



Intel® Manager for Lustre* (IML) IML Installation & Configuration

Implementing an IEEL Solution
Session 03
June 2014

* Other names and brands may be claimed as the property of others.

IML Installation & Configuration Objectives

A Detailed review of the IML Software

- IML Key Features
- What the IML management tool manages
- Overview of the IML software architecture
- Hands-on Lab experience installing IML
- Installing IML Agents on the Lustre servers
- A walk through of the IML GUI and CLI interfaces is provided as an independent lab exercise

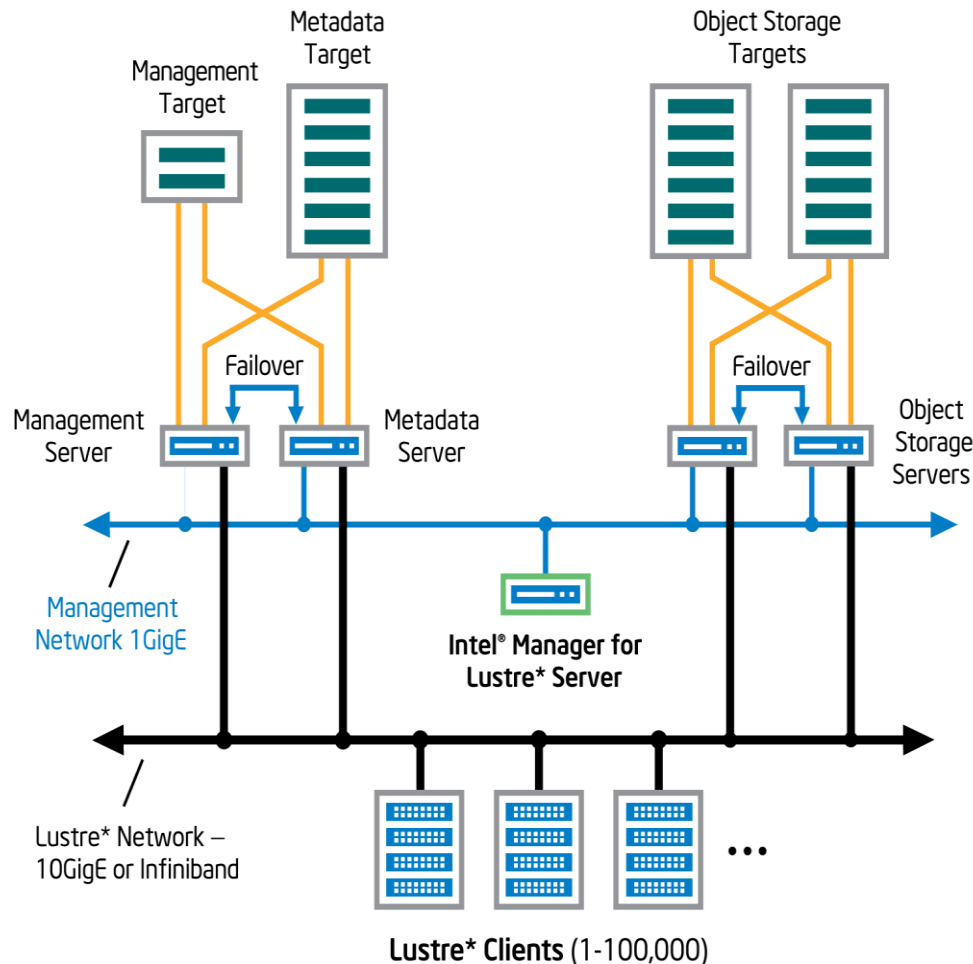
Intel® Manager for Lustre* (IML)

Key Features

- Intuitive, browser-based administration
- Automated Lustre and IML Agent install and configuration
- Real-time system monitoring
- Advanced troubleshooting tools
- Extensible through open, documented APIs

Intel Manager for Lustre*

Provides



The IML manager provides an easy to install Lustre solution standardized on Lustre configuration best practices

- High Availability
- Failover and Failback
- Power Control
- Role based Administration
- Alert & Event Notification
- Real time Monitoring
- Advanced Troubleshooting
- Lustre Install and Setup
- Lustre Re-Configuration
- Advanced Lustre File System Parameter Settings

Intel Manager for Lustre

Monitors

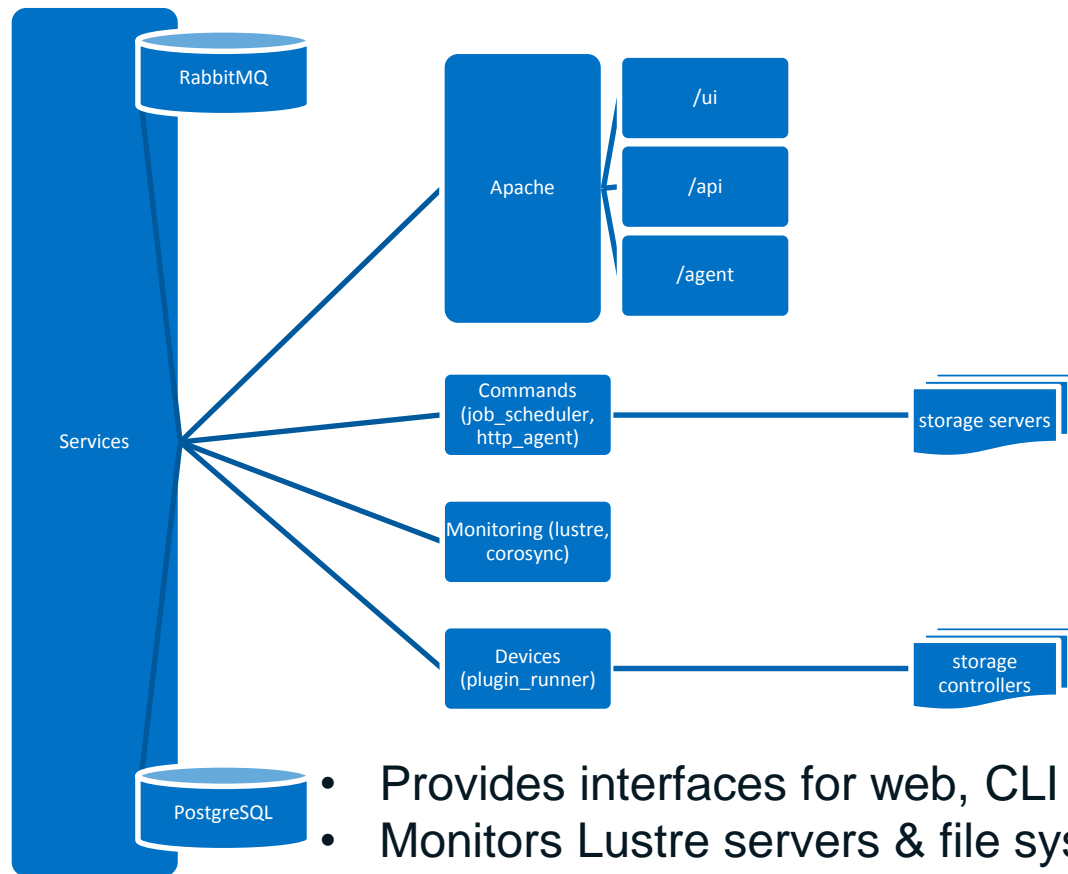
- Read and write throughput to the file system
- Metadata operations to the file system
- CPU and RAM usage on MDS and OSS
- Aggregate system log of all of Lustre servers
- The health of Lustre targets and servers
- LNET status
- The number of clients connected to the Lustre file system
- The usage of Lustre file system
- Heat Map to see the throughput of each OST
- Job stats information: for each OST throughput and IOPS of each applications/users

