

# Dell | Cloudera Solution Crowbar Administration User's Guide v.2.3

A Dell User's Guide for Apache <sup>TM</sup> Hadoop <sup>®</sup> Deployment  
Crowbar v1.6

June 12, 2013

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## Notes, Cautions, and Warnings

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-  A **NOTE** indicates important information that helps you make better use of your computer.
-  A **CAUTION** indicates potential damage to hardware or loss of data if instructions are not followed.
-  A **WARNING** indicates a potential for property damage, personal injury, or death.

## Abbreviations

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Abbreviation	Definition
<b>BMC</b>	Baseboard Management Controller.
<b>DBMS</b>	Database management system.
<b>EDW</b>	Enterprise data warehouse.
<b>EoR</b>	End-of-row switch/router.
<b>HDFS</b>	Hadoop Distributed File System.
<b>IPMI</b>	Intelligent Platform Management Interface.
<b>LAG</b>	Link aggregation group.
<b>LOM</b>	Local Area Network on Motherboard.
<b>NIC</b>	Network interface card.
<b>ToR</b>	Top-of-rack switch/router.

### Introduction

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This document provides instructions you to use when deploying Cloudera Manager and Apache Hadoop Ecosystem components with Crowbar. This guide is for use with the Crowbar Users Guide, and is *not* a stand-alone document. It specifically covers Cloudera Manager, Apache Hadoop and the deployment steps from a Crowbar prospective. Please refer to the *Crowbar User Guide* for assistance with installing common Crowbar components and configuring the target systems.



Concepts beyond the scope of this guide are introduced as needed in notes and references to other documentation.

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### Overview

Hadoop is an Apache project being built and used by a global community of contributors, written in the Java programming language. Yahoo! has been the largest contributor to the project, and uses Hadoop extensively across its businesses. Other contributors and users include Facebook, LinkedIn, eHarmony, and eBay. Cloudera has created a quality controlled distribution of Hadoop and offers commercial management software, support, and consulting services.

Dell developed a solution for Hadoop that includes optimized hardware, software, and services to streamline deployment and improve the customer experience.

The Dell | Cloudera Solution is based on the Cloudera CDH Enterprise distribution of Hadoop. Dell's solution includes:

- Dell Reference architecture (RA) and best practices documentation.
- Optimized hardware and network infrastructure.
- Cloudera CDH software (CDH Community-provided for customer-deployed solutions).
- Cloudera Manager free edition with the ability to upgrade to enterprise level via Cloudera issued license key.
- Cloudera Manager provided Hadoop infrastructure management tools.
- Dell Crowbar software framework.

This solution provides Dell a foundation to offer additional solutions as the Hadoop environment evolves and expands.

## Document Scope

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The focus of this guide is the use of Crowbar, *not* Apache Hadoop or Cloudera Manager. While Crowbar includes substantial components to assist in the deployment of Apache Hadoop and Cloudera Manager, its operational aspects are completely independent. For more detailed information, please refer to the following links:

### Cloudera Manager 4.6 Documentation

- <http://www.cloudera.com/content/support/en/documentation/manager/cloudera-manager-v4-latest.html>

### CDH4 Documentation

- <http://www.cloudera.com/content/support/en/documentation/cdh4-documentation/cdh4-documentation-v4-latest.html>

### Apache Hadoop Documentation

- <http://hadoop.apache.org/>
- 



This guide provides this additional information about Cloudera as notes flagged with the Cloudera logo. For detailed operational support for Hadoop, we suggest visiting the Cloudera documentation web site at <http://www.cloudera.com>.

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## Opscode Chef Server

Crowbar makes extensive use of Opscode Chef Server, <http://opscode.com>. To explain Crowbar actions, you should understand the underlying Chef implementation. This guide provides this additional Chef information as notes flagged with the Opscode logo.



To use Crowbar, it is not necessary to log into the Chef Server; consequently, use of the Chef UI is not covered in this guide. Supplemental information about Chef is included.

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Crowbar is not limited to managing Dell servers and components. Due to driver requirements, some barclamps, for example: BIOS and RAID must be targeted to specific hardware; however, those barclamps are not required for system configuration.

## Dell | Cloudera Solution

This section provides detailed information about the basics of Hadoop, and Hadoop components deployment.

### Hadoop Basics

The Hadoop software library is a framework that allows for the distributed processing of large data sets across clusters of computers using a simple programmatic driven processing model. Hadoop is designed to scale up from a minimum of three servers to thousands of machines, each offering local computation and storage.

Rather than rely on hardware to deliver high-availability, the Hadoop library itself is designed to detect and handle failures at the application layer, so delivering a highly-available service on a cluster of computers, each of which may be prone to failures.

Hadoop is ideal for organizations with a growing need to store and process massive application datasets. It enables applications to work with thousands of nodes and petabytes of data.

- **Hadoop Core:** The common libraries and utilities that provide the basic Hadoop runtime environment. A set of components and interfaces which implement a distributed filesystem and provide general I/O access for the Hadoop framework (serialization, Java RPC and persistent data storage).
- **Hadoop Distributed File System (HDFS):** A distributed file system that provides redundant, high-throughput access to application data.
- **MapReduce:** A software framework for distributed processing of large data sets on compute clusters.

### Apache Hadoop Component Deployment

Cloudera Manager and Pig employ Crowbar tools to construct a starting proposal, and then edit any parameters to fit the specific needs of your environment. Once the proposal is ready, apply the proposal to deploy each system components.


 The Base Hadoop system (HDFS and Map Reduce), YARN, Zookeeper, HBase, Oozie, Hive, Hue, Flume, Impala, Sqoop, and Solr are deployed using the Cloudera Manager administration console. Crowbar also provides a supplemental Hadoop Ecosystem Barclamp (Pig). You must install the base Hadoop system (HDFS and Map Reduce) using Cloudera Manager before deploying any of these add-ons.

Table 1: Supported Apache Hadoop Components

Component	Deployment Method	Description
HDFS	Cloudera Manager	Apache Hadoop Distributed File System (HDFS) is the primary storage system used by Hadoop applications. HDFS creates multiple replicas of data blocks and distributes them on compute hosts throughout a cluster to enable reliable, extremely rapid computations.
MapReduce	Cloudera Manager	Apache Hadoop MapReduce supports distributed computing on large data sets across your cluster (requires HDFS).
YARN	Cloudera Manager	Apache Hadoop MapReduce 2.0 (MRv2), or YARN, is a data computation framework that supports MapReduce applications (requires HDFS). The current upstream MRv2 release is not yet considered stable and should not be considered production-ready at this time.
ZooKeeper	Cloudera Manager	Apache ZooKeeper is a centralized service for maintaining and synchronizing configuration data.



Component	Deployment Method	Description
HBase	Cloudera Manager	HBase is an open-source, non-relational, distributed database modeled after Google's BigTable and is written in Java. It is developed as part of Apache Software Foundation's Apache Hadoop project and runs on top of HDFS (Hadoop Distributed Filesystem), providing BigTable-like capabilities for Hadoop. That is, it provides a fault-tolerant way of storing large quantities of sparse data. HBase features compression, in-memory operation, and Bloom filters on a per-column basis as outlined in the original BigTable paper. Tables in HBase can serve as the input and output for MapReduce jobs run in Hadoop, and may be accessed through the Java API but also through REST, Avro or Thrift gateway APIs. HBase is not a direct replacement for a classic SQL Database, although recently its performance has improved, and it is now serving several data-driven websites, including Facebook's Messaging Platform.
Hive	Cloudera Manager	Hive is a data warehouse system that offers a SQL-like language called HiveQL.
Oozie	Cloudera Manager	Oozie is a workflow coordination service to manage data processing jobs on your cluster.
Hue	Cloudera Manager	Hue is a graphical user interface to work with Cloudera's Distribution Including Apache Hadoop (requires HDFS, MapReduce, and Hive).
Flume	Cloudera Manager	Flume collects and aggregates data from almost any source into a persistent store such as HDFS.
Impala	Cloudera Manager	Impala provides a real-time SQL query interface for data stored in HDFS and HBase. Impala requires Hive service and shares Hive Metastore with Hue.
Sqoop	Cloudera Manager	Sqoop is a tool designed for efficiently transferring bulk data between Apache Hadoop and structured data stores such as relational databases. The version supported by Cloudera Manager is Sqoop 2.
Solr	Cloudera Manager	Solr is a distributed service for indexing and searching data stored in HDFS. The current Solr release is beta software and not recommended for use in production.
Pig	Crowbar Barclamp	Pig is a platform for analyzing large data sets that consists of a high-level language for expressing data algorithms.


For more information about Hadoop, please visit <http://hadoop.apache.org/>.

## Crowbar User Interface

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Crowbar is delivered as a Web application available on the admin node using HTTP on port 3000. By default, you can access it using <http://192.168.124.10:3000>. Additionally, the default installation contains an implementation of Hadoop specific components (see table below).

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 Dell supports running Crowbar on the following browsers: Firefox 3.6, Firefox 11, Google Chrome, Internet Explorer 8, and Internet Explorer 9. HTML5 compatibility and a minimum screen resolution of 1024x768 are recommended.


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**Table 2: User Interface Service URLs**

User Interface Service	Default Location	Port	Example URL
<b>Crowbar</b>	Crowbar Admin Node	3000	<a href="http://&lt;crowbar_admin_node&gt;:3000">http://&lt;crowbar_admin_node&gt;:3000</a>
<b>Cloudera Manager</b>	Hadoop Edge Node	7180	<a href="http://&lt;cloudera_manager_server_node&gt;:7180">http://&lt;cloudera_manager_server_node&gt;:7180</a>
<b>Hadoop Name Node</b>	Hadoop Name Node	50070	<a href="http://&lt;master_name_node&gt;:50070">http://&lt;master_name_node&gt;:50070</a>
<b>Hadoop Secondary Name Node</b>	Hadoop Secondary Name Node	50090	<a href="http://&lt;secondary_name_node&gt;:50090">http://&lt;secondary_name_node&gt;:50090</a>
<b>Hadoop Data Node</b>	Hadoop Data Node	50075	<a href="http://&lt;data_node&gt;:50075">http://&lt;data_node&gt;:50075</a>
<b>Hadoop Job Tracker Web</b>	Hadoop Job Tracker Node	50030	<a href="http://&lt;job_tracker_node&gt;:50030">http://&lt;job_tracker_node&gt;:50030</a>
<b>Hadoop Task Tracker Web</b>	Task Tracker Node	50060	<a href="http://&lt;task_tracker_node&gt;:50060">http://&lt;task_tracker_node&gt;:50060</a>

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 The crowbar admin node IP address (192.168.124.10) is the default address. Replace it with the address assigned to the Crowbar Admin node. Nagios, Ganglia and Chef can be accessed directly from a web browser or via selecting one of the links on the Crowbar Dashboard.

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## Cloudera Manager Overview




























Cloudera Manager deploys and centrally operates a complete Hadoop stack. The application automates the installation process, reducing deployment time from weeks to minutes, gives you a cluster-wide, real time view of the services running and the status of their hosts, provides a single, central place to enact configuration changes across your cluster; and incorporates a full range of reporting and diagnostic tools to help you optimize cluster performance and utilization. Cloudera Manager provides full lifecycle management for Hadoop deployments.

### Functionality Outline

- Installs the complete Hadoop stack in minutes via a wizard-based interface
- Gives you complete, end-to-end visibility and control over your Hadoop cluster from a single interface
- Enables you to set server roles and configure services across the cluster
- Enables you to gracefully start, stop and restart of services as needed
- Shows information pertaining to hosts in your cluster including status, resident memory, virtual memory and roles

Table 3: Cloudera Manager Free Edition and Cloudera Manager Differences

Feature	Cloudera Standard (Free Edition)	Cloudera Enterprise (60-Day Trial)	Cloudera Enterprise (Licensed Edition)
<b>CDH FEATURES</b>			
Hadoop	✓	✓	✓
Flume	✓	✓	✓
Hive	✓	✓	✓
Mahout	✓	✓	✓
Oozie	✓	✓	✓
Pig	✓	✓	✓
Sqoop	✓	✓	✓
Whirr	✓	✓	✓
Zookeeper	✓	✓	✓
Hue	✓	✓	✓
HBase	✓	✓	✓
Impala	✓	✓	✓
Search (beta)	✓	✓	✓
<b>CLOUDERA MANAGER FEATURES</b>			
Deployment & Configuration	✓	✓	✓
Service Management	✓	✓	✓
Service & Host Monitoring	✓	✓	✓
Diagnostics	✓	✓	✓
API	✓	✓	✓
Rolling Updates/Restarts	⚠	✓	✓
SNMP Support	⚠	✓	✓

Feature	Cloudera Standard (Free Edition)	Cloudera Enterprise (60-Day Trial)	Cloudera Enterprise (Licensed Edition)
LDAP Integration			
Configuration History & Rollbacks			
Operational Reports			
Automated Disaster Recovery			(BDR Add-on)
CLLOUDERA NAVIGATOR FEATURES			
Data Audit – HDFS, Hbase & Hive			Navigator Add-on
Access Management			Navigator Add-on
TECHNICAL SUPPORT AND INDEMNITY			
Core Projects			
Apache HBase			RTD Add-on
Cloudera Impala			RTQ Add-on
Cloudera Manager			
Cloudera Navigator			Navigator Add-on

## Barclamps



 Best practice is to reboot a node whenever a barclamp proposal is applied or updated.

