INTEL® OPTANE™ DC PERSISTENT MEMORY (DCPMM) – BIOS SETTINGS

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OBJECTIVES

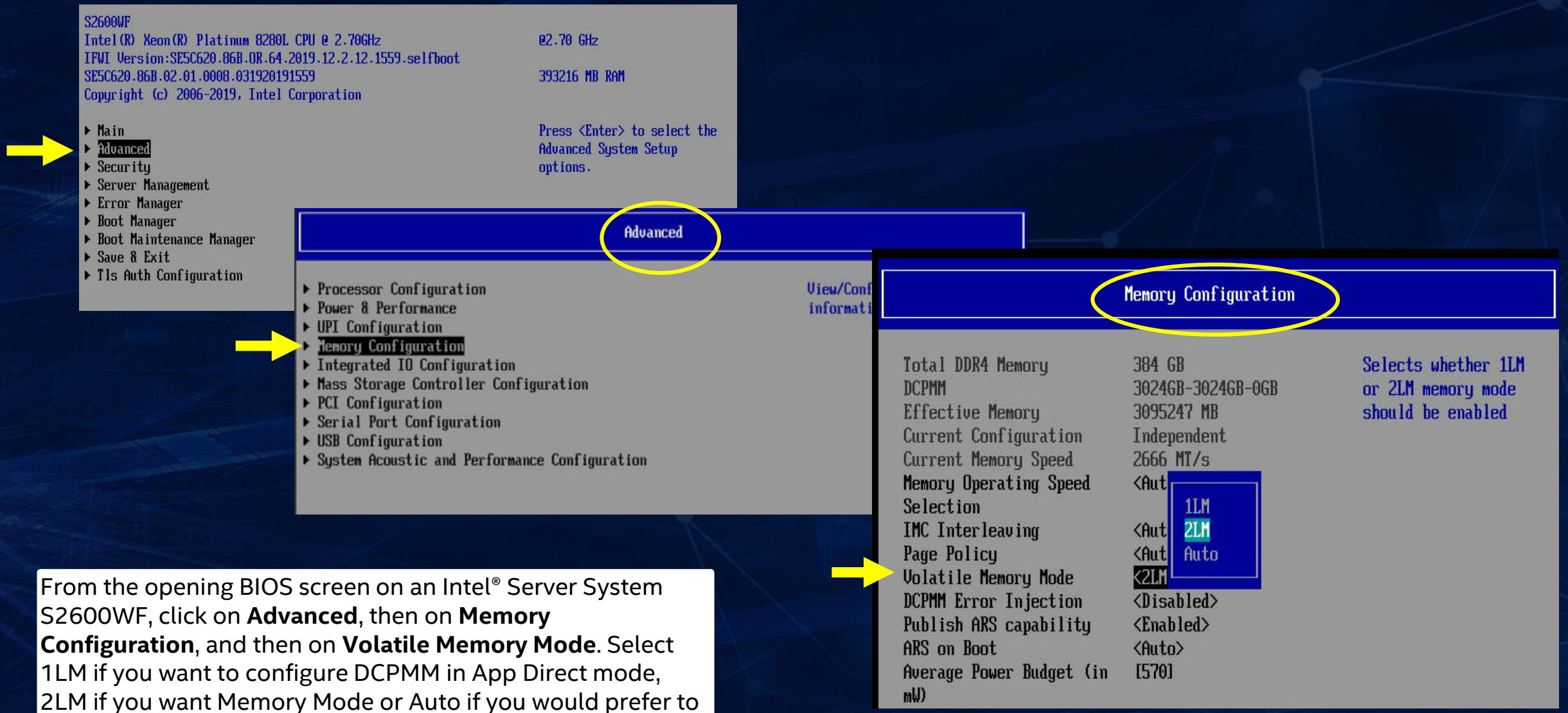
Upon completion of this course, participants will be able to:

- Use Intel BIOS to configure Intel Optane DC persistent memory (DCPMM)
- Know where to find the DCPMM configuration settings in BIOS
- Feel confident in their ability to setup and configure DCPMM in an Intel server

AGENDA

- CONFIGURING DCPMM MODES AND OPTIONS
- VIEWING AND CONFIGURING INDIVIDUAL DCPMMS
- MONITORING DCPMM HEALTH AND UPDATING FIRMWARE
- SECURITY OPTIONS
- CREATING GOALS, REGIONS, AND NAMESPACES
- SUMMARY

CONFIGURING MODES FOR DCPMM USING INTEL BIOS



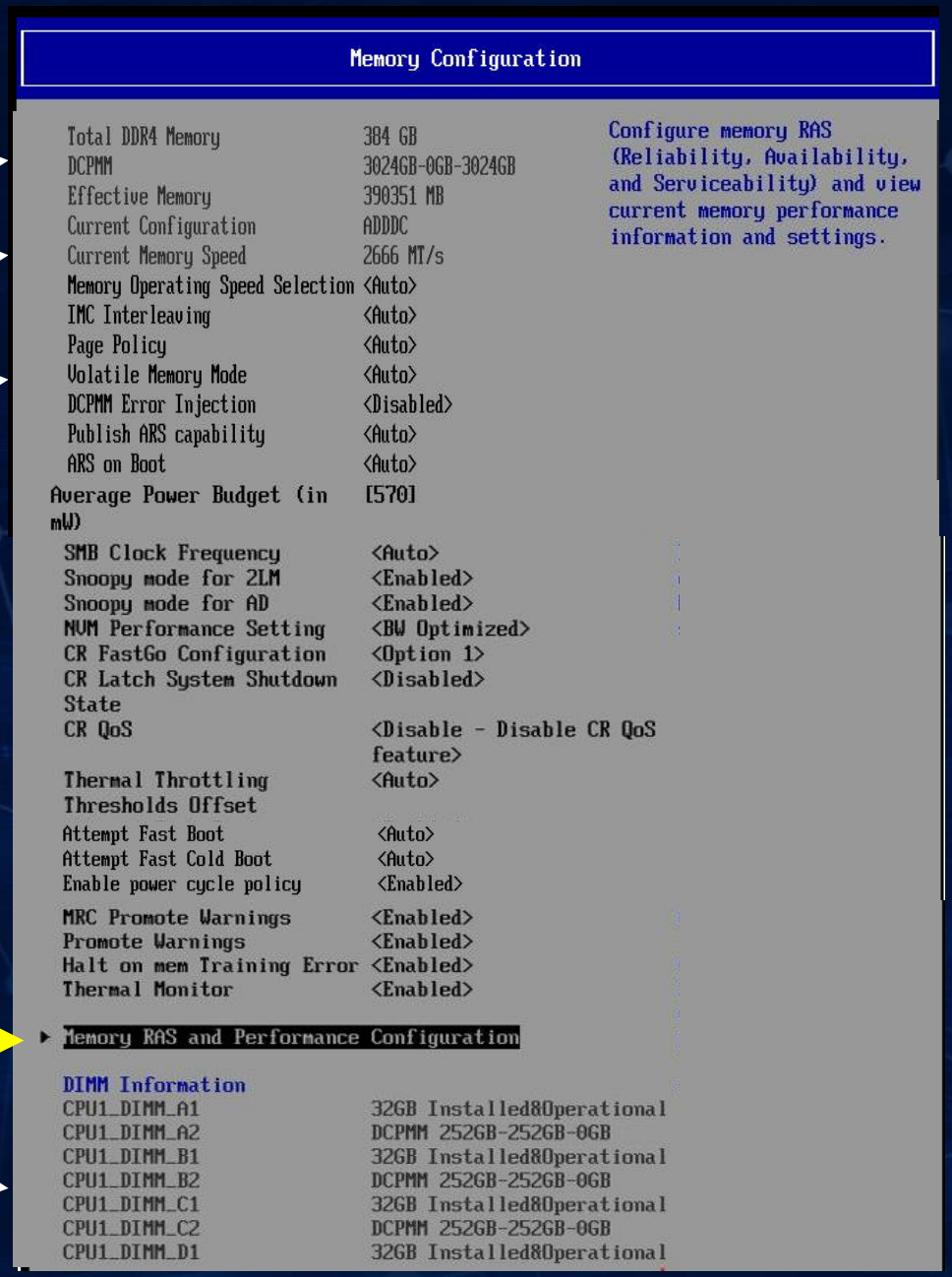
From the opening BIOS screen on an Intel® Server System S2600WF, click on **Advanced**, then on **Memory Configuration**, and then on **Volatile Memory Mode**. Select 1LM if you want to configure DCPMM in App Direct mode, 2LM if you want Memory Mode or Auto if you would prefer to set the Volatile Memory Mode using configuration tools outside of BIOS like IPMCTL or NDCTL.