Manages

- Install Lustre and IML related packages
- Automatically setup High Availability
- Power control Lustre servers
 - power down, on, cycle
- Manual failover and failback option
- Create & Setup new Lustre file systems
- Manage multiple Lustre file systems
- Rescan network configuration changes
- Re-configure Lustre file systems
- Support via GUI or CLI

➤ Assuming that there is no storage plugin in place

Intel Manager for Lustre Server Architecture



- Provides interfaces for web, CLI and API clients
- Monitors Lustre servers & file systems
- Lustre server & file system administrative actions
- Communication with the IML agents is primarily over https

Description of IML Configuration Lab

- You will use IML V 2.1 shipped in the IEEL V 2.0 package
 - IEEL is only available to end customers via HPDD reseller partners.
- You will access and review the Linux pre-installed cluster servers
- You will install IML 2.1 from RPMs through an install script
- You will run the IML Manager to deploy and connect to the IML agents on your Lustre servers

For this lab you will need to access the IEEL Training Cluster via:

- Browser (Recommended: Google Chrome v27 or Mozilla Firefox v22)
- Terminal or Windows Putty Command Line Interface

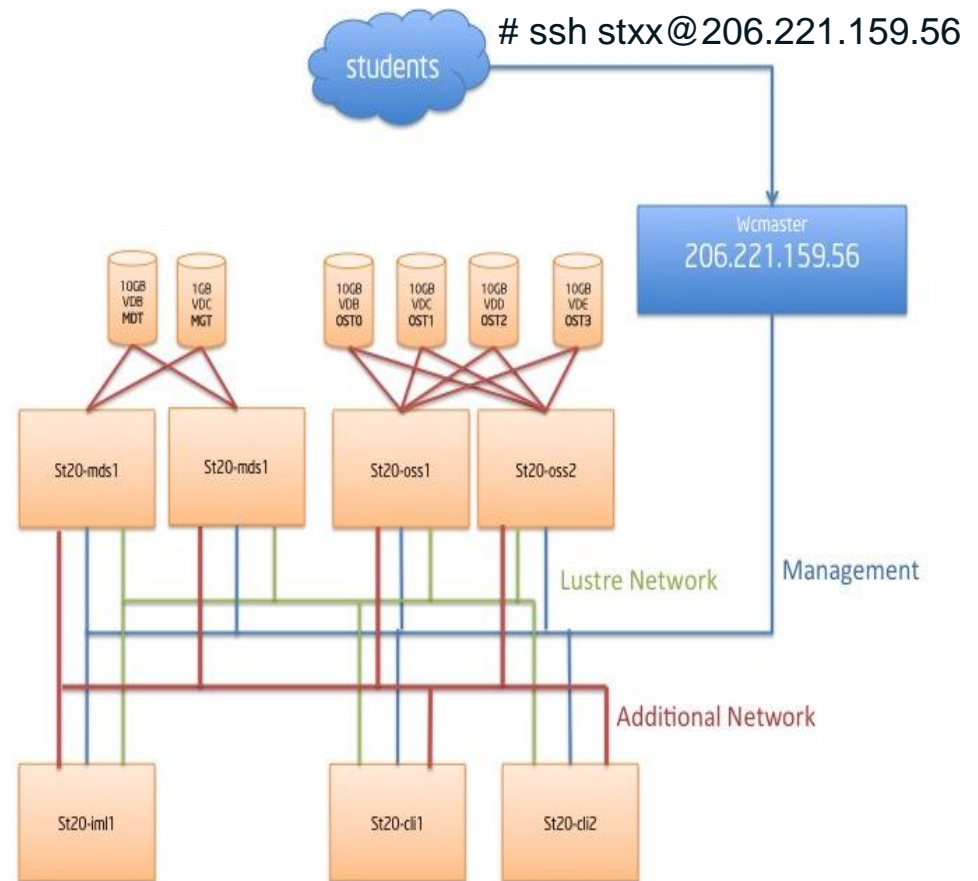
IEEL Training Cluster Review

- (1) Management Server
- (2) MDS servers
 - (1) MGT 1GB volume
 - (1) MDT 10GB volume
- (2) OSS servers
 - (4) OST 10GB volumes
- (2) Lustre clients

{ Later in the Operations Session }

Capacity Expansion will configure a 2nd storage unit consisting of:

- (2) OSS servers in active-active failover
- (4) OST 10GB shared volumes



Intel Manager for Lustre Training Cluster Pre-installed Configuration

What to Do

- CentOS 6.5
- Yum access to a local CentOS 6.5 repository
- Management Network configured
 - SSH root login access
 - Properly configured firewall
 - ssh keys pre-installed (/root/.ssh/authorized_keys)
- FQDNs name resolution (/etc/hosts)
- ~~LNET configuration file (/etc/modprobe.d/lustre.conf)~~
- High Availability cables installed
- NTP is running on the Manager server
 - IML server acts as the time source for all managed servers
- See: IEEL Partner Installation Guide for complete details

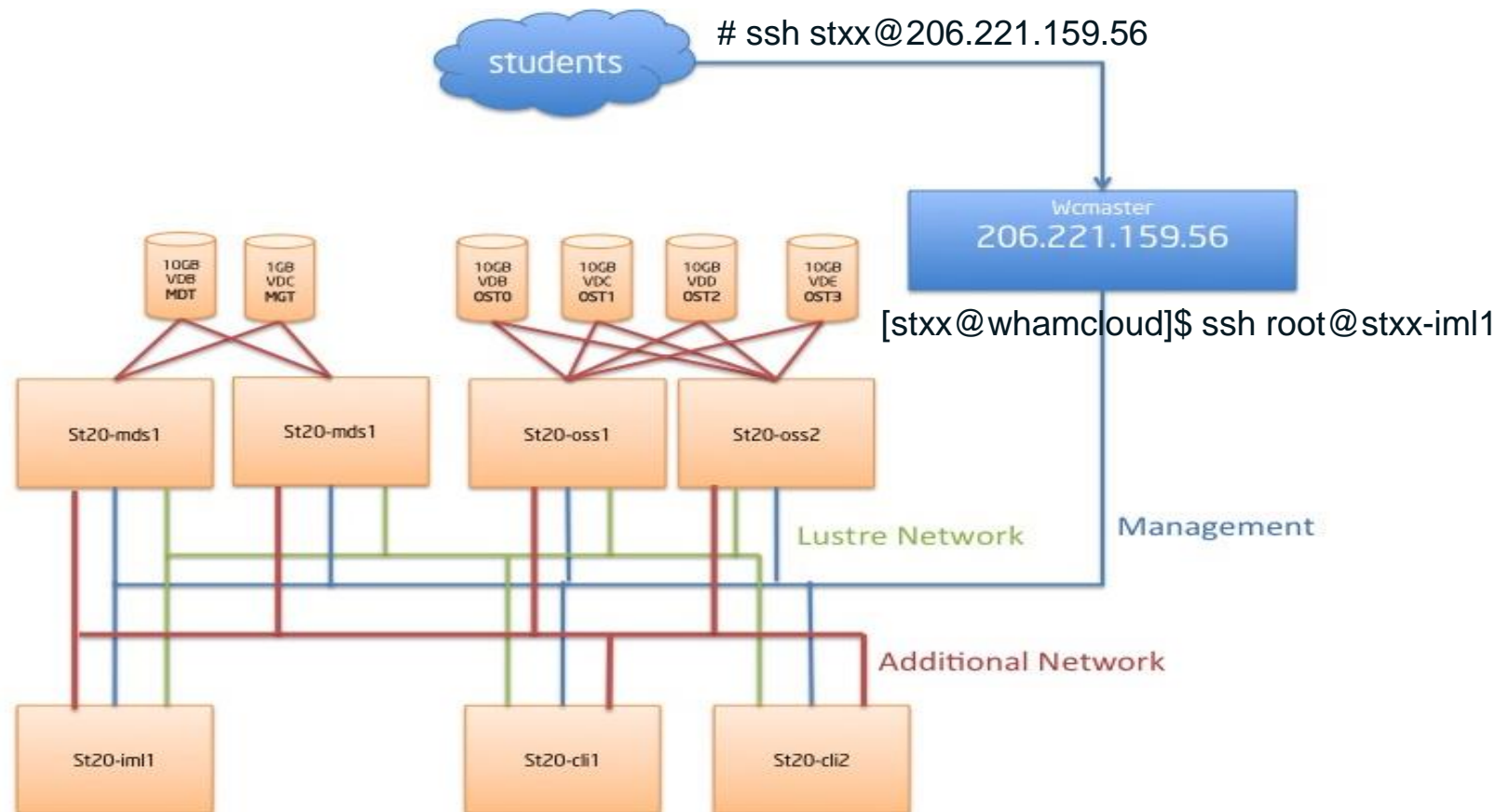
Intel Manager for Lustre Training Cluster Pre-installed Configuration

