a list of available installation media, see the [Installation Media List](#). For example, to download the 1-Touch ISO application for Linux, look for V11 DVD4 (Linux Live CD) with the latest service pack.
4. Use this ISO image to boot the client using one of the following methods:
  - Burn a Live CD and boot the client.

- Copy the ISO image to an NFS server and set up a PXE Server to perform a network boot.
5. Confirm the following are installed for 1-Touch backups:

Redhat/CentOS7:

- yum install kexec-tools
- yum install pciutils
- yum install psmisc
- yum install net-tools

Ubuntu:

- apt-get install kexec-tool

## Boot from ISO

This section outlines how to boot an application instance (or VM) from an ISO, which is accomplished by changing the libvirt media for a given ThinkAgile CP application instance and then intervening on the console for an instance.

## Overview of the Process

The high-level process is described as follows:

1. Stage the media on the compute controller on which the VM is running.
2. Use the iso-mount.py script to change the CD-ROM media on the VM from the ThinkAgile CP guest agent ISO to the locally-staged ISO..
3. Trigger a VM reboot, and then, from the boot console, use the ESC key to select the CD-ROM as the boot device.

## Prerequisites

- A compute node specific tag defined in ThinkAgile CP Cloud Controller. (This needs to be applied to the VM, thus 'tying' it to the node. This is done because the ISO file needs to be located on the same compute node).
- A folder (such as, /iso) in which to copy the .iso file and the iso-mount.py script, which attaches it to the VM. This folder is located on the same compute node as the VM. You may need to change permissions (for example, chmod it to 755).
- The desired ISO file and the iso-mount.py script copied to the folder mentioned above (for example, /iso).

## Procedure

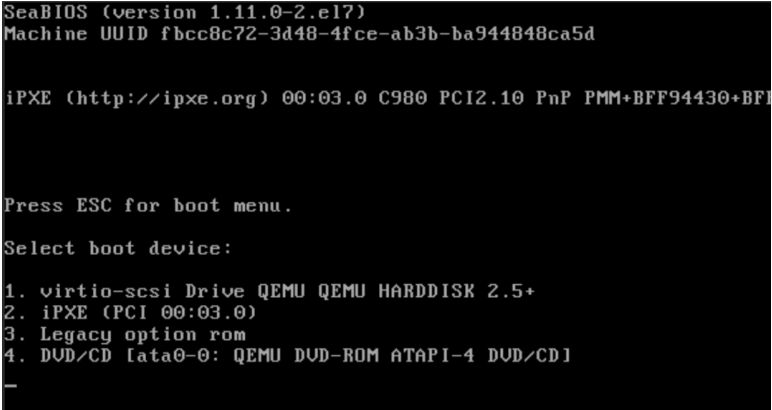
1. In the ThinkAgile CP Cloud Controller, use compute tags to pin and/or migrate the ThinkAgile CP application to a known location.
  - a. Identify or create a node-specific tag for the Migration Zone the application is in, and apply that tag to the application.
  - b. Use the Node filters in the ThinkAgile CP Cloud Controller to confirm that any applicable migration has occurred.
2. Stage the ISO on the compute controller:
  - a. SCP the ISO to the compute controller and place it in a known location (for example, /iso). You can ssh as "manager" and then sudo as root.
  - b. Ensure the ISO is owned by root and is chmod'ed 755 (This should be done for the folder /iso in our example).
3. Run the iso-mount.py script on the compute controller:

- a. Download iso-mount.py to the same folder (for example, /iso) and chmod 750 to make it executable, and then run the script with the syntax: ./iso-mount.sh <vdc-name> <vm-name> <iso-filename>

Example:

```
./iso-mount.sh "MM Training" "Migration Manager Console" /tmp/centos-7-install.iso
```

- b. The media should be changed, and the new ISO should appear in the VM should it be booted.
4. Open a Console window and trigger a reboot to choose the DVD as the boot device:
    - a. Trigger a reboot, either via ThinkAgile CP Cloud Controller or via a graceful reboot in the guest VM.
    - b. While the VM is booting, type ESC during the BIOS boot screen, and then you will see an option to choose the DVD as the boot device:



```
SeaBIOS (version 1.11.0-2.e17)
Machine UUID fbcc8c72-3d48-4fce-ab3b-ba944848ca5d

iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+BFF94430+BF

Press ESC for boot menu.

Select boot device:

1. virtio-scsi Drive QEMU QEMU HARDDISK 2.5+
2. iPXE (PCI 00:03.0)
3. Legacy option rom
4. DVD/CD [ata0-0: QEMU DVD-ROM ATAPI-4 DVD/CD]
_
```

- c. Choose the DVD and boot accordingly.
5. When done, go to ThinkAgile CP Cloud Controller, and insert guest tools, which will unmount your ISO and replace it with the guest tools, as before.
    - a. You can now remove the staged ISO.
    - b. Remove tags as needed to allow the VM to migrate.

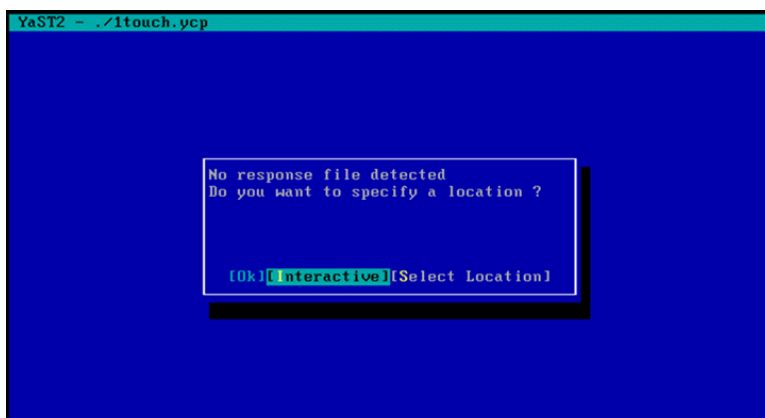
### Interactive Recovery

Interactive recovery is also available if you do not want to use the recovery response file.

Follow these steps to go through the interactive recovery process.

- Step 1. Have the [Client Information Checklist](#) ready.
- Step 2. Boot the client using the ISO image.
- Step 3. Type Default and press Enter to start the default recovery.

**Note:** On certain hardware, after the system state restore, the kexec system call fails and the machine reboots. On such hardware, we recommend that you select the nolapic boot option. Similarly, the noapic boot option is relevant to a particular hardware configuration. Selecting the nolapic or noapic boot options for default recovery might result in incorrect hardware initialization.



Step 4. Select **Interactive** and press Enter.

Step 5. On the Network Config page, enter the IP address, network, and name server details of the network specified in the client information checklist.

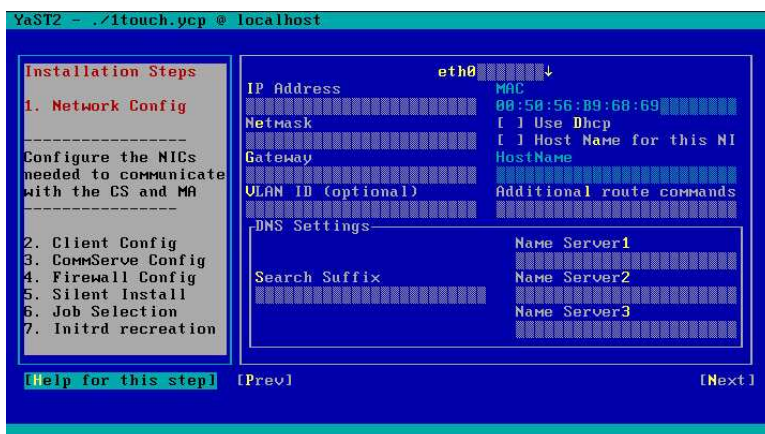
If VLAN tagging for NICs is required, enter the VLAN ID. For more information, see the Commvault FAQ article: [“Is VLAN tagging supported for 1-Touch recovery?”](#)

In the Additional Route Commands field, you can add additional networking commands that are executed after the selected NIC has been brought up. You can also add additional static routes in this field. (Multiple commands must be separated by a semi-colon.)

Example:

```
route add -net 10.10.10.0 netmask 255.255.255.0 gw 172.19.109.1; ip route add 10.20.0.0/16 dev eth0
```

**Note:** The networking commands must be valid, and the commands must use only standard system utilities. These commands take effect automatically during the second phase when the network is re-configured.



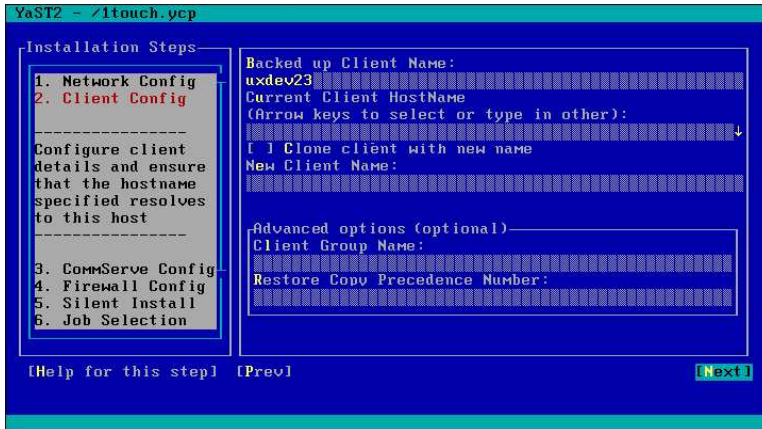
Step 6. Select **Next** and press Enter.

Step 7. On the Client Config page, enter the short name of the backed-up client in the **Backed up Client Name** field, and then select the fully qualified client hostname of the client on which you are performing recovery, from the Current Client HostName selection box.

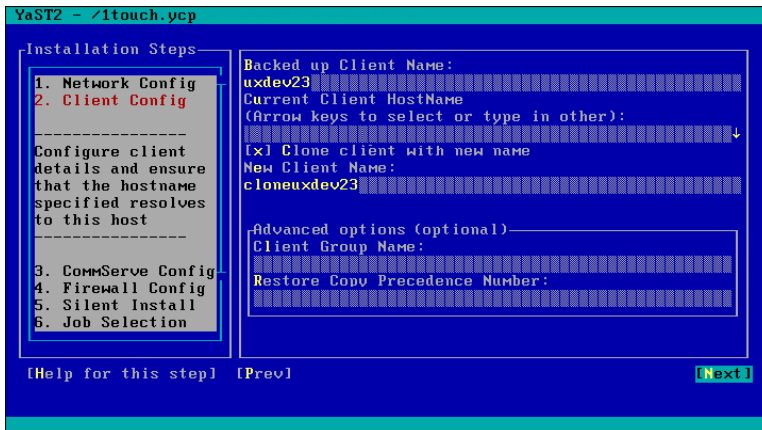
The Current Client Hostname list contains values of all hostnames entered on the Network Config page and the client hostname present in the recovery response XML file. It also contains the hostnames resolved via nslookup for each IP address configured on the Network Config page. You

can also enter a new client hostname manually as specified in the client information checklist. This hostname will be used during recovery and will persist on the machine after the recovery completes.

The hostname must be resolvable from the CommServe and the MediaAgent to the client being recovered. Skip the hostname field to enable installation of the client being recovered with an IP instead of hostname.



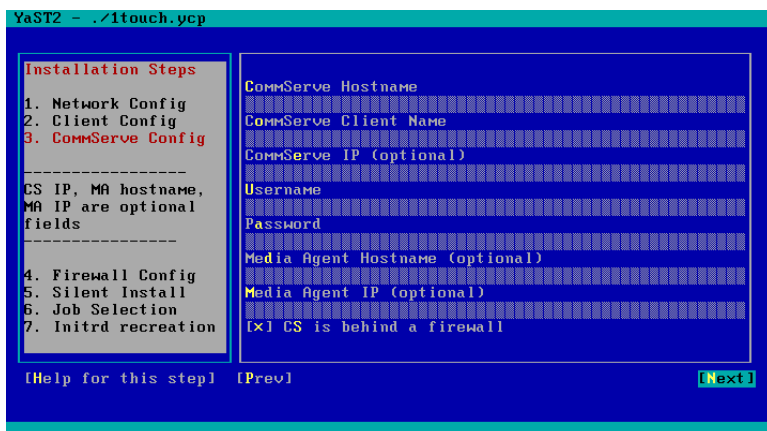
If you want to [clone the client computer](#), select the **Clone client with new name** checkbox and enter the new client name. Otherwise, continue to the next step.



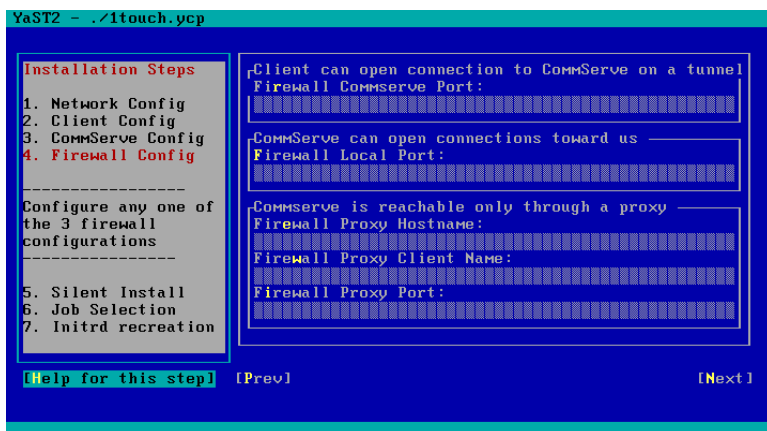
Step 8. Select **Next** and press Enter.

Step 9. On the CommServe Config page, enter the details of the CommServe and the MediaAgent specified in the client information checklist, select **Next** and press Enter.





Step 10. On the Firewall Config page, enter the details of the firewall as specified in the client information checklist, select **Next**, and press Enter.



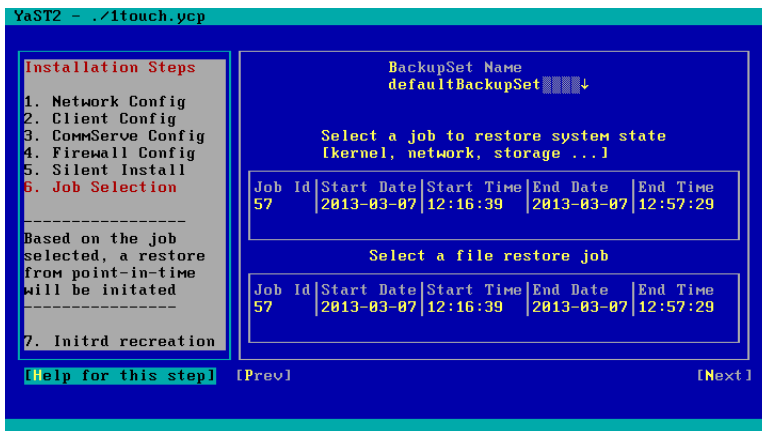
The Installation Progress page appears, showing the installation process.

If there is an error during installation, select one of the following options:

- **OK** - To start the recovery process again from the CommServe Configuration page.
- **Abort** - To exit the recovery process.

Step 11. On the Job Selection page, select **Next** and press Enter.

By default, the system state and the file system data, backed up during the most recent backup, is restored. You can select a backup job to restore the system state data and a backup job to restore the file system data.

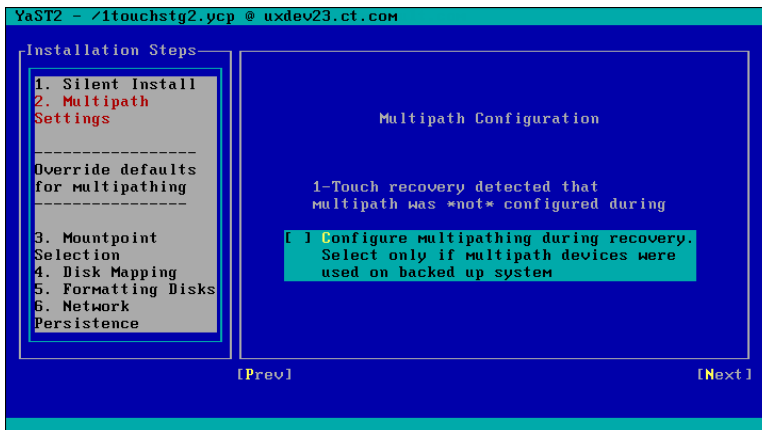


The recovery process now boots into the kernel that was restored from the backup of the source client. After the boot completes, the GUI will restart and perform a temporary Commvault client install before showing the Multipath Settings page. The temporary client will be initially installed to use port numbers 8111 and 8112. The temporary client will be deleted after the recovery process completes, and the client being recovered will be registered with the port numbers used by the original client.