VIEWING MEMORY INFORMATION

Memory Size

Memory Speed

Volatile Memory Mode

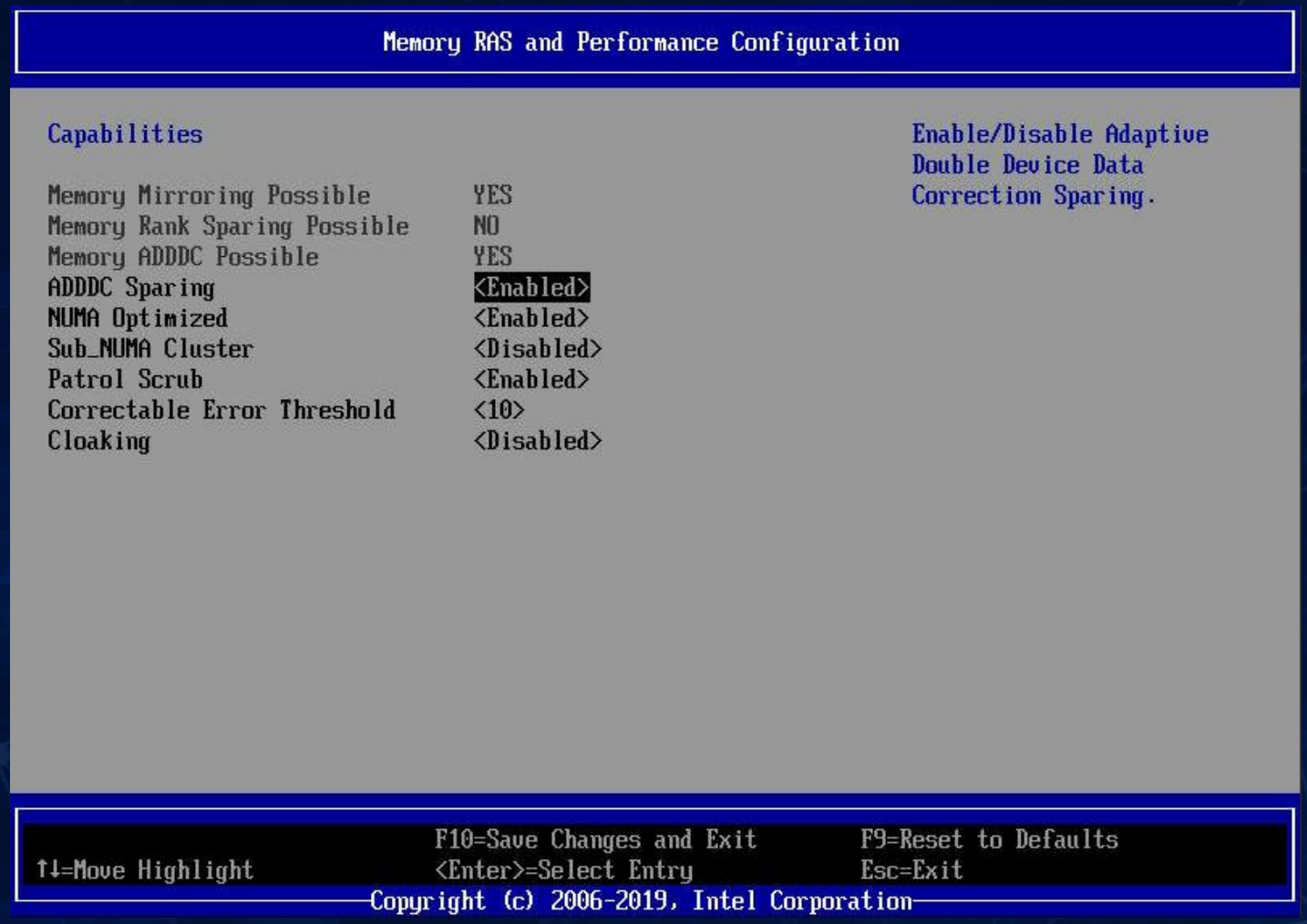


Here is a screen shot of the **Memory Configuration** screen, and as you can see there is a lot of information and settings here, including Memory Size, Memory Speed, Volatile Memory Mode and DIMM Information. Another option from this screen is to select **Memory RAS and Performance Configuration**. We will explore those options on the next slide.

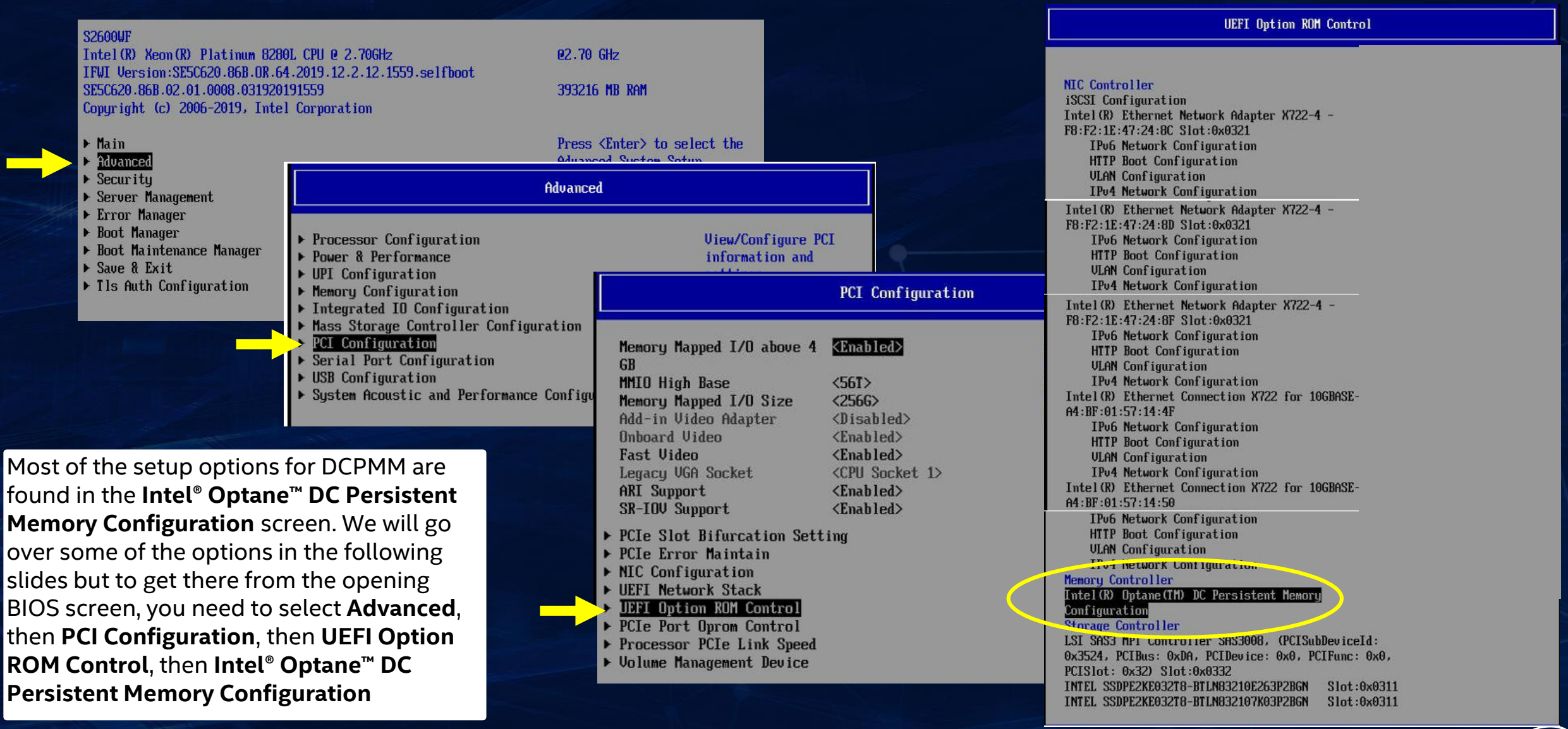
DIMM Information

CONFIGURING RAS AND PERFORMANCE OPTIONS

Here is a screen shot of the **Memory RAS and Performance Configuration** screen. RAS stands for Reliability, Accessibility and Serviceability. From here you can enable or disable Sparing, NUMA Optimization, Patrol Scrub, Cloaking and setting the Correctable Error Threshold.