What Not to Do

- Do Not use the EPEL repository
- Do Not install CMAN (Cluster Manager)
- Do Not configure crossover cable interfaces
- Do Not configure Lustre, Corosync, or Pacemaker
- Do Not configure the NTP time synchronization on the Lustre Servers
 - The IML server's clock will act as the time source for the entire storage cluster.
- See: IEEL Partner Installation Guide for complete details

IEEL Training Cluster

SSH Access to IML



Intel Manager for Lustre Server Requirements

- CentOS 6.5 or Red Hat* Enterprise Linux (RHEL) 6.5
 - Pre-installed on the server
- IML Server Requirements
 - X86 CPU
 - At least 4 GB of RAM
 - Mirrored, redundant storage for the OS using RAID 10
 - At least 24 GB for the operating system and additional packages
 - Swap space equal to twice the available RAM present
 - At least a 500 GB /var partition
 - 1 GigE Management Network configured on the server
 - SSH access with root privileges
- A display monitor with a 1024 x 768 resolution
- See: IEEL Partner Installation Guide for complete details

Intel Manager for Lustre Software Package Review

- The IEEL package contents
 - Install scripts and profiles:
 - **install** (IML python install script)
 - base_managed.profile (Managed Storage Server profile)
 - base_monitored.profile (Monitored Storage Server profile)
 - posix_copytool_worker.profile (Copy Tool Server profile)
 - robinhood_server.profile (Policy Engine Server profile)
 - EULA.txt (End User Legal Agreement)
 - Lustre packages:
 - e2fsprogs-1.42.9.wc1-bundle.tar.gz
 - lustre-2.5.18-bundle.tar.gz
 - lustre-client-2.5.18-bundle.tar.gz
 - sles-client-2.5.18-bundle.tar.gz
 - sles-server-2.5.18-bundle.tar.gz
 - xeon-phi-client-2.5.18-bundle.tar.gz
 - HSM packages
 - robinhood-2.5.0-bundle.tar.gz
 - Hadoop packages under the hadoop directory:
 - hadoop-hpc-scheduler.jar
 - hadoop-lustre-plugin.jar

Intel Manager for Lustre Install Script Requirements

IML is best installed on a freshly installed Linux server

- Install script must be run as root
- Install script must be run from the ieel-2.0.0 directory
- Yum network access to a local or remote CentOS 6.5 or RHEL 6.5 repository
- The current version of IML is not already installed
- The End User Agreement is accepted
- IML requires multiple TCP ports (http 80 & https 443)

Intel Manager for Lustre Software Installation

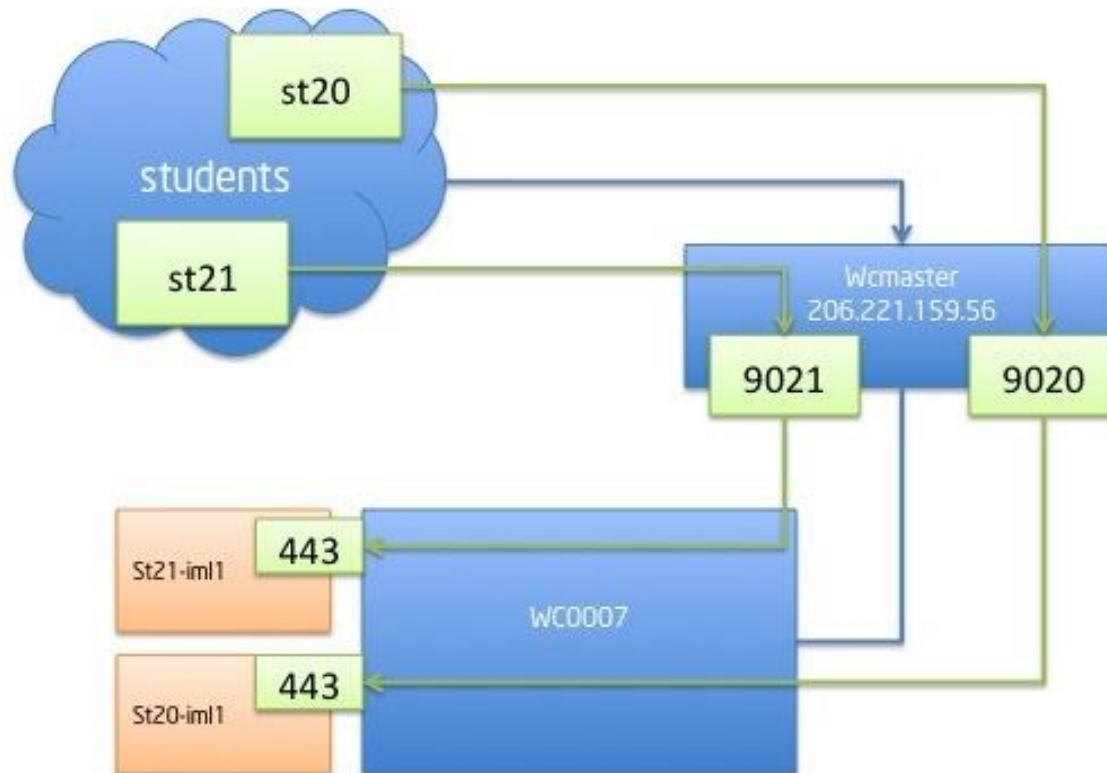
- IML 2.1 https interface
- PostgreSQL database
- RabbitMQ messaging broker
- An IML superuser's userid/password are created:
 - **Do Not forget the administrators username and password**
- IML will time sync managed servers to the IML server
 - The IML server is time synced to a centralize NTP server
- See: IEEL Partner Installation Guide for complete details

