

DCPMM and ThinkSystem tools

Using ThinkSystem tools to monitor and configure DCPMMs

Lenovo

DCPMM and ThinkSystem tools overview

Use the following ThinkSystem tools to manage DCPMMs.

Tool name	Functions
UEFI	<ul style="list-style-type: none">• Check inventory• Configuration
XCC	<ul style="list-style-type: none">• Check inventory• Health status (in XCC event logs)
LXPM	<ul style="list-style-type: none">• Check inventory• Configuration (use the UEFI GUI mode)• Run diagnostics
OneCLI	<ul style="list-style-type: none">• Check inventory• Configuration (use the UEFI GUI mode)• Firmware updates
BoMC	Firmware updates
UpdateXpress	Firmware updates
LXCA	<ul style="list-style-type: none">• Check inventory• Set up operating mode (through LXCA Pattern)• Change security settings

DCPMM information on the system POST screen

On the System POST screen, the following memory size information is displayed:

- Memory detected = DRAM DIMM + DCPMM capacity
- Volatile memory = Total capacity provisioned to Memory mode
- Non-volatile memory = Total capacity provisioned to App Direct mode

Users can use the information displayed on the POST screen to determine which DCPMM mode to run on the system.

Click the buttons on the right to see POST screen samples for different DCPMM operating modes.

```
6528 GB memory detected
Independent mode, usable capacity 6414 GB:
 384 GB of volatile memory
 6024 GB of non-volatile memory

2 processor(s) detected, 48 cores enabled
Genuine Intel(R) CPU 0000%
```

App Direct mode sample

Memory mode sample

Click here



App Direct mode



ThinkSystem SR860

System Events ✖ 3 ▲ 0

Serial Number

Machine Type 7X70

BMC IP 0.0.0.0

UEFI Version 2.10 TEE135N (01/23/2019)

BMC Version 2.40 TEI3410 (01/24/2019)

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ThinkSystem

UEFI:DXE INIT

F1 triggered remotely, preparing to boot into System Setup...

6528 GB memory detected
Total available memory capacity 6414 GB:

384 GB of volatile memory
6024 GB of non-volatile memory

2 processor(s) detected, 48 cores enabled
Genuine Intel(R) CPU 00000e

F1: System Setup

F2: Diagnostic

F10: PXE Boot

F12: One Time Boot Device

In this example, the DCPMMs are provisioned with App Direct mode, so the entire DCPMM capacity (6024 GB) is non-volatile memory. The 384 GB of volatile memory is supplied by the DRAM DIMMs.

Memory mode



The screenshot displays the ThinkSystem SR860 BIOS/UEFI interface. On the left, system information is listed: ThinkSystem SR860, System Events (3 errors, 0 warnings), Serial Number, Machine Type 7X70, BMC IP 0.0.0.0, UEFI Version 2.10 TEE135N (01/23/2019), and BMC Version 2.40 TEI341O (01/24/2019). The main area shows the 'ThinkSystem' logo and 'UEFI:DXE INIT' status. It reports 'F1 triggered remotely, preparing to boot into System Setup...', '6528 GB memory detected', and 'Independent node, usable capacity: 6024 GB:'. A highlighted box contains the text '6024 GB of volatile memory' and '0 GB of non-volatile memory'. Below this, it states '2 processor(s) detected, 48 cores enabled' and 'Genuine Intel(R) CPU 000002e'. At the bottom, there are buttons for 'F1: System Setup', 'F10: PXE Boot', 'F2: Diagnostic', and 'F12: One Time Boot Device'.

ThinkSystem SR860

System Events ✖ 3 ⚠ 0

Serial Number
Machine Type 7X70
BMC IP 0.0.0.0
UEFI Version 2.10 TEE135N (01/23/2019)
BMC Version 2.40 TEI341O (01/24/2019)

ThinkSystem

UEFI:DXE INIT

F1 triggered remotely, preparing to boot into System Setup...

6528 GB memory detected
Independent node, usable capacity: 6024 GB:
6024 GB of volatile memory
0 GB of non-volatile memory

2 processor(s) detected, 48 cores enabled
Genuine Intel(R) CPU 000002e

F1: System Setup F10: PXE Boot
F2: Diagnostic F12: One Time Boot Device

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In this example, the DCPMMs are provisioned with Memory mode, so the DCPMM and DRAM DIMM capacity is volatile memory. There is no non-volatile memory available on the system.