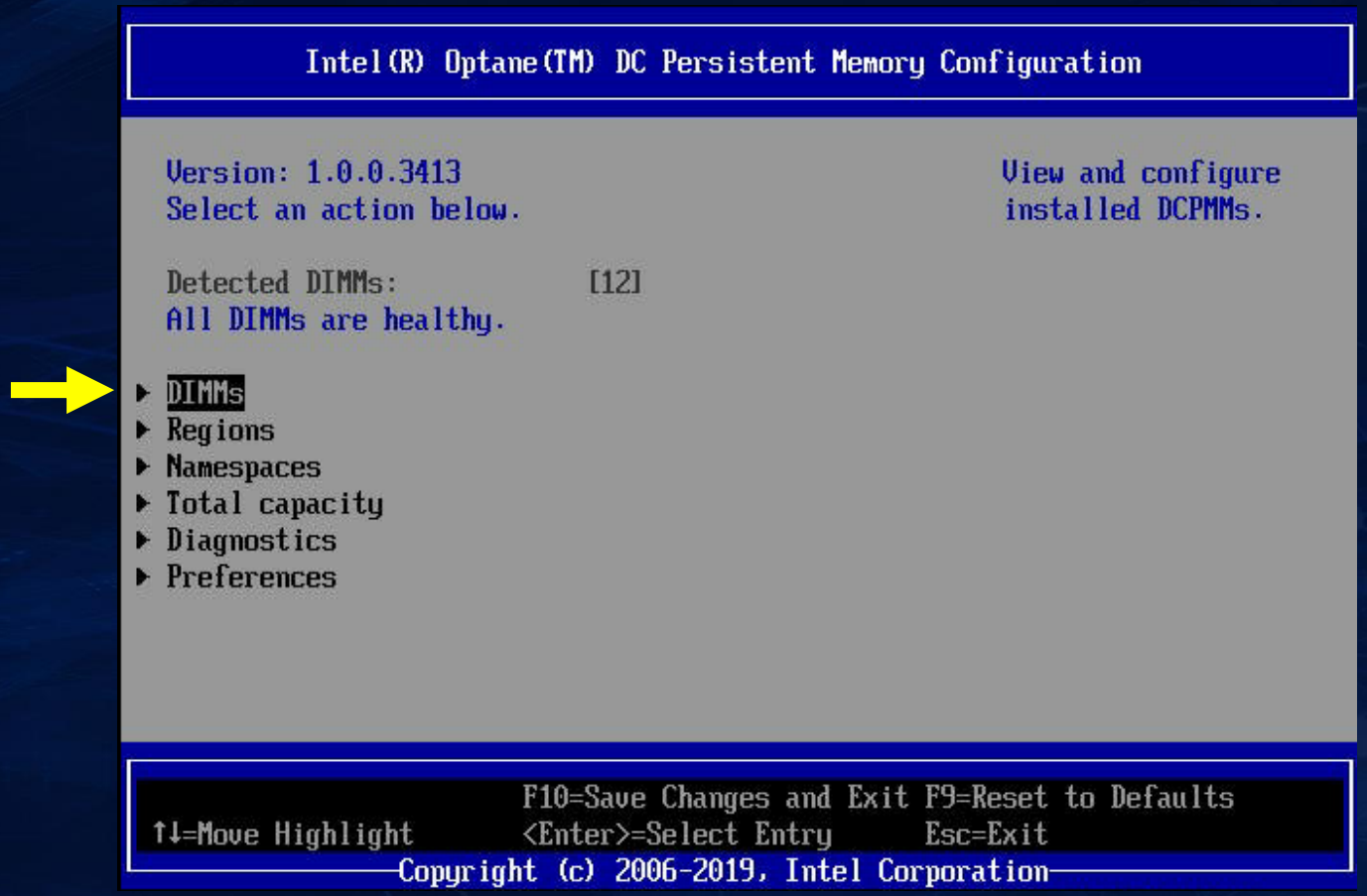
NAVIGATING TO THE MAIN DCPMM SETUP SCREENS



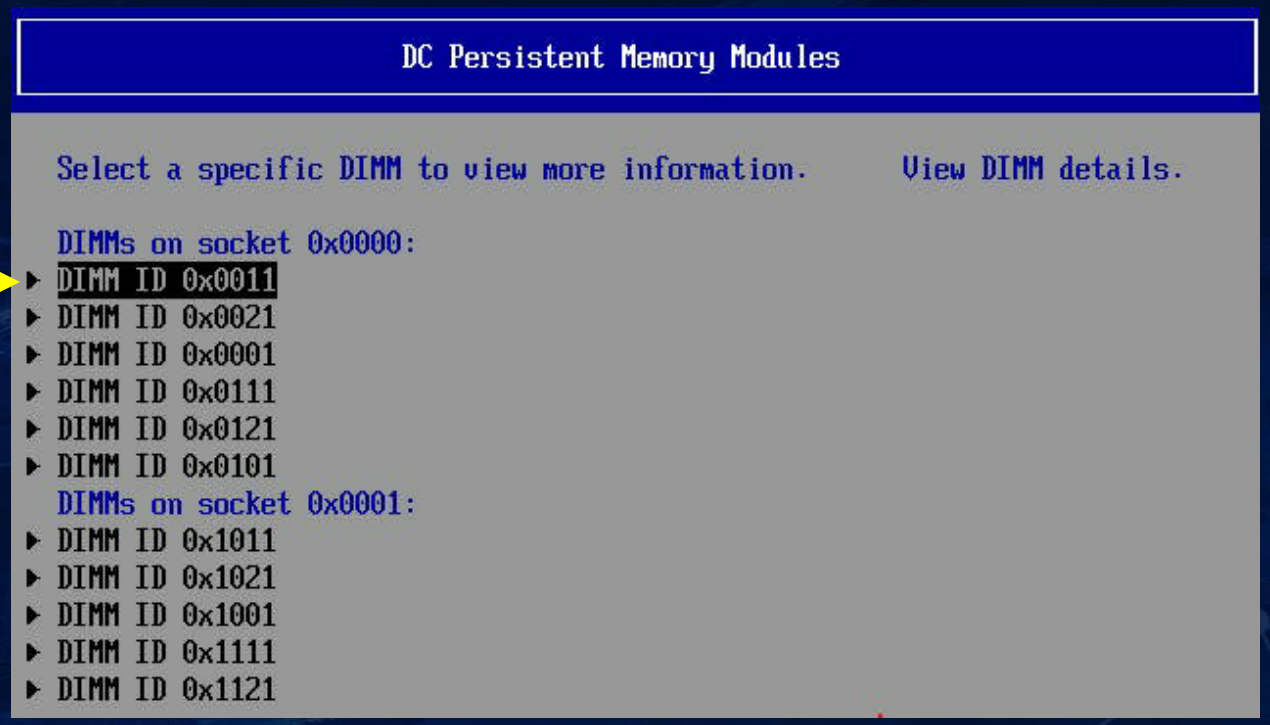
Most of the setup options for DCPMM are found in the **Intel® Optane™ DC Persistent Memory Configuration** screen. We will go over some of the options in the following slides but to get there from the opening BIOS screen, you need to select **Advanced**, then **PCI Configuration**, then **UEFI Option ROM Control**, then **Intel® Optane™ DC Persistent Memory Configuration**