Table 4: Barclamp Descriptions

Barclamp	Description
<b>Cloudera Manager</b>	Provides end-to-end management for apache Hadoop with the ability to deploy and centrally operate a complete Hadoop stack gives you a cluster wide, real time view of nodes and services running and provides a single central place to enact configuration changes across your cluster. Cloudera Manager incorporates a full range of reporting and diagnostic tools to help you optimize cluster performance and utilization.
<b>Pig</b>	Platform for analyzing large data sets that consists of a high-level language for expressing data algorithms.


### Cloudera Manager Barclamp

The Cloudera Manager Barclamp performs all the low level operating system configuration setup for the Hadoop cluster and installs the Cloudera Manager server setup in order to prepare for Hadoop cluster deployment.

 Although Crowbar makes intelligent guesses to preconfigure the node assignments, they may not be optimal for your environment. You can click on the **Remove Node** icon to remove any node from a role.

### Installing the Cloudera Manager Barclamp

1. Navigate to the Crowbar interface using a Web browser. Typically, the IP address is <http://192.168.124.10:3000>.
2. Click on the **Barclamps** tab, and then select **Apache Hadoop**.
3. Select the **Clouderamanager** barclamp, and then click on the **Create** button.
4. In the *Edit Proposal* screen, select **true** from the *Barclamp > Log Debug Messages* drop-down.
5. Scroll down to the *Node Deployment* section.
6. Drag and drop nodes from the *Available Nodes* column to their proper roles:
  - a. **Clouderamanager-cb-adminnode** - Preconfigured with the Crowbar Admin Node
  - b. **Clouderamanager-server** - Dell recommends that you use the Edge Node
  - c. **Clouderamanager-namenode** - The primary and secondary Name Nodes
  - d. **Clouderamanager-datanode** - The Data Nodes
  - e. **Clouderamanager-edgenode** - The Edge Node
  - f. **Clouderamanager-ha-journaling node** - The Quorum-based Journaling Node
  - g. **Clouderamanager-ha-filernode** - The High-availability Filer Node

 You can select only one type of high availability – Quorum-based Journaling or Filer. They are mutually exclusive. Dell recommends that you use Quorum-based Journaling.

7. Click the **Apply** button to commit the barclamp proposal to your nodes.
8. Return to the *Nodes > Dashboard* screen.
  - a. Once all icons are green, the barclamp proposal has been applied.
  - b. You can view the process of the proposal for each node by viewing their consoles via SSH sessions.
9. Reboot the nodes.


 It may take some time for all node icons to return to a green "Ready" status.

Table 5: Barclamp Parameters

Name	Description	Required	Default
<b>Log Debug Messages</b>	Enable log debug messages (/var/log/chef/client.log).	true	false

Table 6: Operating System Parameters

Name	Description	Required	Default
<b>File System Type</b>	File system type (ext3/ext4).	true	ext4
<b>Map/Reduce File Handles</b>	Maximum number of Map/Reduce open file handles.	true	32768
<b>HDFS File Handles</b>	Maximum number of HDFS open file handles.	true	32768
<b>HBASE File Handles</b>	Maximum number of HBASE open file handles.	true	32768

Table 7: Hadoop High Availability Parameters (Shared Storage using NFS)

Name	Description	Required	Default
<b>Shared Edits Directory</b>	Specifies the HA shared edits directory.	true	/dfs/ha
<b>Shared Edits Export Options</b>	Specifies the HA shared edits export options.	true	rw,async,no_root_squash,no_subtree_check
<b>Shared Edits Mount Options</b>	Specifies the HA shared edits mount options.	true	rsync=65536,wsync=65536,intr,soft,bg

## Cloudera Manager Installation Overview

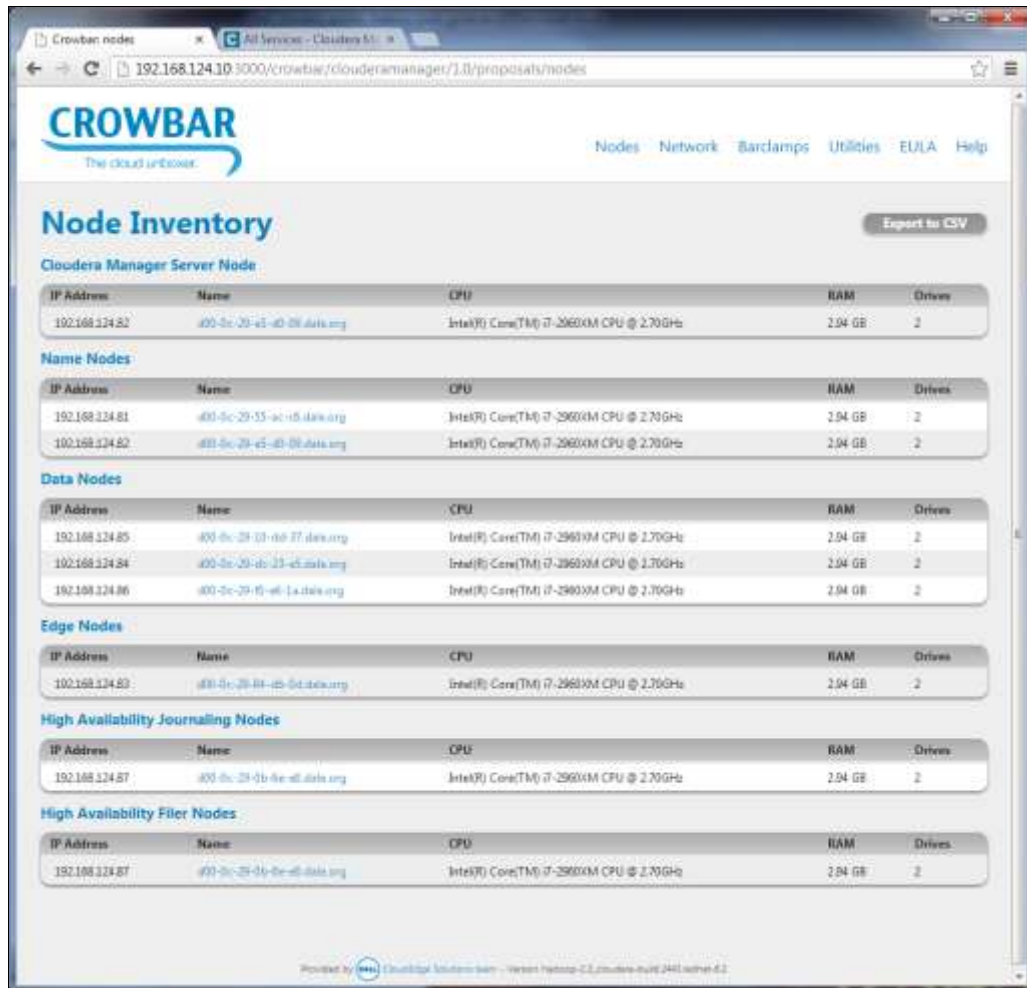
1. After the Clouderamanager barclamp has been deployed from Crowbar, you must run the Cloudera Manager configuration wizard in order to fully deploy the Hadoop cluster. This operation will perform the following tasks:
  - Using SSH, discovers the cluster hosts you specify via IP address ranges or hostnames.
  - Installs the Cloudera Manager Agent and CDH4 (including Hue) on the cluster data nodes.
  - Configures the package repositories for Cloudera Manager, CDH4 and the Oracle JDK.

- Enables you to select and configure optional Hadoop eco-system components.
  - Determines mapping of services to host.
  - Suggests a Hadoop configuration and automatically starts the Hadoop services.
2. You can choose to abort the Cloudera Manager Agent and CDH installation process; the Cloudera Manager wizard will automatically revert and completely rollback the installation process for any uninstalled components. Installed components are not uninstalled during an abort.

### Cloudera Manager Node Inventory Page

Once the Cloudera barclamp has been deployed, from the Edit Proposal page, there is a link below the Proposal Attributes section called "Cloudera Manager Nodes." Clicking on this link will display a page titled "Cloudera Node Inventory." This screen is pictured in the figure below. You can print this page as it will be very useful during the Cloudera Manager installation to ensure the correct nodes are selected for their intended Cloudera Manager roles.

Figure 1: Node Inventory Screen



The screenshot shows the 'Node Inventory' page in the Crowbar interface. It lists various Cloudera Manager roles and their associated nodes. Each role has a table of nodes with columns for IP Address, Name, CPU, RAM, and Drives. An 'Export to CSV' button is located at the top right of the page.

Cloudera Manager Server Node				
IP Address	Name	CPU	RAM	Drives
192.168.124.82	cd00-0c-29-45-40-00.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2

Name Nodes				
IP Address	Name	CPU	RAM	Drives
192.168.124.81	cd00-0c-29-55-4c-10.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2
192.168.124.82	cd00-0c-29-45-40-00.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2

Data Nodes				
IP Address	Name	CPU	RAM	Drives
192.168.124.85	cd00-0c-29-01-d0-37.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2
192.168.124.84	cd00-0c-29-0b-23-45.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2
192.168.124.86	cd00-0c-29-15-40-1a.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2


Edge Nodes				
IP Address	Name	CPU	RAM	Drives
192.168.124.83	cd00-0c-29-04-45-00.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2

High Availability Journaling Nodes				
IP Address	Name	CPU	RAM	Drives
192.168.124.87	cd00-0c-29-01-0e-40.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2


  

High Availability Filer Nodes				
IP Address	Name	CPU	RAM	Drives
192.168.124.87	cd00-0c-29-01-0e-40.data.org	Intel(R) Core(TM) i7-2960XM CPU @ 2.70GHz	2.94 GB	2

 You can also export this data to a comma separated value file by selecting the "Export to CSV" button at the top of the page.

### Cloudera Manager Administration Console

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 Dell has tested running the Cloudera Manager Administration console on the following browsers: Firefox 3.6, Firefox 11, Google Chrome, Internet Explorer 8, and Internet Explorer 9.

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To start the Cloudera Manager Administration Console:

1. In a web browser, type the following URL: `http(s):// IP_ADDRESS: PORT_NUMBER`.
    - a. IP\_ADDRESS is the name or IP address of the host machine where the Cloudera Manager Web Server is installed.
    - b. PORT\_NUMBER is the default port number (7180).
    - c. Crowbar Installation defaults are Crowbar Admin Node on port 7180 (<http://192.168.124.10:7180>).
  2. Log into the Cloudera Manager Admin Console. The default login credentials are:
    - a. Username: admin
    - b. Password: admin
- You can also access the Cloudera Manager Administration Console from the Crowbar User Interface using the link located on the crowbar admin node view page (Cloudera Manager).

---

 For security, you should change the password for the default admin user account as soon as possible. This option is available from the Cloudera Manager application, under the **Administration**->**Password** tab.