Step 12. On the Multipath Settings page, select **Next** and press Enter.

If Linux native multipathing needs to be enabled, select the **Configure multipathing during recovery** checkbox.

By default, the selection will be made based on the configuration of the backed-up machine. Do not change the default value of this option when performing a Recovery on a Similar System.

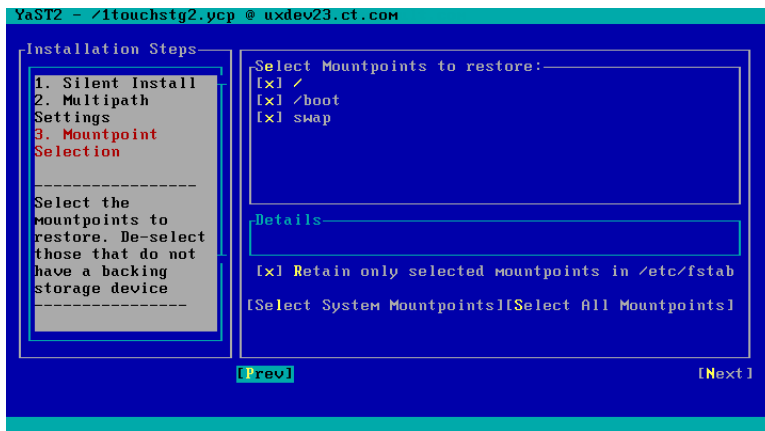


Step 13. On the Mountpoint Selection page, select **Next** and press Enter.

By default, the system mount points are selected for restore. You can select the mount points that you want to recover.

Btrfs subvolumes are supported for restore. See the Commvault [FAQ: Can I restore Btrfs subvolumes during 1-Touch recovery](#) for additional information.

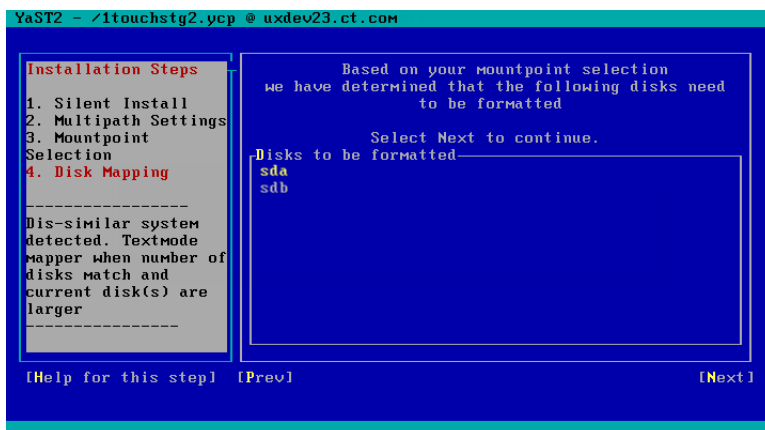
You can exclude bind mount points from backup operations. See the Commvault [FAQ: Skip bind mount points](#) for additional information.



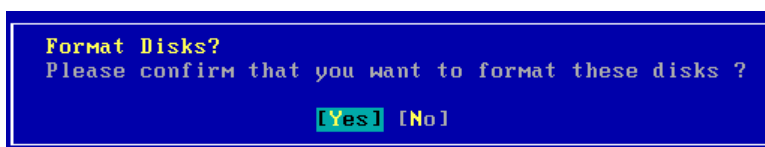
Step 14. On the Disk Mapping page, follow the instructions for manual disk mapping using the [WebADM Disk Mapper](#), and then select **Next** and press Enter.



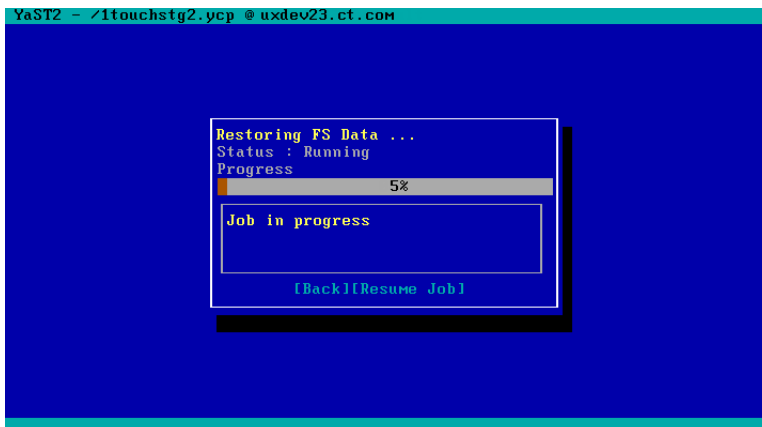
Step 15. Select **Next** and press Enter.



Step 16. In the Format Disks dialog, select **Yes** and press Enter.



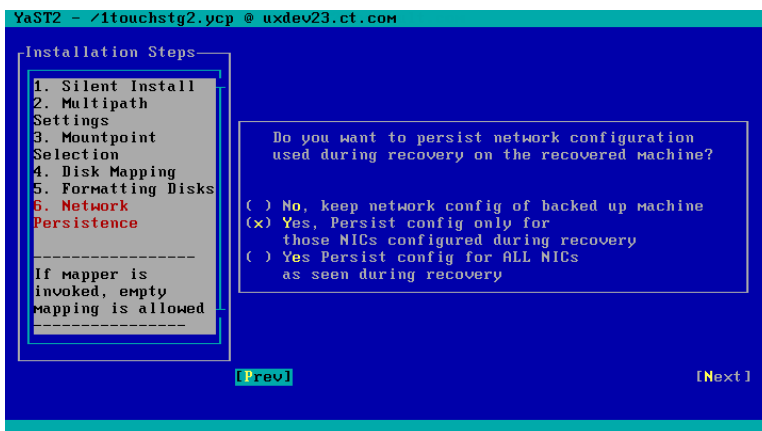
The file system restore will start.



Step 17. When prompted to select an option to persist the network configuration used during the process of this recovery onto the machine after it boots up, select one of the following:

- **No** - Do not persist any configuration. Upon reboot, the machine will have the network configuration of the backed-up machine.
- **Yes-only configured** - Persist the network configuration of only those NICs that were enabled and configured during the recovery (this option is selected by default). Select this option if VLAN-tagged NICs are configured but verify the network configuration files manually to ensure that the correct NIC configuration is applied.
- **Yes-All** - Persist the network configuration for all NICs detected during recovery. An empty configuration file will be created for the NICs that were detected but not configured during the process of this recovery.

Step 18. Select **Next** and press Enter.

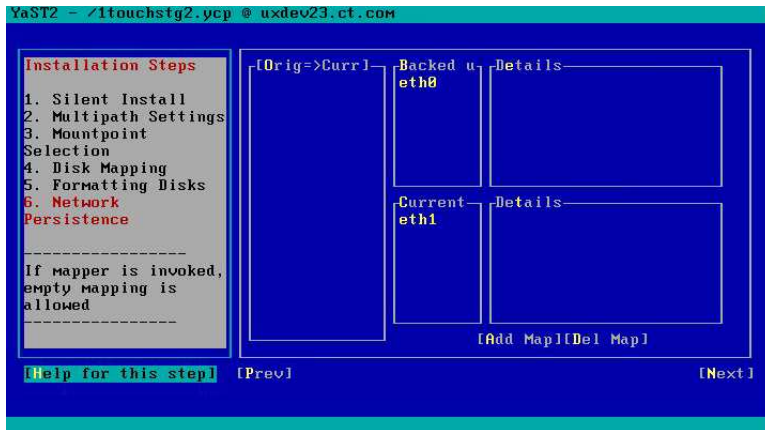


If there is a mismatch in the network configuration on the source (backed-up) machine and the current machine, you will be presented with an option to map the network interfaces. You can choose not to add any map on this screen, and by default, the network interfaces on the current system will map to the network interfaces on the backed-up machine that have the same name. If you wish to override this option, select one NIC from each of the boxes labeled Backed Up and Current, and map using Add Map. It is recommended to leave this option empty in most cases.

In the example screenshot below, the backed-up machine has 1 NIC named eth0 ,while the current machine has 1 NIC named eth1. On selecting each NIC, you will see details for the NIC. Proceeding

from this screen without adding any map ensures that the configuration used on eth1 is applied to the active NIC on the machine. The name may now be different, depending on udev rules present on the restored machine.

Step 19. Select **Next** and press Enter.



Step 20. Press Enter.



Step 21. Remove the 1-Touch Linux Live CD and reboot the system.

## Veeam Backup & Replication

An overview of Veeam Backup & Replication with ThinkAgile CP.

Veeam Backup & Replication lets you deploy and manage Veeam Agents for Microsoft Windows and Linux on virtual machines in your ThinkAgile CP infrastructure.

There is no need to manually install, set up, and operate Veeam Agents on every machine whose data you want to protect. Instead, you can perform Veeam Agent deployment, administration, data protection, and disaster recovery tasks remotely from the Veeam Backup & Replication console.

These technologies allow you to restore from your backups faster and enable capabilities such as automated recovery verification. The technologies can also leverage backup data as an ad hoc testing environment. This capability changes the way that users have used backups in the past because more benefits are associated with having backups. No longer do backups sit idle, waiting for an emergency restore; you can apply your backups for many creative uses.

For more details about Lenovo and Veeam, visit the following link:

## How to Install Veeam Backup & Replication

This section covers the set of instructions required to install Veeam Backup & Replication on ThinkAgile CP.

To install Veeam Backup & Replication, follow these steps:

Step 1. Download and install Veeam Backup & Replication Community Edition as described at the following link:

<https://www.veeam.com/virtual-machine-backup-solution-free.html>

Step 2. Create a virtual machine on the ThinkAgile CP stack. This virtual machine acts as the Backup Server.

### Notes:

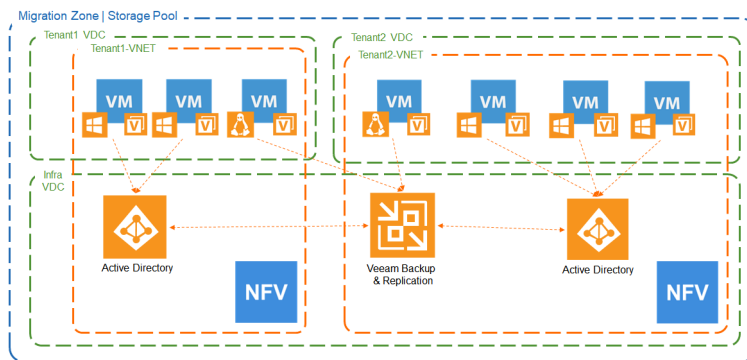
- Use a Lenovo Windows template from the Lenovo Cloud Marketplace.
- The virtual machine needs to match the following Veeam system requirements:

[https://helpcenter.veeam.com/docs/backup/vsphere/system\\_requirements.html?ver=100#backup\\_server](https://helpcenter.veeam.com/docs/backup/vsphere/system_requirements.html?ver=100#backup_server)

Step 3. Set up Veeam Backup & Replication as described in the official Veeam documentation:

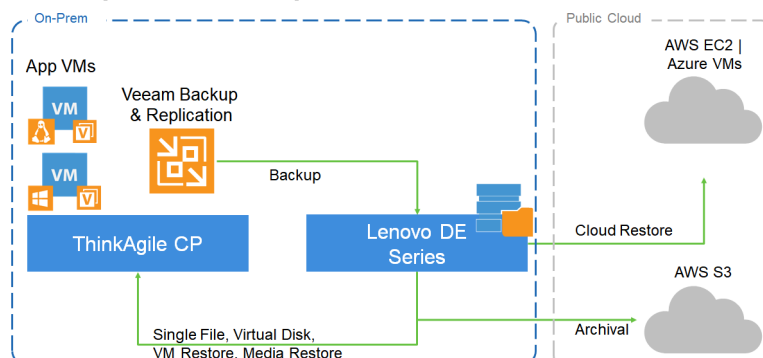
- [Veeam Backup Free Edition User Guide](#)
- [Veeam Agent for Microsoft Windows](#)
- [Veeam Agent for Linux](#)

## Backup Agent Management



Step 4. Configure the backup On-Prem location.

## Backup and Restore Operations



**Note:** We recommend Lenovo ThinkSystem DE Series:

<https://www.lenovo.com/us/en/data-center/storage/storage-area-network/thinksystem-de-series/c/thinksystem-de-series>

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## Manage Encryption

Refer to the following topics for information about managing encryption and configuring KMIP for ThinkAgile CP Cloud Controller

- “Understanding Encryption” on page 341
- “Understanding KMIP Compatibility” on page 342
- “Configure KMIP” on page 342
- “Configure Vormetric DSM” on page 343
- “Configure SafeNet KeySecure” on page 344
- “Configure the KMIP client” on page 346

## Understanding Encryption

To provide security against a situation where disks or a storage enclosure is physically stolen or disposed of inappropriately, ThinkAgile CP storage provides full disk encryption-at-rest capability.

### Storage Encryption Overview

Encryption in ThinkAgile CP is a full disk encryption technology that is done in kernel space. Taking advantage of AES-NI hardware acceleration, the encryption method imposes negligible performance overhead and is transparent to the user. The encryption mode we use is aes-xts-plain64:sha256 with 512-bit keys. The encryption layer is done at the lowest level of our storage stack and each disk is encrypted individually. Handling the encryption at the software layer gives us the flexibility to programmatically and securely handle multiple modes of key management as well as source a wider variety of enterprise SSDs at the high capacity we require.

### Key Management Security Modes

Encryption is only as strong as the encryption key management. We provide two key management solutions; the default using the Trusted Platform Module (TPM) or on a centralized remote key management (KMIP) server. New storage is manufactured to be encrypted with a default password and configured in TPM Security Mode. Our implementation has been designed to match the security profile put forth by the Trusted Computing Group

### TPM Security Mode (Local Key Management)

The encrypted password to unlock the drives is stored in hardware within the secured TPM on the storage unit itself. TPM Security Mode provides security in the case a drive is stolen or disposed of incorrectly. Drives that are separated from the storage unit for any reason will be inaccessible and protected.

You can freely change the encryption password from the default set at manufacturing time to one of your choosing without any loss of data. For security purposes, the old password is required; and, once changed, the new password is secured within the TPM

### KMIP Security Mode (Remote Key Management)

Key Management Interoperability Protocol (KMIP) provides secure centralized remote key management. It is a way to provide FIPS compliance to our product. KMIP protocol uses TCP port number 5696 by default.

Unlike TPM Security Mode where the password is stored on the storage unit itself, KMIP will securely store the password on a remote server managed by the customer through an encrypted channel. The KMIP Security Mode provides an added layer of security in that, even if the enclosure and drives are stolen or misplaced, the data remains encrypted as the password is stored externally.

ThinkAgile CP integrates with both Vormetric and Safenet 3rd party commercial KMIP solutions. For more information, see [“Understanding KMIP Compatibility” on page 342](#).

## Understanding KMIP Compatibility

ThinkAgile CP is compatible with two vendors to support KMIP. Gemalto SafeNet Key Secure and Vormetric DSM key server are third-party, centralized key management platforms for clients who are required to use a KMIP infrastructure and FIPS 140-2 certification. Both vendors provide the solutions in hardware and virtual software appliance.

- At the time of writing, the solutions support KMIP 1.1 and 1.2.
- Gemalto SafeNet KeySecure supports 128-bit encryption. Whereas, Vormetric supports 128 or 256-bit encryption.
- Both solutions support HSM to store the master key.
- Both appliances can deliver FIPS 140-2 Level 2 and Level 3 certification

The following table summarizes the features for the two vendors.

	Vormetric (DSM 6.0)	Safenet KeySecure (8.1)
KMIP version support	1.0, 1.1, 1.2	1.0, 1.1
KMIP client action logging	No	Yes
security isolation at host granularity	Upcoming, Version 6.1	Yes
admin can delete secret data	No	Yes
browse secret data by name attribute	No	Yes
client cert upload required	client certificate	client CA
Self signed certificate support	Yes	Yes
KMIP Register Secret Data	Yes	Yes
KMIP Locate Secret Data	Yes	Yes
KMIP Destroy Secret Data	Yes	Yes
FIPS compliant	Yes	Yes
SSL 3.0 / TLS 1.0, 1.1, 1.2	Yes	Yes
FIPS compliant ciphers	Yes	Yes
HA/cluster	Yes	Yes
secure Secret Data by IP	No	Yes
Two-way SSL/TLS authentication	Yes	Yes

## Configure KMIP

To configure KMIP, set up and configure a supported KMIP server and then configure the KMIP client.