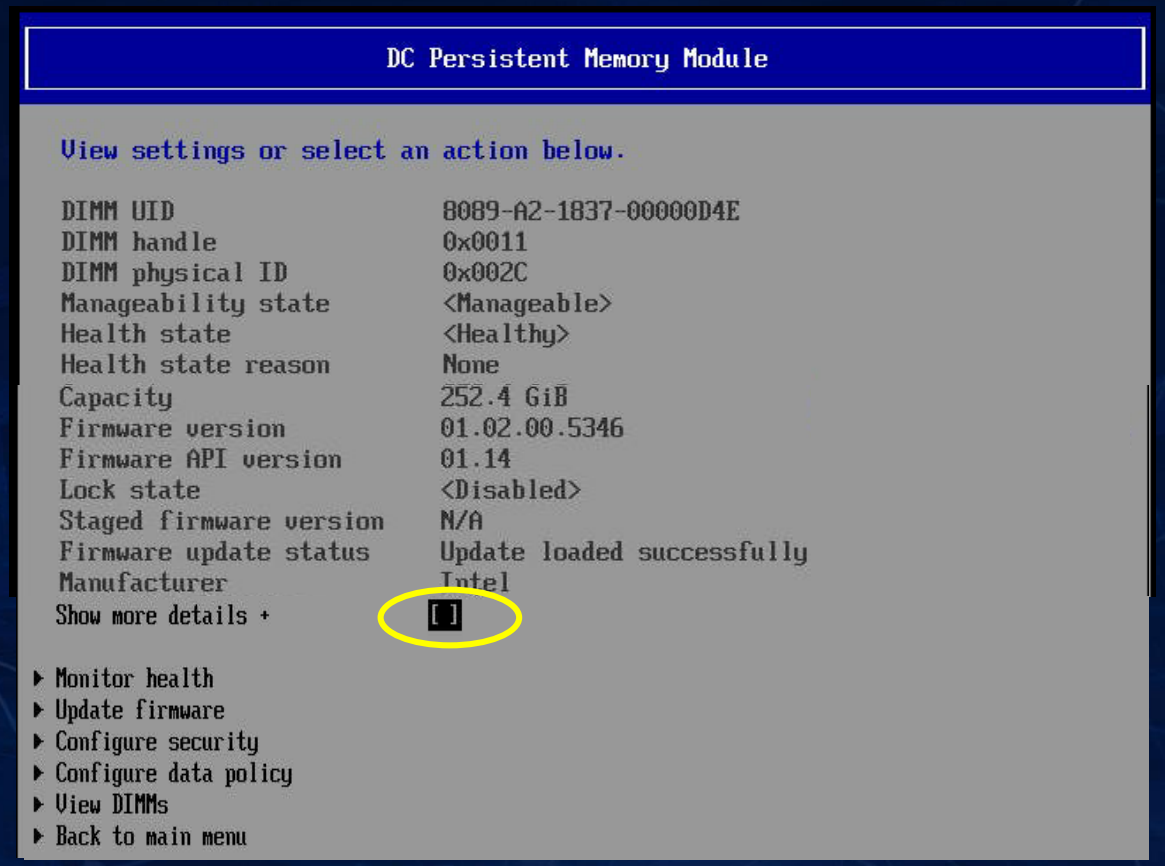
DCPMM MEMORY CONFIGURATION IN INTEL BIOS

This is the main **DCPMM Memory Configuration** screen in the Intel BIOS. You will get a count of detected DIMMS as well as a quick check on their health. From this screen you can access DIMM specific info, Regions, Namespaces, Capacity readings, Diagnostics, and Preferences. On the next slide we will look at what is available when clicking on the **DIMMs** link.



VIEWING INDIVIDUAL DCPMM DIMM INFORMATION

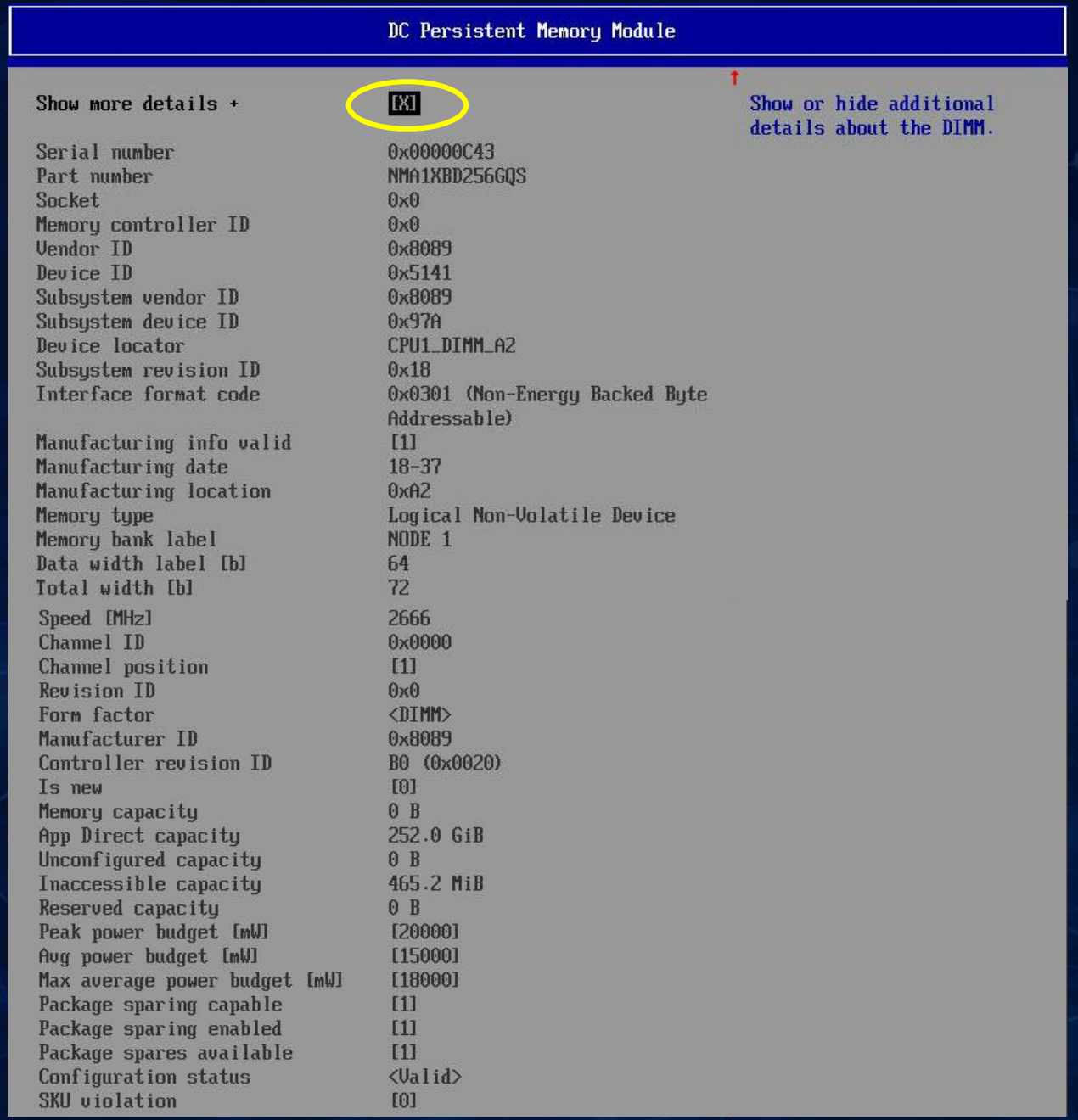




In the previous screen **DCPMM Memory Configuration**, when you select **DIMMs**, you are presented with the screen above on the left, and from there, you can click on a specific DIMM module to get information about that DIMM which is presented on the screen to the right. From this screen, aside from getting a lot of information about the DIMM like the handle number, the health, the capacity, and the firmware version, you can prob deeper into the health of the DIMM, you can update the firmware, and you can configure security and data policy on the DIMM. Clicking on Show More Details will display even more information about the DIMM as we will see in the next slide.

