CLAIMS

1. A method of performing persistent operations, the method comprising: receiving, by a non-volatile dual in-line memory module (NVDIMM) configured to support Persistent Writes, a Persistent Write command and associated write data from a host; performing a Persistent Write of the write data to a non-volatile memory in the NVDIMM based on the Persistent Write command; receiving a write identification (WID) associated with the Persistent Write command from the host upon successful completion of the Persistent Write; receiving, from the host, a request to send status for multiple Persistent Writes along with associated WIDs; and receiving, by the NVDIMM, a group of two or more Persistent Write commands with a common WID, with the last Persistent Write command of the group having a Persist bit set to 1 and the remaining Persistent Write commands having respective Persist bits set to 0 and providing a Persistent Write completion indication for the last Persistent Write command.

2. The method of claim 1, further comprising sending, from the NVDIMM upon successful completion of the Persistent Write, a Persistent Write completion indication along with the associated WID to the host.

3. The method of claim 2, wherein sending the Persistent Write completion indication comprises sending two or more Persistent Write completion indications from the NVDIMM to the host in a different order from an order in which corresponding two or more Persistent Write commands were received from the host.

4. The method of claim 1, further comprising sending a status packet from the NVDIMM to the host, the status packet comprising WIDs for Persistent Write commands whose execution has been completed.

5. The method of claim 1, wherein the WID comprises a multi-bit identification of a Persistent Write and a valid bit.

6. The method of claim 1, further comprising receiving, by the NVDIMM, a FLUSH command from the host, wherein the FLUSH command indicates that all prior writes buffered in volatile media are to be pushed to non-volatile or persistent memory.

7. The method of claim 6, further comprising sending a FLUSH completion indication upon completion of execution of the FLUSH command from the NVDIMM to the host.

8. The method of claim 1, further comprising receiving, by the NVDIMM, one or more Persistent Write commands, maintaining statuses of the one or more Persistent Write commands completed in a completed bitmap and statuses of the one or more Persistent Write commands pending in a pending bitmap, and upon request for status from the host, providing the completed bitmap if there is no uncorrectable error or the pending bitmap if there is an uncorrectable error.

9. A method of performing persistent operations, the method comprising: sending, from a host to a non-volatile dual in-line memory module (NVDIMM) configured to support Persistent Writes, a Persistent Write command and associated write data; providing a write identification

(WID) associated with the Persistent Write command to the NVDIMM from the host upon successful completion of the Persistent Write; sending, from the host to the NVDIMM, a request to send status for multiple Persistent Writes along with associated WIDs; and sending from the host to the NVDIMM, a group of two or more Persistent Write commands with a common WID, with the last Persistent Write command of the group having a Persist bit set to 1 and the remaining Persistent Write commands having respective Persist bits set to 0 and receiving from the NVDIMM, a Persistent Write completion indication for the last Persistent Write, wherein the Persistent Write command indicates to the NVDIMM to perform a Persistent Write of the write data to a non-volatile memory.

10. The method of claim 9, further comprising receiving at the host, a Persistent Write completion indication along with the associated WID from the NVDIMM upon successful completion of the Persistent Write.

11. The method of claim 10, wherein receiving the Persistent Write completion indication comprises receiving from the NVDIMM, two or more Persistent Write completion indications in a different order from an order in which corresponding two or more Persistent Write commands were sent from the host to the NVDIMM.

12. The method of claim 11, further comprising receiving a status packet by the host from the NVDIMM, the status packet comprising WIDs for Persistent Write commands whose execution has been completed.

13. The method of claim 9, wherein the WID comprises a multi-bit identification of a Persistent Write and a valid bit.

14. The method of claim 9, further comprising sending a FLUSH command from the host to the NVDIMM, wherein the FLUSH command indicates that all prior writes buffered in volatile media are to be pushed to non-volatile or persistent memory by the NVDIMM.

15. The method of claim 14, further comprising receiving at the host, a FLUSH completion indication upon completion by the NVDIMM of execution of the FLUSH command.