See the following topics:



- To set up and configure a supported KMIP server, see [“Configure Vormetric DSM” on page 343](#) or [“Configure SafeNet KeySecure” on page 344](#).
- To configure the KMIP client, see [“Configure the KMIP client” on page 346](#). (The storage controller acts as a KMIP client.)

## Configure Vormetric DSM

The following steps describe how to configure Vormetric DSM to handle KMIP client requests from ThinkAgile CP storage controllers.

### Requirements

- Vormetric DSM must already be installed. Refer to the Vormetric DSM documentation for information about installation and setup.

### Create the ThinkAgile CP Domain and Administrator

1. Log in to the Vormetric DSM web interface. The initial Vormetric DSM (web interface) can be accessed from a web browser (currently 10.0.15.250). The current password for "admin" is "Cloudistics1!"
2. Once logged in, proceed to creating a new Domain for ThinkAgile CP. Navigate to **Domains → Manage Domains** and create a new domain ThinkAgile CP.
3. Now you need to create a new Domain Administrator, and assign it to manage the ThinkAgile CP Cloud Controller domain. This user will be able to add hosts and set policies.
4. Navigate to **Administrators → All** and create a new Administrator named ThinkAgile CP with User Type of Domain and Security Administrator.
5. Navigate to the domain you created and edit it. Click the **Assign Admin** tab and assign the ThinkAgile CP user as the Domain administrator.

### Add Hosts to the Domain

1. Log out of the admin account, and then log in as the ThinkAgile CP user.

**Note:** The current password for ThinkAgile CP is "Cloudistics12"

2. Add a Storage Controller host to the ThinkAgile CP Cloud Controller Domain. Navigate to Hosts, and add a new host. You must use the Storage Controller serial number (found in: `/etc/tacp/appliance_serial_number`). This string appended to "tacp-" becomes the host's name (for example, "tacp-DDVWFB2"). When authenticating clients the server will compare this Host Name field with the Common Name field in the client certificate and only allow access if they match exactly.
3. Add as many Storage Controller hosts as you need. You will next need to configure the KMIP Client on each Storage Controller for two-way authentication to be successful.

### Configure Storage Controller Hosts

1. Follow the KMIP Client Configuration steps on each storage controller as described in the topic, [“Configure the KMIP client” on page 346](#).
2. After the client has been configured, download or copy the client certificate to your system, you will need it for the next step.

```
/usr/share/tacp/kmip/certs/client.pem
```

### Upload the Client Certificate to the Host Account

1. Log in to the Vormetric DSM as the ThinkAgile CP user, and then navigate to the host where you generated the certificate.
2. Click the **Upload KMIP Cert** button and select the certificate file you created or copied in the preceding step.

Once the certificate has been uploaded, the host will be ready to serve KMIP requests from this storage controller.

### Test KMIP Communication

With the KMIP Client (Storage Controller) and Server (Vormetric DSM) configured, you can test the KMIP communication with the following script on the Storage Controller:

```
/usr/share/tacp/kmip/verify_kmip_configuration.py
```

## Configure SafeNet KeySecure

The following steps describe how to configure SafeNet KeySecure to handle KMIP client requests from ThinkAgile CP storage controllers.

### Requirements

SafeNet must already be installed. Refer to the SafeNet KeySecure documentation for information about installation and setup.

### Generate the KMIP Server Certificate

1. Create a local Certificate Authority: **Security → Device CAs & SSL Certificates → Local CAs.**
2. Fill out the following:CA Name: ThinkAgile CP KMIP Server

Certificate Name: ThinkAgile CP KMIP Server

Common Name: ThinkAgile CP KMIP Server

Organization Name: Lenovo

Organizational Unit Name: ThinkAgile CP

Locality Name: Reston

State or Province Name: VA

Country Name: US

Email Address:

Key Size: 2048

Certificate Authority Type:

\* Self-signed Root CA

CA Certificate Duration (days): 3650

Maximum User Certificate Duration (days): 3650

### Create the SSL Certificate Request

1. Create the SSL certificate request: **Security → Device CAs & SSL Certificates → SSL Certificates.**
2. Fill out the following:CA Name: ThinkAgile CP KMIP Server

Certificate Name: ThinkAgile CP KMIP Server

Common Name: ThinkAgile CP KMIP Server

Organization Name: Lenovo

Organizational Unit Name: ThinkAgile CP

Locality Name: Reston

State or Province Name: VA Country Name: US

Email Address: Key Size: 2048

### Create a Self-Signed Certificate

1. Under Certificate List, click the name of the Certificate Request you just created.
2. Click the Certificate Request link.
3. Update the expiration to 3650 days.
4. Click the **Create Self Sign Certificate** button. The list should contain the new Server Certificate ThinkAgile CP KMIP Server-self sign.
5. Download this certificate. You will need it for the KMIP client to connect and two-way authentication.

### Generate Client Certificates

Follow the KMIP Client Configuration steps for each storage controller as described in this topic, [“Configure the KMIP client” on page 346](#).

### Install the Client CA

After the client has been configured, download or copy the client CA to your system. (You will need it for the next step.)

```
/usr/share/tacp/kmipclient/certs/client_ca.crt
```

### Install the CA Certificate

Install the CA Certificate: **Security → Device CAs & SSL Certificates → Known CAs**.

Certificate Name : ca.crt.<STORAGE CONTROLLER SERIAL NUMBER> (ex: ca.crt.DDVWFB2)

### Add Certificates to the Trusted CA List

1. Add the certificates to the trusted CA list: **Security → Device CAs & SSL Certificates → Trusted CA Lists**.
2. Add a new profile called ThinkAgile CP.
3. After it has been created, select it and click the **Edit** button under the Trusted Certificate Authority List.
4. Add ThinkAgile CP KMIP Server under Local Certificate Authorities.
5. Add the Client certificate CA you just created under CA Certificates.
6. Save and verify that the certificates are listed in the list.

### Configure Host Access

1. Configure host access: **Security → Users & Groups → Local Authentication**.
2. Click **Add** to create a new user/host with the following credentials:
  - a. **Username:** tacp-<STORAGE CONTROLLER SERIAL NUMBER> (ex: tacp-DDVWFB2)
  - b. **Password:** ThinkAgileCP
3. Click **Save**.

**Note:** When authenticating clients, the server will compare this Host Name field with the Common Name field in the client certificate and only allow access if they match exactly.

## Configure the KMIP Server

1. Configure the KMIP server: **Device → Key Server**.
2. Click **Add** under Cryptographic Key Server Settings.
  - Protocol: KMIP IP: [ALL]
  - Port: 5696
  - Use SSL: Yes
  - Server Certificate: ThinkAgile CP KMIP Server-selfsign

## Manage Passwords

To manage passwords, navigate to: **Security → Managed Objects → Keys**.

Each Storage Controller will have a password ("Secret Data" in KMIP terminology) associated with it. You can delete the key to remove the key permanently.

## Revoke Host Authorization

1. To revoke host authorization, navigate to: **Security → Users & Groups → Local Authentication**.
2. Select the button next to the User to remove, and click the **Delete** button. This will deny access to the host indefinitely.

## Configure the KMIP client

Complete these steps to configure the KMIP client.

**Note:** The ThinkAgile CP storage controller acts as a KMIP client.

1. You need to first create the initial KMIP configuration file:

```
/etc/pykmip/pykmip.conf
```

A sample configuration can be used as a template:

```
/etc/pykmip/pykmip.conf.sample
```

**Note:** The remaining steps are to be performed on both storage controllers prior to encrypting the CBS storage array with a KMIP protected password (where active goes first, then passive).

2. Configure the KMIP Server IP by discovering the host name or IP address of the KMIP server, and setting this value in the configuration.

```
host=1.2.3.4
```

3. After the server has been configured, you need the server CA. Import the KMIP Server Certificate Authority as follows.

If you are using Vormetric DSM (KMIP Server) run the following script:

```
/usr/share/tacp/kmip/get_vormetric_certificate.sh <KMIP Server IP>
```

If you are using SafeNet, follow the guide, and after generating the Server Certificate, copy it into this file on the client:

```
/usr/share/tacp/kmip/certs/server_ca.pem
```

You can check that the hostname/IP and the certificate are valid by running this script:

```
/usr/share/tacp/kmip/verify_server_cert.sh 1.2.3.4
```

4. Generate the KMIP Client Certificate. You will generate a client certificate and a public/private key signed by it for communication with the KMIP server.

```
/usr/share/tacp/kmip/generate_client_certificates.sh
```

This script will generate the following files:

```
/usr/share/tacp/kmip/certs/client_ca.crt  
/usr/share/tacp/kmip/certs/client.key  
/usr/share/tacp/kmip/certs/client.pem
```

The KMIP Client certificate's Common Name field (CN) will be generated with the Storage Controller's Appliance Serial Number located here: `/etc/tacp/appliance_serial_number`. The format will be `tacp-<SERIAL NUMBER>`. For the KMIP server to authenticate the connection, the host (Vormetric) or user (SafeNet) will need to be registered with this name, or the server will deny the connection if they do not match. To verify the certificate run the following command:

```
deployment/storage-controller/kmip/check_cert.sh
```

```
/usr/share/tacp/kmip/certs/client.pem
```

```
Certificate: Data:Version: 3 (0x2) Serial Number: 2 (0x2)Signature Algorithm:  
sha256WithRSAEncryptionIssuer: C=US, ST=Virginia, L=Reston, O=Lenovo, CN=tacp-DDVWFB2
```

#### 5. Upload the Client Certificate to the KMIP Server.

For Vormetric and SafeNet you will have to create a new host (Vormetric) or user (SafeNet) for each Storage Controller that you intend to configure for KMIP. The name of the host/user must match the following format `tacp-<Storage Controller Serial Number>`.

For Vormetric you will need to upload the `client.pem` previously created.

For SafeNet you will need to copy the `client_ca.crt` file for each host you configure on the server within the new ThinkAgile CP Domain to the server. Since SafeNet only requires the Client CA for security reasons or to save time you can reuse the same client CA on every host and only upload the Client CA once to the SafeNet KMIP server. To do this generate the first certificate as usual then copy the `client_ca.crt` to the other Storage Controllers you wish to configure and run:

```
/usr/share/tacp/kmip/generate_client_certificates.sh --skip_ca
```

This will use the existing CA `client_ca.crt` but generate a new client certificate.

#### 6. Verify KMIP Configuration: The final step is to perform a test that checks that the certificates are correct, the configuration is valid, the server is configured to accept connections from our storage controller, and there is connectivity between the two. Run the following command:

```
/usr/share/tacp/kmip/verify_kmip_configuration.py
```

### Migrate from TPM to KMIP Security

With the configuration complete and the verification successful, you can finalize the process of switching from TPM to KMIP.

Both storage controllers will need to setup a new password and store this "Private Data" object with the Vormetric KMIP server. Both need to use the same password.

- **Active Controller**

Run the following script which will ask for a new password, change the encryption key on the drives, store the password on the KMIP server, and change the FDE security mode to KMIP from TPM.

```
/usr/share/tacp/kmip/setup_kmip_security.sh
```

The storage controller FDE security mode will be automatically updated from TPM to KMIP in `/etc/tacp/fde_security_mode`.

- **Passive Controller**

```
echo "KMIP" > /etc/tacp/fde_security_mode
/usr/share/tacp/kmip/tacp_kmip_client.py --set_password
Enter new password: <NEW PASSWORD>
```

### **Change the KMIP-Protected Password**

This will work with either TPM or KMIP with the following command:

```
/usr/share/tacp/encryption/tacp-change-sed-password
```

### **Add or Replace Disks**

Adding or replacing new disks will work with either TPM or KMIP with the following command:

```
/usr/share/tacp/encryption/tacp-add-sed-disks
```

After the disk(s) are encrypted, we will need to still add them to the RAID array and CBS pool as usual.

### **Test KMIP Communication**

The following commands can be run to test the KMIP communication. These commands will get and set passwords but will not make any changes to the actual encryption password on the Storage Controller.

If you change the password, make sure you change it back, or the Storage Controller will be unable to decrypt the drives on the next reboot.

#### **1. Get the Password**

```
/usr/share/tacp/kmip/tacp_kmip_client.py --get_password
```

#### **2. Change the Password**

You can reset the password by issuing the command again with the `--set_password` option. It will locate the original record, destroy it, and store a new record.

```
/usr/share/tacp/kmip/tacp_kmip_client.py --set_password
```

```
Enter new password: ABC123
```

```
tacp_kmip_client - INFO - Successfully registered secret data with ID:
c3383b8b-4f30-44c1-8d69-2b8665b45dd
```

#### **3. Get the New Password**

```
/usr/share/tacp/kmip/tacp_kmip_client.py --get_password
```

---

## Chapter 3. Troubleshooting

This section provides helpful information for performing advanced tasks and troubleshooting or resolving common issues in ThinkAgile CP.

You can view topics by the following categories:

- [“Application instances” on page 349](#)
- [“Application templates” on page 368](#)
- [“Backup and disaster recovery” on page 370](#)
- [“Networking” on page 371](#)
- [“System hardware and software” on page 374](#)
- [“Browsers” on page 381](#)

---

### Application instances

Refer to these topics for information about troubleshooting application instances in ThinkAgile CP.

### Multiple Windows disks offline

When creating a new instance with multiple disks, the first disk is formatted with the operating system installed on it; but, the other disks are effectively empty and zeroed out without any formatting, causing Windows to see them as offline.

#### Solution

To use the disk(s), you must either use Disk Management or execute `diskpart` in a command shell.

From Disk Management or the Disk Partition application bring the disk(s) online, create partition(s), format the volumes, and assign drive letters.

### Windows Disks Offline after Adding vNIC

This section covers the workaround procedures for when disks go offline after adding a vNIC.

The following procedure adds a new vNIC and results in disks going offline:

- Step 1. Shut down a Windows Server instance that has multiple disks and is in Enhanced mode.
- Step 2. Select **Add vNIC** from the Actions drop-down menu, enter the settings for the new vNIC, and click **Add vNIC**.
- Step 3. Start the instance.

After the instance boots up, all disks except the boot disk are offline.

To resolve the issue, try [“Workaround 1” on page 349](#). If the issue still persists, try [“Workaround 2” on page 350](#).

#### Workaround 1

This section covers the first workaround procedure for when disks go offline after adding a vNIC.

To bring offline disks back online, follow these steps:

- Step 1. Open Disk Management in the instance.

Step 2. Right-click each offline disk and click **Online**.

The disks are online and remain as such through subsequent reboots.

## Workaround 2

This section covers the second workaround procedure for when disks go offline after adding a vNIC.

To bring offline disks back online, follow these steps:

Step 1. Run command shell as administrator.

Step 2. In the command shell, execute the following command to start the Disk Partition application:

```
diskpart
```

Step 3. In the Disk Partition application, execute the following command:

```
san
```

Step 4. Check the command output for the following message:

```
SAN Policy : Offline Shared
```

If the message is present in the command output, then execute the following commands:

- a. `san policy=OnlineAll`
- b. `list disk`
- c. For each offline disk, execute the following commands separately:
  1. `select disk X`, where *X* is the disk number as displayed by the `list disk` command.  
For example: `select disk 1`
  2. `attributes disk clear readonly`
  3. `online disk`

All the disks remain online even after adding new vNICs.

## Issues with bringing a cloned disk online

When you clone a disk from a backup of a Windows 2016 server and attach it to that same server, you may encounter problems bringing the disk online through **File and Storage Services** in **Server Manager**.

If you bring the disk online through Disk Management, the problem is avoided.

Complete the following steps to bring a cloned disk online.

Step 1. Connect to the application instance.

Step 2. Bring the disk online through **Disk Management**.

- a. Bring up Computer Management (from the Control Panel), and click **Disk Management**.