DCPMM inventory information in UEFI

In UEFI, go to **System Setting** → **Memory** to find all installed DRAM DIMMs and DCPMMs on the system.

DIMM Details		
DIMM 1	[EMPTY]	CPU 1 DIMM in slot 4 is installed and in use.
DIMM 2	[EMPTY]	
DIMM 3	Present, Enabled	Capacity: 512GB
DIMM 4	Present, Enabled	Memory Capacity: 107GB
DIMM 5	Present, Enabled	App Direct Capacity: 384GB
DIMM 6	Present, Enabled	Technology: DDR-T
DIMM 7	Present, Enabled	

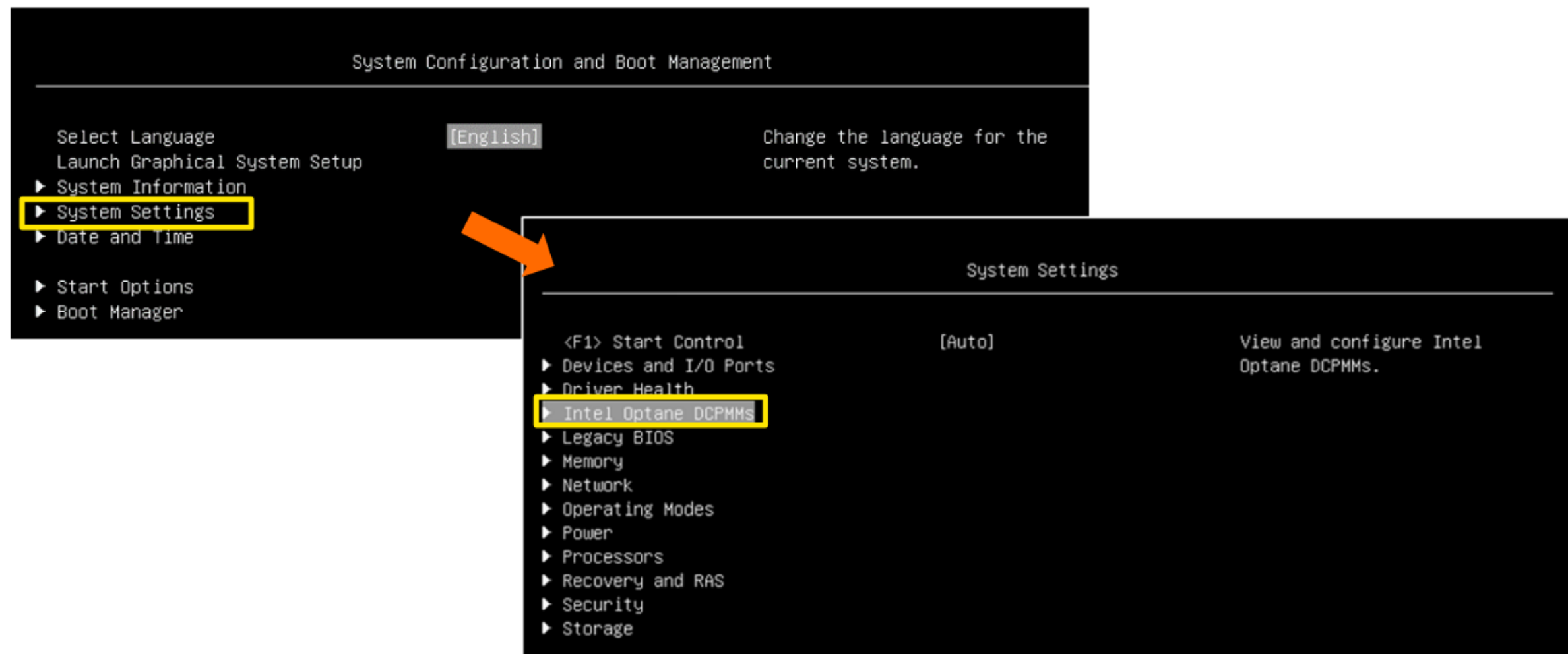
DDCPMM

DIMM Details		
DIMM 1	[EMPTY]	CPU 1 DIMM in slot 3 is installed and in use.
DIMM 2	[EMPTY]	
DIMM 3	Present, Enabled	Capacity: 32GB
DIMM 4	Present, Enabled	Technology: DDR4
DIMM 5	Present, Enabled	

DDR4 DIMM

How to access the DCPMM configuration page in UEFI

To configure DCPMMs through UEFI, go to **System Setting** → **Intel Optane DCPMMs**.