Intel Manager for Lustre Installed Software Review

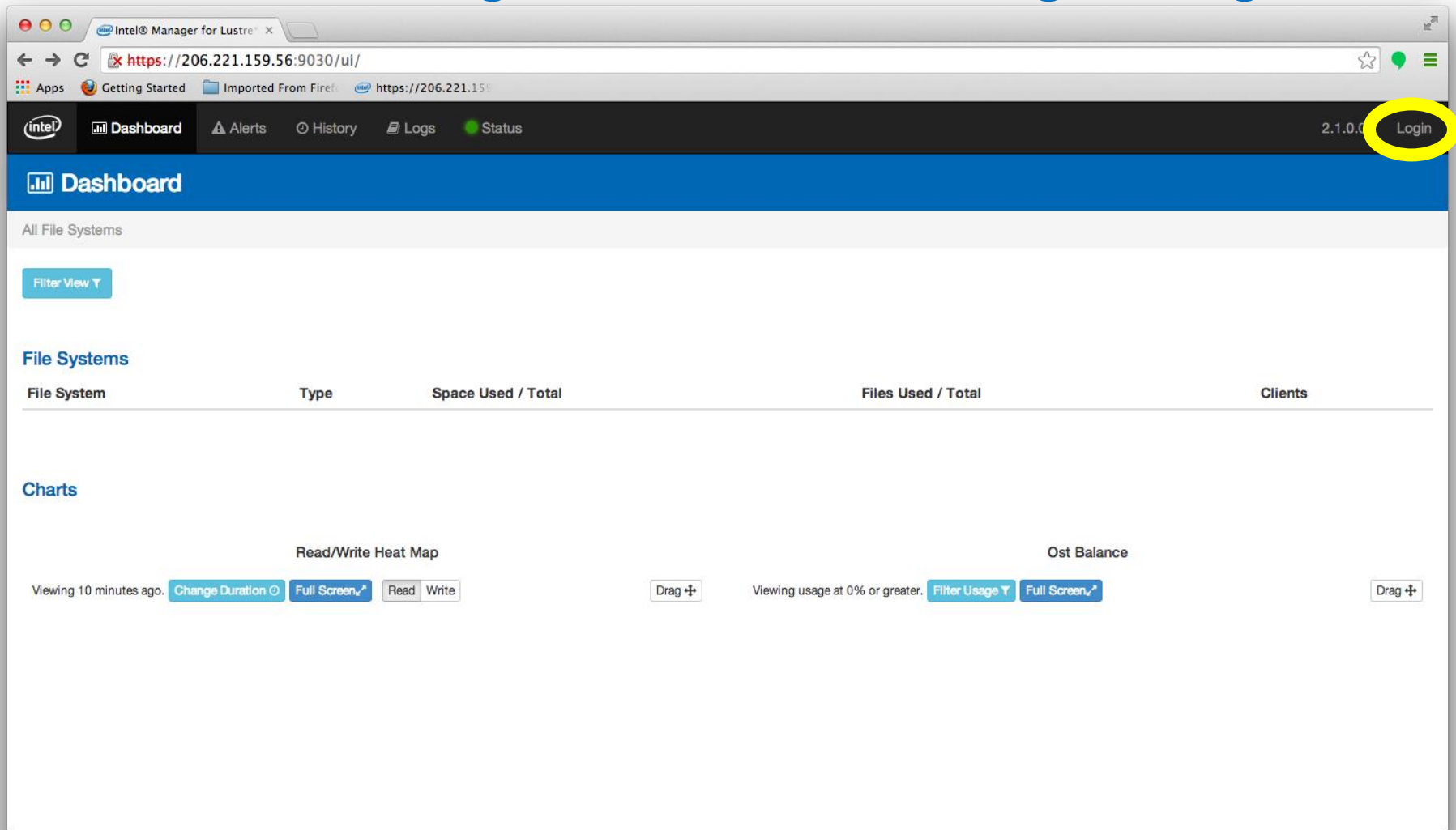
- Installed directories
 - /usr/bin/chroma – Command Line interface
 - /var/log/chroma – IML log files
 - /var/lib/chroma/repo – IML repository
 - /usr/lib/python2.6/site-packages
 - /usr/share/chroma-manager – IML files
- Installed database “chroma”
- Configuration files
- Running daemons

