CORE Course description

CORE is the first course in the Intel® Solutions for Lustre* Software training curriculum. You'll learn about the various Intel® Solutions for Lustre* software, Linux and Lustre* fundamentals and will install a Lustre* system.

The modules covered in this course are:

1. Introduction to Intel® Solutions for Lustre* Software
2. Linux Essentials
3. Lustre* Fundamentals - Part 1
4. Lustre* Fundamentals - Part2
5. Intel Solutions for Lustre*
6. Lustre* - Manual Installation

Course Duration: Approx 6hrs.

Prerequisites:

- Strong Linux Administration and Storage skills

- Access to Intel® Enterprise Edition for Lustre* Software. You can download the software from the Reseller Portal or contact Intel Sales.

- Lustre* Users without Intel Support can also benefit from the training. However most modules refer to specific features with Intel® Enterprise Edition for Lustre* Software.

- Access to the Partner Installation Guide, provided with Intel® EE for Lustre* Software and Lustre* Manual at http://wiki.hpdd.intel.com or http://lustre.org under 'Documentation'.

- Minimum hardware for a basic configuration as defined in the Partner Installation Guide and Lustre* Manual (Chapter 5).

Module Name	Detailed Module Description	Module Objectives
Introduction to Intel® Solutions for Lustre* Software	This module introduces the Lustre* file system and its features. It also covers: - Characteristics of Lustre* - Key Markets for Lustre* - Advantages of Lustre*	At the end of this module you will be able to: - Define what the Lustre* file system is. - List the major characteristics of the Lustre* file system. - Identify the basic components of the Lustre* file system architecture.

	- Lustre* Architecture - Typical Lustre* I/O - Traditional network file system Vs Lustre* Module Duration: 30mins	- Identify the differences between traditional network file systems and a Lustre* file system. - List the three Lustre* based software solutions developed and offered by Intel. - Identify the features and technology that Intel adds to the Lustre* file system
Linux Essentials	This module provides a brief Linux overview. It'll cover: - Linux Users - Linux Vs Lustre* Features - Linux File systems - Linux Networking - Linux Storage Module Duration: 50mins	At the end of this module you will be able to: - Differentiate between kernel and user operations - Identify how tasks are scheduled on the CPU - Identify how processes can access hardware - Identify user accounts and access privileges, to include escalating privileges - Identify log files for both the kernel and system processes - Identify ways to manage Linux packages - Identify the some of the current file systems and their characteristics - Identify different aspects of Linux Networking, to include Ethernet, Infiniband and RDMA - Have a deeper understanding of Linux storage, to include SCSI and SATA
Lustre* Fundamentals - Part 1	This module covers the Lustre* fundamentals and its functionalities. Specifically : - Lustre* Storage Servers - Lustre* Storage Targets - Lustre* Clients and I/O Module Duration: 45mins	At the end of this module you will be able to: - Understand the main components of a Lustre* file system - Identify and differentiate between the different types of Lustre* servers - Identify and differentiate the different types of Lustre* storage targets - Identify and differentiate the different types of Lustre* clients - Know the basic I/O operations between Lustre* clients and servers - Know of the important components of a Lustre* file, and how those components are used
Lustre* Fundamentals - Part 2	This module introduces the Lustre* Network (LNET) and its features. It also covers: - Lustre* Command Line Interface (CLI) - Lustre* High Availability (HA)	At the end of this module you will be able to: - Understand Lustre* Networking and its components - Identify the layers in the Lustre* network stack - Identify that different protocols that are used to provide RDMA and

	Module Duration: 45mins	IP-based networking to Lustre* - Configure, start and stop Lustre* networking - Use the Lustre* command line interface to perform administrative and end user functions - Understand how High Availability allows Lustre* to respond to component failure and remain functional
Intel® Solutions for Lustre* Software	This module provides an overview about the Intel® Solutions for Lustre* Software. It covers: - The different types of Lustre* releases from Intel - The differences between the Lustre* releases from Intel. - Information about the components within Intel® Enterprise Edition for Lustre* Software. Module Duration: 80mins	At the end of this module you will be able to: - Describe and differentiate between the primary Lustre* solutions from Intel - Describe the components of Intel® EE for Lustre* software, and what benefits they add to Lustre*
Lustre* - Manual Installation	This module covers the manual installation in the traditional way to deploy Lustre*. It also covers: - Types of Lustre* Installations - Manual Lustre* Installation using ldiskfs - Manual Lustre* Installation using ZFS* - Starting and Stopping the Lustre* file system Module Duration: 35mins + 60mins (for Installation)	At the end of this module you will be able to: -Identify the Lustre* deployments that require a manual installation -Identify the required and optional components that are needed in addition to the Lustre* software -Discuss and perform the process of a manual installation of Lustre*, for both ldiskfs and ZFS -Discuss the prerequisites to perform a Lustre* installation -Identify the client and server packages to be installed -Perform the initialization of management, metadata and object storage targets -Safely start and stop a Lustre* file system

BASIC course description
After learning the fundamentals of Lustre* technology in the CORE course, this course will expose you to the key capabilities like Intel® Manager for Lustre* Software and will give you the tools necessary to perform basic triage and escalate issues through Intel's support processes. The modules covered in this course are: 1. Introduction to Intel® Manager for Lustre* Software 2. Enabling Lustre* Monitoring with Intel® Manager for Lustre* Software

3. Lustre* Triage & Support

Course Duration: 3hrs

Prerequisite:
1. Same as prerequisites for CORE course.
2. Successful completion of CORE course.