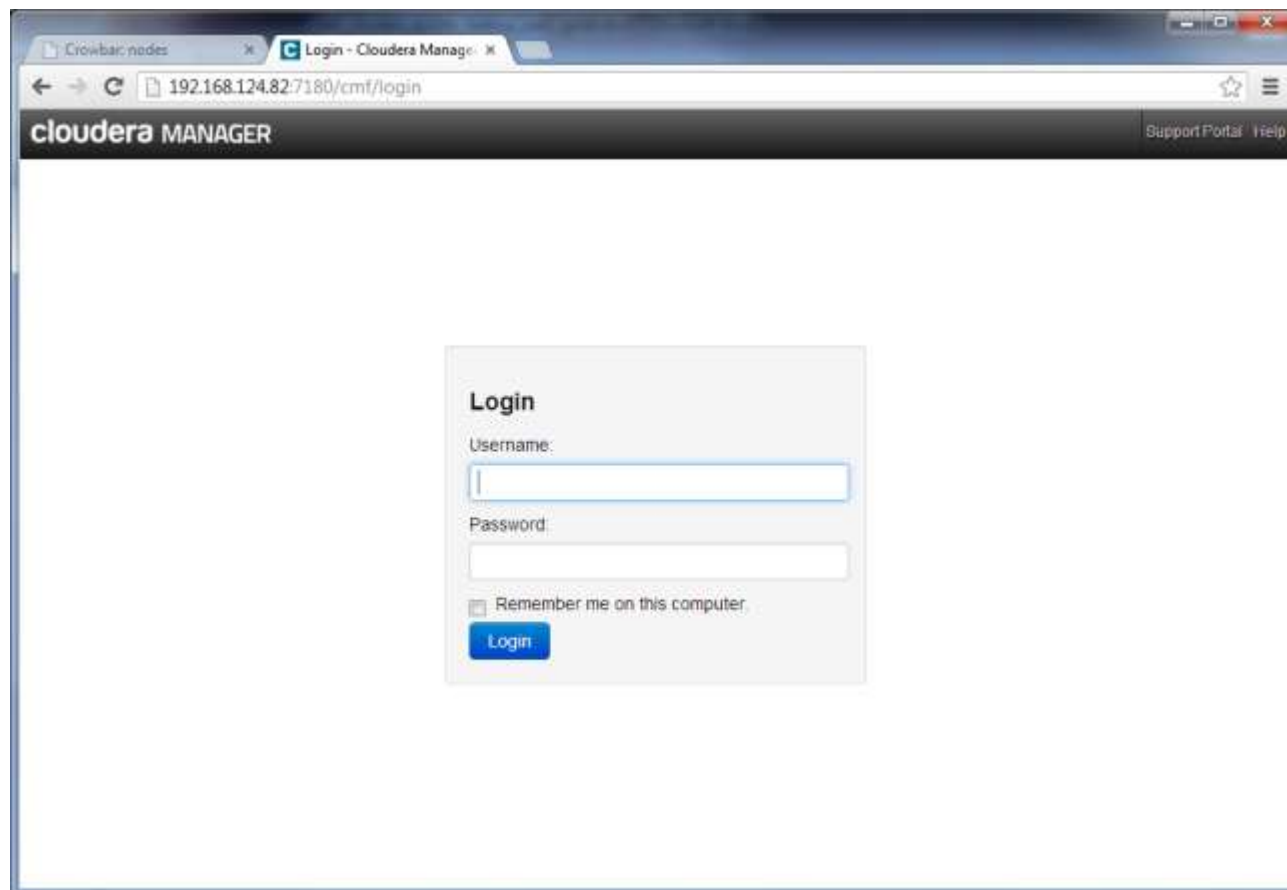
---



### Login Screen

1. Enter the user login name and password (default=admin, admin).
2. If you want to save the password, enable the **Remember me on this computer** checkbox.
3. Click the **Login** button to proceed.

Figure 2: Login Screen




### Select Edition Screen

This screen enables you to select one of the following Cloudera Manager editions:

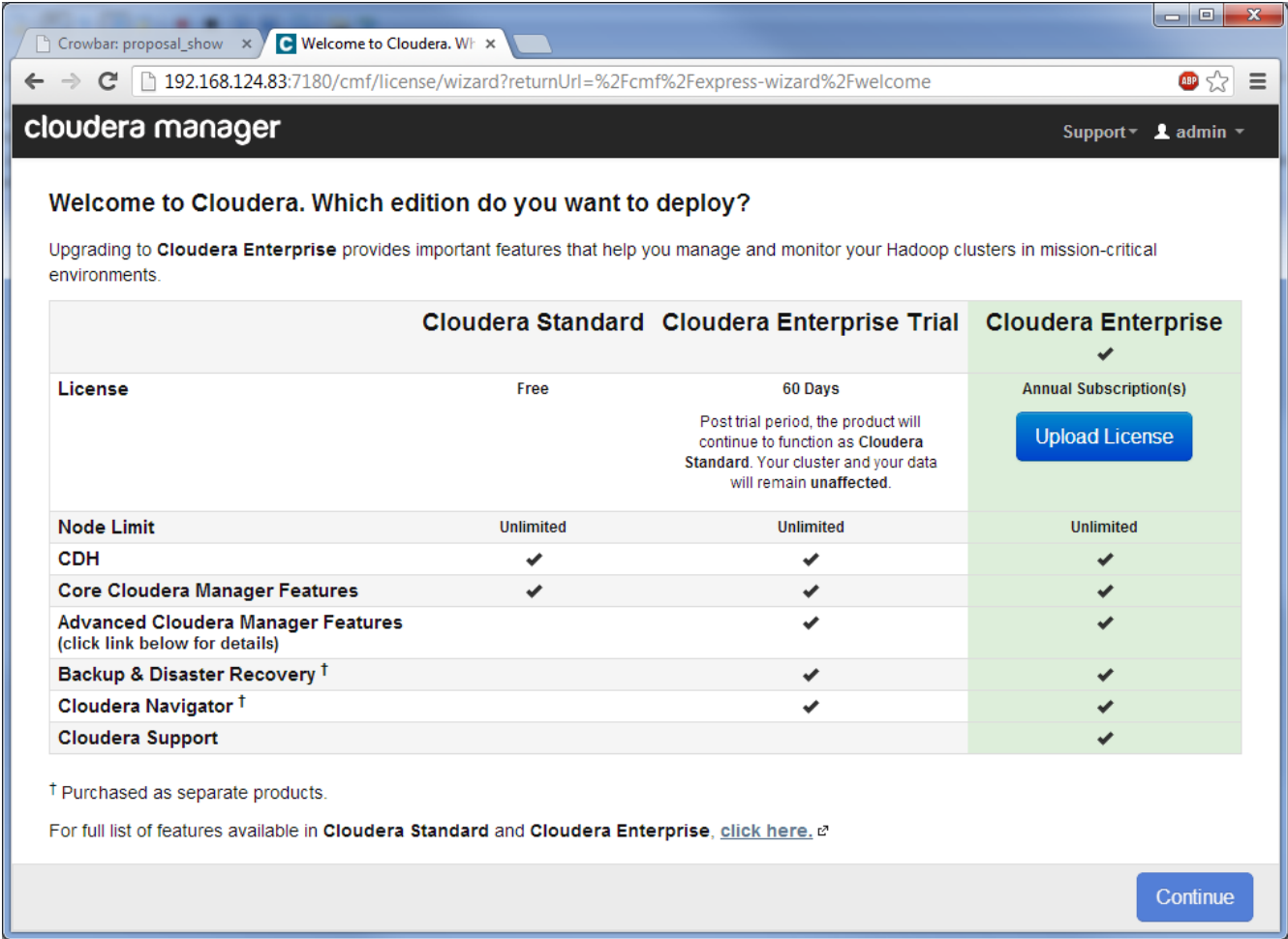
- **Cloudera Standard** - A free edition with limited features.
  - **Cloudera Enterprise Trial** - A free, 60-day trial of the full-featured Cloudera Enterprise edition. After 60 days the trial expires, and the product will continue to function as Cloudera Standard.
  - **Cloudera Enterprise** - The full Cloudera Enterprise product. This edition requires a paid, annual license.
1. Click on the column for the product you wish to install. That column becomes highlighted.
    - a. If you wish to use the Cloudera Manager Free Edition or Cloudera Enterprise Trial Edition, click the **Continue** button to proceed.
  2. If you have obtained a Cloudera Manager License key and you wish to upgrade to the Cloudera Manager Enterprise Edition, you can enter the license key.
    - a. Click the **Upload License** button.
    - b. A file browser window appears, enabling you to select a license key file.
    - c. Click the **Upload** button to apply the license key.
    - d. Click the **Continue** Button to proceed after the license key has been applied.

---

 Applying the license key is an optional step and you can always enter the license key later on in the process by clicking on the **welcome->admin** link in the Cloudera Manager user interface. This menu option is located at the top right side of the display.

---

Figure 3: Select Edition Screen



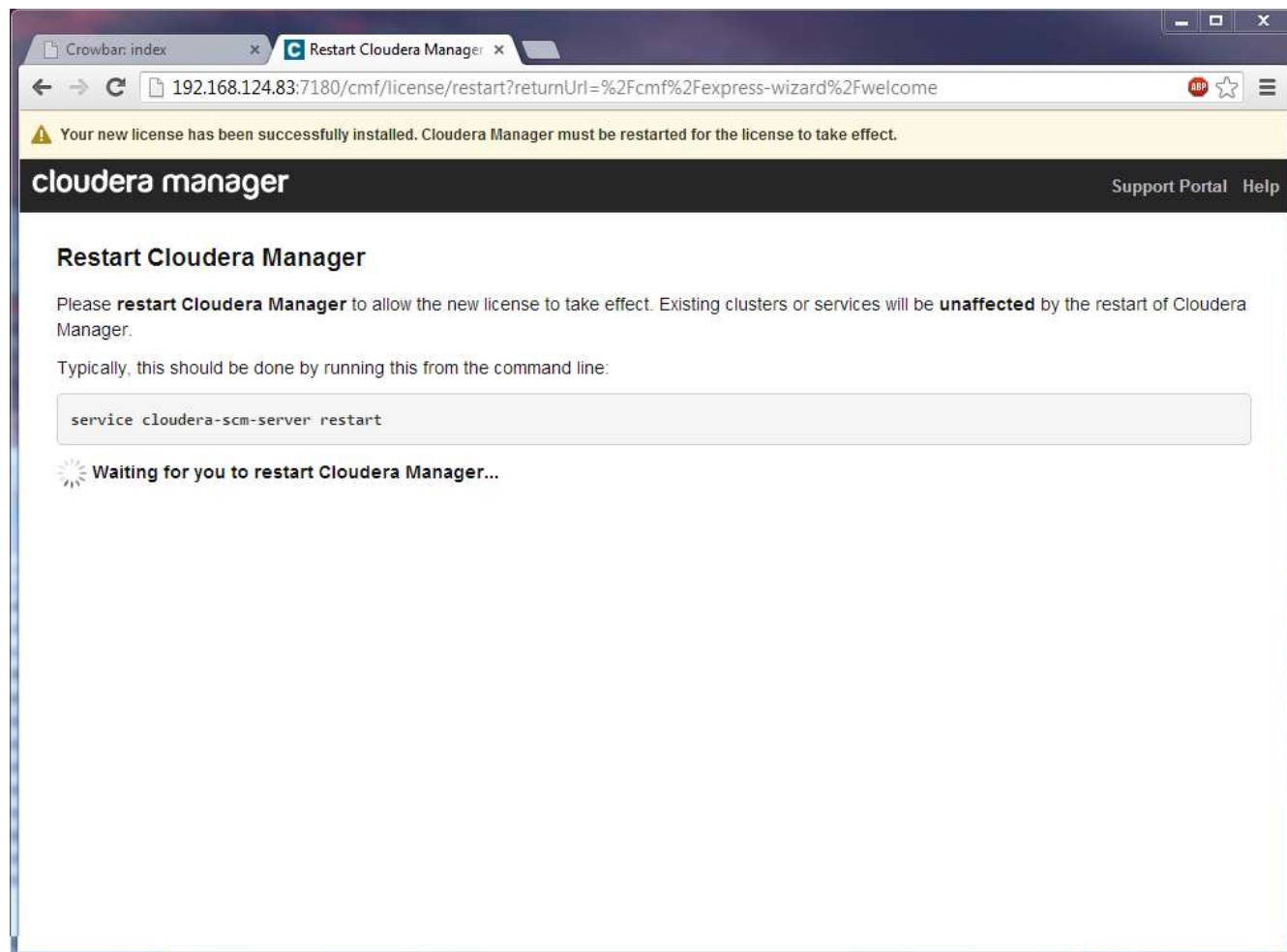
### License Key Restart Screen

1. Once the license key has been uploaded, the Cloudera Manager application will ask you to restart the Cloudera Manager server in order for it to take effect. You need to open an SSH console on the node which has the Cloudera Manager (*clouderamanager-server*) role applied to it (login=root/crowbar) and execute the following commands:

```
# service cloudera-scm-server restart
```

2. Once the Cloudera manager server has been restarted, you need to log back into the Cloudera Manager user Interface to proceed.

Figure 4: License Key Restart Screen



- Upon restarting the service, the screen message transitions from "Waiting for you to restart Cloudera Manager ..." to "Restarting ..."

The User interface refreshes to the Login screen.