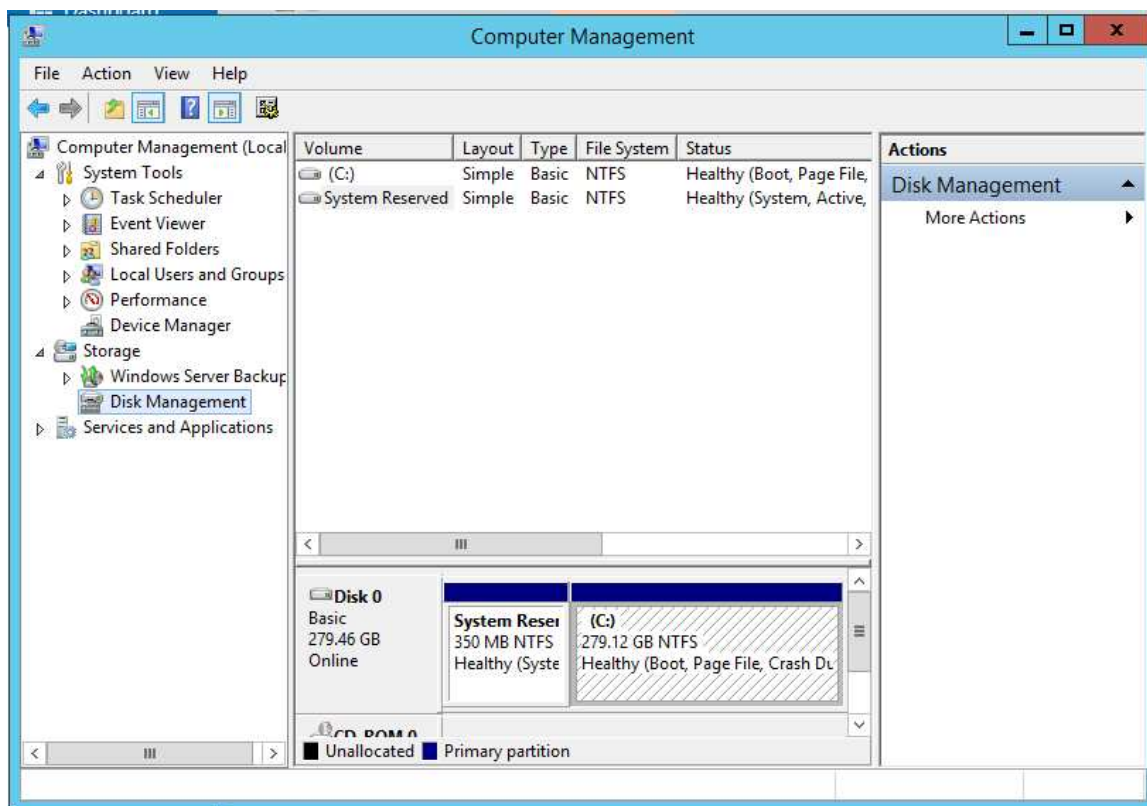


Figure 382. Disk Management

- b. Right-click each offline disk; then click **Online**.
- Step 3. Bring the disk online through **File and Storage Services** (from Server Manager) by removing the read-only attribute on the disk.
- a. Run command shell as administrator.
  - b. In the command shell, execute the following command to start the Disk Partition application:
 

```
diskpart
```
  - c. In the Disk Partition application, execute the following command to check the disks that are currently available:
 

```
list disk
```
  - d. Locate and select the newly cloned disk (it usually has the highest disk number and free space equal to its size):
 

```
select disk <X>, where <X> is the disk number as displayed by the list disk command.
```
  - e. Remove the read-only attribute from the disk:
 

```
attributes disk clear readonly
```
  - f. Refresh **File and Storage Services**

The disk should be online.

## Cannot update Windows Guest Agent

This section covers the procedure for when the Windows guest agent cannot be updated.

If you encounter a failure while performing an update of a new guest agent and/or uninstalling an old guest agent version on a Windows device, there may be an issue with registration handling by the ThinkAgile CP VSS provider.

If this occurs, you need to launch Component Services and delete the VSS provider. After this is done, you are able to uninstall the old ThinkAgile CP agent and reinstall the new version.

To update the Windows guest agent, follow these steps:

Step 1. Launch Component Services from the Windows device, or execute the following command:

```
dcomcnfg.exe
```

Step 2. Navigate to **Component Services** → **Computers** → **My computer** → **COM+ Applications** → **tacp** → **tacpVSSProvider**.

Step 3. Right-click on the *CldtxVSSProvider* entry and delete it.

Step 4. Navigate to **Control Panel** → **Programs and Features**.

Step 5. Locate the ThinkAgile CP program and uninstall the old guest agent version.

Step 6. Navigate to the ThinkAgile CP executable and install the new guest agent version.

After these steps are performed, the new version of the ThinkAgile CP guest agent is present in Programs and Features.

## Cannot boot in Compatibility Mode for Windows

After installing 3.3+ guest agent tools on a Windows 10 or Windows 2016 instance, the instance cannot boot in Compatibility Mode.

Compatibility Mode works only for instances that previously had SATA disks with the disk drivers installed. Windows instances created from Lenovo Cloud Marketplace templates are created using VirtIO disks, not SATA; therefore, compatibility mode does not work for these instances.

In Windows 2016 and Windows 10, only one type of storage driver can be installed. When the guest agent tools are installed for Enhanced Mode, the old storage driver that only works in Compatibility Mode is replaced by one that only works in Enhanced Mode. Because of this, a Windows 2016 or Windows 10 instance that has the guest agent tools installed can no longer boot in Compatibility Mode.

To switch to Enhanced Mode, follow these steps:

Step 1. Force shutdown the instance.

Step 2. In the instance's profile, click **Switch to enhanced mode**.

Step 3. Start the instance.

**Note:** Since the last boot failed, it boots into Windows Recovery Mode.

Step 4. Force shutdown the instance, and then restart it.

The instance now boots in Enhanced mode.

## Spectre and Meltdown fixes

ThinkAgile CP has released a hotfix to protect the hardware against Spectre and Meltdown vulnerabilities. For full protection, software patches for these vulnerabilities should be installed within the instance OS.

**Note:** After installing a patch for Spectre and Meltdown within an instance OS, shut down the instance and then start it, rather than just rebooting the instance.

- **Windows:**

For most Windows machines, the patches for Spectre and Meltdown are included in Windows Updates (see this [article](#) for more details).

Microsoft has identified a compatibility issue with some antivirus software products, so only machines running compatible antivirus software will receive the Spectre and Meltdown updates through Windows Update (see this [article](#) for more details).

- **Linux:**

Most Linux distributions have patches for the Spectre and Meltdown vulnerabilities. To apply these patches, run your regular package manager to download and install the latest updates (see this [article](#) for more details).

- For Ubuntu and Debian, run the following commands to install the patch:

```
sudo apt-get update
sudo apt-get dist-upgrade
```

- For CentOS and RHEL, run the following command to install the patch:

```
sudo yum update
```

- For Fedora, run the following command to install the patch:

```
sudo dnf update
```

**Note:** There are currently no patches released for FreeBSD distributions.

## Restart Guest Agent

The ThinkAgile CP Cloud Controller Guest Agent runs as a service on Microsoft Windows and Linux application instances.

For more information about the Guest Agent, see [“Manage instance modes and guest agents”](#) on page 67.

To restart the guest agent, follow these steps:

Step 1. For Microsoft Windows:

- a. Navigate to Services.
- b. Locate the ThinkAgile CP Guest Agent.
- c. Right-click and select **Restart**.

Step 2. For CentOS 6.x:

Execute the following command with root privileges:

```
/etc/init.d/tacp-guest-agent restart
```

Step 3. For CentOS 7.x or Ubuntu 16.04:

Execute the following command with root privileges:

```
systemctl restart tacp-guest-agent
```

The ThinkAgile CP Guest Agent is now restarting.

## Cannot shut down or restart Linux instances

A Linux instance consistently fails to reboot or shut down when "Restart" or "Shut down" is selected in the ThinkAgile CP Management Portal, but "Force restart" and "Force shut down" succeed.

Shutdown and restart commands send an ACPI signal to the instance, which can be ignored if the ACPI daemon is not installed or not configured properly on the instance.

This issue is resolved by installing the ACPI daemon on the specific instance.

To install the ACPI daemon on an instance, follow these steps:

Step 1. Log into the instance.

Step 2. Execute the following commands, depending on the operating system:

a. For CentOS:

```
yum install acpid
chkconfig acpid on
service acpid start
```

b. For Ubuntu:

```
sudo aptitude install acpid
```

## Hot-Plug CPU and Memory – Linux

Some Linux kernels do not support hot-plug of CPU and/or memory. This can affect Linux instances created from ISO or from a template created from an imported VM.

This issue also affects the following Lenovo Cloud Marketplace templates:

- Ubuntu 16.04 - Firemon Immediate Insight
- Ubuntu 16.04 LTS (64-bit)

### Solution

Compile a new kernel with CONFIG\_HOTPLUG\_CPU and CONFIG\_NUMA enabled. Please see these third-party articles for more information: [CPU](#) and [memory](#).

## Hot-Plug CPU and RAM failure – Windows 2008

After adding CPU and RAM to a Windows 2008 R2 instance, the instance does not recognize the added resources.

### Cause

Hot-plug CPU is only supported on Datacenter and Itanium versions, and hot-plug RAM is only supported on Datacenter, Itanium and Enterprise [versions](#). Hot-plugging CPU may cause the instance to be seen as “unresponsive” if the Kernel-Mode Driver Framework is below version 1.11.

### Solution

Reboot the instance, and it will recognize the added resources; or, use one of the hot-plug-supported editions of Windows 2008 R2. Before hot-plugging CPU, install [Kernel-Mode Driver Framework 1.11](#)

## Hot-Plug CPU and RAM Windows 2016 server issues

After adding CPU and RAM to a Windows 2016 Server instance, the instance does not recognize the added resources. Additionally, if the Windows 2016 server has 2GB or less RAM, hot-plugging CPU can cause the operating system to be sluggish and on rare occasions crash.

These issues are caused by a bug in the Microsoft ACPI driver that prevents the hot-plug of CPU for Windows 2016.

One solution is to reboot the instance. After the reload, the added resources are recognized by the instance.

Another method is to edit the Windows registry by following these steps:

- Step 1. Uninstall the existing **HID Button over Interrupt** driver package for this device, which shows up in Device Manager as not working properly.
- Step 2. Download PsTools from the [Windows Sysinternals website](#).
- Step 3. Extract PsTools from the archive.
- Step 4. Open a command shell with administrator privileges and navigate to the directory containing the PsTools.

For example: `cd c:\users\admin\downloads\pstools`

- Step 5. Execute the following command:

```
psexec -s -i regedit.exe
```

- Step 6. Open the Windows Registry by executing the following command:

```
regedit
```

- Step 7. In the registry, navigate to `HKLM\SYSTEM\DriverDataBase\DriverPackage\hidinterrupt.inf_x86<some instance ID>\Descriptors\ACPI`.
  - a. Right-click the `ACPI0010` subkey and select **Export**. Export the file to a memorable location.
  - b. Right-click the `ACPI0010` subkey and select **Delete**. Confirm the deletion of the subkey.
- Step 8. In the registry, navigate to: `HKLM\SYSTEM\DriverDataBase\DeviceIds\ACPI\ACPI0010`
  - a. Right-click the `bidinterrupt.inf` subkey and select **Export**. Export the file to a memorable location.
  - b. Right-click the `bidinterrupt.inf` subkey and select **Delete**. Confirm the deletion of the subkey.

## Hot-Plug memory failure on CentOS 7

After creating a CentOS 7 instance from ISO the Profile is changed to add more RAM, but the instance does not recognize the additional RAM.

This is a [kernel issue](#).

To resolve the issue, [blacklist the rapl module](#):

- Step 1. Boot into the CentOS 7 instance.
- Step 2. Execute the following command:

```
vi /etc/modprobe.d/blacklist.conf
```

- Step 3. Type `i` to edit the file.
- Step 4. Add `blacklist paevm` to the bottom of the file. Then press `ESC` and type `:wq` to save the changes and close the file.

## CentOS 7 - Hot-Adding CPU Might Cause Intermittent Reboot

Adding CPU into a running CentOS 7 instance may cause the instance to intermittently crash and reboot. This most commonly happens with instances created from the *Centos 7 with FIO (Flexible IO) benchmark* Lenovo Cloud Marketplace template.

Our engineering team is working on a solution to this issue.

## CentOS 7 instance incorrect time

The time is incorrect on a CentOS 7 instance, which can cause the instance to lose its IP when attempting to renew its DHCP lease.

The instance is set to maintain the real time clock (RTC) in local time instead of universal time (UTC). Maintaining RTC in local time is not fully supported by the OS and causes multiple problems with time zone changes.

If the boot disk is listed, perform the installation and all the disks are present in the instance after it completes. If the boot disk is not listed, edit the instance profile to delete disks until seven or fewer remain. Then reboot the instance and perform the installation. After the installation is done, re-add the disks.

Verify that RTC is maintained in local time:

Step 1. Execute the following command:

```
timedatectl status
```

Step 2. If RTC is maintained in local time, the following message is present in the previous command output:

```
RTC in local TZ: yes
```

Step 3. Execute the following command to set RTC to be maintained in UTC:

```
timedatectl set-local-rtc 0
```

## Actions unavailable - Windows setup

Some actions (such as, restart, shutdown, etc.) may not be available on Windows instances before the Windows post-installation wizard has completed.

### Solution

Complete the post-installation wizard. Once this is complete, all application instance actions will become available.

## Disks missing in Windows installer

Disks appear to be missing in the installation wizard after creating a multi-disk instance from a Windows ISO. For example, only seven of the disks are listed.

### Cause

Although all disks are correctly presented to the instance and will be present in the instance after installation completes, the Windows ISO does not recognize more than seven.

### Solution

If the boot disk is listed, perform the installation, and all the disks will be present in the instance after it completes. If the boot disk is not listed, edit the instance profile to delete disks until seven or fewer remain, reboot the instance, and perform the installation; then re-add the disks after installation completes.

## Windows 10 VNC performance

There are delays in mouse movement, keyboard typing, and opening applications in Windows 10 instances.

### **Cause**

The KVM display driver for Windows 8 and later is a Display Only Driver, which lacks 3D/2D acceleration, unlike the driver for Windows 7 and earlier (click [here](#) for more details).

### **Solution**

The VNC performance cannot be improved until a new version of the display driver is released. Using RDP instead of the ThinkAgile CP Cloud Controller management console can bypass the display performance issues.

## **Ubuntu server 16.04 boot issue**

After creating an instance from Ubuntu 16.04 Server installer and opening the console, the instance shows a black screen or a message about /dev/sda1:clean.

### **Cause**

This is a known issue in the Ubuntu 16.04 Server.

### **Solution**

Use the console options provided to send CTRL + ALT + F2 to switch virtual terminals to cause a login prompt to display.

Alternatively, log in via SSH.

## **Disks reordered**

After creating a multi-disk instance from a Windows ISO and navigating through the installation wizard, the disks appear in a different order than configured.

### **Cause**

This is a Microsoft issue concerning SATA port numbering:

<https://support.microsoft.com/en-us/kb/937251>

### **Solution**

Reboot the instance so Windows can retry ordering the disks; or delete all disks except the boot disk in ThinkAgile CP Cloud Controller, reboot the instance, and then add the additional disks after installation completes.

## **Cannot enable nested virtualization**

Virtualization cannot be enabled within a ThinkAgile CP Cloud Controller instance's OS, even though Nested Virtualization is enabled in the instance's profile.

### **Notes:**

- Nested virtualization can be enabled by turning on the VT-x flag in the ThinkAgile CP Cloud Controller user interface. However, only nested KVM hypervisors are supported.
- Hyper-V or ESX hypervisors cannot be run within a ThinkAgile CP Cloud Controller instance.

To enable nested virtualization, follow these steps:

Step 1. Shut down all the instances on which you wish to run a hypervisor.

Step 2. Select the **Nested Virtualization** checkbox in the instance Profile page in ThinkAgile CP.

- Step 3. Use SSH or open the hardware console to connect to each compute node with the username, manager and the password that you set when the hardware was registered.
- Step 4. Execute the following command and re-enter the manager password to become root.

```
sudo su
```

- Step 5. Execute the following command:

```
cat /sys/module/kvm_intel/parameters/nested
```

If N is returned, proceed with the remaining steps. Otherwise, if Y is returned, no further actions need to be taken on that compute node.

- Step 6. Reboot the compute node.
- Step 7. Log back into the compute node and execute the following command a second time:

```
cat /sys/module/kvm_intel/parameters/nested
```

It should return Y.

- Step 8. Start the instances.

You can now install and run hypervisors within the instances.

## ESXi install - no disks found

When creating an instance from an ESXi 6.5 ISO, the ESXi installation wizard does not list any hard disks.