Module Name	Detailed Module Description	Module Objectives
Introduction to Intel® Manager for Lustre* Software	This module introduces the Intel® Manager for Lustre* Software and its key functionalities. It also covers: - Installing Intel® Manager for Lustre* Software - UI Walkthrough for Intel® Manager for Lustre* Software - Monitoring Manual Lustre* installations for Intel® Manager for Lustre* Software Module Duration: 40 mins + 45 mins for installation/configuration.	At the end of this module you will be able to: - Identify the prerequisites to install Intel® Manager for Lustre* Software - Perform an installation of Intel® Manager for Lustre* Software - Identify key aspects of Intel® Manager for Lustre* Software - Identify the management aspects of Intel® Manager for Lustre* Software, including setting up accounts - Understand the performance information that Intel® Manager for Lustre* Software provides for each monitored Lustre* file system
Enabling Lustre* Monitoring with Intel® Manager for Lustre* Software	This module provides the UI walk-through on the monitoring features. It also covers: - Enabling Lustre* Monitoring with Intel® Manager for Lustre* Software Module Duration: 25 mins + 45 mins for installation/configuration	At the end of this module you will be able to: - Use Intel® Manager for Lustre* Software to enable monitoring of an existing Lustre* file system - Use Intel® Manager for Lustre* Software to monitor the status of the components of Lustre* file system - Use Intel® Manager for Lustre* Software to monitor the load characteristics on the Lustre* servers - Use Intel® Manager for Lustre* Software to monitor I/O performance characteristics on the Lustre* storage targets -

| Lustre* Triage and Support | This module provides the overview of the triage and support processes involved. It covers:
- Tracking Lustre* issues
- Triage, who own the issue
- Intel Support levels
- Issue reporting
- Gathering Information
- Tracking Information

Module Duration: 40mins | At the end of this module you will be able to:
- Identify and explain the responsibilities in the levels of Intel support for Lustre*
- Understand and use the different types of JIRA accounts
- Collect information and report issues through HPDD JIRA tracking system
- Track and respond to issues as they are worked on by Intel support |

STANDARD Course description	

Building upon the CORE & BASIC courses, this course will allow you to learn about how to Architect an Intel® Enterprise Edition for Lustre* Software solution, go deeper with Intel® Manager for Lustre* Software and the many ways to troubleshoot Lustre*.

The modules covered in this course are:

1. Architecting Intel® Enterprise Edition for Lustre* Software
2. Provisioning Lustre* with Intel® Manager for Lustre* Software
3. Lustre* Troubleshooting

Course Duration: 3hrs

Prerequisite:
1. Same as prerequisites for CORE & BASIC courses.
2. Successful completion of CORE & BASIC courses.

Module Name	**Detailed Module Description**	**Module Objectives**

Architecting Intel® Enterprise Edition for Lustre* Software	In this module you'll learn how to Architect the Intel® Enterprise Edition for Lustre* Software. It covers: - Intel® Enterprise Edition for Lustre* Software Overview - High Availability Configuration Specification - Overall System Configuration - Server Requirements - Storage Target Requirements - What Not to Do Module Duration: 40mins	At the end of this module you will be able to: - Prepare a Lustre* system for Intel® Manager for Lustre* Software to provision and subsequently manage. - Details of what was in High Availability configuration specification - And lastly what you must NOT do when architecting and configuring a Lustre* system.
Provisioning Lustre* with Intel® Manager for Lustre* Software	This module covers the deployment and management of Lustre* File system. It also covers: - Provisioning Requirements for Intel® Manager for Lustre* Software driven Lustre* Installations -Provisioning a Lustre* File System using Intel® Manager for Lustre* Software Module Duration: 35mins	At the end of this module you will be able to: - List the prerequisites to use Intel® Manager for Lustre* Software to provision a Lustre* file system - Explain the different steps to using Intel® Manager for Lustre* Software to provision a Lustre* file system, to include adding servers, targets, and creating the file system - Successfully use Intel® Manager for Lustre* Software to provision a Lustre* file system
Lustre* Troubleshooting	This module is about troubleshooting Lustre*. It covers: - Preventing data loss - Types of Lustre* failures - Data collection - Troubleshooting Lustre* - Resolving specific Lustre* issues Module Duration: 80mins	At the end of this module you will be able to: - Prevent data loss by preventing problems - Explain the different types of Lustre* failures and Linux kernel errors - Collect data relevant to the problem from several sources, including creating proactive monitoring tasks - Follow a logical progression to Troubleshoot Lustre* issues, including preventative measures with the OSTs to help ensure business continuity - Resolve selected Lustre* issues with Lustre* OSTs
ELITE Course description		