Intel Manager for Lustre Web Browser Access

<https://206.221.159.56:9020>

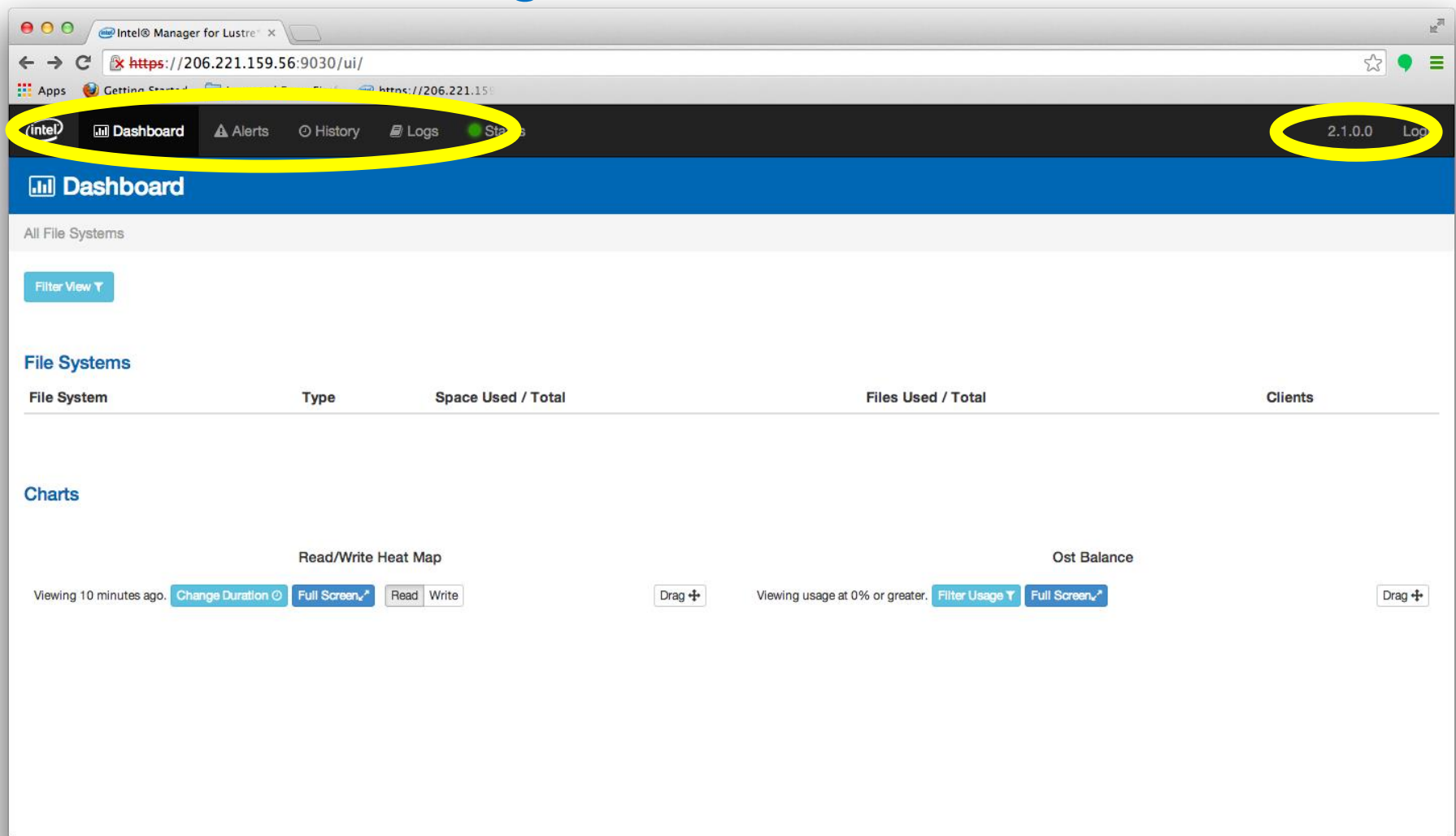


Intel Manager for Lustre - Login Page

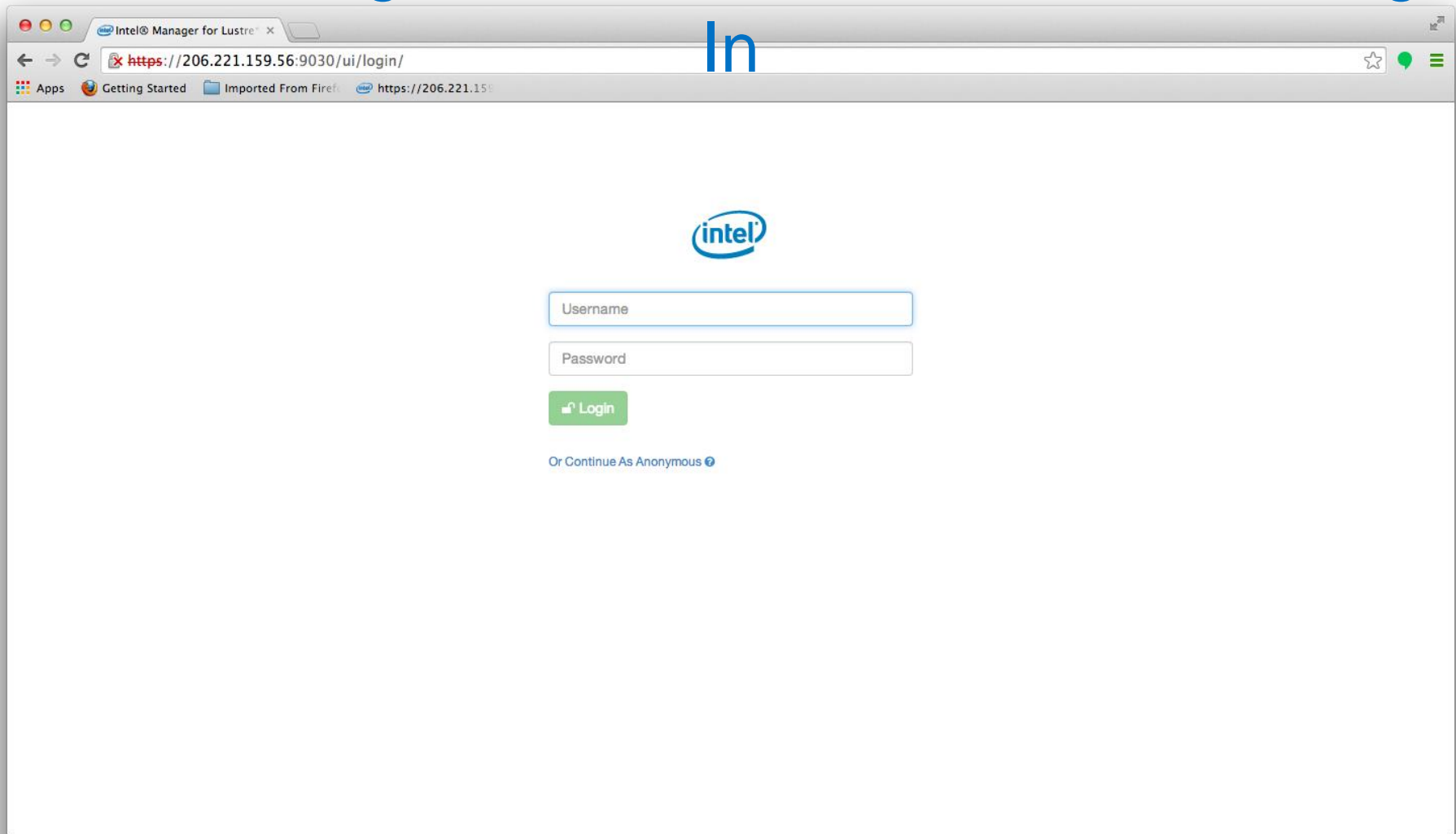


Note: “No data available” until we actually start adding servers and configuring the cluster