**Note:** Although nested virtualization can be enabled through the ThinkAgile CP Cloud Controller Management Portal, ThinkAgile CP cannot support individual forms of nested virtualization.

To resolve the issue, follow these steps:

- Step 1. Forcibly reboot the instance.
- Step 2. When the instance starts to boot into the ESXi installation ISO, press `Shift + 0` to edit Boot Options.
- Step 3. Add `preferVmkernel=TRUE` to the end of the line, and press `ENTER` to apply the changes.

The ESXi installation ISO now recognizes the disks.

- Step 4. After completing the installation, force-shutdown the instance to unmount the ESXi installation ISO and then restart it to boot from the hard disk.

## Migrated VM with firewall profile disconnects

If a virtual machine (VM) with a firewall profile is migrated, all existing connections will be disconnected.

### Solution

You will need to manually reconnect to the VMs.

## Instance NIC speed

What is the speed of the NIC for an application instance in the ThinkAgile CP platform?

In Compatibility Mode (an application instance without paravirtualized VirtIO drivers installed in the guest), application instances have an emulated Intel NIC with 1Gbps link speed:

- On Windows, the NIC shows up as Intel Pro/1000 MT Network Connection.



- On Linux, it appears as Intel Corporation 82540EM Gigabit Ethernet Controller.

In Enhanced Mode (with paravirtualized VirtIO drivers installed), instances have 10Gbps NIC.

- On Windows, the NIC shows up as RedHat Virtio Ethernet Adapter.
- On Linux, it appears as Red Hat, Inc Network Device.

For more information about Compatibility and Enhanced modes, see [“Understand instance modes” on page 67](#).

## Enable or disable memory oversubscription

In ThinkAgile CP, you can enable memory oversubscription to ensure more efficient use of available memory and improved workload performance. This feature enables dynamic memory allocation across virtual machines (VMs) running on a compute node, which allows those VMs to release memory when no longer needed. At any given time, no VM has more memory allocated than it actually consumes.

Refer to the following topics for more information.

- [“Enable memory oversubscription on the compute controller” on page 359](#)
- [“Disable memory oversubscription on the compute controller” on page 359](#)
- [“Enable or disable memory oversubscription within application instances” on page 360](#)

### Enable memory oversubscription on the compute controller

This section covers the procedure to enable the memory oversubscription service on the compute controller.

#### Notes:

- By default, the memory oversubscription service daemon is not enabled.
- If you are using a hardware stack with multiple compute controllers, you need to enable the memory oversubscription service on each compute node.

To enable memory oversubscription, follow these steps:

Step 1. Execute the following command to start the memory oversubscription service:

```
sudo systemctl start tacp-memory-oversubscription.service
```

Step 2. Execute the following command to ensure the service is up and running:

```
sudo systemctl status tacp-memory-oversubscription.service
```

```
● cloudistics-memory-oversubscription.service - Cloudistics Dynamic Memory Oversubscription Service
   Loaded: loaded (/usr/lib/systemd/system/cloudistics-memory-oversubscription.service; disabled; vendor preset: disabled)
   Active: active (running) since Tue 2018-12-04 12:37:05 EST; 1s ago
     Main PID: 47861 (cloudistics-mem)
        Tasks: 1
      CGroup: /system.slice/cloudistics-memory-oversubscription.service
              └─47861 /usr/bin/python /usr/bin/cloudistics-memory-scheduler -i 1 -r 300 -m 25 -f 10
```

*Figure 383. Verifying the memory oversubscription service is running*

Step 3. Execute the following command to set the service to start on reboot:

```
sudo systemctl enable tacp-memory-oversubscription.service
```

### Disable memory oversubscription on the compute controller

This section covers the procedure to disable the memory oversubscription service on the compute controller.

To disable memory oversubscription, follow these steps:

Step 1. Execute the following command to stop the memory oversubscription service:

```
sudo systemctl stop tacp-memory-oversubscription.service
```

Step 2. Execute the following command to ensure the service is not up and running:

```
sudo systemctl status tacp-memory-oversubscription.service
```

```
● cloudistics-memory-oversubscription.service - Cloudistics Dynamic Memory Oversubscription Service
   Loaded: loaded (/usr/lib/systemd/system/cloudistics-memory-oversubscription.service; disabled; vendor preset: disabled)
   Active: inactive (dead)
```

*Figure 384. Verifying the memory oversubscription service is not running*

Step 3. Execute the following command to disable the service:

```
sudo systemctl disable tacp-memory-oversubscription.service
```

## Enable or disable memory oversubscription within application instances

You enable or disable the memory oversubscription within application instances as described below.

For Linux application instances, no action is needed. Memory oversubscription is supported automatically once enabled on the compute controller.

For Windows application instances, follow these steps to enable/disable the memory oversubscription service:

### Notes:

- Templates provided by Lenovo Cloud Marketplace already include the necessary drivers. You need to install them manually only if you are preparing your own custom template.
- The Windows Memory Ballooning service is NOT installed by default in templates provided by Lenovo Cloud Marketplace. You need to install it manually for both ThinkAgile CP and your custom templates.

Step 1. Open the Windows PowerShell application with administrator privileges.

Step 2. To ensure that VirtIO drivers are installed, execute the following command:

```
driverquery
```

```

Administrator: Windows PowerShell
AmdK8      AMD K8 Processor Drive Kernel 4/28/2018 12:26:16 AM
AmdPPM     AMD Processor Driver   Kernel 4/28/2018 12:26:16 AM
amdsata    amdsvcs                 Kernel 5/14/2015 8:14:52 AM
amdsbs     amdsvcs                 Kernel 12/11/2012 4:21:44 PM
amdxtata   amdsvcs                 Kernel 4/30/2015 8:55:35 PM
AppID      AppID Driver           Kernel 3/29/2018 11:36:34 PM
applockerflt Smartlocker Filter Dri Kernel 7/15/2016 10:27:27 PM
AppvStrm   AppvStrm               File System 9/15/2016 12:15:25 PM
AppvVemgr AppvVemgr              File System 4/28/2018 1:37:22 AM
AppvVfs    AppvVfs                File System 4/28/2018 1:37:21 AM
arcsas     Adaptec SAS/SATA-II RA Kernel 4/9/2015 3:12:07 PM
AsyncMac   RAS Asynchronous Media Kernel 7/15/2016 10:29:00 PM
atapi      IDE Channel            Kernel 7/15/2016 10:29:05 PM
b06bdrv    QLogic Network Adapter Kernel 5/25/2016 3:03:08 AM
BALLOON    VirtIO Balloon Service Kernel 7/19/2017 10:12:58 PM
BasicDisplay BasicDisplay           Kernel 3/28/2017 1:36:52 AM
BasicRender BasicRender            Kernel 3/6/2018 12:28:50 AM
bcmfn      bcmfn Service          Kernel 6/8/2015 4:32:02 AM
bcmfn2     bcmfn2 Service         Kernel 3/16/2014 6:07:36 AM
Beep       Beep                   Kernel 7/15/2016 10:22:02 PM
bfadcoei   bfadcoei              Kernel 4/14/2015 7:01:58 PM

```

If the drivers are not present, install them manually as described in [“Install VirtIO drivers”](#) on page 362.

- Step 3. Ensure that the memory ballooning service is listed and its status is Running by executing the following command:

```
Get-Service
```

```

Administrator: Windows PowerShell
PS D:\virtio-win-0.1.141\Balloon\2k16\amd64> Get-Service

Status Name                DisplayName
-----
Stopped AJRouter             AllJoyn Router Service
Stopped ALG             Application Layer Gateway Service
Stopped AppIDSvc       Application Identity
Running Appinfo          Application Information
Stopped AppMgmt         Application Management
Running AppReadiness   App Readiness
Stopped AppVClient     Microsoft App-V Client
Stopped AppXSvc        AppX Deployment Service (AppXSVC)
Stopped AudioEndpointBu... Windows Audio Endpoint Builder
Stopped Audiosrv       Windows Audio
Stopped AxInstSV       ActiveX Installer (AxInstSV)
Running BalloonService    Balloon Service
Running BFE            Base Filtering Engine
Stopped BITS           Background Intelligent Transfer Ser...
Running BrokerInfrastru... Background Tasks Infrastructure Ser...
Stopped Browser        Computer Browser

```

If the memory ballooning service is not listed, install it manually as described in [“Install the Windows Memory Oversubscription service”](#) on page 363.

If the service is not running, start it.

The memory oversubscription service is now enabled.

## Install VirtIO drivers

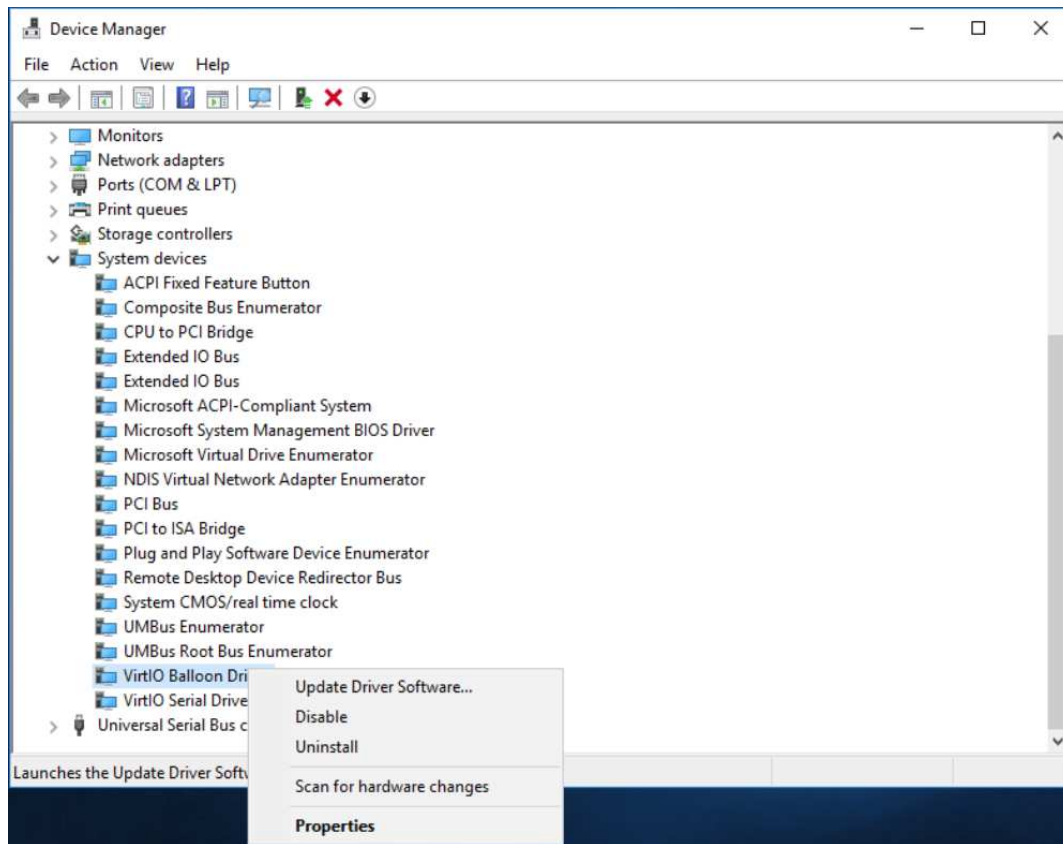
This section covers the procedure to install VirtIO drivers.

To install VirtIO drivers, follow these steps:

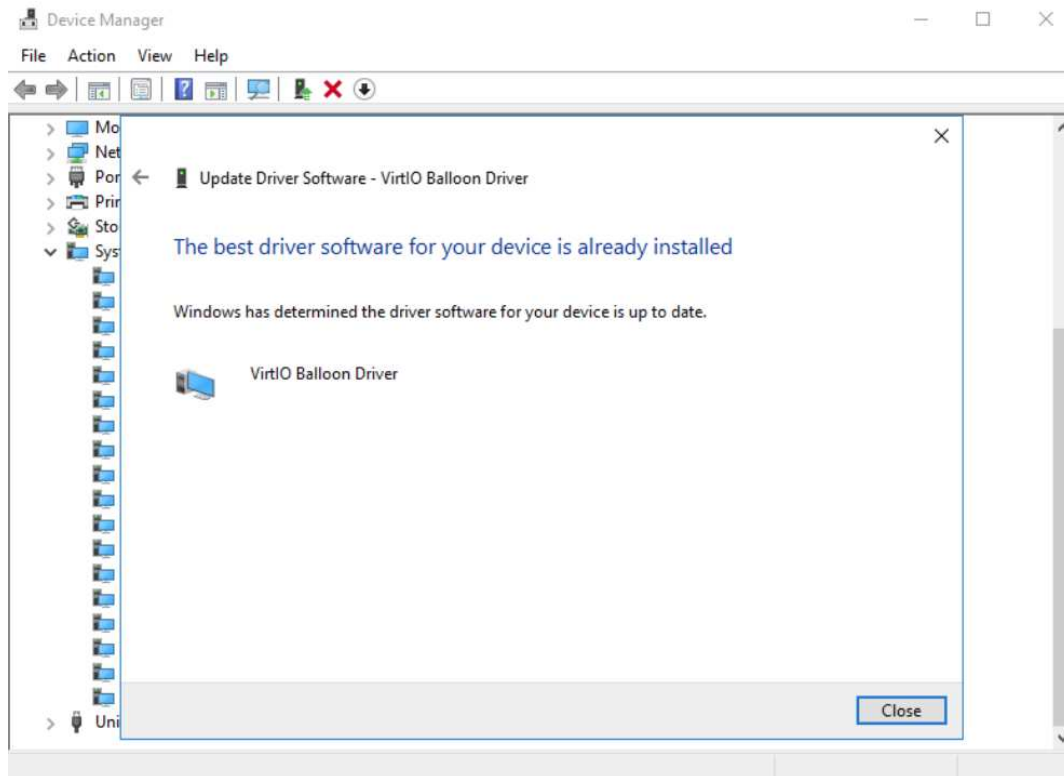
- Step 1. Within the Windows guest OS, ensure that the ThinkAgile CP ISO is attached.
- Step 2. Open Device Manager.
- Step 3. Navigate to **System Devices**.

**Note:** The **System Devices** option might have a different name depending on your Windows OS version.

- Step 4. Right-click the VirtIO Balloon Driver and click **Update Driver Software**.



- Step 5. The Update driver software window appears. Select **Browse my computer for driver software**.
- Step 6. Provide the path to the CD Drive and click **Next**. Click **Close** after the drivers are installed and you receive a confirmation window.



The VirtIO drivers are now installed.

### Install the Windows Memory Oversubscription service

This section covers the procedure to install the Windows memory oversubscription service.

To install the Windows memory oversubscription service, follow these steps:

- Step 1. Within the Windows guest OS, ensure that the ThinkAgile CP ISO is attached.
- Step 2. Navigate to `<CDROM>:\virtio-win-0.1.141\Balloon\<WINDOWS>`, where `<CDROM>` is the letter of the CD Drive and `<WINDOWS>` is the Windows OS version that you are using.
- Step 3. Copy the folder that contains the memory oversubscription service to a safe location on the drive `C:`. For example, you can use `C:\Balloon`.

#### Notes:

- Depending on your Windows version, the ISO might include both 32-bit (x86) and 64-bit (amd64) versions of the service. Choose the one that corresponds to your VM processor architecture.
- It is very important to copy the service into a reliable location before registering it; otherwise, the service might become unavailable after the VM restart.

Step 4. Open the Windows PowerShell application as an administrator and navigate to the folder where you copied the service.

Step 5. Register the service within the OS by executing the following command:

```
.\blnsvr.exe -i
```

```

Administrator: Windows PowerShell
PS D:\virtio-win-0.1.141\Balloon\2k16\amd64> .\blnsrv.exe -i
Service Installed
Service is starting...
Service RUNNING.
PS D:\virtio-win-0.1.141\Balloon\2k16\amd64>

```

Step 6. Ensure that the memory ballooning service is listed and its status is Running by executing the following command:

```
Get-Service
```

```

Administrator: Windows PowerShell
PS D:\virtio-win-0.1.141\Balloon\2k16\amd64> Get-Service

```

Status	Name	DisplayName
Stopped	AJRouter	AllJoyn Router Service
Stopped	ALG	Application Layer Gateway Service
Stopped	AppIDSvc	Application Identity
Running	AppInfo	Application Information
Stopped	AppMgmt	Application Management
Running	AppReadiness	App Readiness
Stopped	AppVClient	Microsoft App-V Client
Stopped	AppXSvc	AppX Deployment Service (AppXSVC)
Stopped	AudioEndpointBu...	Windows Audio Endpoint Builder
Stopped	Audiosrv	Windows Audio
Stopped	AxInstSV	ActiveX Installer (AxInstSV)
Running	BalloonService	Balloon Service
Running	BFE	Base Filtering Engine
Stopped	BITS	Background Intelligent Transfer Ser...
Running	BrokerInfrastru...	Background Tasks Infrastructure Ser...
Stopped	Browser	Computer Browser

If the service is not running, start it.