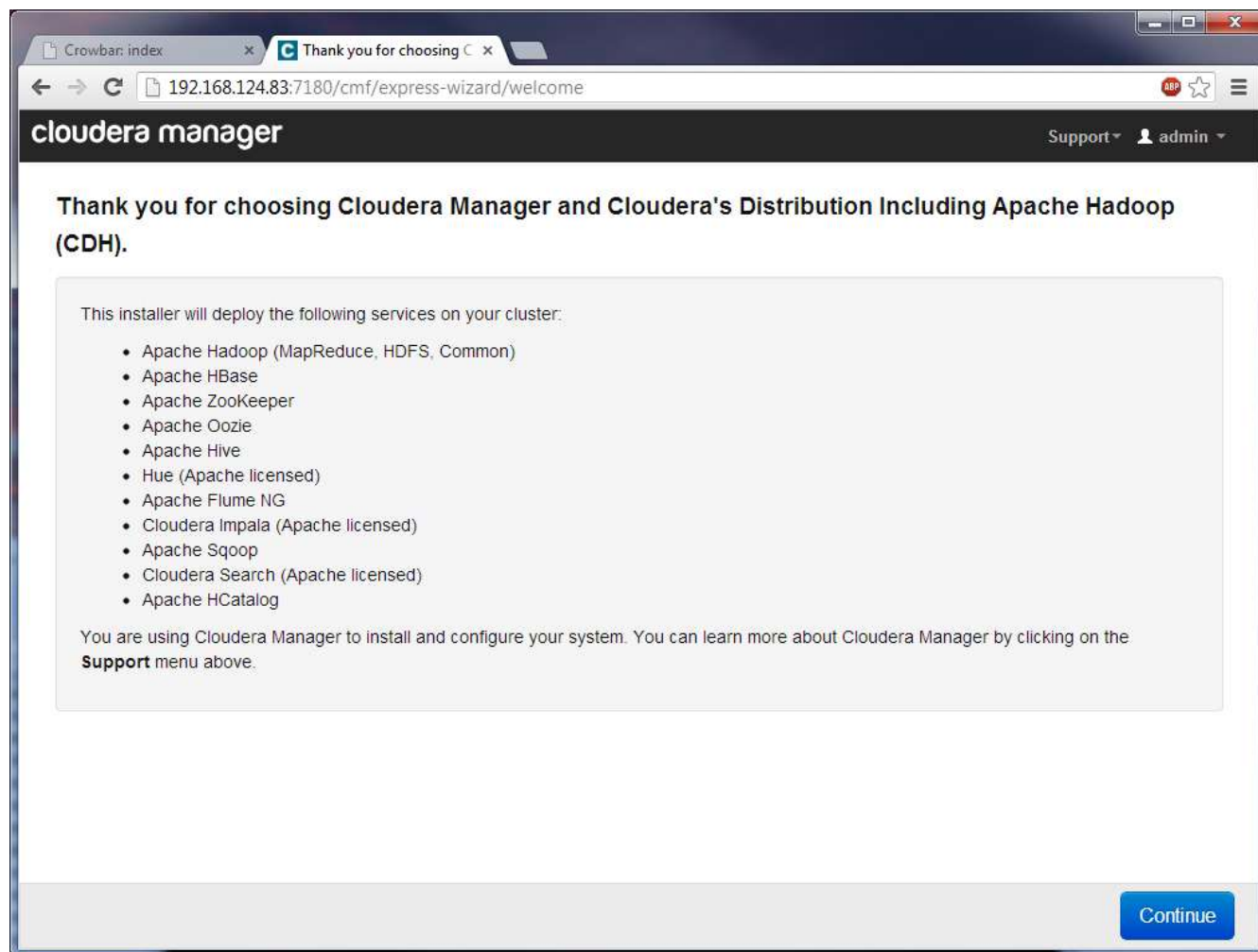
- Login with username **admin** and password **admin**.

### License Key Confirmation Screen

If you have entered the Cloudera Manager License key, you will see this additional screen.

- Click the **Continue** Button to proceed.

**Figure 5: License Key Confirmation Screen**



### Node Search Screen

1. Enter the IP range or hostname search pattern for all Hadoop cluster nodes. Cloudera Manager will search the cluster using this pattern and will consider any node with a Cloudera Manager agent process running on it as a valid Hadoop node candidate. For example;
  - 192.168.124.[80-90] will attempt to discover all the nodes between 192.168.124.80 and 192.168.124.90
  - 192.168.124.8[1-3] will attempt to discover 192.168.124.81, 192.168.124.82, and 192.168.124.83
  - For additional information on Cloudera Manager search patterns, see the search for hostnames and/or IP addresses using patterns link on the Cloudera Manager user Interface.
2. Optionally, enter the host's **SSH Port**. The default port is 22.
3. Click the **Search** button to proceed.

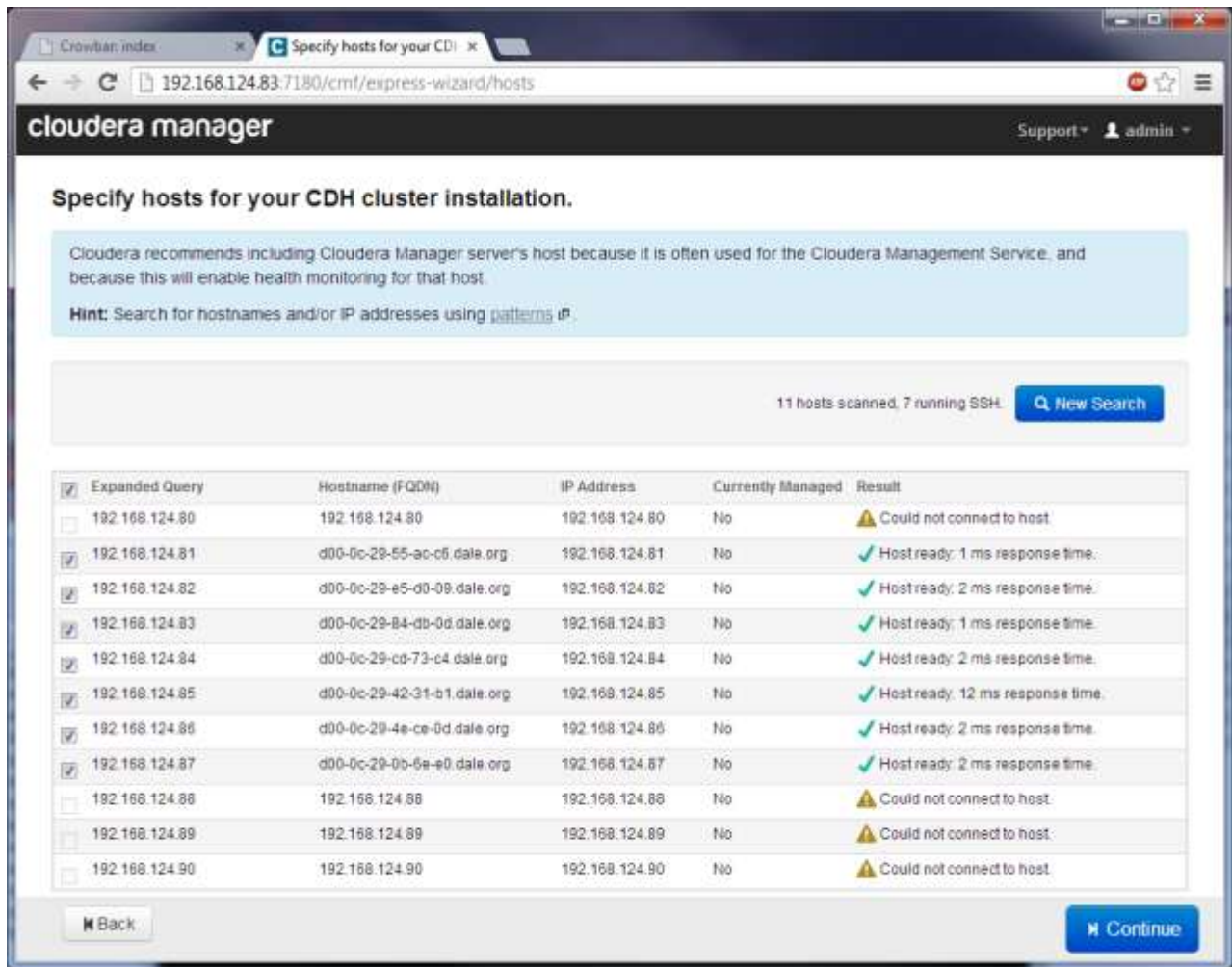
Figure 6: Cloudera Cluster Node Search Screen

The screenshot shows a web browser window with the Cloudera Manager interface. The title bar indicates the URL is `192.168.124.83:7180/cm/express-wizard/hosts`. The page header says "cloudera manager" and "Support admin". The main heading is "Specify hosts for your CDH cluster installation." Below this, a light blue box contains a recommendation: "Cloudera recommends including Cloudera Manager server's host because it is often used for the Cloudera Management Service, and because this will enable health monitoring for that host." A hint below says: "Hint: Search for hostnames and/or IP addresses using [patterns](#)". The main form area has a large text input field for host patterns. To the right of this field is an "SSH Port" label and a text input field containing the number "22". A blue "Search" button is to the right of the SSH Port field. At the bottom of the page, there is a "Back" button on the left and a "Continue" button on the right.

Node Search Results Screen

1. Verify that all your Hadoop nodes have been discovered.
2. Make any cluster configuration adjustments by selecting or deselecting any checkboxes.
3. Click the **Continue** button to proceed.

Figure 7: Node Search Results Screen



### Select Repository Screen

- Select **Use Packages** as the installation method.


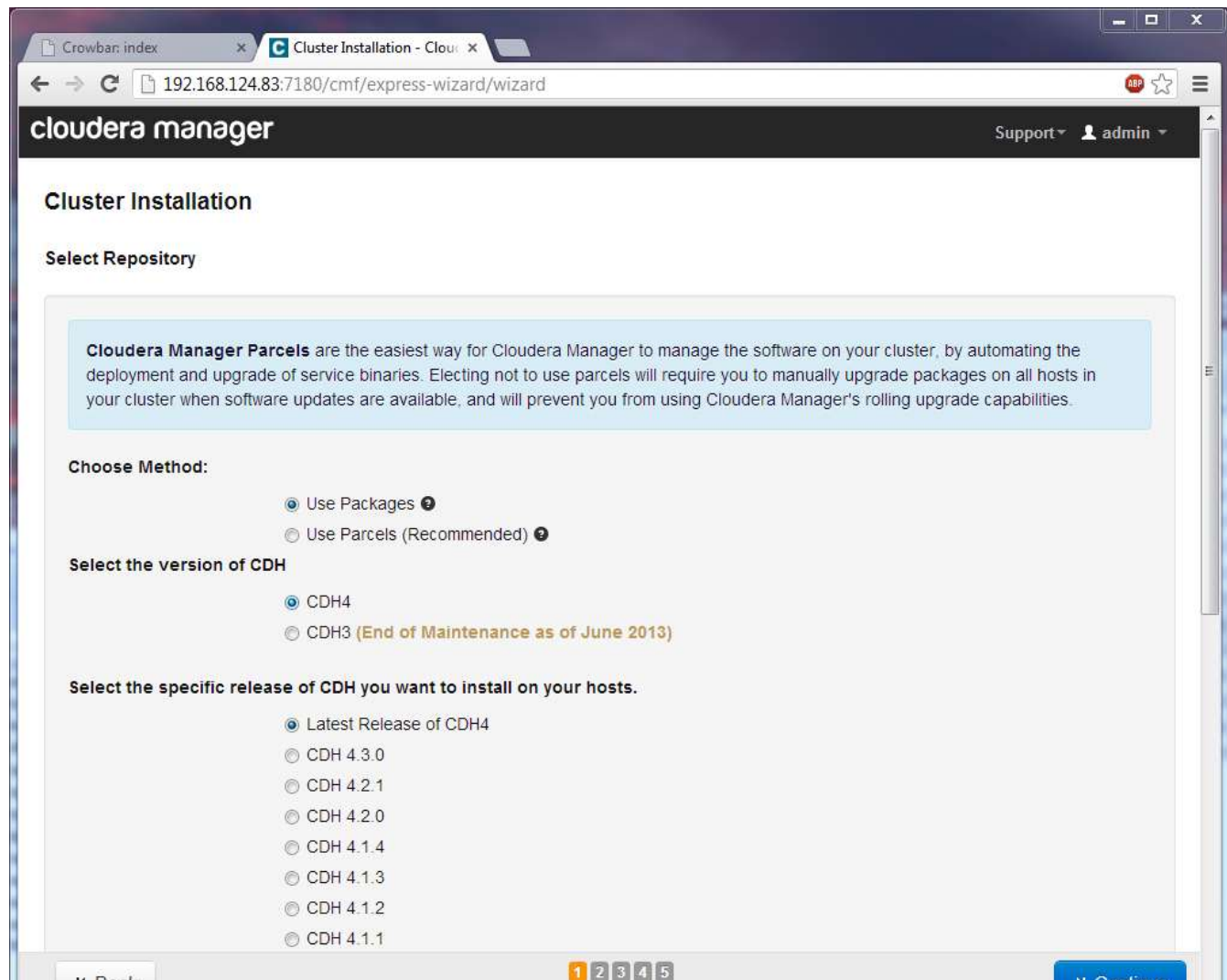
 The Dell | Cloudera Solution includes built-in software repositories, accessible via Packages instead of the default Cloudera "parcels". This enables you to install the software without Internet access.

Figure 8: Select Repository Screen




The Select Repository screen expands to display configuration choices.