Intel Manager for Lustre - Menu bar

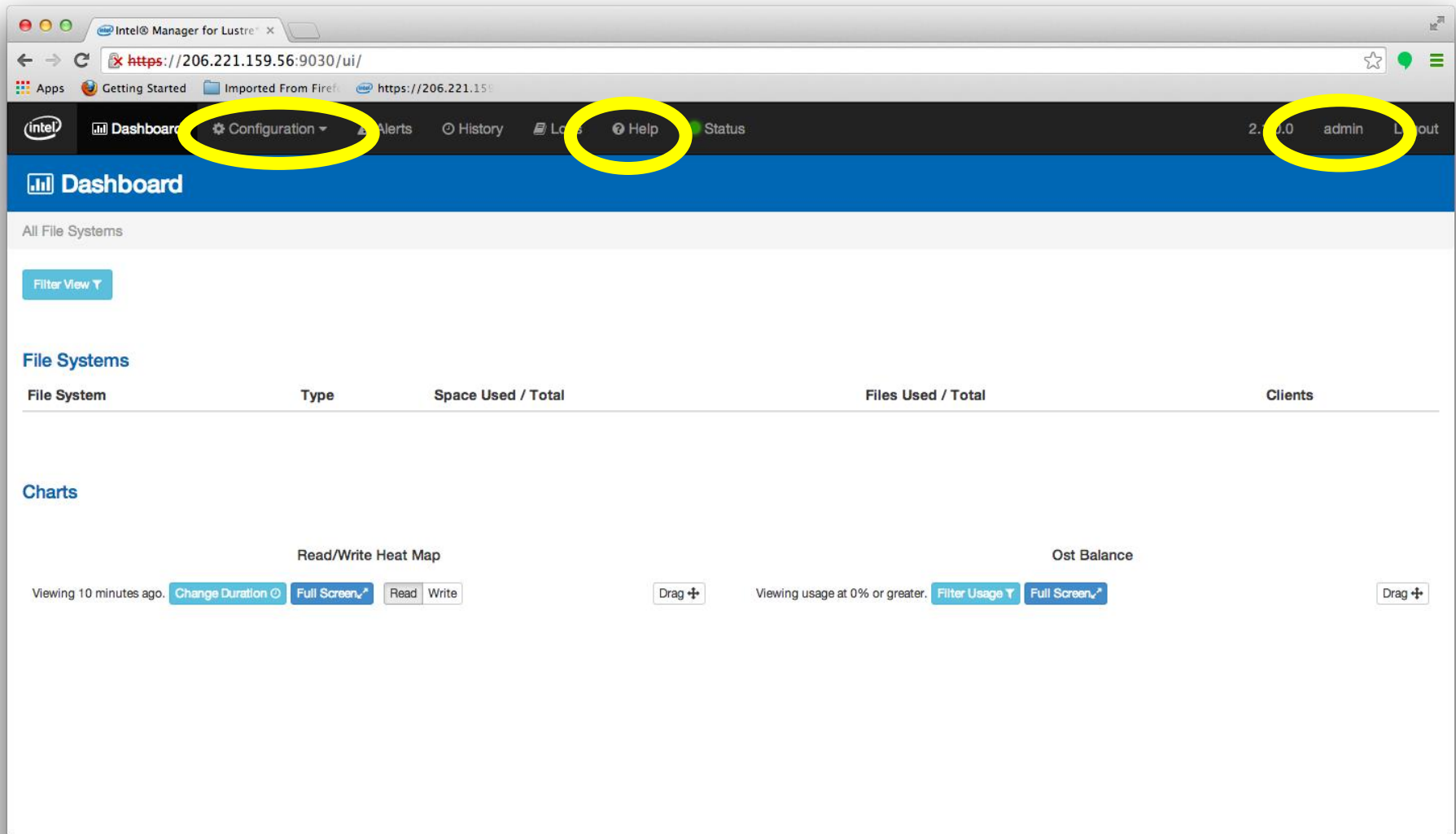


Intel Manager for Lustre - Administration Log In



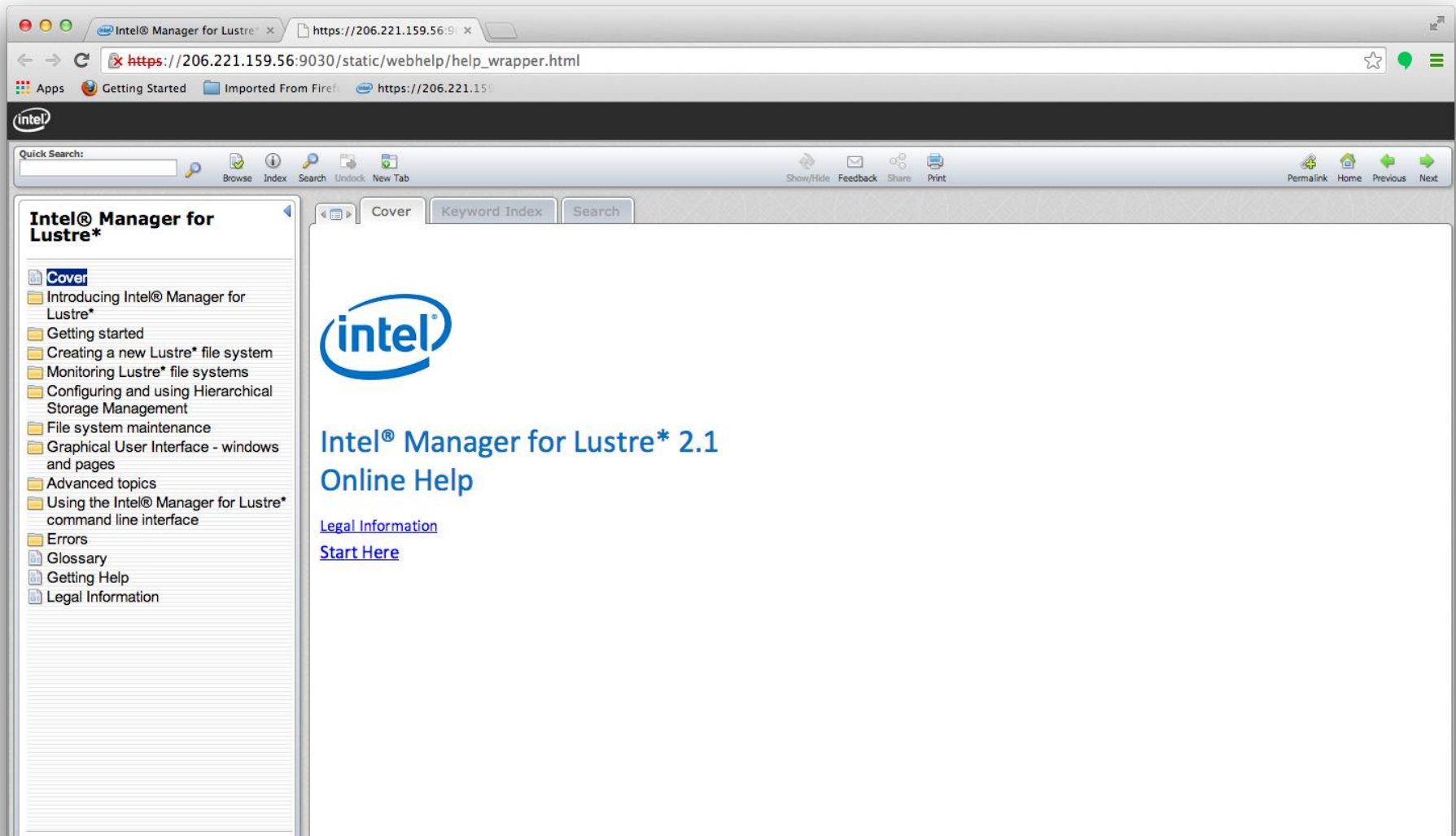
The screenshot shows a web browser window with the title "Intel® Manager for Lustre". The address bar displays the URL "https://206.221.159.56:9030/ui/login/". The browser's tab bar shows several tabs: "Apps", "Getting Started", "Imported From Fire...", and "https://206.221.159.56:9030/ui/login/". The main content area of the browser displays the Intel logo at the top center. Below the logo, there are two input fields: "Username" and "Password". Below these fields is a green "Login" button. At the bottom of the login area, there is a link that says "Or Continue As Anonymous" with a small question mark icon.

IML - Administrator Menu bar

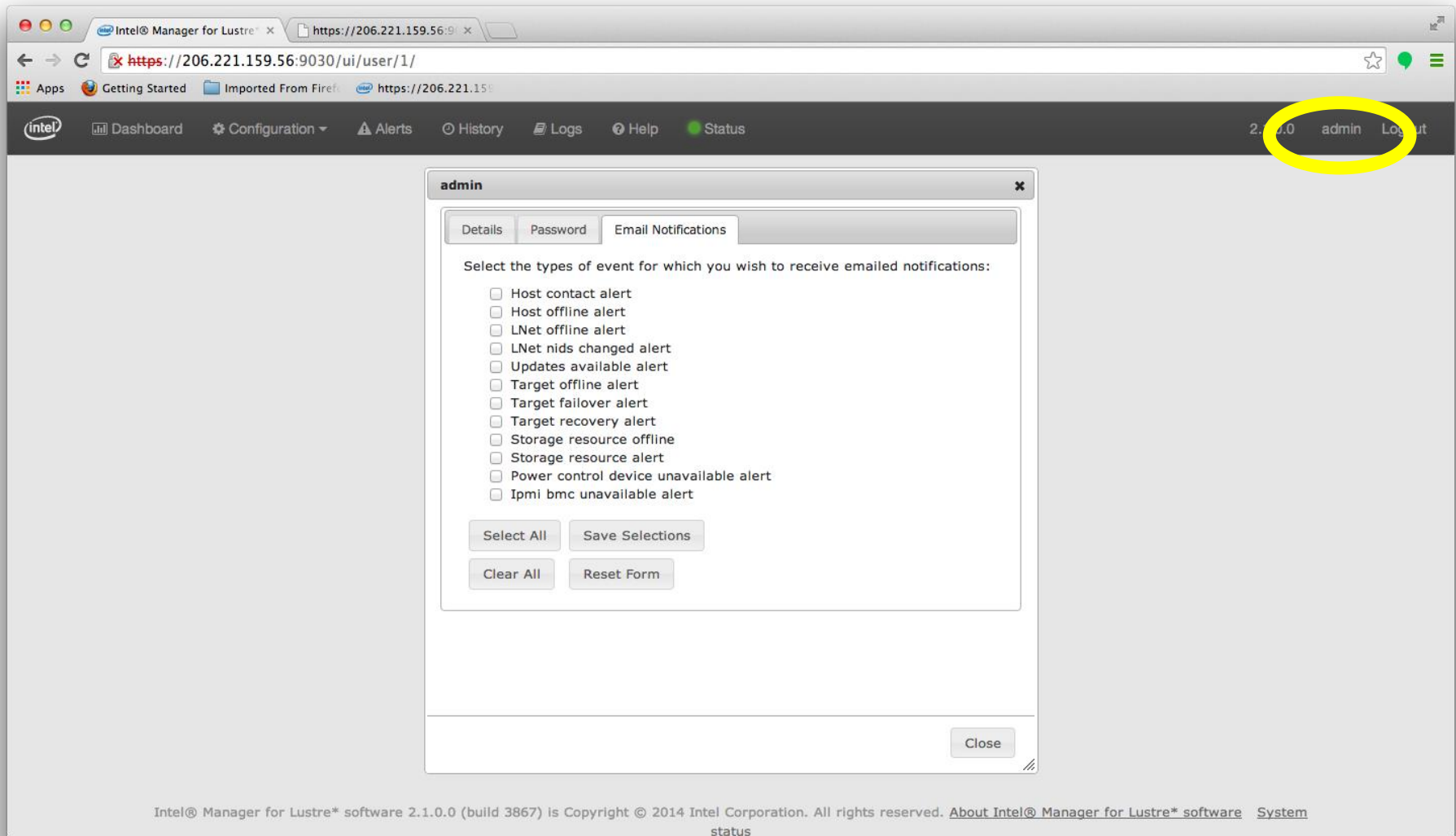


Note: Observe the addition of the Configuration, Help, and Account tabs to the toolbar