DCPMM configuration options in UEFI

Intel Optane DCPMMs

Number of Intel Optane DCPMMs Detected

12

The number of Intel Optane DCPMMs which are detected.

Total Raw Capacity	5.8 TB
Total Memory Capacity	5.8 TB
Total App Direct Capacity	0 B
Total Unconfigured Capacity	0 B
Total Inaccessible Capacity	0 B
Total Reserved Capacity	7.1 GB

In this example, the DCPMMs are set to 100% Memory mode on the system.

- ▶ Intel Optane DCPMMs Details
- ▶ Goals
- ▶ Regions
- ▶ Namespaces
- ▶ Security
- ▶ DCPMM Configuration

Intel Optane DCPMMs Details



Intel Optane DCPMMs Details for Processor 1		
DIMM 2		
Firmware Version	01.02.00.5310	Users can find the DCPMM firmware version, configuration status, operating mode, and other information on this page.
Configuration Status	[Configured]	
Raw Capacity	502.5 GB	In this example, the DCPMMs are set to 100% Memory mode on the system (100% of the capacity is provisioned for Memory mode and none for App Direct mode).
Memory Capacity	502.0 GB	
App Direct Capacity	0 B	
Unconfigured Capacity	0 B	
Inaccessible Capacity	0 B	
Reserved Capacity	613.0 MB	
Percentage Remaining	100	
Security State	[Disabled]	
DIMM 4		
Firmware Version	01.02.00.5310	
Configuration Status	[Configured]	
Raw Capacity	502.5 GB	
Memory Capacity	502.0 GB	

Goals



Goals		
Create a new goal configuration:		
Scope	[Platform]	All Intel Optane DCPMMs found under the selected scope would use the new memory allocation goal.
Memory Mode [%]	0	
Persistent Memory Type	[App Direct]	
Press to Create Goal		
There is no goal configuration.		



Use the Goals page to set the DCPMM mode and define the approximate percentage of capacity to apply to system memory. Users should input the memory percentage in the **Memory Mode [%]** column based on the following principles:

- App Direct mode: 0%
- Mixed Memory mode: 1-99% (the rest will be provisioned for App Direct use)
- Memory mode: 100%



Click the arrow to see more.

Goals



Goals		
Create a new goal configuration:		
Scope	[Platform]	All Intel Optane DCPMMs found under the selected scope would use the new memory allocation goal.
Memory Mode [%]	0	
Persistent Memory Type	[App Direct]	
Press to Create Goal		
There is no goal configuration.		

In App Direct mode and Mixed Memory mode, DCPMMs connected to the same processor are by default interleaved (displayed as App Direct in the **Persistent Memory Type** column), while memory banks are used alternately. In UEFI, to set DCPMMs as not interleaved, set the **Persistent Memory Type** as App Direct Not Interleaved.

Click the arrow to go back.



Regions



Region Details

Region ID	0x0001	The software unique identifier in the system for this region.
Socket	Processor 1	
Persistent Memory Type	App Direct	
Capacity	192.0 GB	
Free Capacity	192.0 GB	
App Direct Namespace Max Size	192.0 GB	
App Direct Namespace Min Size	2.0 GB	

Use the Regions page to view the Region ID (the software unique identifier of the DCPMMs in the system) and other DCPMM information.

↑↓=Move Highlight

<Enter>=Select Entry

<ESC>=Backwards

Namespaces



Create Namespace

Name	DCPMM1
Region ID	[0x0001]
Allocated Capacity	3012
Allocated Capacity Unit	[GB]

Press the button to create a new namespace.

Use this page to create a namespace or view the available namespaces on the DCPMMs. DCPMMs must be provisioned for App Direct mode to create a namespace.