### Repository Configuration Screen

---

 RPM based packages are served from the crowbar admin node. By default, the IP address is 192.168.124.10 on port 8091 (http://192.168.124.10:8091). If you configure the crowbar admin node to be on another IP address, you will have to make the appropriate adjustments to the URLs listed above.


---

1. Select **CDH4** for installation.
2. Select **Custom Repository** for CDH.
  - a. Enter this URL - <http://192.168.124.10:8091/redhat-6.4/crowbar-extra/clouderamanager>
3. Select **None** for Impala™ installation.
  - a. Or, to install Impala, select **Custom Repository** for Impala.
  - b. Enter this URL - <http://192.168.124.10:8091/redhat-6.4/crowbar-extra/clouderamanager>
4. Select **None** for Solr installation.
  - a. Or, to install Solr, select **Custom Repository** for Solr.
  - b. Enter this URL - <http://192.168.124.10:8091/redhat-6.4/crowbar-extra/clouderamanager>
5. Select **Custom Repository** for Cloudera Manager Agent.
  - a. Enter this URL - <http://192.168.124.10:8091/redhat-6.4/crowbar-extra/clouderamanager>
6. Leave the GPG Key URL field empty.
7. Click the **Continue** button to proceed.

#### About Cloudera Impala

Cloudera Impala enables you to perform fast SQL queries upon HDFS or HBase-stored Apache Hadoop data. It uses the same ODBC driver, SQL (Hive SQL) syntax, storage infrastructure, and user interface as Apache Hive. Impala is not a replacement for MapReduce-based batch processing frameworks.

---

 You must point the *Custom Repository for Impala* to Cloudera's corresponding repository in order to download Impala. See [Repository Configuration Screen](#) above. Cloudera Manager must be installed and operational upon a node with Internet access in order for Impala to function. Cloudera currently supports Impala running on Red Hat Enterprise Linux (RHEL)/CentOS 6.4 (64-bit) platforms only.


---

You can find Cloudera's Impala documentation at

<http://www.cloudera.com/content/support/en/documentation/cloudera-impala/cloudera-impala-documentation-v1-latest.html>.

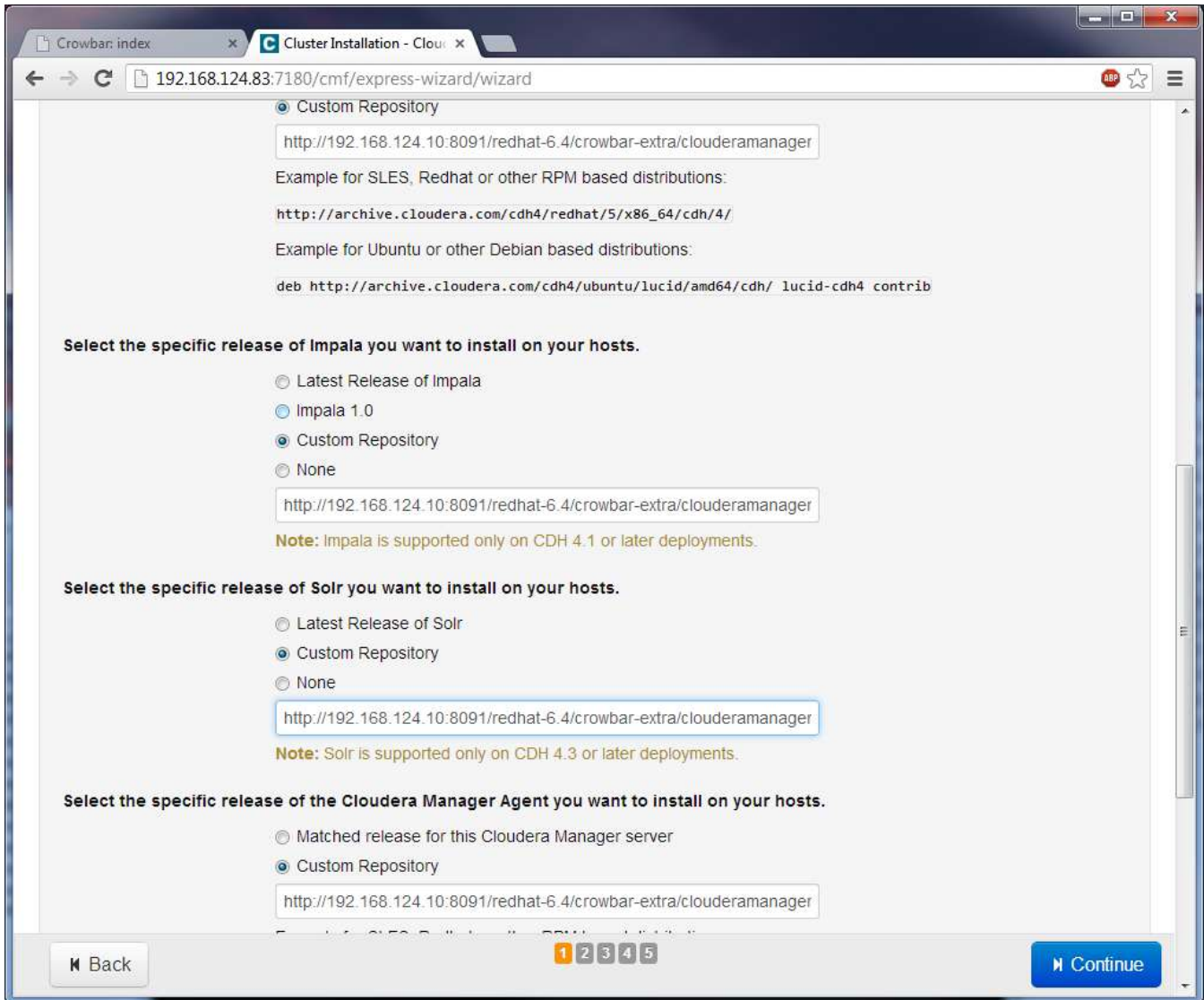
#### About Solr

Cloudera Search, powered by Apache Solr™, enables fast, easy searches within a Hadoop cluster. Users are not required to have deep technical skills in order to use Cloudera Search effectively. Cloudera Search is a replacement for MapReduce-based batch processing frameworks.

 Cloudera Search is a Cloudera beta product; as such, Dell does not provide support for Cloudera Search. You can find Cloudera Search documentation at <http://www.cloudera.com/content/support/en/documentation/cloudera-search/cloudera-search-documentation-v1-latest.html>.

You must point the Custom Repository for Cloudera Search to Cloudera's corresponding repository in order to download Cloudera Search. See Repository Configuration Screen above. Cloudera Manager must be installed and operational upon a node with Internet access in order for Cloudera Search to function. Cloudera currently supports Cloudera Search running on Red Hat Enterprise Linux (RHEL)/CentOS 6.2 (64-bit) platforms only.

**Figure 9: Repository Configuration Screen**



Crowbar: index x Cluster Installation - Clou x

192.168.124.83:7180/cm/express-wizard/wizard

☒ Custom Repository

Example for SLES, Redhat or other RPM based distributions:

`http://archive.cloudera.com/cdh4/redhat/5/x86_64/cdh/4/`

Example for Ubuntu or other Debian based distributions:

`deb http://archive.cloudera.com/cdh4/ubuntu/lucid/amd64/cdh/ lucid-cdh4 contrib`

**Select the specific release of Impala you want to install on your hosts.**

☐ Latest Release of Impala

☐ Impala 1.0

☒ Custom Repository

☐ None

**Note:** Impala is supported only on CDH 4.1 or later deployments.

**Select the specific release of Solr you want to install on your hosts.**

☐ Latest Release of Solr

☒ Custom Repository

☐ None

**Note:** Solr is supported only on CDH 4.3 or later deployments.

**Select the specific release of the Cloudera Manager Agent you want to install on your hosts.**

☐ Matched release for this Cloudera Manager server

☒ Custom Repository

1 2 3 4 5

Back Continue

### SSH Credentials Screen

1. Select **Login to all hosts as root**.
2. Select **All hosts accept same password**.
3. Enter the **SSH login password** for the cluster (default=crowbar).
4. Accept the default settings for the **SSH port** and **number of simultaneous installations**.
5. Click the **Continue** button to proceed.

Figure 10: SSH Credentials Screen

The screenshot shows the Cloudera Manager web interface for the 'Cluster Installation' wizard. The browser address bar shows the URL: 192.168.124.83:7180/cm/express-wizard/wizard#step=hostCredentialsStep. The page title is 'cloudera manager' and the user is logged in as 'admin'. The main heading is 'Cluster Installation' and the sub-heading is 'Provide SSH login credentials.'.

Root access to your hosts is required to install the Cloudera packages. This installer will connect to your hosts via SSH and log in either directly as root or as another user with password-less sudo/pbrun privileges to become root.

Login to all hosts as: ☒ root ☐ Another User:

You may connect via password or public-key authentication for the user selected above:

Authentication Method: ☒ All hosts accept same password ☐ All hosts accept same private key

Enter Password:

Confirm Password:

SSH Port:

Number of simultaneous installations:   
(Running a large number of installations at once can consume large amounts of network bandwidth and other system resources)

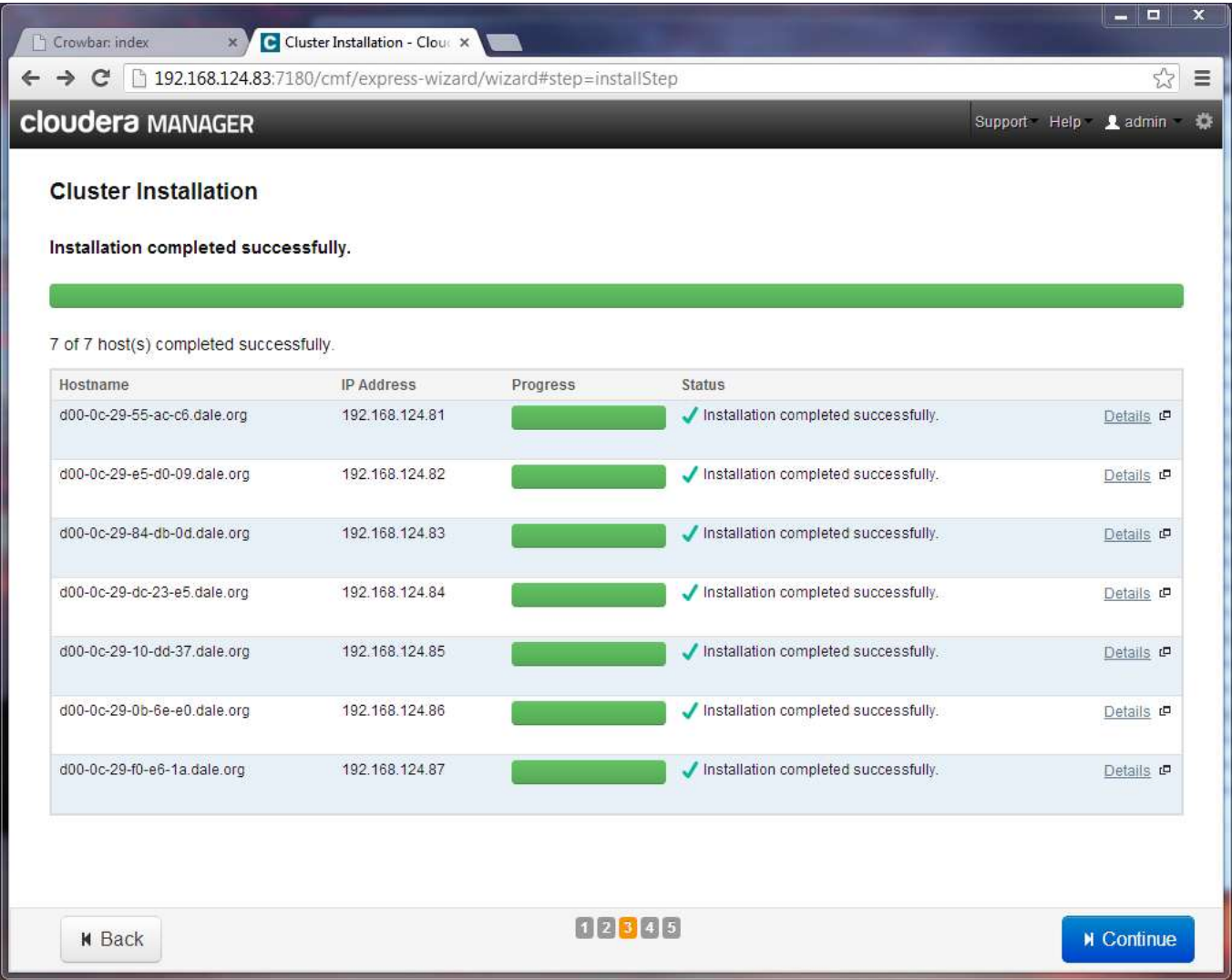
At the bottom, there is a 'Back' button, a progress indicator with steps 1, 2, 3, 4, 5 (step 2 is highlighted), and a 'Continue' button.