After completing CORE, BASIC & STANDARD, you will have gathered significant knowledge about Intel® Solutions for Lustre* software. This course will further strengthen the foundation that you built from the previous three courses. We will focus on advanced Lustre* topics such as File Striping, OST Pools, Quotas and Lustre* Networking.

The modules covered in this course are:

1. Lustre* File Striping
2. Lustre* Quota's
3. Lustre* OST pools
4. Lustre* Backup & Restore
5. Lustre* Networking
6. Managing Lustre* with Intel® Manager for Lustre* Software &
7. Lustre* Debugging

Course Duration: 5 hrs

Prerequisites:
1. Same as prerequisites for CORE, BASIC & STANDARD courses.
2. Successful completion of CORE, BASIC & STANDARD courses.

Module Name	Detailed Module Description	Module Objectives
Lustre* File Striping	This module covers Lustre* file striping. It includes: - Overview of file striping - Advantages and disadvantages - Striping new files - Default striping policies - Setting the striping policy on a directory - File allocation algorithms - Overriding the striping policy Module Duration: 30mins	At the end of this module you will be able to: - Understand Lustre striping and how it applies to the objects that contain the block data of the Lustre files. - Learn about stripe count, size and offset - Learn about the advantages and disadvantages of striping - Become familiar with RR and QOS algorithms - Set, check and verify striping patterns.

Lustre* Quotas	This module covers the Lustre* quotas. It includes: - Overview of Lustre* quotas - Details of Lustre* quotas - Configuration of Lustre* quotas - Quota Administration - Quota Usage by End Users Module Duration: 30mins	At the end of this module you will: Learn about Lustre* quotas, including the similarities and differences between Linux quotas and Lustre* quotas. You will be able to implement Lustre* quotas and perform administration of the Lustre* quotas. You will also be able to train end users in how to perform relevant Lustre* quota commands in the daily work.
Lustre* OST pools	This module covers Lustre* OST pools. It includes: - An introduction and overview of OST pools - Configuring OST Pools - Administration of OST Pools - OST Pool usage by End Users Module Duration: 30mins	At the end of this module you will be able to: Design and implement OST pools, administer OST pools, and train end users how to perform relevant OST pool commands in their daily work.
Lustre* Backup & Restore	This module covers performing backup and restore of a Lustre* file system. It includes: - Options for performing a Lustre* backup - Overview of performing selected Lustre* backups - Details on performing a low-level Lustre* backup and restoration Module Duration: 40mins	At the end of this module you will be able to: Select the best type of backup for a given Lustre* deployment, perform different types of backups of a Lustre* file system, and you will be able to restore a Lustre* file system from backup.

Lustre* Networking	This module covers Lustre* Networking. It includes: - An overview of LNET - Network Identifier Configuration - Multi-rail, multi-path and multi-plane network connections - Details of interface bonding - Overview and configuration of LNET routing Module Duration: 75mins	At the end of this module you will: Have a better understanding of LNET. You will know how to configure a NID for both small and large deployments, you will be able to determine which type of network connections are supported, which are not, and which aspects of each type of network connection are supported. You will have detailed information about interfaces bonding, and you will be able to configure and administer LNET routing.
Managing Lustre* with Intel® Manager for Lustre* Software	This module covers Managing Lustre* with Intel® Manager for Lustre* Software. It includes these topics: - Start and Stop a File System - Add Capacity to a File System - Failover / Failback a Storage Target - Failover all Targets on a Server - Remove an OST from the File System Module Duration: 30mins	At the end of this module you will be able to: Manage a Lustre* file system using Intel® Manager for Lustre* Software. Execute typical steps such as starting & stopping a file system, adding capacity, configuring the HA parameters. Also with many storage targets to manage, you'll see how Intel® Manager for Lustre software can be used to failover and failback targets. And lastly how to remove an OST from the filesystem.
Lustre* Debugging	This module covers Lustre* Debugging. It includes: - An overview of Lustre* Debugging - Details of a Lustre* Bug - Lustre* Debug Logs - Lustre* Debugging options - Lustre* Debug Daemon Module Duration: 50mins	At the end of this module you will be able to: Understand and use the Lustre* debugging techniques. You will know how to collect and process a Lustre* bug, you will know how to configure different debug options, you will know how to access the Lustre* debug logs, and you will know how to use the Lustre* debug daemon.