Intel Manager for Lustre - Help



IML- Administration Account



IML- Configuration – Create Users

The screenshot shows the 'Users' configuration page in the Intel® Manager for Lustre* software. The page has a dark blue header with the Intel logo and navigation links: Dashboard, Configuration, Alerts, History, Logs, Help, and Status. The user is logged in as 'admin' on version 2.1.0.0. The main content area is titled 'User Administration' and features a '+ Create user' button. Below this is a table with columns 'Username' and 'Name'. The table contains one entry: 'admin' under 'Username' and an empty 'Name' field. A modal window titled 'Create user' is open in the center, showing fields for Role (set to 'superusers'), Username, First name, Last name, Email, Password, and Confirm password. The modal has 'Cancel' and 'Create' buttons at the bottom. At the bottom of the page, there is a footer with copyright information: 'Intel® Manager for Lustre* software 2.1.0.0 (build 3867) is Copyright © 2014 Intel Corporation. All rights reserved. About Intel® Manager for Lustre* software System status'.

Configuration – Users

https://206.221.159.56:9030/ui/configure/user/

Apps Getting Started Imported From Fire... https://206.221.159.56:9030/ui/configure/user/

intel Dashboard Configuration Alerts History Logs Help Status 2.1.0.0 admin Logout

Users

User Administration

+ Create user

Show 10 entries

Username	Name
admin	

Showing 1 to 1 of 1 entries

Create user

Role: superusers

Username:

First name:

Last name:

Email:

Password:

Confirm password:

Cancel Create

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IML - Setting up email notifications

The screenshot shows the Intel® Manager for Lustre* software interface. The browser address bar displays `https://206.221.159.56:9030/ui/user/2/`. The top navigation bar includes links for Dashboard, Configuration, Alerts, History, Logs, Help, and Status. The user is logged in as 'admin'.

The 'Users' section is active, showing a table of users:

Username	Name
admin	
test	Gabriele Paciucci

The 'test' user is selected, and the 'Email Notifications' tab is active. The configuration window shows the following options:

Select the types of event for which you wish to receive emailed notifications:

- ☐ Host contact alert
- ☐ Host offline alert
- ☐ LNet offline alert
- ☐ LNet nids changed alert
- ☐ Updates available alert
- ☐ Target offline alert
- ☐ Target failover alert
- ☐ Target recovery alert
- ☐ Storage resource offline
- ☐ Storage resource alert
- ☐ Power control device unavailable alert
- ☐ Ipmi bmc unavailable alert

Buttons at the bottom of the configuration window include 'Select All', 'Save Selections', 'Clear All', and 'Reset Form'. A 'Close' button is located at the bottom right of the configuration window.

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IML- Configuration - Add Servers

The screenshot shows the Intel® Manager for Lustre web interface. The browser address bar displays `https://206.221.159.56:9030/ui/dashboard`. The top navigation bar includes the Intel logo, a 'Dashboard' button, a 'Configuration' dropdown menu (highlighted with a yellow circle), and links for Alerts, History, Logs, Help, and Status. The user is logged in as 'admin' with version '2.1.0.0'. The 'Configuration' dropdown menu is open, showing options: Servers, Power Control, File Systems, HSM, Storage, Users, Volumes, and MGTs. The 'Servers' option is highlighted with a yellow circle. The main dashboard area includes a 'Filter View' button, a 'File Systems' section with a table header (File System, Type, Space Used / Total, Files Used / Total, Clients), and a 'Charts' section with two charts: 'Read/Write Heat Map' and 'Ost Balance'. The 'Read/Write Heat Map' chart shows 'Viewing 10 minutes ago' and has buttons for 'Change Duration', 'Full Screen', 'Read', and 'Write'. The 'Ost Balance' chart shows 'Viewing usage at 0% or greater' and has buttons for 'Filter Usage', 'Full Screen', and 'Drag'.

IML- Configuration - Add Servers

The screenshot shows the Intel Manager for Lustre web interface. The browser address bar displays `https://206.221.159.56:9030/ui/configure/server/`. The top navigation bar includes the Intel logo, a menu icon, and links for Dashboard, Configuration, Alerts, History, Logs, Help, and Status. The user is logged in as 'admin' with a 'Logout' link. The main header is blue and labeled 'Servers'. Below this, the 'Server Configuration' section features a yellow circle highlighting the '+ Add Server' button. A table below the button is empty, with columns for 'Hostname', 'LNet State', and 'Configure LNet'. The table footer indicates 'No Servers to display' and 'Showing 0 to 0 of 0 entries'. The 'Server Actions' section contains four buttons: 'Detect File Systems', 'Re-scan NIDs', 'Re-write Target Configuration', and 'Install Updates'. The footer text reads: 'Intel® Manager for Lustre* software 2.1.0.0 (build 3867) is Copyright © 2014 Intel Corporation. All rights reserved. [About Intel® Manager for Lustre* software](#) [System status](#)'.

Configuration - Servers `https://206.221.159.56:9030/ui/configure/server/`

Dashboard Configuration Alerts History Logs Help Status 2.1.0.0 admin Logout

Servers

Server Configuration

+ Add Server

Show 10 entries

Hostname	LNet State	Configure LNet
No Servers to display		

Showing 0 to 0 of 0 entries

Server Actions

Detect File Systems Re-scan NIDs Re-write Target Configuration Install Updates

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IML- Configuration - Add Servers

The screenshot displays the Intel Manager for Lustre web interface. The main page is titled 'Servers' and shows a table of configured servers. A modal dialog box titled 'Add server' is open, allowing the user to add a new server. The 'SSH' tab is selected, and the hostname 'st30-md1' is entered. The 'Server profile' dropdown menu is open, showing four options: 'POSIX HSM Agent Node', 'Robinhood Policy Engine Server', 'Managed storage server' (highlighted with a yellow circle), and 'Monitored storage server'. The background page shows a table of servers with columns for 'Show', 'Hostname', and 'Actions'. The footer of the page contains copyright information for Intel Corporation.

Configuration - Servers x <https://206.221.159.56:9030/ui/configure/server/>

Dashboard Configuration Alerts History Logs Help Status 2.1.0.0 admin Logout

Servers

Server Configuration

+ Add Server

Show 10 entries

Hostname
Showing 0 to 0 of 0 entries

Server Actions

Detect File Systems Re-scan NIDs Re-write Target Configuration Install Updates

Add server

SSH HTTPS

st30-md1

Server profile: ---

SSH Authentication:

Existing key Root Password Another key

If this management server is configured with a key, those keys will be used to register this server.

POSIX HSM Agent Node
Robinhood Policy Engine Server
Managed storage server
Monitored storage server

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IML- Configuration - Add Servers

The screenshot displays the Intel Manager for Lustre web interface. The main page shows the 'Servers' section with a 'Server Configuration' area containing an 'Add Server' button and a table of servers (currently empty). Below this is the 'Server Actions' section with buttons for 'Detect File Systems', 'Re-scan NIDs', 'Re-write Target Configuration', and 'Install Updates'. A modal dialog box titled 'Add server' is open in the center. It has two tabs: 'SSH' (selected and highlighted with a yellow circle) and 'HTTPS'. The 'SSH' tab contains the following fields: 'Hostname' (with the value 'st30-md1'), 'Server profile' (set to 'Managed storage server'), and 'SSH Authentication' (with 'Existing key' selected and highlighted by a yellow circle). Below these fields is a note: 'If this management server is configured with a set of ssh keys, those keys will be used to register this new server.' and a 'Continue' button. The background interface includes a top navigation bar with links like 'Dashboard', 'Configuration', 'Alerts', 'History', 'Logs', 'Help', and 'Status', along with user information '2.1.0.0 admin Logout'.