Package Install Screen

You will see bar graphs next to each node and the name of the package it is installing.

- 1. Wait for the installation process to complete.
- 2. Click the **Continue** button to proceed.

Figure 11: Package Install Screen

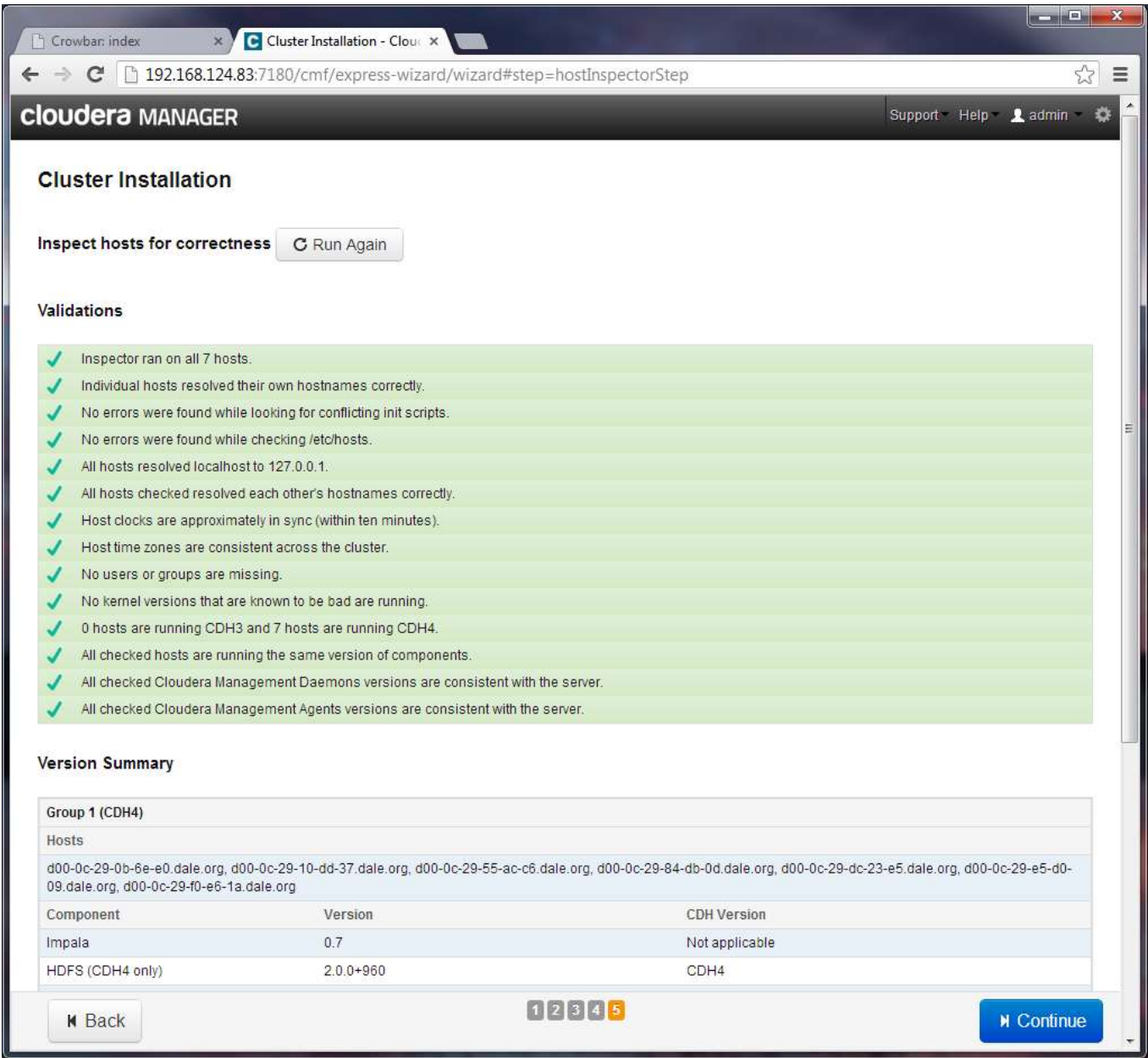


Host Inspector Screen

The Cloudera Manager Host Inspector runs during this part of the installation process in order to validate the proper cluster configuration for the Hadoop installation.


- 1. Wait for this process to complete.
- 2. Click the **Run Again** button if you want to run the Host Inspector again.
- 3. Click the **Continue** button to proceed.

Figure 12: Host Inspector Screen



### Service Selection Screen

1. Select the services that you want to install.
  - **Core Hadoop** – includes HDFS, MapReduce, Oozie, Hive, and Hue
  - **Core with Real-Time Delivery** – Includes HDFS, MapReduce, ZooKeeper, HBase, Oozie, Hive, and Hue
  - **Core with Real-Time Query (Beta)** – Includes HDFS, MapReduce, Impala, Oozie, Hive, and Hue
  - **All Services** – Includes HDFS, MapReduce, ZooKeeper, HBase, Impala, Oozie, Hive, and Hue
  - **Custom Services** – Select only the services that you want
  - **Cloudera Navigator** – A separately-licensed suite of management services

 If you select anything other than *All Services*, you can optionally add additional services in the future.

2. If you select **Cloudera Navigator**, first ensure that you have purchased the required licenses. Cloudera Navigator is a separately-licensed feature. Please contact your Dell representative for more information.
3. Click the **Inspect Role Assignments** button to configure the Hadoop cluster services.


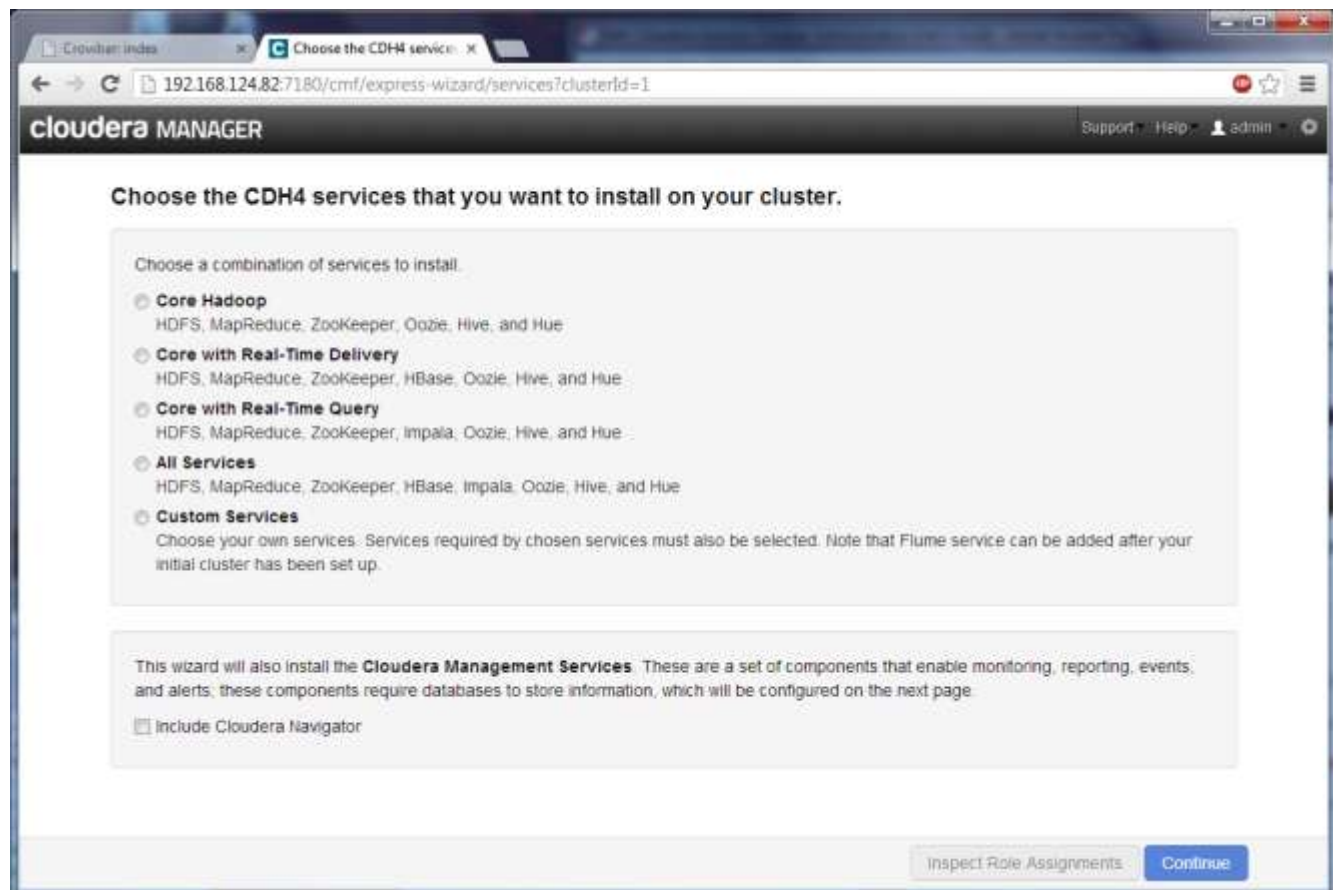
 **Important:** Do not select *Continue*, as this will give you the default role assignments, which may not be acceptable to you.


Figure 13: Service Selection Screen

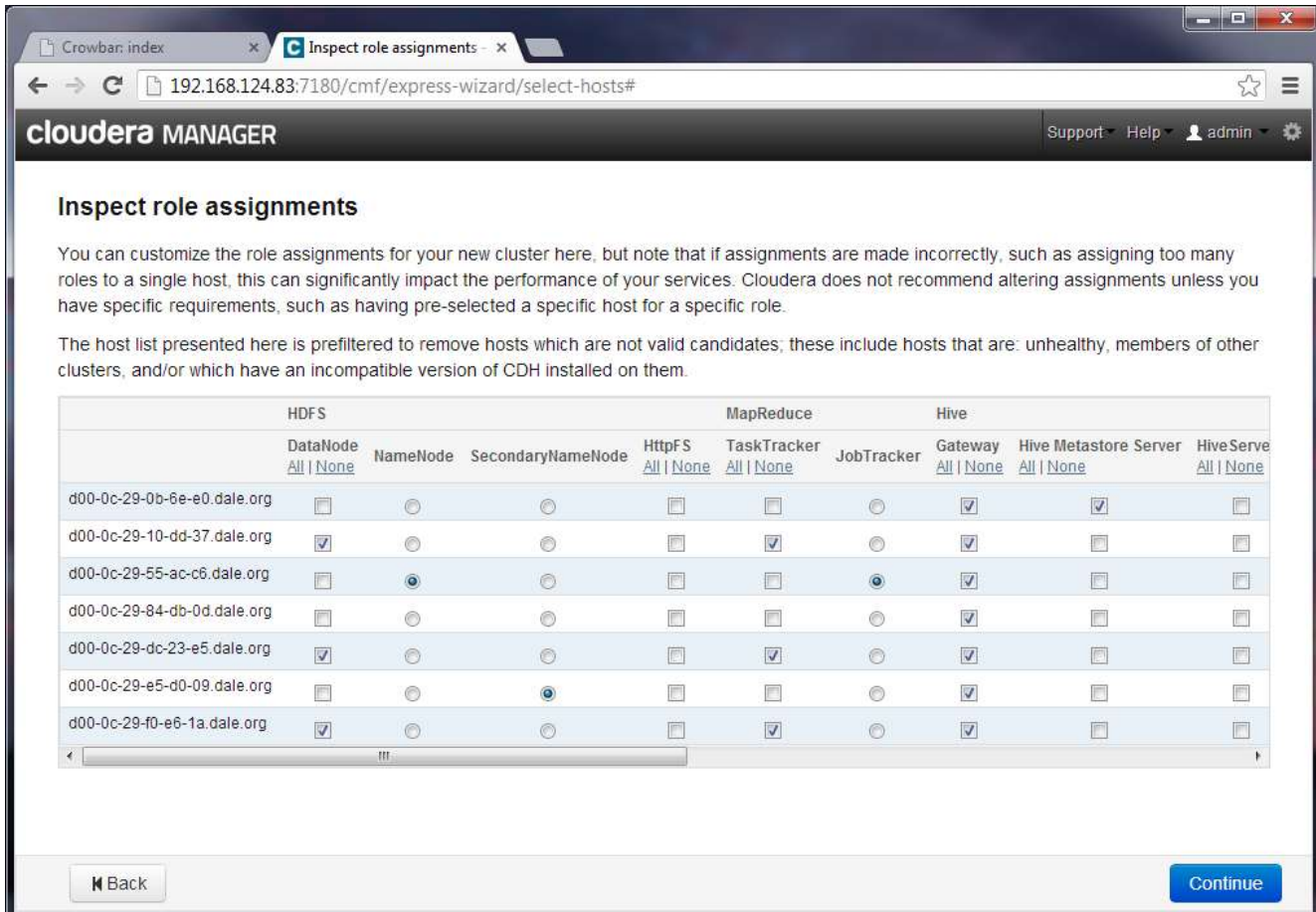




**Inspect Role Assignments Screen # 1**

- Select the Cloudera Manager role assignments for Hadoop cluster deployment. Recommended settings for the Dell Reference Architecture:
  - CM DataNode** – Crowbar nodes which contains the *clouderamanager-datanode* role.
  - CM NameNode** – 1<sup>st</sup> Crowbar node which contains the *clouderamanager-namenode* role.
  - CM SecondaryNameNode** – 2<sup>nd</sup> Crowbar node which contains the *clouderamanager-namenode* role.
  - CM TaskTracker roles** – Crowbar nodes which contains the *clouderamanager-datanode* role.
  - CM JobTracker role** – Crowbar node which contains the *clouderamanager-namenode* role.
  - Cloudera Management Service roles** – Crowbar node which contains the *clouderamanager-server* role.
- Please refer to Figure 15: Inspect Role Assignments Screen #2, before clicking the **Continue** button.