VIEWING MORE DIMM INFORMATION PART 1

In the **DC Persistent Memory Module** screen, when you select **Show More Details** you are presented with the screen to the right (plus the screen on the next slide). As you can see there is a wealth of information about the DIMM including the serial number, the manufacturing date, the channel position, and the controller revision, just to name a few.



(Information continued on next slide)

VIEWING MORE DIMM INFORMATION PART 2

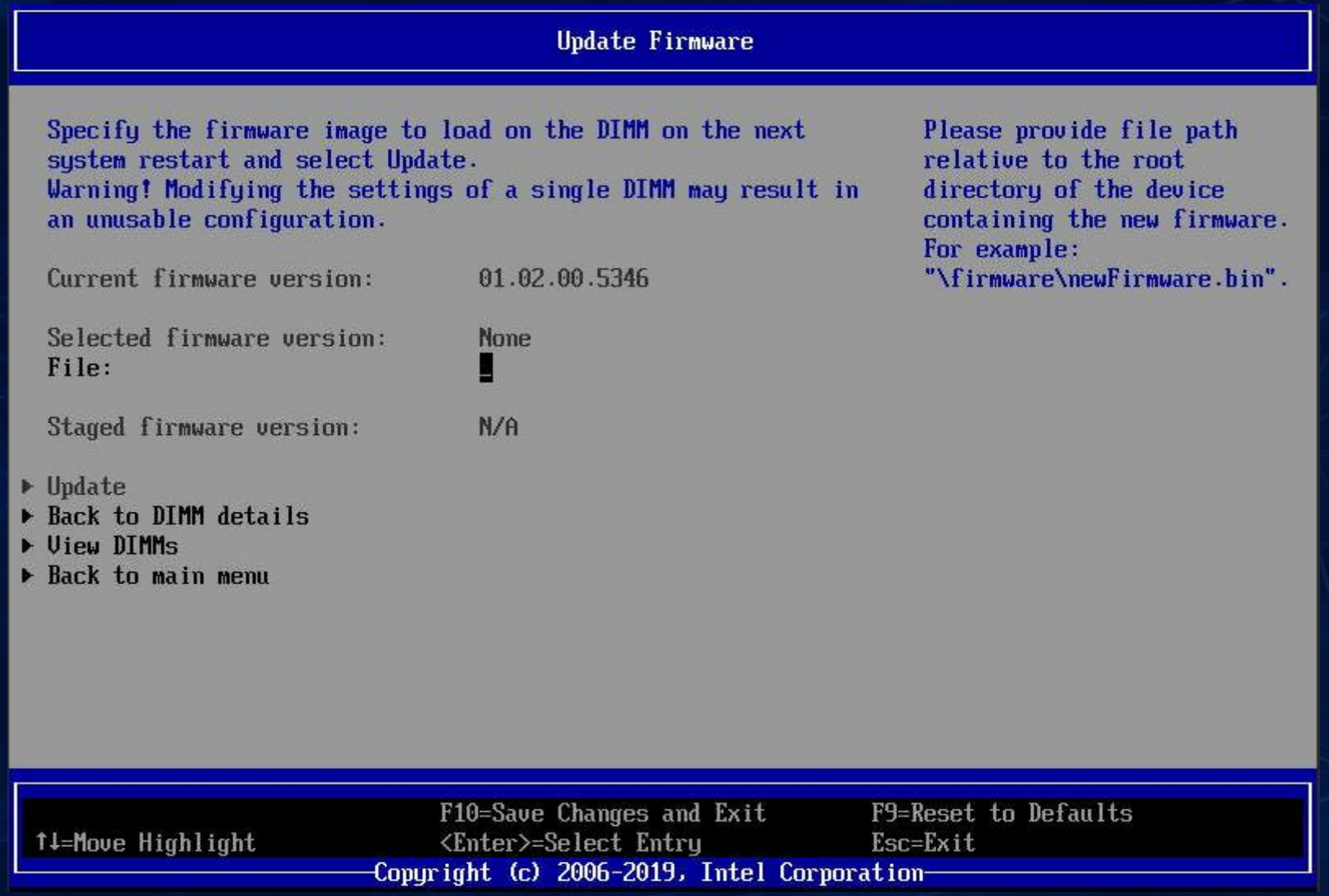
This is the rest of the information that is displayed when **Show More Details** has been selected from the **DC Persistent Memory Module** screen. I won't tire you by reading all the items on this screen but as you can see, there is a LOT of information.

MONITORING DCPMM HEALTH

In the previous screen **DC Persistent Memory Module**, when you select **Monitor Health**, you are presented with the screen to the right, and from there you can see the values for various sensors as well as how many times the thresholds have been exceeded or not met on things like the temperature of the Media on the DIMM or the controller temperature. You also can get a reading here of how much “life” is left in the DIMM expressed as a percentage. There is also information on the Power On time, Up time, Power cycles and Firmware error counts. Finally, at the bottom of the screen you can set non-critical thresholds. Be sure to Apply Changes if you update any settings.

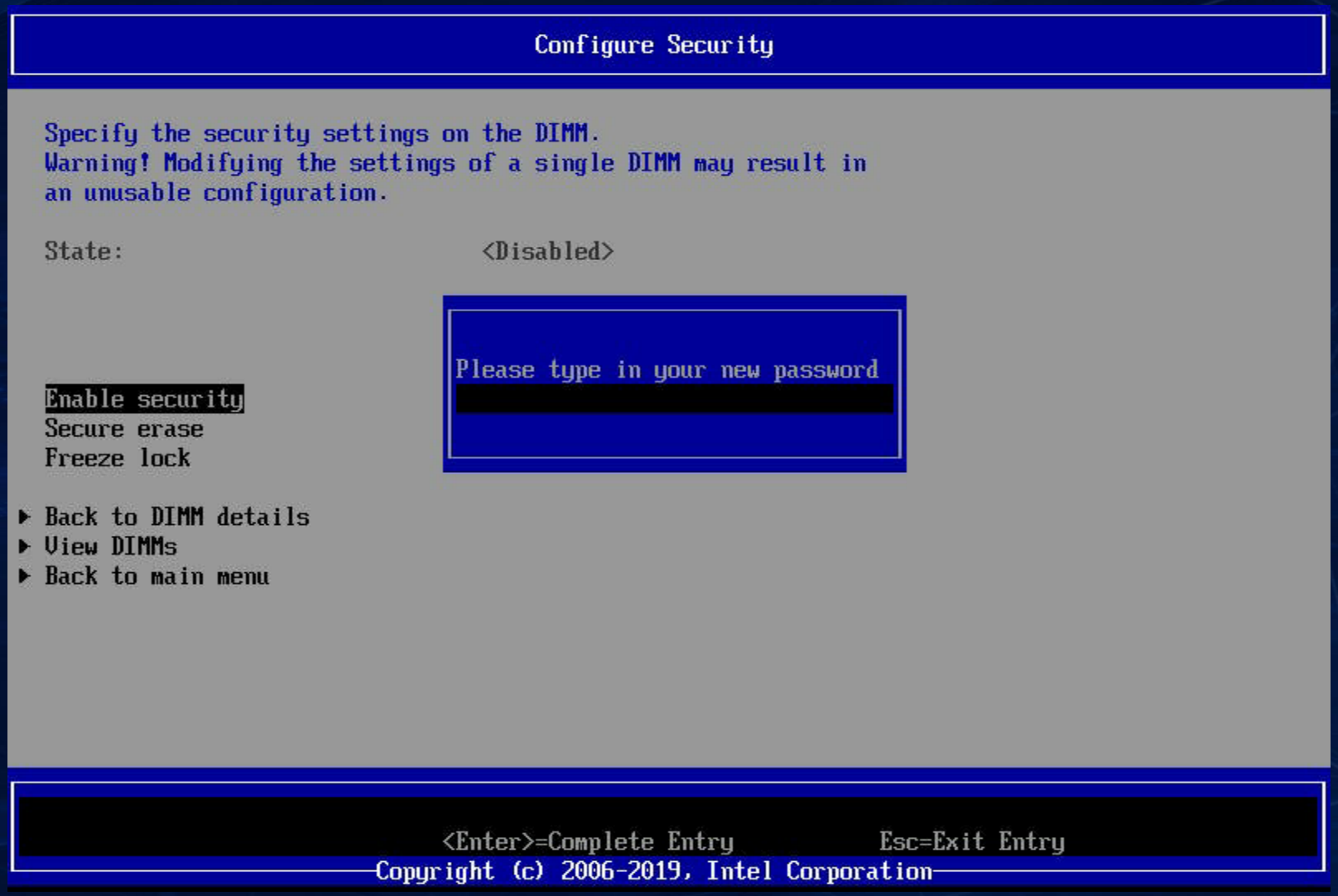
UPDATING DCPMM FIRMWARE

In the previous screen **DC Persistent Memory Module**, when you select **Update Firmware**, the screen to the right is what you are presented with. You can specify a file containing the new firmware code and then select **Update.**