Once a namespace has been created in a Windows or Linux OS, the partition in the DCPMM will be reserved for the OS and cannot be used in a different OS environment. If a user needs to switch the OS environment on the system (for example, switch from Windows 2019 to SLES 15), the user must back up the data and delete file systems and namespaces on the DCPMMs first. If not, the new OS will not be able to access the DCPMMs. (The DCPMMs' state will be displayed as "reserved" in the OS drive management window.)

View/Modify/Delete Namespaces

Namespace ID 0x0101
Capacity
Namespace ID 0x0201
Capacity

DCPMM1
2.9 TB
DCPMM2
2.9 TB

View the details of this namespace.

Security



Security

Security Configuration:

Scope

[Platform]

Enable the security by typing
the same passphrase for all
Intel Optane DCPMMs selected.

The security state of all the Intel Optane DCPMMs is "Disabled".

Press to Enable Security

Press to Secure Erase

When security is enabled on DCPMMs,
users must enter the passphrase to access
stored data or change DCPMMs settings.

Security

Security Configuration:

Scope

[Single DCPMM]

Processor 1

DIMM 7

[]

DIMM 9

[]

DIMM 11

[]

DIMM 6

[]

DIMM 4

[]

DIMM 2

[]

Processor 2

DIMM 19

[]

DIMM 21

[]

DIMM 23

[]

DIMM 18

[]

DIMM 16

[]

DIMM 14

[]

Choose [Platform] to run
security operation on all
units of Intel Optane DCPMM
found in the system, or
[Single DCPMM] to run on one
or more selected units. When
using [Platform] the
passphrase is stored in the
system to automatically unlock
before booting to the OS,
while using [Single DCPMM] the
passphrase is not stored. It
is recommended to record the
passphrase externally for
recovery.

DCPMM Configuration

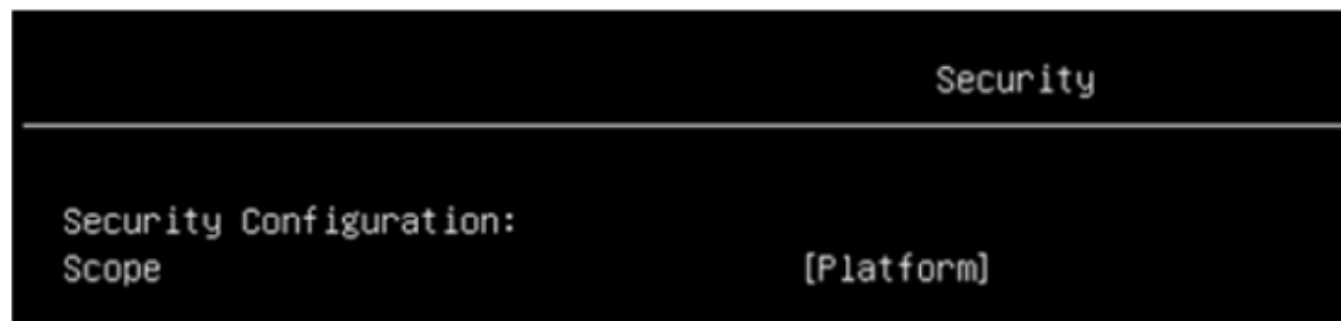


DCPMM Configuration	
Current Percentage Remaining Thresholds [%]	<input type="text" value="10"/>
Percentage Remaining Thresholds [%]	10

Use this page to set up the remaining spare block thresholds for DCPMMs. Users can configure the remaining threshold setting. If the percentage remaining falls to a lower level than the thresholds, or falls to 0%, the user will receive a warning message in the XCC event log.

If a DCPMM has no remaining spare blocks, users should contact Lenovo to purchase a replacement. (This is not covered by the service warranty.)

DCPMM security passphrase



Security supports two types of passphrase protection:

- Platform: Choose this option to run security operations on all installed DCPMM units at once. The Platform passphrase is stored and automatically applied to unlock DCPMMs before the OS starts running, but the secure erase action still requires the passphrase.
- Single DCPMM: Choose this option to run security operations on one or more selected DCPMM units. The user must manually enter the passphrase before the OS starts running or before attempting the secure erase action.