 The Cloudera Node Inventory page you printed from within the Cloudera Manager barclamp page in Crowbar is very useful for this step to ensure the roles selected in Cloudera Manager are assigned to nodes which have been provisioned (RAID, BIOS, etc.) specifically for that purpose.

**Figure 14: Inspect Role Assignments Screen # 1**


**cloudera MANAGER** Support · Help · admin · ⚙

### Inspect role assignments

You can customize the role assignments for your new cluster here, but note that if assignments are made incorrectly, such as assigning too many roles to a single host, this can significantly impact the performance of your services. Cloudera does not recommend altering assignments unless you have specific requirements, such as having pre-selected a specific host for a specific role.

The host list presented here is prefiltered to remove hosts which are not valid candidates; these include hosts that are: unhealthy, members of other clusters, and/or which have an incompatible version of CDH installed on them.

	HDFS			MapReduce			Hive		
	DataNode <small>All   None</small>	NameNode	SecondaryNameNode	HttpFS <small>All   None</small>	TaskTracker <small>All   None</small>	JobTracker	Gateway <small>All   None</small>	Hive Metastore Server <small>All   None</small>	HiveServe <small>All   None</small>
d00-0c-29-0b-6e-e0.dale.org	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d00-0c-29-10-dd-37.dale.org	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d00-0c-29-55-ac-c6.dale.org	<input type="checkbox"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d00-0c-29-84-db-0d.dale.org	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d00-0c-29-dc-23-e5.dale.org	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d00-0c-29-e5-d0-09.dale.org	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d00-0c-29-f0-e6-1a.dale.org	<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

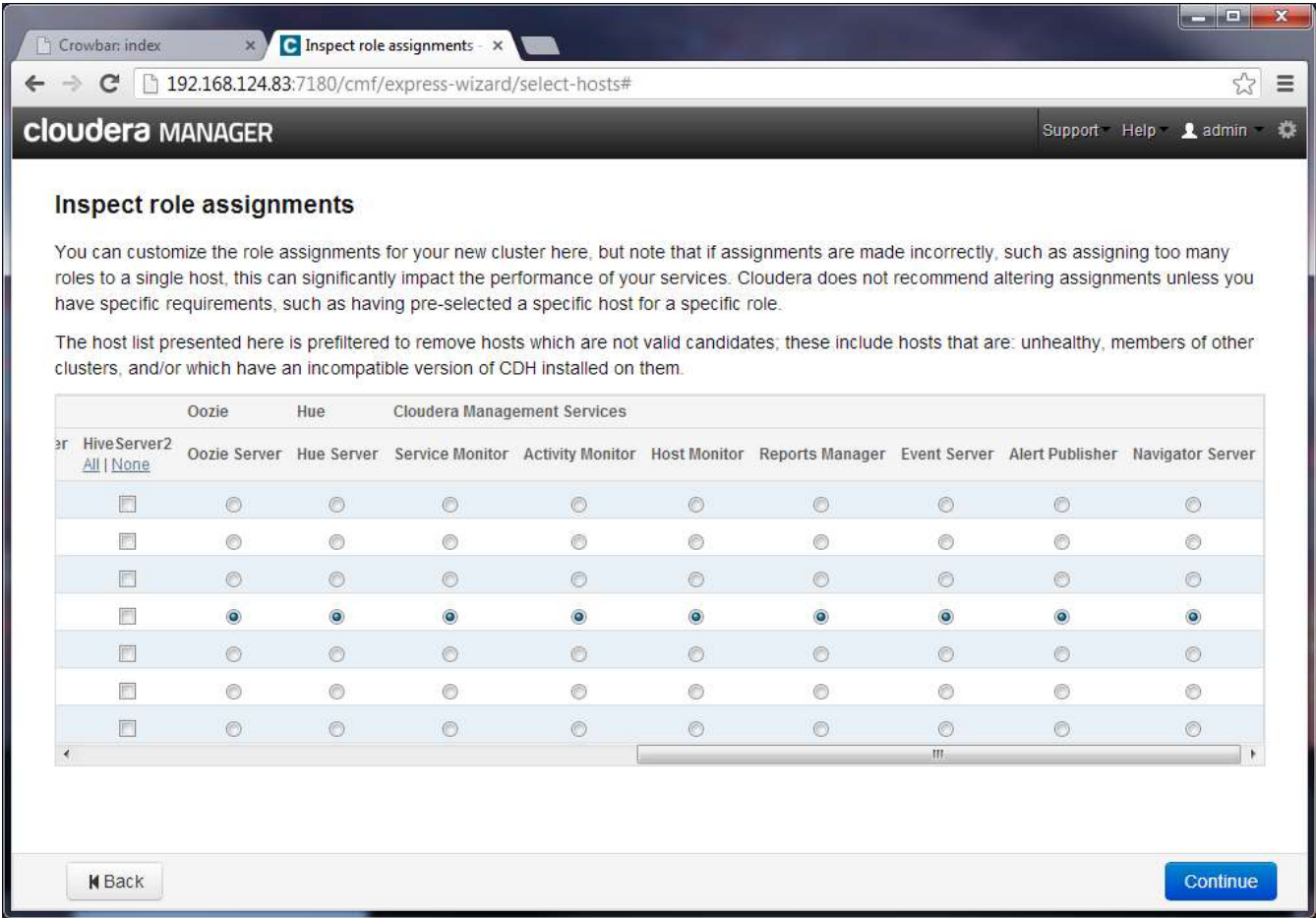
⏪ Back Continue ⏩

Inspect Role Assignments Screen # 2

If you entered the Cloudera Manager License key, you will see this additional screen.

- 1. Select the role assignments for Hadoop add-ons services and monitoring services (Activity Monitor, Service Monitor, Reports Manager, etc.). Dell suggests that you assign these roles to the Cloudera Manager Server Node.
- 2. Click the **Continue** button to proceed.

Figure 15: Inspect Role Assignments Screen #2





### Monitoring Database Setup Screen

If you entered the Cloudera Manager License key, you will see this additional screen.

1. Select **Use Embedded Database**.
2. You can leave the rest of the settings at default values unless you want to change them.
3. Click the **Test Connection** button to make sure you can connect to all the databases (required).
4. Click the **Continue** button to proceed.

**Figure 16: Monitoring Database Setup Screen**

**cloudera manager** Support admin

### Database Setup

On this page you configure and test database connections. If using custom databases, create the databases first according to the **Installing and Configuring an External Database** section of the [Installation Guide](#).

When using the Embedded Database, passwords are auto generated. Please copy them down.

☒ **Use Embedded Database**  
☐ **Use Custom Databases**

---

#### Hive

Database Host Name:	Database Type:	Database Name :	Username:	Password:
d00-0c-29-84-db-0d.dale.org:7432	PostgreSQL	hive	hive	ssN6YgFnfE

---

#### Service Monitor

Currently assigned to run on d00-0c-29-84-db-0d.dale.org.

Database Host Name:	Database Type:	Database Name :	Username:	Password:
d00-0c-29-84-db-0d.dale.org:7432	PostgreSQL	smon	smon	5QosHgtS63

---

#### Activity Monitor

Currently assigned to run on d00-0c-29-84-db-0d.dale.org.

Database Host Name:	Database Type:	Database Name :	Username:	Password:
d00-0c-29-84-db-0d.dale.org:7432	PostgreSQL	amon	amon	7r7oBDSOgl

---

#### Host Monitor

Currently assigned to run on d00-0c-29-84-db-0d.dale.org.

## Review Configuration Changes Screen

If you entered the Cloudera Manager License key, you will see this additional screen.

1. If not set by default, set the Alert Publisher mail server hostname for alerts (*localhost*).
2. If not set by default, set the Alert Publisher mail server message recipients for alerts (*root@localhost*).
3. Click the **Continue** button to proceed.

Figure 17: Review Configuration Changes Screen

Set the following configuration values for your new role(s). Required values are marked with \*

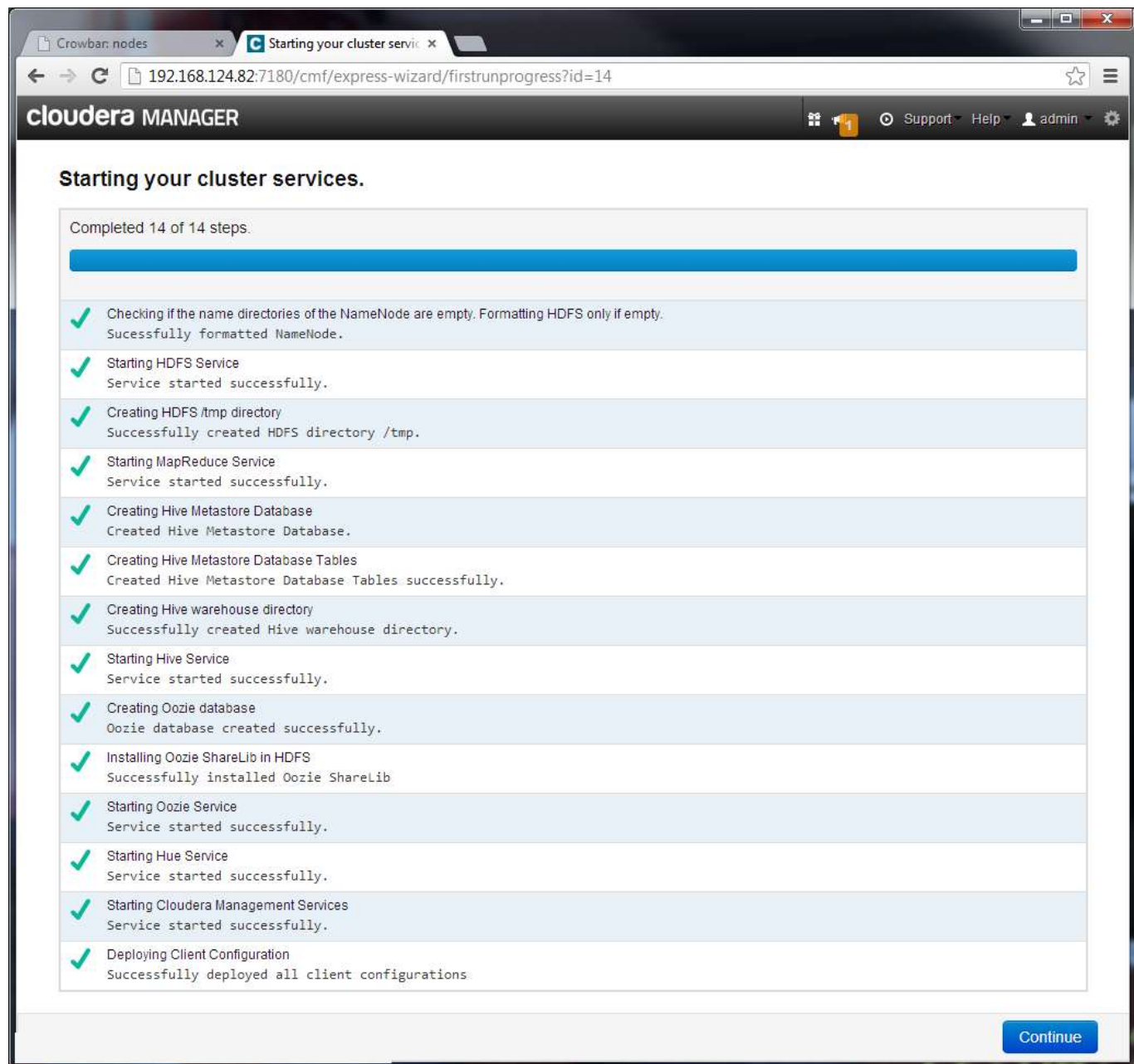
Group	Parameter	Recommended Value	Description
<b>Service hbase1</b>			
Service-Wide	HDFS Root Directory* hbase.rootdir	/hbase default value	The HDFS directory shared by HBase RegionServers.
<b>Service hdfs1</b>			
DataNode (Base) <a href="#">Show Members</a>	DataNode Data Directory* dfs.datanode.data.dir	/data/1/dfs/dn <a href="#">Reset to empty default value</a>	Comma-delimited list of directories on the local file system where the DataNode stores HDFS block data. Typical values are /data/N/dfs/dn for N = 1, 2, 3... These directories should be mounted using the noatime option and the disks should be configured using JBOD. RAID is not recommended.
DataNode (Base) <a href="#">Show Members</a>	DataNode Failed Volumes Tolerated dfs.datanode.failed.volumes.tolerated	0 default value	The number of volumes that are allowed to fail before a DataNode stops offering service. By default, any volume failure will cause a DataNode to shutdown.
DataNode (1) <a href="#">Show Members</a>	DataNode Data Directory* dfs.datanode.data.dir	/data/1/dfs/dn <a href="#">Reset to empty default value</a>	Comma-delimited list of directories on the local file system where the DataNode stores HDFS block data. Typical values are /data/N/dfs/dn for N = 1, 2, 3... These directories should be mounted using the noatime option and the