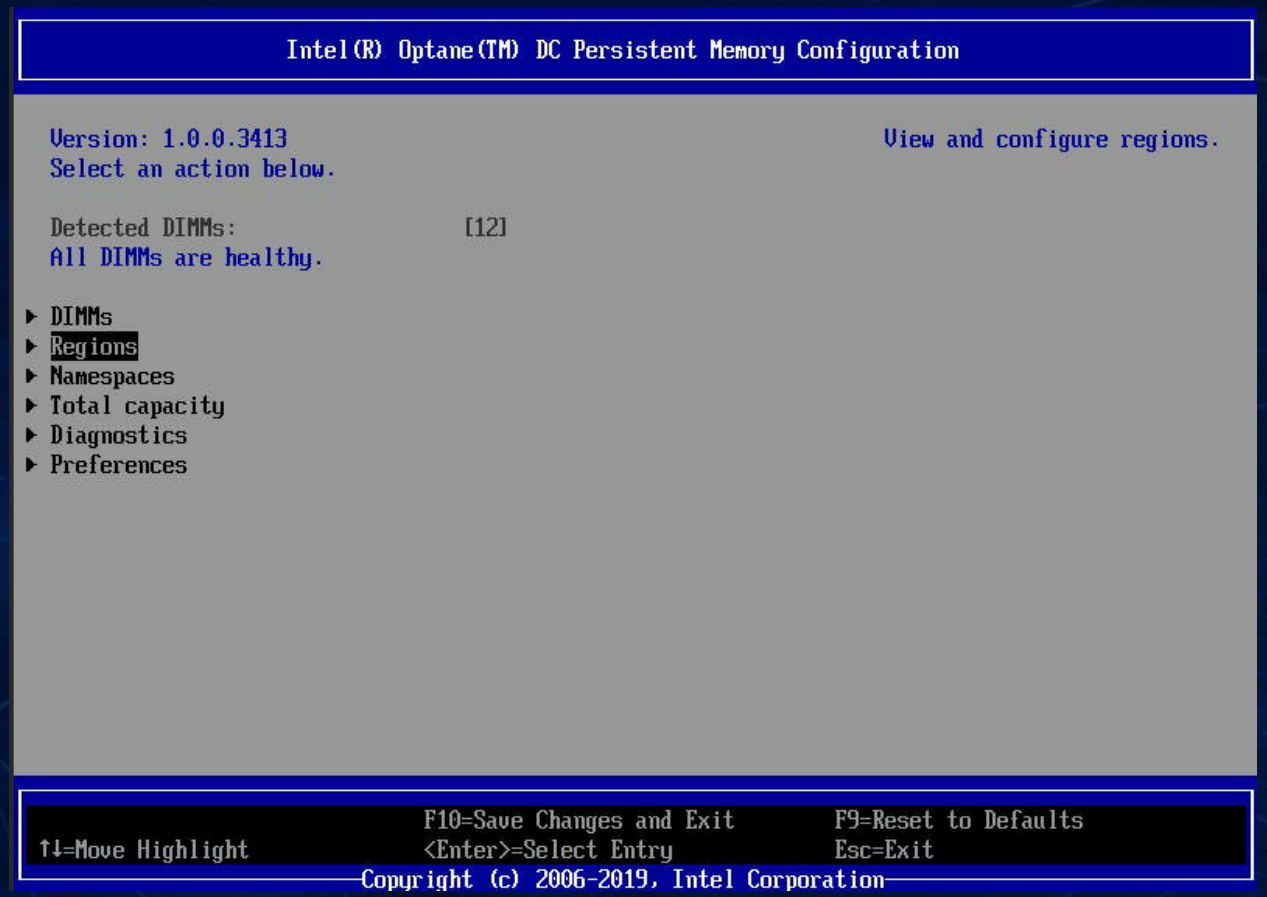
CONFIGURING DCPMM SECURITY

In the previous screen **DC Persistent Memory Module**, when you select **Configure Security**, the screen to the right is what you are presented with. If you select to set a password, it is stored and automatically applied to unlock DCPMMs before the operating system starts running, but the secure erase action still requires the passphrase. Secure erase is used to erase the encrypted data on the DIMM. Freeze lock is used to lock the security settings of the DIMM.