Note: After three failed unlocking attempts, the corresponding DCPMMs will enter the “exceeded” state, a system warning message will be sent, and the system will need to be restarted before the DCPMMs can be unlocked. If the user forgets the passphrase and cannot unlock a DCPMM, the user must contact Lenovo support for secure erase actions. Refer to the Problem Determination and Troubleshooting section for more information.

DCPMM inventory information in XCC

XCC currently only supports inventory information for DCPMMs. Users cannot perform any other configuration actions on DCPMMs, such as changing operating mode or security states, through XCC.

The screenshot displays the XClarity Controller (XCC) interface for a system named "Chris' SR650" (System name: CG_Cyborg). The left sidebar contains navigation options: Home, Events, Inventory (selected), Utilization, Remote Console, Firmware Update, Server Configuration, and BMC Configuration. The main content area shows the "DIMM: 3/24 Installed" section. A table lists the installed DIMMs:

Slot	Type	Capacity	Part Number
DIMM 5	DDR4	32 GB	M393A4K40BB2-CTD
DIMM 6	Intel Optane DCPMM	512 GB	NMA1XBD512GQS

Below the table, a detailed view for DIMM 6 is shown:

Description		FRU Part Number	
FRU Serial Number	000022EE	Manufacturer	Intel
Type	Intel Optane DCPMM	Manufacture Date	3418 (wk/yr)
Max Speed	2666 MHz	Configured Memory Clock Speed	2666 MHz
Ecc Bits	16	Module Supported Voltage	1.2V
Raw Capacity	502.5 GB	Memory Capacity	0 B
App Direct Capacity	0 B	Unconfigured Capacity	0 B
Inaccessible Capacity	502 GB	Reserved Capacity	613 MB
Firmware Version	01.00.00.5127		

At the bottom, another row of the DIMM table is visible:

Slot	Type	Capacity	Part Number
DIMM 20	DDR4	32 GB	M393A4K40BB2-CTD

DCPMM with OneCLI

With the latest version of OneCLI, users can use OneCLI commands to perform DCPMM configuration actions, such as showing inventory, creating namespace, changing operating modes, enabling security, and updating firmware. For the complete list of OneCLI commands, refer to the latest OneCLI user guide on the Lenovo Support Web site <https://support.lenovo.com/tw/en/solutions/Invo-tcli>.

DCPMM firmware updates with ThinkSystem tools

Use the following tools to update DCPMM firmware:

- BoMC
- UpdateXpress
- OneCLI

The procedures for DCPMM firmware updates with ThinkSystem tools are the same as the procedures for firmware updates to other components in the system. Refer to each tool's user guide on the Lenovo XClarity Essentials support Web site for more details.

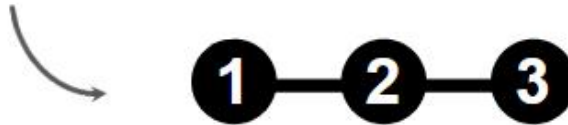
Note:

- Due to Intel's limitation, before updating the DCPMM firmware, users must disable the DCPMM security settings.
- Make sure the firmware for each DCPMM in a system is updated to the same level. Inconsistencies in DCPMM firmware may cause unexpected issues in the system.

DCPMM information in LXCA



Click each number in turn to see more details about DCPMM information in LXCA.



DCPMM information in LXCA

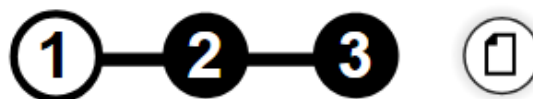
If a server has DCPMMs installed, users can find the DCPMM listed in the Memory section of the LXCA server's inventory page.

The screenshot displays the LXCA inventory page. At the top, it shows 'Power Supplies: (2) Installed'. Below that, the 'Memory: (4) Installed' section is expanded, showing a table of installed memory modules. Bay 5 is highlighted, showing a 256 GB Intel Optane DC module. A pop-up window titled 'Intel Optane Summary' is overlaid on the right, providing detailed information about the selected module. To the right of the pop-up, a 'Manufacturer' list shows Intel, Micron Technology, Samsung, and Samsung.