16. An apparatus comprising: a host; and a non-volatile dual in-line memory module (NVDIMM) configured to support Persistent Writes and configured to: receive the Persistent Write command and associated write data from the host; and perform a Persistent Write of the write data to a non-volatile memory in the NVDIMM based on the Persistent Write command; receive a write identification (WID) associated with the Persistent Write command from the host upon successful completion of the Persistent Write; receive, from the host, a request to send status for multiple Persistent Writes along with associated WIDs; and receive a group of two or more Persistent Write commands with a common WID, with the last Persistent Write command of the group having a Persist bit set to 1 and the remaining Persistent Write commands having respective Persist bits set to 0 and providing a Persistent Write completion indication for the last Persistent Write command.

17. The apparatus of claim 16, wherein the NVDIMM is further configured to provide, upon successful completion of the Persistent Write, a Persistent Write completion indication along

with the associated WID to the host.

18. The apparatus of claim 17, wherein the NVDIMM is further configured to provide two or more Persistent Write completion indications to the host in a different order from an order in which corresponding two or more Persistent Write commands were received from the host.

19. The apparatus of claim 18, wherein the NVDIMM is further configured to provide a status packet to the host, the status packet comprising WIDs for Persistent Write commands whose execution has been completed.

20. The apparatus of claim 16, wherein the WID comprises a multi-bit identification of a Persistent Write and a valid bit.

21. The apparatus of claim 16, wherein the NVDIMM is further configured to receive a FLUSH command from the host, wherein the FLUSH command indicates that all prior writes buffered in volatile media are to be pushed to non-volatile or persistent memory.

22. The apparatus of claim 21, wherein the NVDIMM is further configured to provide a FLUSH completion indication upon completion of execution of the FLUSH command to the host.

23. The apparatus of claim 16, wherein the NVDIMM is further configured to receive one or more Persistent Write commands; maintain statuses of the one or more Persistent Write commands completed in a completed bitmap and statuses of the one or more Persistent Write commands pending in a pending bitmap; and upon request for status from the host, provide the completed bitmap if there is no uncorrectable error or the pending bitmap if there is an uncorrectable error.

24. An apparatus comprising: a host configured to send a Persistent Write command and associated write data; and a non-volatile dual in-line module (NVDIMM) configured to receive the Persistent Write command and the associated write data sent from the host, wherein the Persistent Write command indicates to the NVDIMM to perform a Persistent Write of the write data to a non-volatile memory of the NVDIMM, and wherein the host is further configured to provide a write identification (WID) associated with the Persistent Write command to the NVDIMM and send to the NVDIMM upon successful completion of the Persistent Write, a request to send status for multiple Persistent Writes along with associated WIDs, and to send to the NVDIMM, a group of two or more Persistent Write commands with a common WID, with the last Persistent Write command of the group having a Persist bit set to 1 and the remaining Persistent Write commands having respective Persist bits set to 0 and receive from the NVDIMM, a Persistent Write completion indication for the last Persistent Write.

25. The apparatus of claim 24, wherein the host is further configured to receive a Persistent Write completion indication along with the associated WID from the NVDIMM upon successful completion of the Persistent Write.

26. The apparatus of claim 25, wherein the host is further configured to receive from the

NVDIMM, two or more Persistent Write completion indications in a different order from an order in which corresponding two or more Persistent Write commands were sent to the NVDIMM.

27. The apparatus of claim 26, wherein the host is further configured to receive a status packet from the NVDIMM, the status packet comprising WIDs for Persistent Write commands whose execution has been completed.

28. The apparatus of claim 27, wherein the WID comprises a multi-bit identification of a Persistent Write and a valid bit.

29. The apparatus of claim 24, wherein the host is further configured to send a FLUSH command to the NVDIMM, wherein the FLUSH command indicates that all prior writes buffered in volatile media are to be pushed to non-volatile or persistent memory by the NVDIMM.

30. The apparatus of claim 29, wherein the host is further configured to receive a FLUSH completion indication upon completion by the NVDIMM of execution of the FLUSH command.