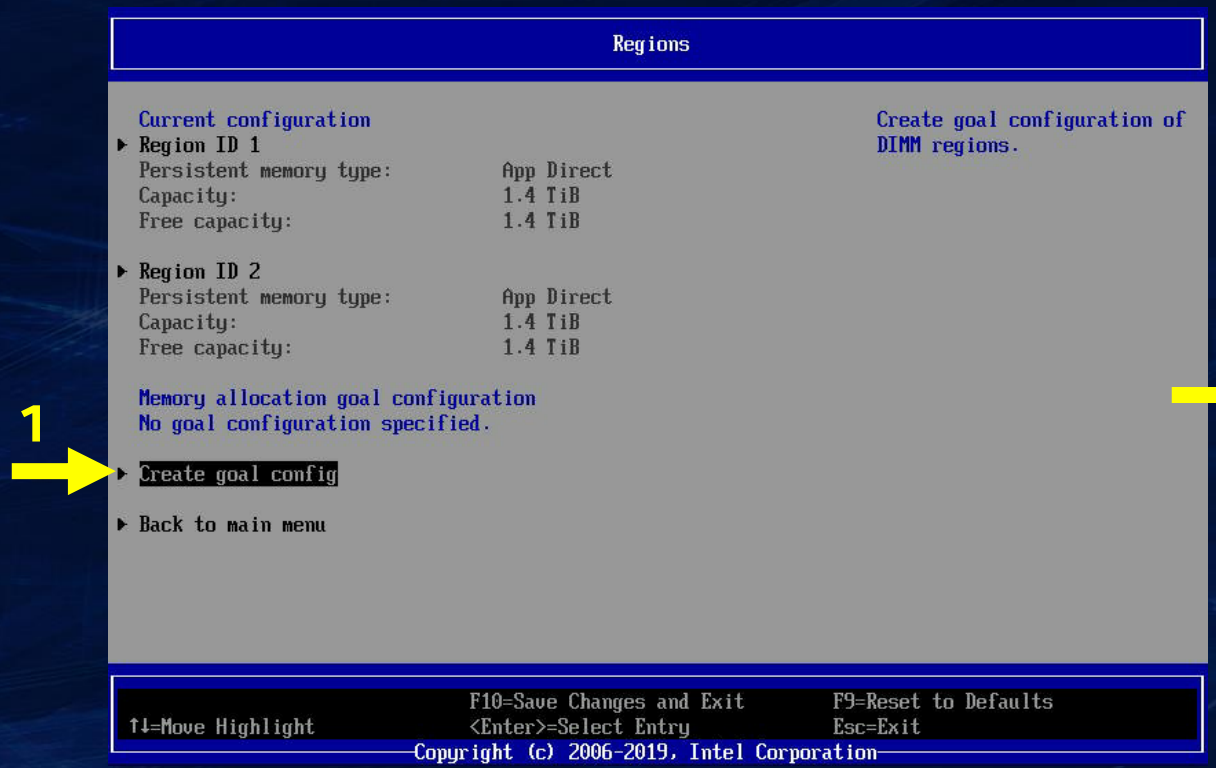


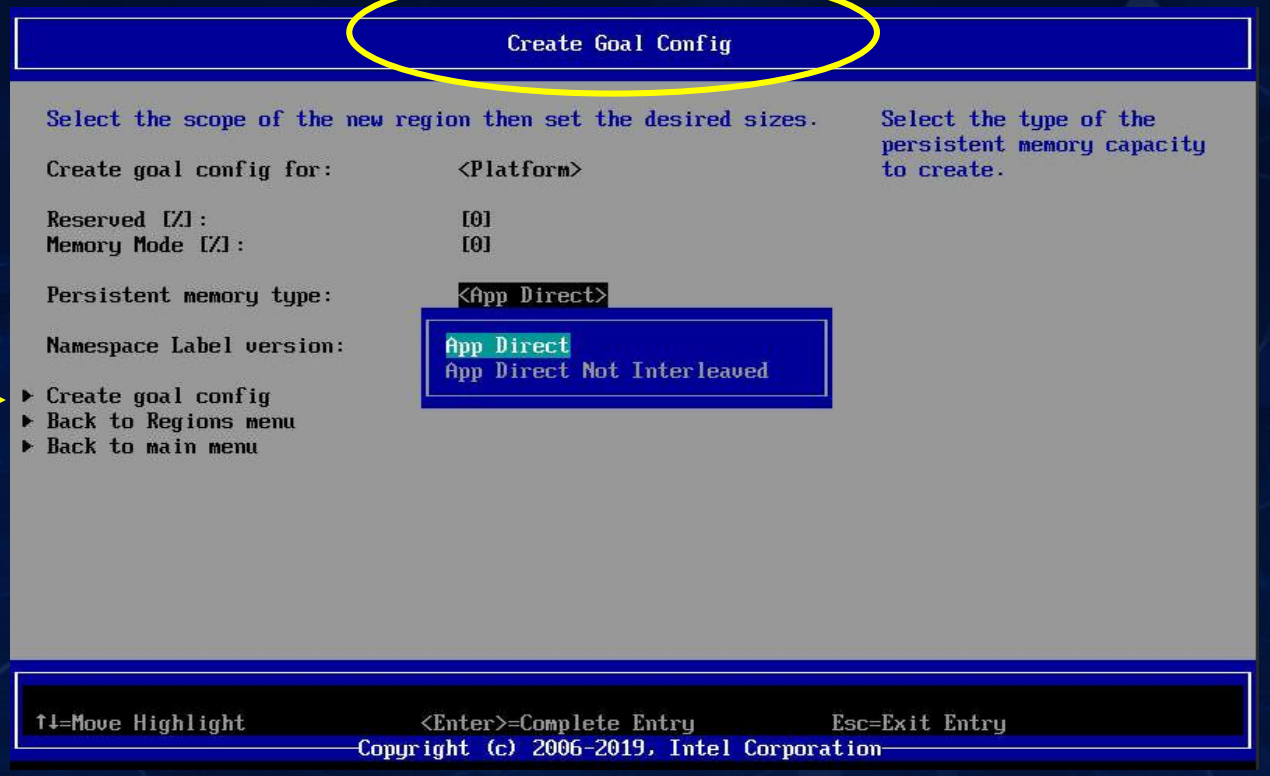
SETTINGS IN BIOS FOR APP DIRECT

To use DCPMM in App Direct mode, several steps need to be performed, including creating a **goal** which identifies how much memory to use, creating **regions** which are a group of one or more DCPMMs, and create **namespaces** which define a contiguously addressed range of non-volatile memory conceptually similar to a hard disk partition. From the **DCPMM Memory Configuration** BIOS screen you can do all of these steps. Note that creating a goal is part of the creating namespaces process. Also note that from this screen you can get to an option for running diagnostics on the DCPMM which we will look at later in this presentation.



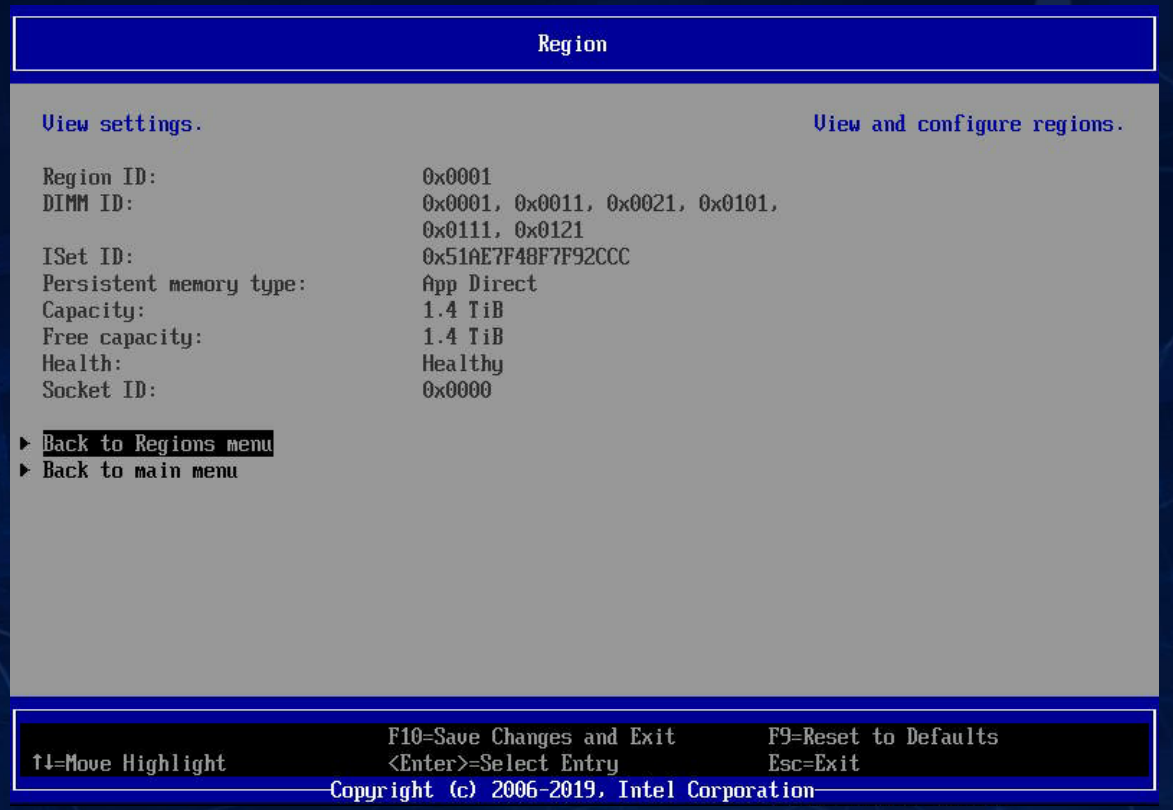
CREATING DCPMM GOALS IN BIOS





Creating a goal is a two-step process. The first step is to select **Create Goal Config** from the **Regions** screen. Once you do that you will be presented with the screen on the right side of this slide. When creating a goal, there are several options. One option is to select if the goal is for the entire platform (which is the default) or if you want to create a goal for one socket on the platform. Another option is determining if the memory will be standard App Direct which is interleaved or if the memory will be App Direct non-interleaved. Once you have made your selections, the second and final step is to click on **Create Goal Config** in the **Create Goal Config** screen. A reboot is required.