The Windows Memory Oversubscription service is now installed.

## Windows VMs Will Not Shut Down

Microsoft Windows Virtual Machines (VMs) do not shut down when the shutdown command is issued from the ThinkAgile CP Cloud Controller Management Portal.

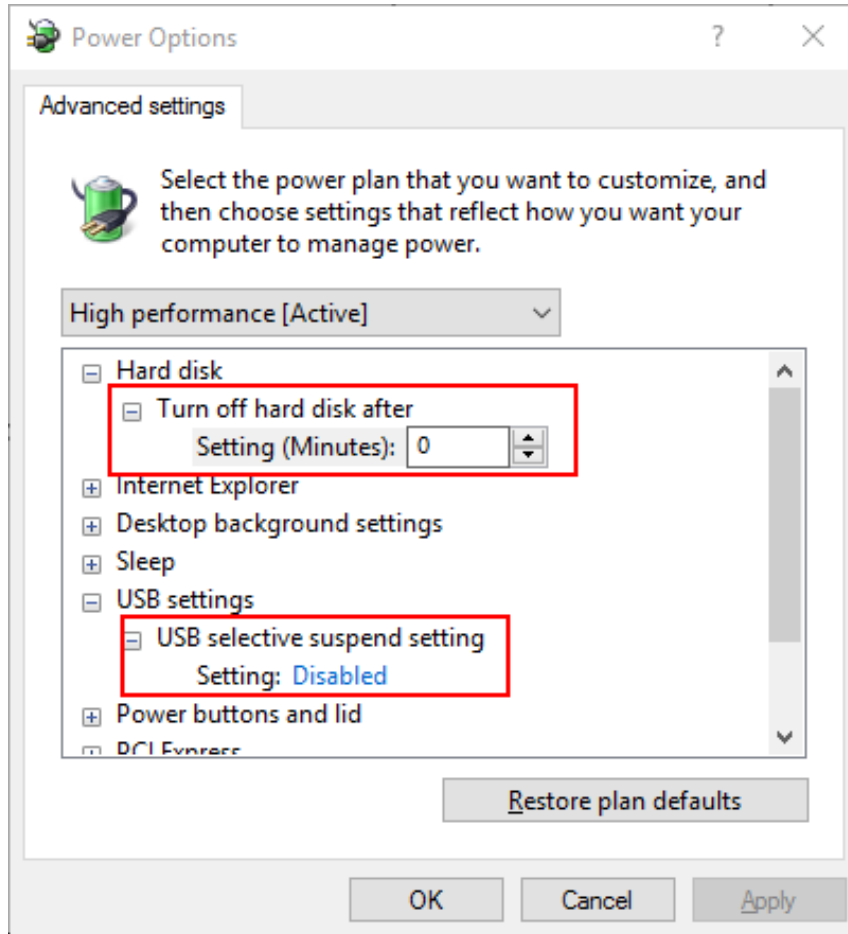
This issue can be caused when the default Windows Power Plan is set to Balanced. These settings are specifically designed for physical machines and they may be irrelevant or even harmful for virtual machines. Switching the Windows Power Plan to High Performance and setting the Turn off the display option to Never addresses this issue.

To resolve this issue, follow these steps:

- Step 1. Go to: **Settings → Power and Sleep → Additional Power Settings**.
- Step 2. Select the **High Performance** radio button.
- Step 3. Click on the **Change Plan Settings** link.
- Step 4. From the **Turn off the display** drop-down menu, select **Never**.

Step 5. Check that the current settings reflect the correct Power Plan by clicking the **Change advanced power settings** link.

- a. In the Power Options dialog box, **Hard Disk → Turn off hard disk after**, ensure that the **Setting (Minutes)** option is set to **0**.
- b. Ensure that **USB Settings → USB selective suspend setting** is set to **Disabled**.



**Note:** If you prepare your own Windows templates, it is important to note that the Windows Power Settings are reset to Balanced when running sysprep. As such, you need to set the power plan for newly deployed machines.

## Issues when migrating Windows VMs

You might run into issues when you attempt to migrate Windows 10 VMs, Windows Server 2016 VMs, or Windows Server 2019 VMs that were created from templates in the Lenovo Cloud Marketplace before ThinkAgile CP, Release 5.1.4 (Windows templates dated before September, 2020).

### Symptom

During the migration of a Windows 10 VM (Pro or Enterprise), Windows Server 2016 VM, or Windows Server 2019 VM to a different compute node, you might run into the following issues:

- The instance freezes.
- The instance IP cannot be pinged.
- The instance shows a blue screen (BSOD) or a black screen.

## Cause

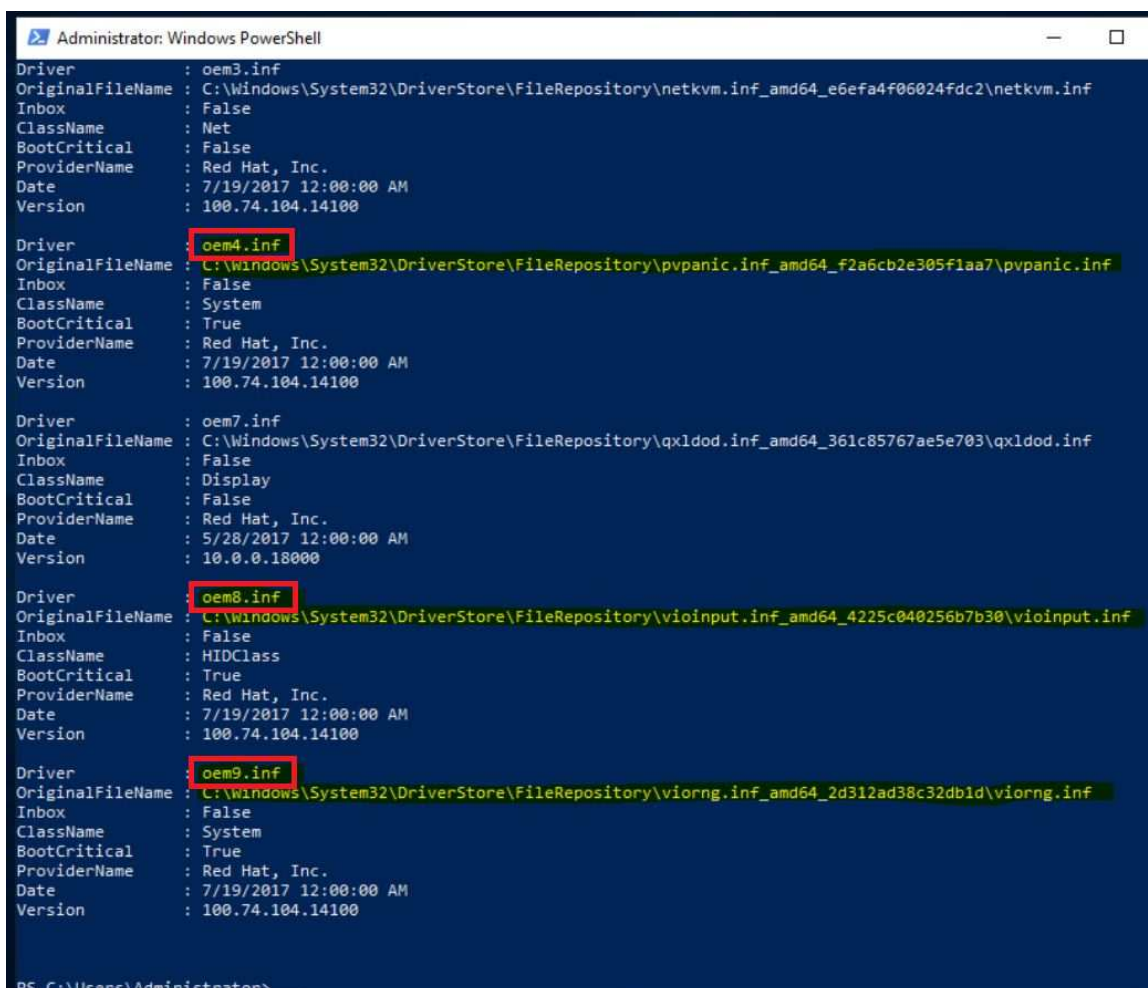
The templates for Windows 10, Windows Server 2016, and Windows Server 2019 contain extra drivers that can hinder the migration of VM instances created from those drivers. Specifically, the following Red Hat drivers are included in the templates:

- viostor
- vioinput
- viornrg
- pvpanic

## Solution

The drivers need to be removed from the VM instance. Complete the following steps to remove the drivers from the VM instance:

1. Establish an SSH session with the VM instance.
2. From PowerShell, type the following command to display a list of all drivers containing “Red”  
`Get-WindowsDriver -Online -All | where {$_.ProviderName -like "*Red*"}`
3. Record the Driver name (oemx.inf) for each of these drivers: viostor, vioinput, viornrg, and pvpanic. For example:



```
Administrator: Windows PowerShell
Driver : oem3.inf
OriginalFileName : C:\Windows\System32\DriverStore\FileRepository\netkvm.inf_amd64_e6efa4f06024fdc2\netkvm.inf
Inbox : False
ClassName : Net
BootCritical : False
ProviderName : Red Hat, Inc.
Date : 7/19/2017 12:00:00 AM
Version : 100.74.104.14100

Driver : oem4.inf
OriginalFileName : C:\Windows\System32\DriverStore\FileRepository\pvpanic.inf_amd64_f2a6cb2e305f1aa7\pvpanic.inf
Inbox : False
ClassName : System
BootCritical : True
ProviderName : Red Hat, Inc.
Date : 7/19/2017 12:00:00 AM
Version : 100.74.104.14100

Driver : oem7.inf
OriginalFileName : C:\Windows\System32\DriverStore\FileRepository\qxldod.inf_amd64_361c85767ae5e703\qxldod.inf
Inbox : False
ClassName : Display
BootCritical : False
ProviderName : Red Hat, Inc.
Date : 5/28/2017 12:00:00 AM
Version : 10.0.0.18000

Driver : oem8.inf
OriginalFileName : C:\Windows\System32\DriverStore\FileRepository\vioinput.inf_amd64_4225c040256b7b30\vioinput.inf
Inbox : False
ClassName : HIDClass
BootCritical : True
ProviderName : Red Hat, Inc.
Date : 7/19/2017 12:00:00 AM
Version : 100.74.104.14100

Driver : oem9.inf
OriginalFileName : C:\Windows\System32\DriverStore\FileRepository\viorng.inf_amd64_2d312ad38c32db1d\viorng.inf
Inbox : False
ClassName : System
BootCritical : True
ProviderName : Red Hat, Inc.
Date : 7/19/2017 12:00:00 AM
Version : 100.74.104.14100

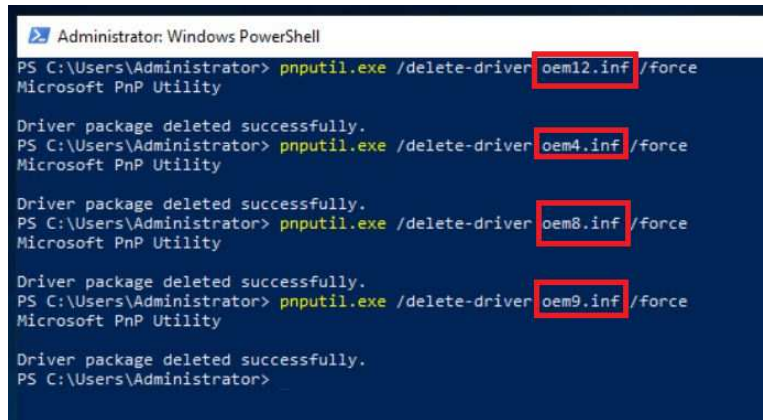
PS C:\Users\Administrator>
```

4. Run the following command for **each** of the drivers to delete them:



```
pnputil.exe /delete-driver oem<X>.inf /force
```

where oem<X> corresponds to the driver name you recorded in the previous step. For example:



```
Administrator: Windows PowerShell
PS C:\Users\Administrator> pnputil.exe /delete-driver oem12.inf /force
Microsoft PnP Utility

Driver package deleted successfully.
PS C:\Users\Administrator> pnputil.exe /delete-driver oem4.inf /force
Microsoft PnP Utility

Driver package deleted successfully.
PS C:\Users\Administrator> pnputil.exe /delete-driver oem8.inf /force
Microsoft PnP Utility

Driver package deleted successfully.
PS C:\Users\Administrator> pnputil.exe /delete-driver oem9.inf /force
Microsoft PnP Utility

Driver package deleted successfully.
PS C:\Users\Administrator>
```

5. Validate the drivers have been deleted by running the following command again:

```
Get-WindowsDriver -Online -All | where {$_.ProviderName -like "*Red*"}
```

Make sure that the following drivers no longer appear:

- viostor
- vioinput
- viornig
- pvpanic

6. Shut down the VM instance.

7. Restart the VM instance.

## Networking is not enabled for Red Hat, version 8

When manually installing Red Hat, version 8, the networking is not enabled by default.

After installing the operating system, complete the following steps to resolve the issue:

1. Shut down the instance from the portal and restart it.
2. Log in to the instance.
3. Install the guest agent tools and change it to Enhanced mode:

[“Install guest agent tools” on page 68](#)

4. Complete one of the following steps:

- a. Install cloud-init to configure the instance. For more information about cloud-init, see:

<https://cloud-init.io/>

- b. Manually resolve the IP address using one of the following methods:

- Run the following command to configure the IP address:

```
sudo dhclient <interface>
```

- Edit `/etc/sysconfig/network-scripts/ifcfg-<interface>` and set `ONBOOT=yes`

Then, save the file and reboot the VM.

---

## Application templates

Refer to these topics for information about troubleshooting application templates ThinkAgile CP.

### Cannot create a FreeNAS or Netscaler template

Creating a template from a FreeBSD, FreeNAS or Netscaler instance fails with the error: No operating systems found.

ThinkAgile CP Cloud Controller uses libguestfs to create templates. Libguestfs does not support FreeBSD/FreeNAS or Netscaler operating systems and, therefore, templates cannot be created from these operating systems.

Complete the following steps to create a new instance from a FreeNAS or Netscaler instance:

Step 1. Manually create a backup of the instance.

For information about creating a manual local backup, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/take-a-local-backup-manually.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/take-a-local-backup-manually.html)

Step 2. Create a new instance from the backup.

For information about creating a new instance from a backup, see the following topic:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/create-an-instance-from-a-local-backup.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/create-an-instance-from-a-local-backup.html)

Step 3. If necessary, configure the new instance so as to not conflict with the original within the new instance operating system.

### Windows 10 sysprep template creation

When creating a template with sysprep from a Windows 10 instance, template creation fails.

#### Cause

This is a known Microsoft issue wherein sysprep fails on Windows 10 due to problems with the default Windows Store applications.

#### Solution

Remove the problematic applications and then retry to create the sysprep template.