Back [javascript:history.go\(-1\)](#) **Continue**

### Cluster Services Initialization Screen

1. Wait for the Hadoop cluster installation process to complete.
2. Click the **Continue** button to proceed.

Figure 18: Cluster Services Initialization Screen

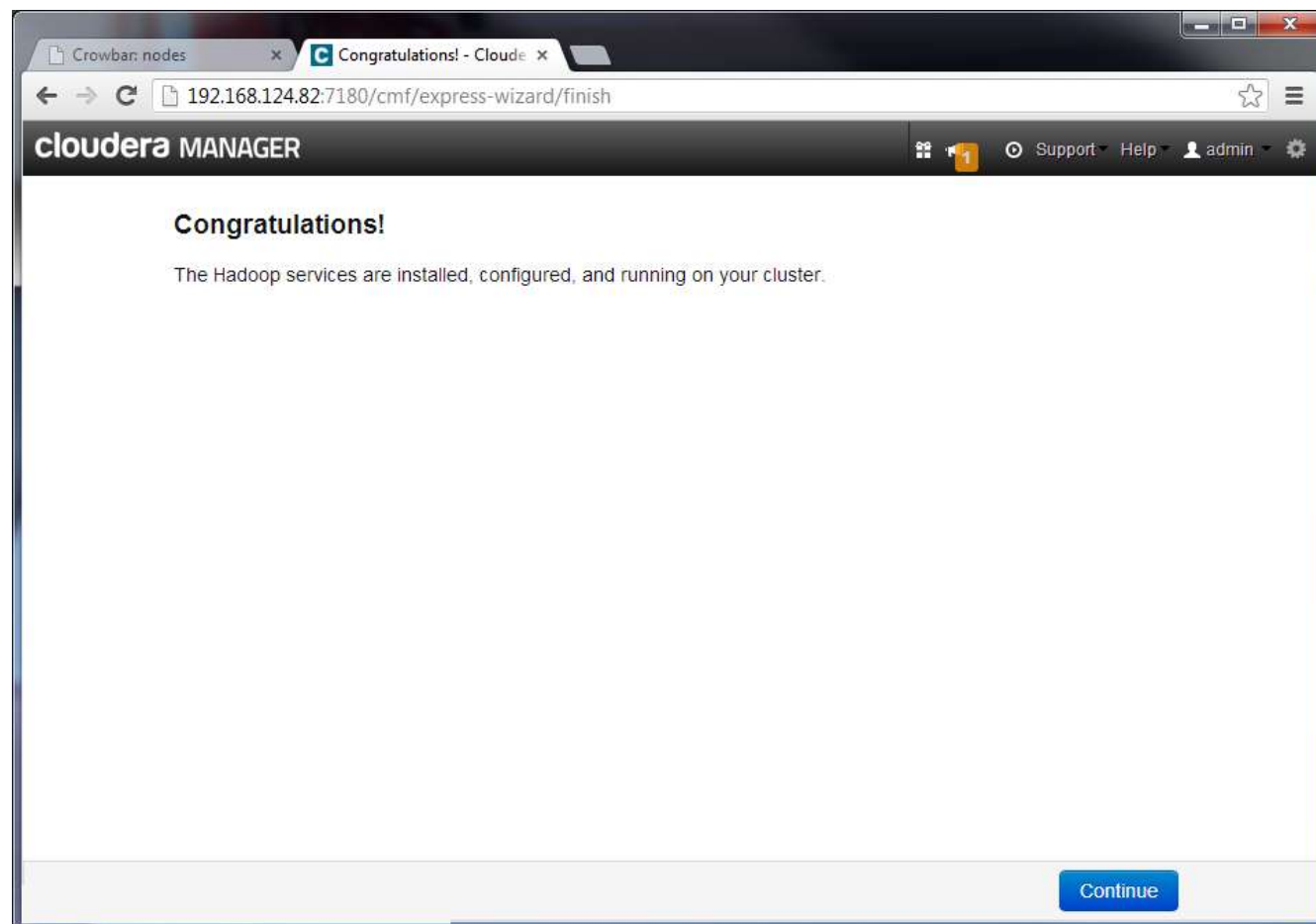


### Configuration Completion Screen

If the Hadoop configuration steps complete successfully, you will see the final Cloudera Manager confirmation screen.

- Click the **Continue** button to start using Cloudera Manager.

**Figure 19: Configuration Completion Screen**

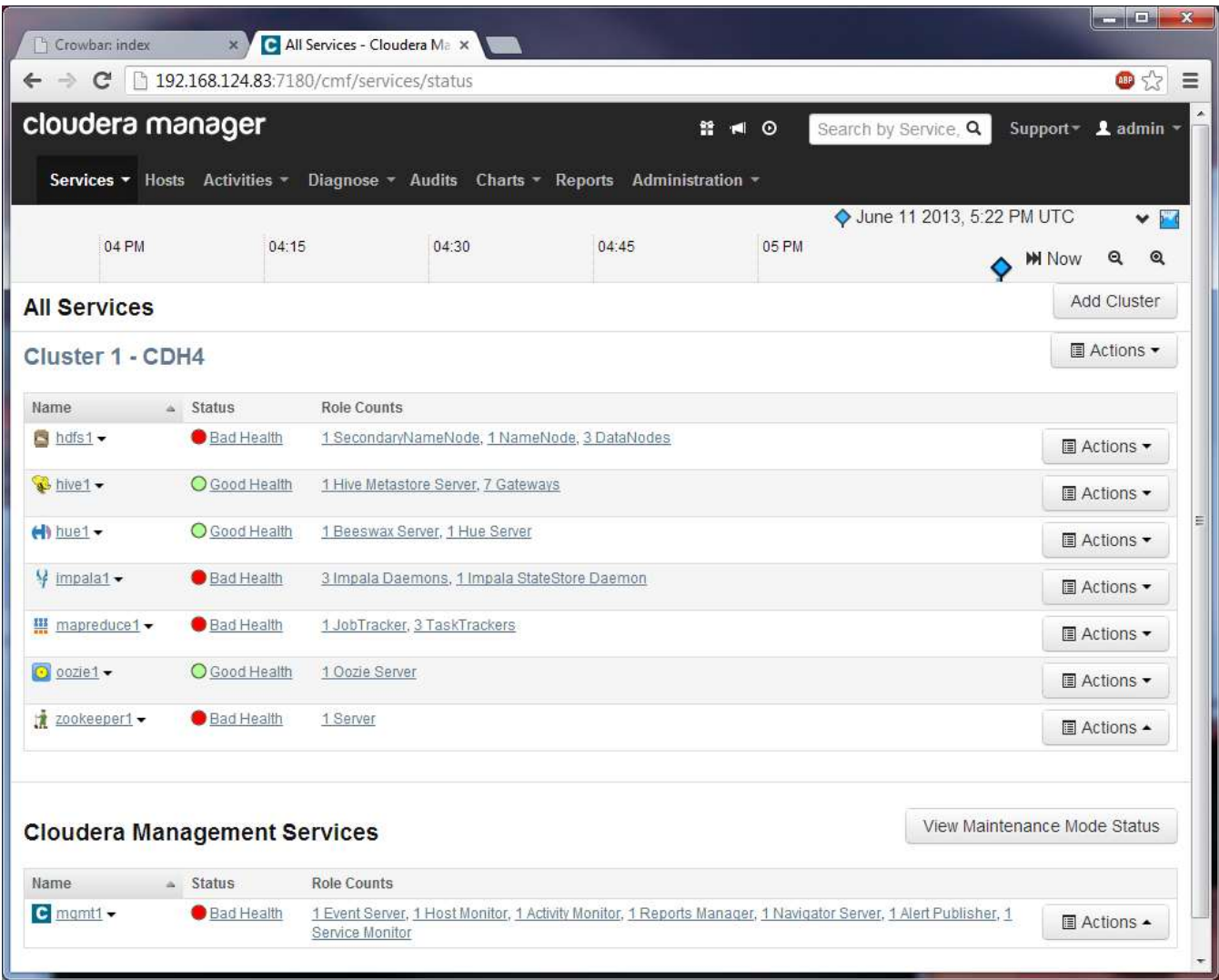


Service Display Screen

This is the normal startup screen after Cloudera Manager has completed the installation steps.

- Please refer to the *Cloudera Manager Users Guide* for additional information on operating Cloudera Manager.

Figure 20: Service Display Screen



## Pig Barclamp

Apache Pig is a platform for analyzing large data sets that consists of a high-level language for expressing data analysis programs, coupled with infrastructure for **evaluating** these programs. The salient property of Pig programs is that their structure is amenable to substantial parallelization, which in turns enables them to handle very large data sets.

Pig's infrastructure layer consists of a compiler that produces sequences of MapReduce programs, for which large-scale parallel implementations already exist (e.g., the Hadoop subproject). Pig's language layer currently consists of a textual language called Pig Latin, which has the following key properties:

- **Ease of programming:** It is trivial to achieve parallel execution of simple, "embarrassingly parallel" data analysis tasks. Complex tasks comprised of multiple interrelated data transformations are explicitly encoded as data flow sequences, making them easy to write, understand, and maintain.
- **Optimization opportunities:** The way in which tasks are encoded permits the system to optimize their execution automatically, allowing the user to focus on semantics rather than efficiency.
- **Extensibility:** Users can create their own functions to do special-purpose processing.

Table 8: Pig Barclamp Parameters

Name	Description	Required	Default
<b>java_home</b>	JAVA_HOME environment variable.	true	/usr/java/jdk1.6.0_31/jre
<b>log4jconf</b>	log4jconf log4j configuration file.	true	./conf/log4j.properties
<b>brief</b>	brief logging - no timestamps.	true	false
<b>cluster</b>	Clustername, name of the hadoop jobtracker. If no port is defined port 50020 will be used.	false	
<b>debug_level</b>	Debug level, INFO is default.	true	INFO
<b>file</b>	A file that contains pig script.	false	
<b>jar</b>	Load jarfile, colon separated.	false	
<b>verbose</b>	Verbose print all log messages to screen (default to print only INFO and above to screen).	true	false
<b>exectype</b>	Exectype local or mapreduce - mapreduce is default.	true	mapreduce
<b>ssh_gateway</b>	HOD gateway property.	false	
<b>hod_expect_root</b>	HOD expect root property.	false	
<b>hod_expect_uselatest</b>	HOD use latest root property.	false	
<b>hod_command</b>	HOD command root property.	false	
<b>hod_config_dir</b>	HOD config directory property.	false	
<b>hod_param</b>	HOD param property.	false	
<b>pig_spill_size_thresh old</b>	Do not spill temp files smaller than this size (bytes).	true	5000000
<b>pig_spill_gc_activati on_size</b>	EXPERIMENT: Activate garbage collection when spilling a file bigger than this size (bytes). This should help reduce the number of files being spilled.	true	40000000
<b>log_file</b>	Log file location.	false	

## Support

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### Dell Support

To obtain Dell hardware and software support:

- Open a request at Dell's support portal: <http://support.dell.com>
- See a list of Dell Technical Support [call centers](#) near you

### Cloudera Support

To obtain support for Hadoop:

- Open a request at Cloudera's support portal: <http://www.cloudera.com/hadoop-support/>

## Appendix A: References

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- Cloudera: <http://www.cloudera.com>
- Nagios: <http://www.nagios.org>
- Ganglia: <http://ganglia.sourceforge.net>

### To Learn More

For more information on the Dell | Cloudera Solution, visit:

[www.Dell.com/Hadoop](http://www.Dell.com/Hadoop)

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