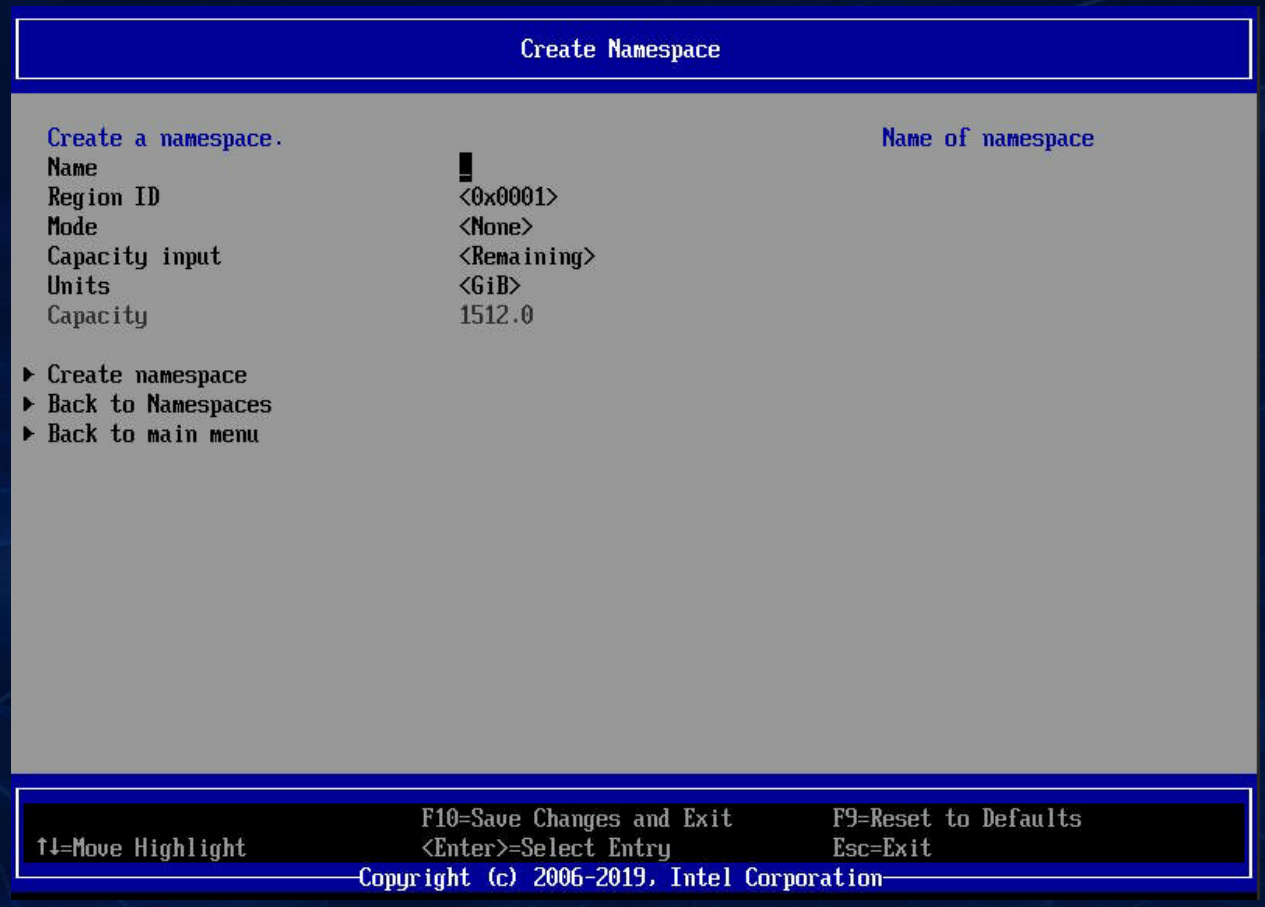
VIEWING DCPMM REGION SETTING IN BIOS



To view region settings, select a region from the **Regions** screen and when you press Enter you will see a screen similar to the one on the right side of this slide, showing the Region ID, the DIMMs that are part of that region, the persistent memory type (standard interleaved or non-interleaved), the capacity, the health and the socket the region is tied to.

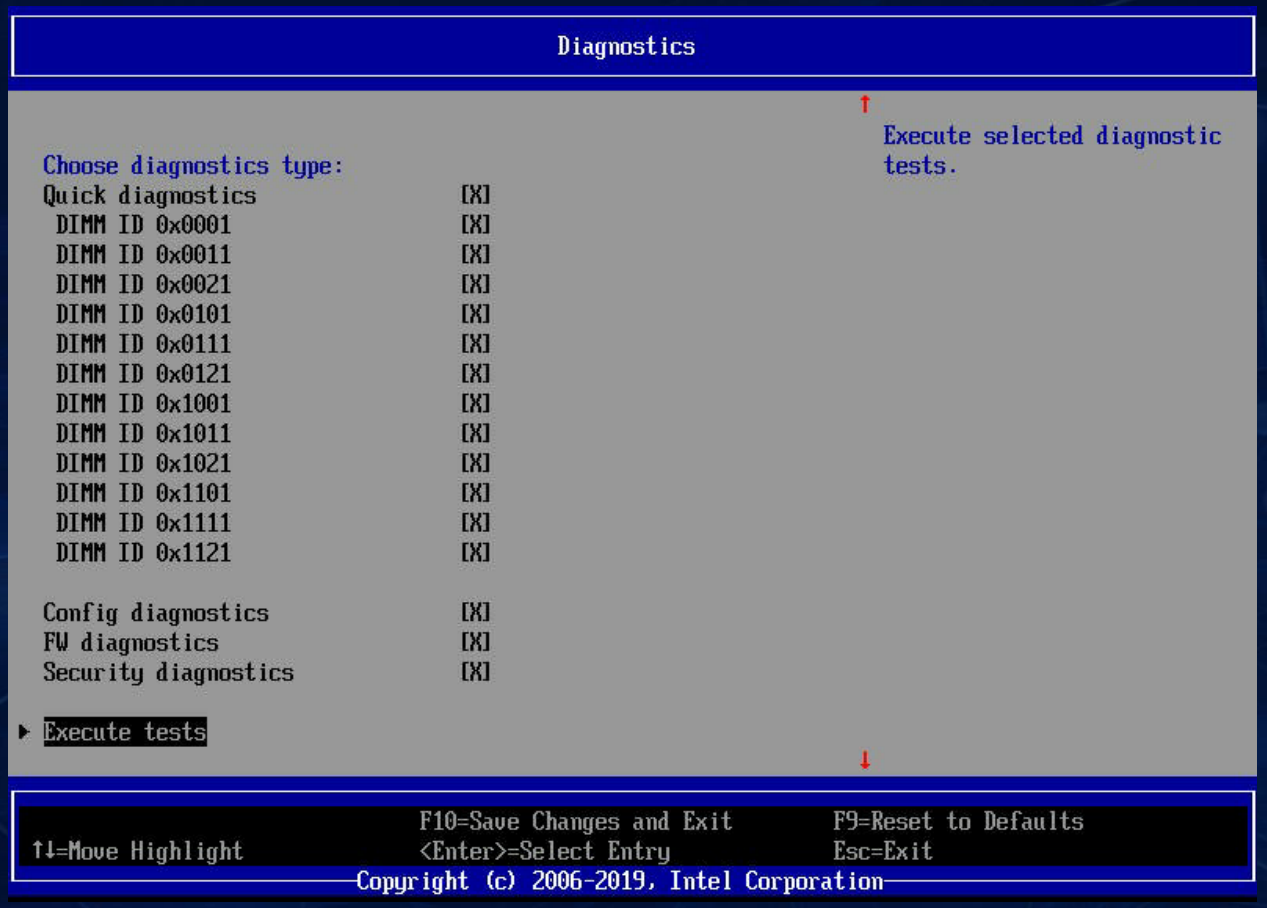
CREATING DCPMM NAMESPACE SETTING IN BIOS

From the **DCPMM Memory Configuration** BIOS screen you can also select to create a namespace. The screen on the right is what is displayed and allows options for giving the namespace a name or label, associating it with a region, and assigning a size to the namespace.



RUNNING DIAGNOSTICS ON DCPMM

From the **DCPMM Memory Configuration** BIOS screen you can select **Diagnostics** which will allow you to run diagnostics on individual DIMMs or all of them, as well as validating the configuration parameters, and checking the firmware and security settings.



SUMMARY

- The Intel BIOS is a powerful tool for configuring and diagnosing Intel® Optane™ DC persistent memory modules (DCPMMs)
- BIOS can configure the DCPMMs for Memory Mode or App Direct Mode
- In BIOS, you can configure Goals, Regions, and Namespaces required for App Direct operations
- BIOS has a health check option for DCPMM modules