If Windows sysprep fails, you can also configure the following registry to bypass the error:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\StreamProvider] "LastFullPayloadTime"=dword:00000000
```

See [this Microsoft article](#) for more information on the issue and instructions for removing the problematic applications.

See [this Microsoft article](#) for more information about setting the registry key.

### Cannot mount CIFS shares

Cannot mount CIFS shares on RHEL hardware with FIPS. RHEL compute nodes cannot mount CIFS shares to create instances from ISO, and RHEL storage nodes cannot mount CIFS shares to import virtual machines (VMs) to templates.

When FIPS mode is enabled, the use of md4 and md5 are disabled, which prevents users from using NTLM, NTLMv2 or NTLMSSP authentication. Also, signing cannot be used since it requires md5. Any CIFS mount that uses these methods break when FIPS mode is enabled.

To disable and enable FIPS, follow these steps:

Step 1. Log onto the compute and storage nodes via a console or SSH connection.

Step 2. Check if FIPS is enabled by executing the following command:

```
cat /proc/sys/crypto/fips_enabled
```

If it is set to 1, then FIPS is enabled and CIFS mounts result in failure. If it is set to 0, then FIPS is disabled and CIFS mounts result in success.

Step 3. To configure FIPS, execute the following commands:

a. To enable FIPS, execute:

```
grubby --update-kernel=ALL --remove-args=fips=1  
sed -i 's/ fips=1//' /etc/default/grub
```

b. To disable FIPS, execute:

```
grubby --update-kernel=ALL --args=fips=1  
sed -i 's/\<boot\>/fips=1 &/' /etc/default/grub
```

Step 4. Reload the node.

## Cannot create a template with Full SysPrep from a Windows ISO image

When attempting to create a template with Full SysPrep mode from an application that was created from a Windows ISO image, the creation process might fail with the error Error processing command COMMAND\_REQUEST\_TYPE\_TEMPLATE\_CREATE\_FROM\_VM.

The error looks similar to the following:

Type: User actions

US - Rack 21 Stack 3: Status of user actions

```
Failed to create template from application instance: win8.1-iso. Error processing command  
COMMAND_REQUEST_TYPE_TEMPLATE_CREATE_FROM_VM: guestfs error: mount: /dev/sda2  
on / (options: "): The disk contains an unclean file system (0, 0). Metadata kept in Windows cache,  
refused to mount. Failed to mount '/dev/sda2': Operation not permitted The NTFS partition is in  
an unsafe state. Please resume and shutdown Windows fully (no hibernation or fast restarting),  
or mount the volume read-only with the 'ro' mount option. The Create Template From  
Application was initiated by user shanmugam sengodan from IP address 115.111.218.82. Please  
try again. If the problem persists, please contact support.
```

**Note:** This topic applies to all Windows ISO images except Windows 10.

To resolve the issue, follow these steps:

Step 1. Connect via SSH to the impacted Windows VM.

Step 2. Open the contents of the ISO image and uninstall the guest agent by running the 32-bit or 64-bit MSI file.

Step 3. Shut down the Windows VM.

Step 4. Create the template using Full SysPrep.

**Note:** For more information, see [“Import a VM to create a template” on page 33](#)

Step 5. Start the instance and install the guide agent by running the same 32-bit or 64-bit .MSI file.

**Note:** For more information, see [“Install guest agent tools” on page 68](#)

---

## Backup and disaster recovery

Refer to these topics for information about troubleshooting issues related to backups and disaster recovery in ThinkAgile CP.

- [“Unable to take a Windows VM backup” on page 370](#)
- [“Backups of ZFS \(FreeNAS\)” on page 370](#)

## Unable to take a Windows VM backup

You might be unable to take backups for a Windows VM when certain services are disabled.

Complete the following steps to resolve this issue.

Step 1. Open Windows Services Manager.

From the Run window, run the following command:

```
services.msc
```

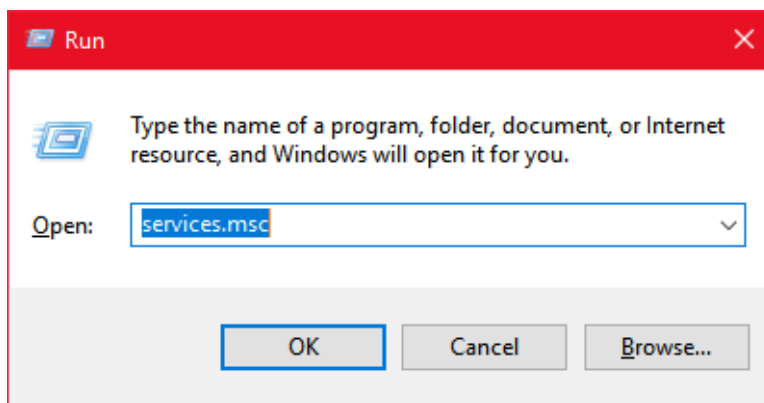


Figure 385. Windows Run window

Step 2. Make sure that these services are enabled and that the startup type is as follows:

- Remote Procedure Call (RPCSS). Validate that Startup Type is set to **Automatic**.
- COM+ Event System (EventSystem). Validate that Startup Type is set to **Manual**.
- System Event Notification Service (SENS). Validate that Startup Type is set to **Automatic**.
- Volume Shadow Copy (VSC). Validate that Startup Type is set to **Manual**.
- Microsoft Software Shadow Copy Provider (SWPRV). Validate that Startup Type is set to **Manual**.

If, after enabling these services, the backups show a size of zero (0), reload the application instance.

## Backups of ZFS (FreeNAS)

For clean backups to be created for application instances in ThinkAgile CP, the filesystem is frozen before the backup is taken and is thawed afterwards.

ZFS (the filesystem used by freeNAS) has no freeze/thaw operation. Therefore, backups of this filesystem will be crash-consistent, not application-consistent. If multiple filesystems are present in an application instance, backups of the supported filesystems will be application-consistent, but backups of the ZFS filesystem will not.

---

## Troubleshooting the ThinkAgile CP interconnect switch

This topic identifies common ThinkAgile CP Interconnect issues and some possible solutions.

### PSU power supply LED not lit

- **Symptom:** The power supply LED is not lit.
- **Solution:** Check the power supply to ensure that there is a proper connection to the power source. Ensure that power is available from the power source.

### Fan LED not lit

- **Symptom:** The fan LED is not lit.
- **Solution:** Check the fan module to ensure that it is properly inserted in the system. Replace the fan module if not functioning normally.

### Port link LED not lit

- **Symptom:** The port link LED is not lit.
- **Solutions:**
  - Check the port configuration in the firmware (see the Command Reference). If the port is configured with a specific speed or duplex mode, check the other device to confirm that it is set to the same configuration.
  - Check the cables connecting the port to the other device. Ensure that they are connected correctly and that you are using the correct cable type.

### Switch does not initialize (boot)

- **Symptom:** All the switch LEDs stay on, and the command prompt is not displayed on the console.
- **Solution:** The operating system may be damaged. Connect the console port and cycle the system power. If the system cannot boot into NOS, reinstall the NOS firmware. (Refer to the NOS installation guide.)

**Note:** Before reinstalling the firmware, ensure that all the configuration logs have been saved and that you have all applicable firmware and procedures ready.

---

## Networking

Refer to these topics for information about troubleshooting networking issues in ThinkAgile CP.

### Cannot SSH to an NFV internal IP Address

You can SSH to an NFV instance's internal IP from instances in the VNET but not from outside the VNET.

To resolve the issue, follow these steps:

Step 1. Connect using the console to the NFV instance and log in with the following credentials:

- Username: root
- Password: ThinkAgileCP

Step 2. Execute the following command to edit the `sysctl.conf` file:

```
vi /etc/sysctl.conf
```

After, type `i` to start editing the file.

Step 3. Add the following line to the end of the file:

```
net.ipv4.conf.default.rp_filter=2
```

Step 4. Press `ESC` and type `:wq` to save the changes and close the file.

Step 5. To load the changes to `sysctl`, execute the following command:

```
sysctl -p
```

You are now be able to connect via SSH to the internal IP address of the NFV instance from outside the VNET.

## IPv6 network protocol compatibility

ThinkAgile CP and the cloud management portal are not compatible with the IPv6 network protocol. When using a browser running on a device with an IPv6 IP address, the UI will be unresponsive. Avoid using devices with IPv6 IP addresses to access the management portal.

## Windows instance gets a private IP address

A Windows instance receives a private IP address (169.254.x.x).

### Cause

There are two scenarios that may cause this:

- When Windows first boots up, it may temporarily receive a private IP address while it is identifying the network. In this case, it will receive a real IP after a few minutes.
- When Windows machines cannot get an IP from the DHCP server, they will receive an auto-assigned private IP address. This can happen if there are no more IPs available in the VNET IP range or if the VNET services application is not running.

## Application instance does not get an IP address

Application instance does not get an IP after applying a firewall profile. Using a restrictive Application Firewall will prevent the Application from getting an IP from a DHCP server.

### Solution

In the Firewall Profile used by the application instance, add the following rule at the top of the list to allow the DHCP request to go to the DHCP server.



## Interconnect switch does not boot - out of disk space

The interconnect does not boot after running out of disk space.

The partition for the root filesystem (`/`) on the Interconnect has limited space. ThinkAgile CP software is careful to use storage space sparingly and leaves about 300MB free after installation.

If you encounter this issue, follow these steps to recover your Interconnect:

Step 1. Connect to the interconnect switch using the console cable. For more details, see [“Connecting to the console port of an interconnect switch” on page 373](#).

- Step 2. Reload the Interconnect and boot into ONIE Rescue mode.
- Step 3. Mount the main partition by executing the following commands:

```
mkdir /mnt/picos
mount /dev/sda5/mnt/picos
```

- Step 4. Determine which files and directories are taking up the space.

You can use the following commands:

```
df -hT
du -ch
```

- Step 5. Delete the files or move them to the larger /tmp/ partition as follows:

```
mount /dev/sda7 /mnt/tmp
mv /mnt/picos/home/manager/* /mnt/tmp/manager/
```

- Step 6. Unmount the main filesystem by executing the following commands:

```
umount /mnt/picos
umount /mnt/tmp
```

- Step 7. Reload the interconnect switch.

## Connecting to the console port of an interconnect switch

This section covers the procedure to connect to the console port of an interconnect switch.

To connect to the IOIOI console port, follow these steps:

- Step 1. If your computer has a serial port, use the DB9-to-RJ45 console cable included in the interconnect switch box.

Alternatively, you can use a USB-to-serial RJ45 adapter cable to connect the console.



Figure 386. IOIOI console port location on the ThinkAgile CP Interconnect

- Step 2. If your using Windows to connect to the console port, open a terminal emulator and connect to the interconnect using the following settings:

- connection type = serial
- serial COM port
- default baud rate = 115,200 bps
- parity = none
- data bits = 8
- stop bits = 1
- flow control = XON/XOFF

**Note:** The COM port corresponding to your serial cable can be found in the Windows Device Manager.

Step 3. If your using Linux to connect to the console port, follow these steps:

- a. Look at the dmesg output to find the USB device that corresponds to the serial cable.
- b. Execute the following command:

```
screen /dev/ttyUSB0 "115200,-crtsdts"
```

- c. Press Enter twice.

You are now connected to the interconnect switch via the console port.

---

## System hardware and software

Refer to these topics for information about troubleshooting issues related to hardware and software in ThinkAgile CP.

**Notes:** Before replacing hardware, make sure that Support Mode has been enabled in the ThinkAgile CP Cloud Controller.

- For information about Support Mode, see:

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/managing\\_interconnect\\_support\\_mode.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/managing_interconnect_support_mode.html)

- For information about hardware maintenance procedures, see

[https://thinkagile.lenovofiles.com/help/topic/thinkagile\\_cp/replacing\\_hardware.html](https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/replacing_hardware.html)

## Pulling a drive to test RAID

If one drive is pulled, the software RAID at this point adds the hot-spare and starts rebuilding the RAID (this will take a few hours).

**Important:** You should not pull more than one drive. Since there is only one hot spare, pulling more than one drive can cause data loss.

Your environment is still be up, but some resources are reserved to assist in the rebuilding process.

**Note:** There are no current monitoring alerts for RAID health status (although, we are working to get this implemented in a future feature). Also, if a drive fails, adding a new drive to the RAID is not automatic and requires support interaction.

### Example before pulling the drive

```
[From storage]# cat /proc/mdstat
```

```
Personalities : [raid6] [raid5] [raid4] [raid0]
md50 : active raid0 md124[0] md126[1] md125[2] md127[3]
44989628416 blocks super 1.2 512k chunks
```

```
md124 : active raid5 dm-9[6] dm-0[2] dm-4[7] dm-7[3] dm-3[4] dm-1[5] dm-6[1]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 2/14 pages [8KB], 65536KB chunk
```

```
md125 : active raid5 dm-15[0] dm-17[1] dm-19[6] dm-24[2] dm-18[3] dm-23[7](S) dm-20[5] dm-16[4]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 1/14 pages [4KB], 65536KB chunk
```

```
md126 : active raid5 dm-10[0] dm-22[7](S) dm-13[1] dm-12[6] dm-8[4] dm-5[2] dm-14[5] dm-11[3]
```



```
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 2/14 pages [8KB], 65536KB chunk
```

```
md127 : active raid5 dm-26[0] dm-30[7](S) dm-31[6] dm-27[5] dm-29[4] dm-28[3] dm-25[2] dm-21[1]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 1/14 pages [4KB], 65536KB chunk
```

```
unused devices: <none>
```

### Console warning when the drive is removed

```
[From storage]# WARNING: Your hard drive is failing
```

```
Device: /dev/bus/11 [megaraid_disk_01], failed to read SMART values
```

### Status after pulling the drive (shows rebuild progress and estimated time to finish)

```
[From Storage]# cat /proc/mdstat
```

```
Personalities : [raid6] [raid5] [raid4] [raid0]
```

```
md50 : active raid0 md124[0] md126[1] md125[2] md127[3]
44989628416 blocks super 1.2 512k chunks
```

```
md124 : active raid5 dm-9[6] dm-0[2] dm-4[7] dm-7[3] dm-3[4] dm-1[5] dm-6[1]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 1/14 pages [4KB], 65536KB chunk
```

```
md125 : active raid5 dm-15[0] dm-17[1](F) dm-19[6] dm-24[2] dm-18[3] dm-23[7] dm-20[5] dm-16[4]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/6] [U_UUUUU]
[>.....] recovery = 0.9% (18209920/1874589696) finish=154.5min speed=200195K/sec
bitmap: 2/14 pages [8KB], 65536KB chunk
```

```
md126 : active raid5 dm-10[0] dm-22[7](S) dm-13[1] dm-12[6] dm-8[4] dm-5[2] dm-14[5] dm-11[3]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 2/14 pages [8KB], 65536KB chunk
```

```
md127 : active raid5 dm-26[0] dm-30[7](S) dm-31[6] dm-27[5] dm-29[4] dm-28[3] dm-25[2] dm-21[1]
11247538176 blocks super 1.2 level 5, 16k chunk, algorithm 2 [7/7] [UUUUUUU]
bitmap: 1/14 pages [4KB], 65536KB chunk
```

```
unused devices: <none>
```

## New compute controller does not receive an IP address

After receiving a new compute controller and plugging it into the enclosure, it does not receive an IP address.

This issue has the following symptoms:

- The network switch shows that the link is down.

Executing the following command returns no result:

```
cli -c "show interface brief | match up"
```

- Within the compute controller enclosure, the interface shows as UP.

Execute the following commands and check their results:

```
ip link show returns UP
```

```
ethtool eno1 returns Link Detected: yes
```

- The compute enclosure port LED is orange.

To resolve this issue, follow these steps:

Step 1. Log into the compute controller using the console port.

Step 2. Become `root` and execute the following command to change the interface speed:

```
ethtool -s eno1 speed 10000 and ethtool -s eno2 speed 10000
```

## Compute or storage controllers do not receive IP when v2 switch reboots

When a v2 switch loses power and reboots, an internal race condition might prevent the compute or storage controllers from receiving an IP address.

The workaround is to restart the DHCP server on the network switch in this scenario.

**Note:** This issue only affects customers still on v2.

To resolve the issue, follow these steps:

Step 1. Execute the following command to check `tacp-ovs-monitor` is running:

```
sudo service tacp-ovs-monitor status
```

Step 2. If `tacp-ovs-monitor` is not running, start it by executing the following command:

```
sudo service tacp-ovs-monitor start
```

Step 3. Execute the following command to restart the DHCP server:

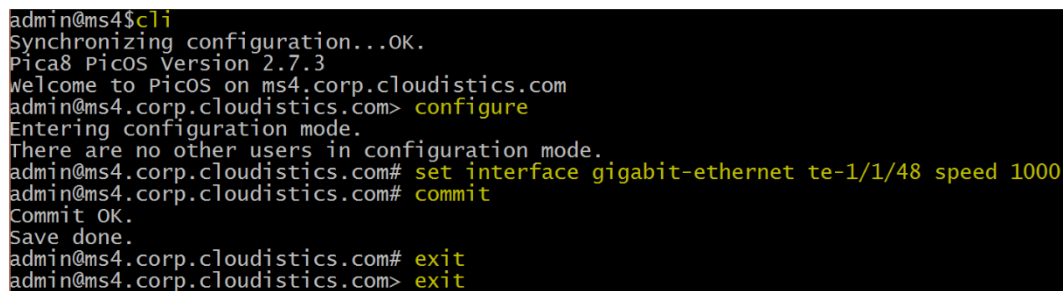
```
sudo service isc-dhcp-server restart
```

## Configure 1 Gbps Link Speed in the ThinkAgile CP Cloud Controller

This section covers the procedure to configure a 1 Gbps link speed in the Cloud Controller.

The ThinkAgile CP Cloud Controller is designed to use a 10 Gbps link speed. If your network only supports 1 Gbps, log into the Cloud Controller on the interconnect switch and run these commands to configure 1 Gbps link speed on Ethernet port 48:

```
$ cli
> configure
# set interface gigabit-ethernet te-1/1/48 speed 1000
# commit
# exit
> exit
```




```
admin@ms4$cli
Synchronizing configuration...OK.
Pica8 PicOS Version 2.7.3
Welcome to PicOS on ms4.corp.cloudistics.com
admin@ms4.corp.cloudistics.com> configure
Entering configuration mode.
There are no other users in configuration mode.
admin@ms4.corp.cloudistics.com# set interface gigabit-ethernet te-1/1/48 speed 1000
admin@ms4.corp.cloudistics.com# commit
Commit OK.
Save done.
admin@ms4.corp.cloudistics.com# exit
admin@ms4.corp.cloudistics.com> exit
```

## Power down hardware

In rare cases, you might want to shut down the ThinkAgile CP hardware — for example, to move it to another rack in the datacenter.

To power down the hardware, follow these steps:

Step 1. In ThinkAgile CP Cloud Controller, shut down all application instances.

Step 2. From the Hardware page, power off the compute nodes and storage blocks by clicking the  menu next to them and selecting **Power off**.

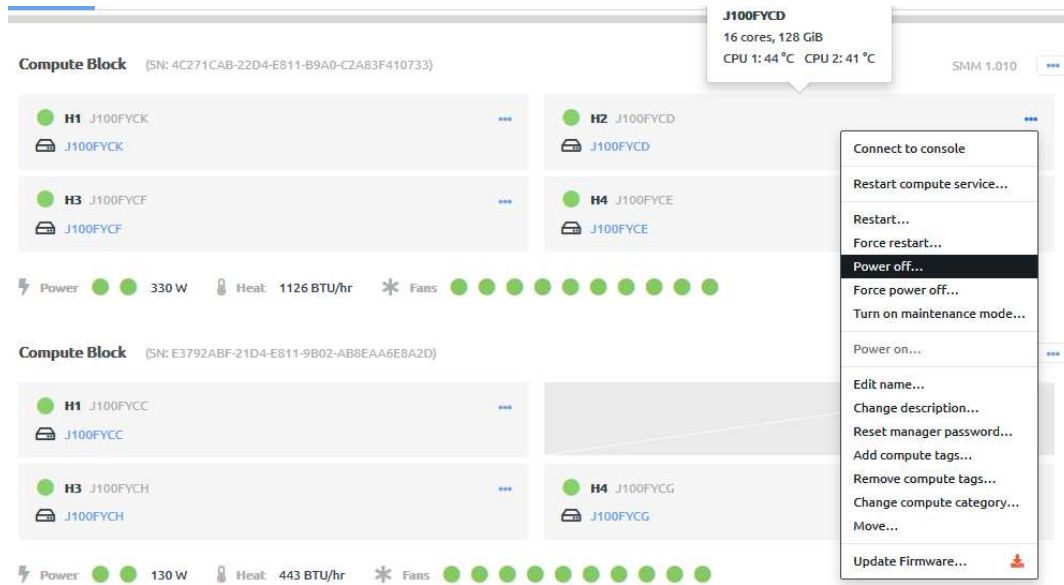


Figure 387. Power off a compute node

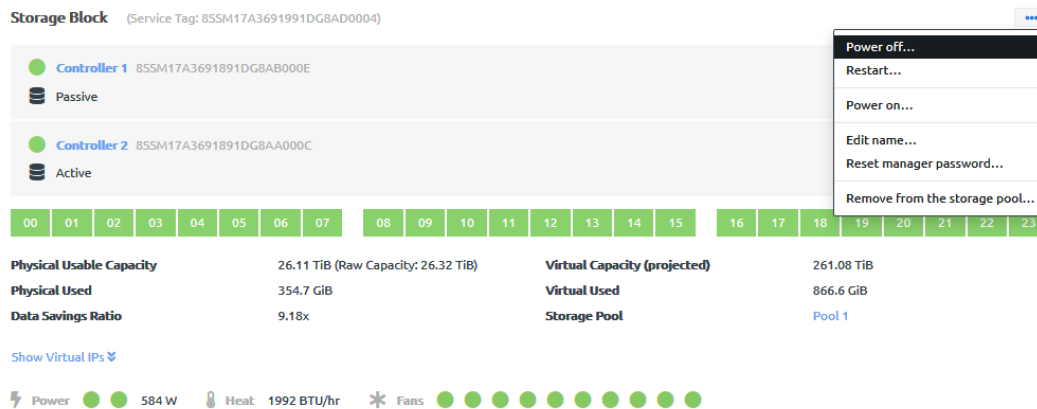



Figure 388. Power off a storage block

Step 3. Once the compute nodes and the storage blocks are powered off, click the  menu beside the interconnect switch and select **Restart**. When the Interconnect finishes shutting down and before it boots again, unplug the power cable from the switch.

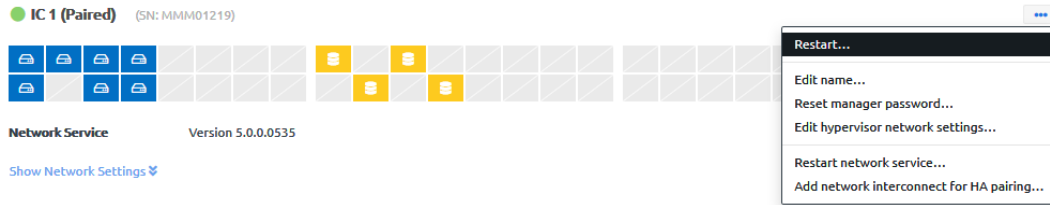


Figure 389. Restart the interconnect switch

**Note:** When powering the hardware back on, first power on the interconnect switch, and then compute nodes and the storage blocks.

## Forward logs to a remote server

This section covers the procedure to resolve issues with forwarding logs to a remote server.

To resolve the issue, the steps covered in this section must be performed on each controller from where the logs are forwarded:

- each network controller/interconnect
- each compute node
- each storage controller (both active and passive)

To forward logs to a remote server, follow these steps:

**Note:** Perform these steps on each compute node and storage controller in the stack.

Step 1. Establish an SSH session with the compute node or storage controller.

The user is manager and the password is the one chosen when the hardware was registered.

Step 2. Execute the following command and re-enter the manager password to gain root access.

```
sudo su
```

If you are unable to gain root access, contact Lenovo Support.

Step 3. Edit the rsyslog configuration file by executing the following command:

```
vi /etc/rsyslog.conf and then type i
```

Step 4. To forward to a remote server, add the following lines to the bottom of the file:

```
# start forwarding rule
$ActionQueueType LinkedList # use asynchronous processing
$ActionQueueFileName svrfwd # set file name, also enables disk mode
$ActionResumeRetryCount -1 # infinite retries on insert failure
$ActionQueueSaveOnShutdown on # save in-memory data if rsyslog shuts down
*. * @@server:port
```

Step 5. Execute the following command to save the changes and close the file:

```
:wq
```

Step 6. Replace server with the name or IP address of the remote server where the logs are being forwarded to.

:port is optional and can be deleted, but if needed, you can replace it with the server port receiving the logs.

Step 7. To forward to multiple remote servers, add the following lines to the bottom of the file:

```
# start forwarding rule 1
$ActionQueueType LinkedList # use asynchronous processing
$ActionQueueFileName srvrfd1 # set file name, also enables disk mode
$ActionResumeRetryCount -1 # infinite retries on insert failure
$ActionQueueSaveOnShutdown on # save in-memory data if rsyslog shuts down
*. * @@server1:port
# end forwarding rule 1

# start forwarding rule 2
$ActionQueueType LinkedList # use asynchronous processing
$ActionQueueFileName srvrfd2 # set file name, also enables disk mode
$ActionResumeRetryCount -1 # infinite retries on insert failure
$ActionQueueSaveOnShutdown on # save in-memory data if rsyslog shuts down
*. * @@server2:port
# end forwarding rule 2
```

Step 8. Execute the following command to save the changes and close the file:

```
:wq
```

Step 9. Replace `server1` and `server2` with the names or IP addresses of the servers where the logs are being forwarded to.

- `:port` is optional and can be deleted, but if needed, you can replace it with the server port receiving the logs.
- The `$ActionQueueFileName` must be unique in the `rsyslog.conf` file, which is why there is a different name in each forwarding rule.

Step 10. Execute the following command to restart `rsyslog`:

```
service rsyslog restart
```

## L1TF mitigation in ThinkAgile CP

The L1 Terminal Fault is an Intel x86 processor vulnerability that allows unprivileged access to the Level 1 Data Cache under certain conditions and can potentially enable hackers to bypass restrictions and gain access to the memory of running virtual machines (VMs) in a multi-tenant cloud environment. This topic provides information about mitigation modes that are available in ThinkAgile CP for the L1TF vulnerability. It also provides instructions for viewing the mitigation status in the ThinkAgile CP Cloud Controller management portal, as well as changing the mitigation mode via command line, if needed.

For more information about L1 Terminal Fault, see the following website: [L1 Terminal Fault](#)

- [“Mitigation modes in ThinkAgile CP” on page 379](#)
- [“L1TF mitigation mode commands” on page 380](#)
- [“View the L1TF mitigation mode in the user interface” on page 380](#)

## Mitigation modes in ThinkAgile CP

ThinkAgile CP includes an updated Red Hat kernel (3.10.0-862.20.2.el7.x86\_64) in the latest release.

ThinkAgile CP provides the following L1TF mitigation modes as recommended by Red Hat:

- **Full** - Addresses all L1TF vulnerabilities by flushing the Level 1 Data Cache and turning off Intel hyperthreading. **WARNING:** This mode can have a high performance impact.
- **Partial** - Flushes the Level 1 Data Cache on all context switches from the hypervisor to a guest VM. Hyperthreading is enabled. This mode reduces the attack surface but does not fully prevent leaking of information. It prevents any guest OS from attacking the hypervisor, but it does not prevent a guest OS from attacking another running on the same hypervisor. This mode has a medium performance impact.

- **Disabled** - No mitigation is applied. This mode has no performance impact. **WARNING:** Vulnerability is increased if untrusted workloads are running.

**Note:** For L1TF mitigation support, you must be running ThinkAgile CP version 4.0.2 or later. When the platform is updated to 4.0.2, the L1TF mitigation mode is set to Full by default.

### Considerations for Applying the L1TF Mitigation Modes

This Full mode disables the Intel hyperthreading feature and reduces the effective CPU core count by half. For this mode, you should ensure you have enough cores to adequately run existing workloads.

If you decide to apply the PARTIAL mode, which does not disable hyperthreading, you should protect your environment as much as possible by patching all running VMs to the latest level.

Or, you could leave the mitigation mode at FULL and add more compute nodes to make up for the lost CPU core counts, and then pick and choose your protection mode on a per hypervisor basis.

### L1TF mitigation mode commands

Several L1TF mitigation mode commands are available.

The following commands are available for the L1TF mitigation modes:

- To determine the L1TF mitigation mode, log onto the hypervisor as manager and enter the following command:

```
# tacp_get_l1tf_mitigation
```

For example:

```
[manager@tacp-compute-0e42ba6b04e845ddab4ef4c31fa78aae]# tacp_get_l1tf_mitigation FULL
```

- To change the mitigation mode, enter the following command:

```
sudo tacp_set_l1tf_mitigation -s <FULL|PARTIAL|DISABLED>
```

For example:

```
[manager@tacp-compute-0e42ba6b04e845ddab4ef4c31fa78aae] # tacp_set_l1tf_mitigation -s
PARTIAL
Setting l1tf_mitigation to PARTIAL and restarting Compute Controller
```

### View the L1TF mitigation mode in the user interface

You can view the mitigation mode of a compute node in the ThinkAgile CP Cloud Controller management portal.

To view the mitigation mode of a compute node, follow these steps:

- Step 1. In the ThinkAgile CP Cloud Controller management portal, under the Resources menu, click Nodes.
- Step 2. On the Nodes page, select the node for which you want to view information. The details page for that node opens.
- Step 3. Click the Information tab to view the mitigation status of the node.

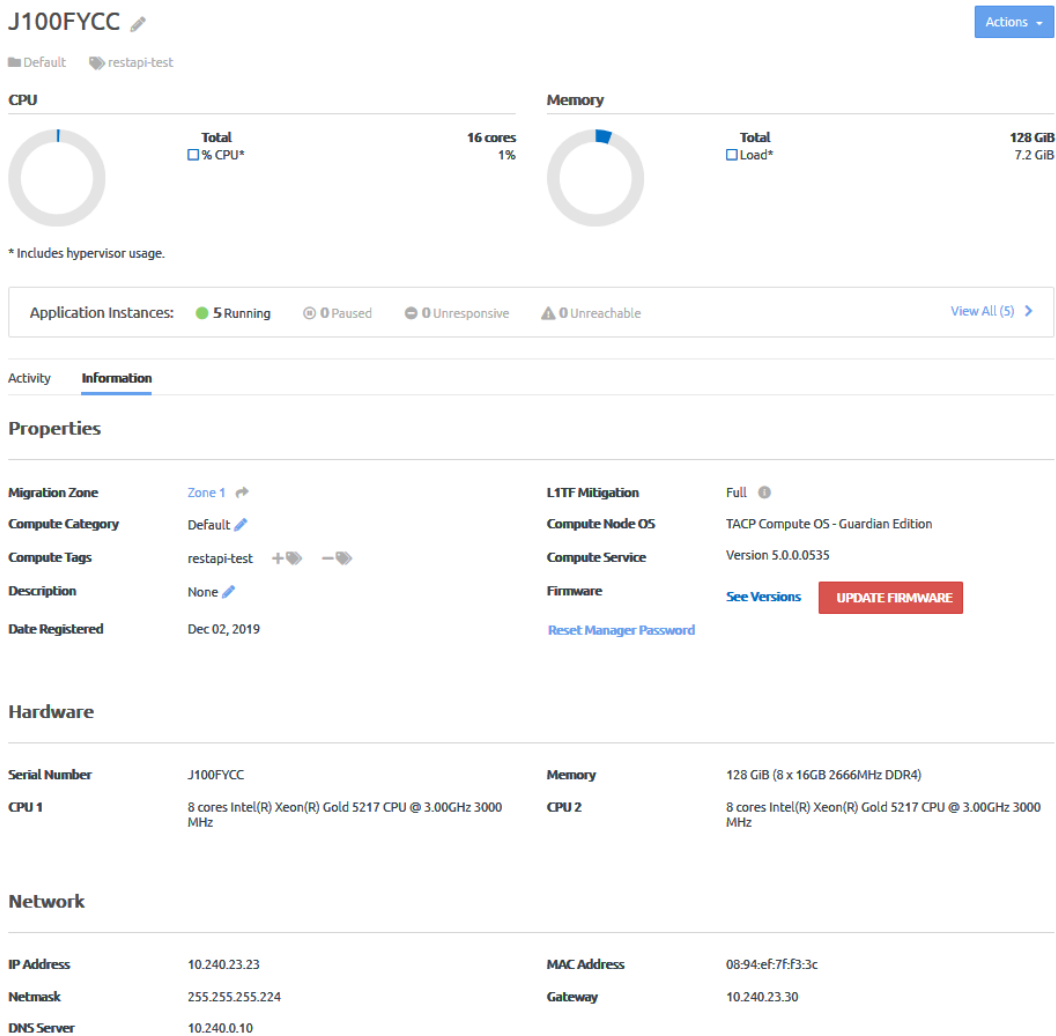


Figure 390. L1TF Mitigation Status for a Node

## Browsers

Refer to these topics for information about troubleshooting issues related to browsers in ThinkAgile CP.

### Blank web page - Firefox 38

Users may experience a blank page after logging in to the ThinkAgile CP Cloud Controller management console if they are using Firefox 38.

#### Solution

Upgrade to Firefox 45, or use a different web browser (such as Chrome).

### Instance console does not open in Firefox

Opening an instance console in the ThinkAgile CP Cloud Controller management portal fails in some versions of Firefox.

**Solution**

Upgrade Firefox to the latest version, or use Google Chrome to open the ThinkAgile CP Cloud Controller management portal.





**Lenovo**