Configuration - Servers x <https://206.221.159.56:9030/ui/configure/server/>

Dashboard Configuration Alerts History Logs Help Status 2.1.0.0 admin Logout

Servers

Server Configuration

+ Add Server

Show 10 entries

Hostname
Showing 0 to 0 of 0 entries

Server Actions

Detect File Systems Re-scan NIDs Re-write Target Configuration Install Updates

Add server

SSH HTTPS

Hostname:
st30-md1

Server profile:
Managed storage server

SSH Authentication:
Existing key Root Password Another key

If this management server is configured with a set of ssh keys, those keys will be used to register this new server.

Continue

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IML- Configuration - Add Servers

The screenshot displays the Intel Manager for Lustre web interface. The main page is titled 'Servers' and includes a 'Server Configuration' section with an 'Add Server' button. A modal dialog box titled 'Add server' is open, showing the 'SSH' tab selected. The 'Hostname' field contains 'st30-md1'. The 'Server profile' dropdown is set to 'Managed storage server'. Under 'SSH Authentication', the 'Root Password' option is selected. A 'Root password' input field is visible below. The 'Continue' button is at the bottom right of the dialog. The background interface shows a navigation bar with 'Dashboard', 'Configuration', 'Alerts', 'History', 'Logs', 'Help', and 'Status'. The footer of the page states: 'Intel® Manager for Lustre® software 2.1.0.0 (build 3867) is Copyright © 2014 Intel Corporation. All rights reserved. [About Intel® Manager for Lustre® software](#) [System status](#)'.

IML- Configuration - Add Servers

The screenshot displays the Intel Manager for Lustre web interface. The main navigation bar includes links for Dashboard, Configuration, Alerts, History, Logs, Help, and Status. The user is logged in as 'admin' with version '2.1.0.0'. The 'Servers' section is active, showing a list of servers (currently empty) and a 'Server Configuration' panel with an 'Add Server' button. A modal dialog titled 'Add server' is open, featuring two tabs: 'SSH' (selected and highlighted with a yellow circle) and 'HTTPS'. The 'SSH' tab contains the following fields: 'Hostname' (filled with 'st30-md1'), 'Server profile' (set to 'Managed storage server'), and 'SSH Authentication' (with 'Existing key', 'Root Password', and 'Another key' options; 'Another key' is highlighted with a yellow circle). Below these are a text area for 'Private key', a 'Private key passphrase' field, and a 'Continue' button. The background interface shows 'Server Actions' like 'Detect File Systems', 'Re-scan NIDs', and 'Re-write Target Con'. At the bottom, a footer contains copyright information for Intel Corporation, 2014.

Configuration - Servers x <https://206.221.159.56:9030/ui/configure/server/>

Dashboard Configuration Alerts History Logs Help Status 2.1.0.0 admin Logout

Servers

Server Configuration

+ Add Server

Show 10 entries

Hostname	
Showing 0 to 0 of 0 entries	

Server Actions

Detect File Systems Re-scan NIDs Re-write Target Con

Add server

SSH HTTPS

Hostname:
st30-md1

Server profile:
Managed storage server

SSH Authentication:
Existing key Root Password **Another key**

A private key that is a pair with a public key on this new server, may be used. A passphrase can be supplied for an encrypted private key.

Private key:

Private key passphrase:

Continue

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IML- Configuration - Add Servers

The screenshot displays the Intel Manager for Lustre configuration interface. A modal dialog titled "Add server" is open, showing options for "SSH" and "HTTPS" (highlighted with a yellow circle). The dialog includes a description of the command line generation, a "Server profile" dropdown set to "Managed storage server", and two input fields: "How many times may this command be used to register a new storage server?" (set to 1) and "For how long will this command and token be valid?" (set to 5m). A yellow circle highlights these two input fields. The background interface shows the "Servers" section with a "Server Configuration" tab and a "Server Actions" section with buttons like "Detect File Systems", "Re-scan NIDs", and "Re-write Target Con".

Configuration - Servers x <https://206.221.159.56:9030/ui/configure/server/>

Dashboard Configuration Alerts History Logs Help Status 2.1.0.0 admin Logout

Servers

Server Configuration

+ Add Server

Show 10 entries

Hostname

Showing 0 to 0 of 0 entries

Server Actions

Detect File Systems Re-scan NIDs Re-write Target Con

SSH HTTPS

This will generate a limited-use command line that includes a token. It may be run on a storage server to install the needed software and register it with the manager server.

Server profile: Managed storage server

How many times may this command be used to register a new storage server?

1 1

For how long will this command and token be valid?

5m 5m 10h

Generate

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Intel Manager for Lustre Configuration - Add Servers

Adding a Storage server via CLI

- Accessing the command line interface
 - [root@stxx-impl1 ~]# /usr/bin/chroma
 - **Note:** For information about using the CLI, see the Intel® Manager for Lustre* online Help topic, *Using the command line interface*.
 - *CLI Examples*
 - Review the CLI usage statement
 - # /usr/bin/chroma -h
 - We will add a new server to the IML manager using the CLI
 - # /usr/bin/chroma --username admin --password admin.123 \server-add stxx-oss1 --server_profile base_managed

WARNING: To manage Lustre file systems from the command line, you must use the Intel® Manager for Lustre* command line interface (CLI).

WARNING: Modifying a file system manually from a shell on a storage server will interfere with the ability of the Intel® Manager for Lustre* software to manage and monitor the file system.

IML - Requirements

The screenshot displays the Intel® Manager for Lustre* software interface. The main window is titled "Configuration - Servers" and shows the "Servers" section. A modal dialog box titled "Add server" is open, showing the "SSH" tab. The dialog lists the following information for the host "st30-mds1":

- Host: **st30-mds1**
- Authenticated: ✓
- Resolve: ✓
- Reverse resolve: ✓
- Ping: ✓
- Reverse ping: ✓
- Valid hostname: ✓
- FQDN resolves: ✓
- FQDN matches hostname: ✓
- Valid yum repositories: ✓
- Valid yum mirror: ✓

The dialog also includes "Back" and "Confirm" buttons. The background interface shows the "Server Configuration" section with a table for "Hostnames" and the "Server Actions" section with buttons for "Detect File Systems", "Re-scan NIDs", "Re-write Target Configuration", and "Install Updates". The footer of the interface contains the text: "Intel® Manager for Lustre* software 2.1.0.0 (build 3867) is Copyright © 2014 Intel Corporation. All rights reserved. [About Intel® Manager for Lustre* software](#) [System status](#)".

IML – Servers Added

The screenshot shows the Intel Manager for Lustre web interface. The browser address bar displays `https://206.221.159.56:9030/ui/configure/server/`. The navigation bar includes links for Dashboard, Configuration, Alerts, History, Logs, Help, and Status, along with the version 2.1.0.0 and user admin. The main header is labeled "Servers".

Server Configuration

[+ Add Server](#)

Show 10 entries

Hostname	LNet State	Configure LNet		
st30-mds1	LNet up	Configure	Actions	✓
st30-mds2	LNet up	Configure	Actions	✓
st30-oss1	LNet up	Configure	Actions	✓
st30-oss2	LNet up	Configure	Actions	✓

Showing 1 to 4 of 4 entries

Server Actions

[Detect File Systems](#) [Re-scan NIDs](#) [Re-write Target Configuration](#) [Install Updates](#)

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Questions?