Bay Number	Size	Speed	Type
5	256 GB	2666 MT/s	Intel Optane DC...
6	16 GB	2666 MT/s	DDR4
7	16 GB	2666 MT/s	DDR4
8	16 GB	2666 MT/s	DDR4

Memory Direct Capacity	252 GB
Memory Inaccessible Capacity	448 MB
Memory Capacity	0 MB
Firmware Name	AEP DIMM firmware
Firmware Version	01.02.00.5318
Firmware Status	Active

Manufacturer
Intel
Micron Technology
Samsung
Samsung

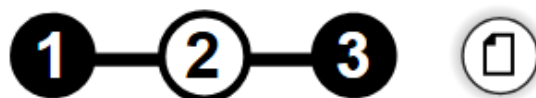
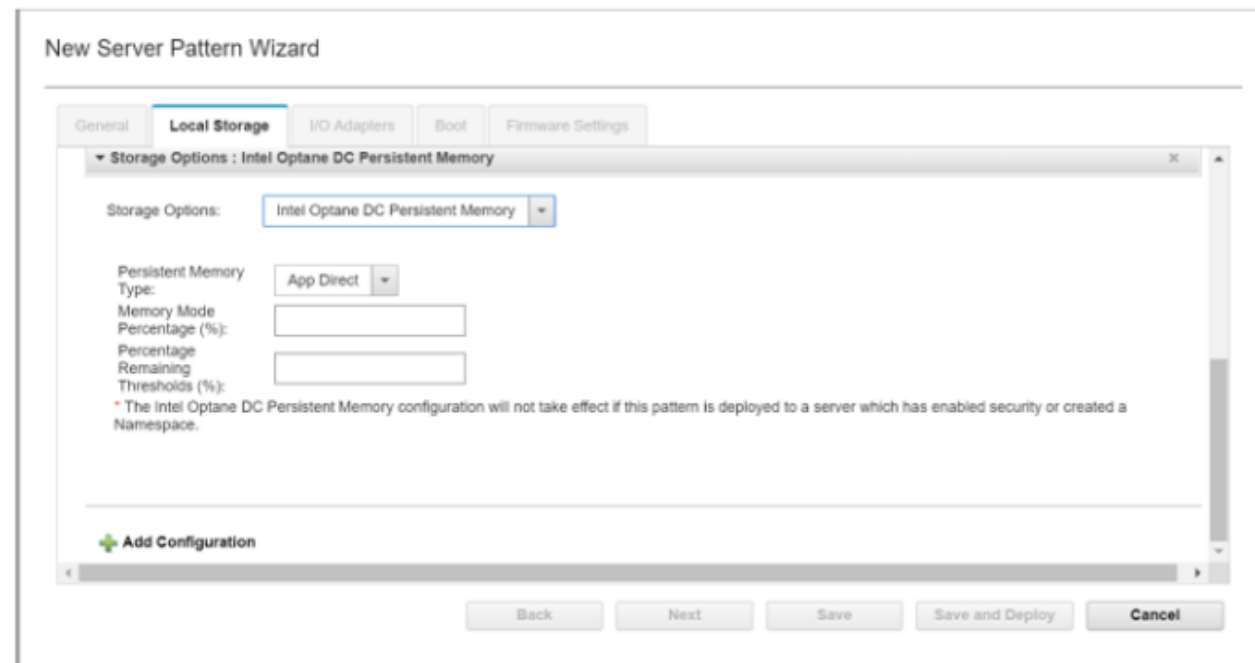


DCPMM information in LXCA

Users can create a server pattern for DCPMM provision. In the **New Server Pattern Wizard** → **Local Storage** section, select **Intel Optane DC Persistent Memory** from the Storage Options menu, and then set up the DCPMM operating mode and usage remaining thresholds for unconfigured DCPMMs.

After setting up the pattern, apply the pattern to the target system.

If users want to re-apply the pattern with different DCPMM settings to the system when DCPMMs have already been provisioned to App Direct or Mixed Memory mode, delete the files and namespaces on the DCPMM first. If not, the pattern may not be correctly applied to the system.



DCPMM information in LXCA

Users can use LXCA to enable or disable the DCPMM security settings. To configure DCPMM security settings through LXCA, go to **Hardware** → **Servers** → select the target server → click **All Actions** → **Service** → **Intel Optane Security Operation**.

