Dell Cloud Solution for
OpenStack™ Solutions

Crowbar Users Guide

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your system.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

CROWBAR: A BUNNY indicates potential for awesomeness.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

1 Introduction

This document provides instructions for users of **Crowbar** to assist in deploying **OpenStack** components including **Nova, Glance** and **Swift**.

Other suggested materials:

- OpenStack Reference Architecture (RA, July 2011)
- Crowbar Getting Started Guide (July 2011)
- Bootstrapping OpenStack Clouds (Dell Tech White Paper , Feb 2011)

1.1 Concepts

The purpose of this guide is to explain the user interface of Crowbar. Please consult the getting started guide for assistance with installing Crowbar and configuring the target system.

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

1.2 OpenStack

The focus of this guide is the use of Crowbar, *not* OpenStack. While Crowbar includes substantial components to assist in the deployment of OpenStack, its operational aspects are completely independent of OpenStack.

> For detailed operational support for OpenStack, we suggest visiting the OpenStack documentation web site at http://docs.openstack.org/.

This guide will provide this additional information about OpenStack as notes flagged with the OpenStack logo.

1.3 Opscode Chef Server

Crowbar makes extensive use of Opscode Chef Server**,** http://opscode.com. To explain Crowbar actions, it is helpful (but not required) to understand the underlying Chef implementation.

> 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 will be including using this formation.

This guide will provide this additional Chef information as notes flagged with the Opscode logo.

1.4 Dell Specific Options

The Dell EULA version of Crowbar provides additional functionality and color pallets than the open source version. When divergences are relevant, they will be identified.

To perform some configuration options and provide some integrations, we use libaries that cannot be distributed via open source.

Crowbar is **not** limited to managing Dell servers and components. Due to driver requirements, some barclamps, e.g. BIOS & RAID, must be targeted to specific hardware; however, they barclamps are not required for system configuration.

2 General Navigation

The Crowbar interface is has two primary concepts: nodes and barclamps. All actions are focused on management of these two elements.

2.1 Using Crowbar

Crowbar is delivered as a web application available on the "admin" node via HTTP on port 3000. By default, you can access it using http://192.168.124.10:3000.

✓ Crowbar has been tested on the following browsers: FireFox 3.5+, FireFox 4.0, Internet Explorer 7, and Safari 5. A minimum screen resolution of 1024x768 is recommended.

2.2 Nodes

Nodes represent distinct servers in your environment. A server is a single operating system that can be physical or virtual with multiple NICs and HDDs. Each server is identified uniquely by the MAC address of the NIC on the administrative network.

Crowbar nodes map directly to Chef nodes. In fact, all data used in Crowbar is stored entirely in Chef. Chef is the database for Crowbar. Changing a node's data in Chef changes it in Crowbar.

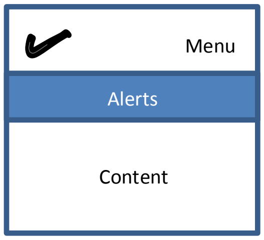
2.3 Barclamps

Barclamps represent modular capabilities that you can install onto none, some, or all of the nodes in your environment. Barclamps are activated by generating a 'Proposal' for that Barclamp. It is possible to generate multiple proposals for a barclamp. Once a proposal has been reviewed, you must activate it before it becomes an 'Active Role' in the system.

In addition to logic for Crowbar, barclamps are decomposed in Chef as multiple components: crowbar data bag entries, cookbooks, recipes, and roles. Our objective is to allow the Chef components used by Barclamps to operate in Chef even without Crowbar.

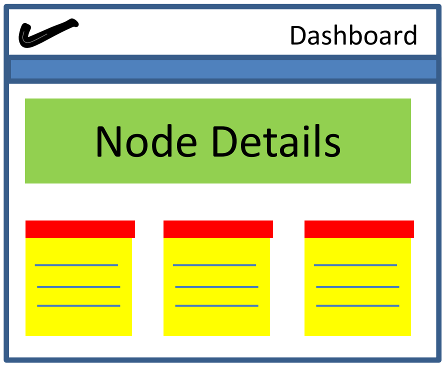
Barclamps have a specific life cycle that will be discussed in more detail as we explore the user interface. Information about using, creating, and extending barclamps is included in the Supplemental Material section.

2.4 General Layout



The menu for Crowbar is displayed on the upper right side of the page. Clicking on one of the menu sections will cause related content to be displayed on the lower section of the screen.

Alerts or confirmation messages may be displayed between the menu and the page content. Most Crowbar screens automatically update state information so users should not have to refresh the page to get the most current information.



3 Dashboard

The Dashboard shows all the nodes in the system and allows users to manipulate their power and configuration states.

3.1 Node Switch Groups

Nodes are shown organized by the physical switching infrastructure which is discovered automatically during the configuration process. The switch and port of each node's administrative network interface is used to determine groups and order within groups.

✓ If you use a consistent pattern for connecting nodes to switches then the Crowbar display will match your nodes' physical location.

The top of the group box (red in illustration) shows the Switch MAC address and a pie chart of the nodes' status within each group. Nodes (yellow in illustration) connected to the switch display in port order (lowest on top) with their current deployment state shown by the status light.

The possible states are:

Status	Icon	Comment	User Action
Ready	🟢	Requested services provisioned.	
Pending	🟡	Holding state after discovery	Node waiting to be activated
Not Ready	🔴 blinking	Crowbar & Chef actively deploying	
Unknown	⚫	In between states or not reporting for 20 minutes (powered off).	Restart server if desired

The Admin node is the node that runs the Crowbar, Chef and other core services. It exists in the system before the user interface is available.

3.2 Node Details

Clicking on a node's name will display details about the selected node in the details panel (green in illustration). The detail panel displays important information about the node including it's FQDN, uptime, switch connectivity hardware profile, and a detailed list of all active network connections.

Node detail only shows a tiny fraction of the total details that Chef tracks for each node. To see the complete list, examine the Run List and Attributes for each node in Chef.

The Links list is barclamp specific and will expand depending on which barclamps are using the selected node. Links open a new window to view additional information about the node.

4 The Barclamps and Roles lists indicate what capabilities have been assigned to the node. The Deployment Functions

To allow control of the process, Crowbar breaks deployment into phases. You must activate and allocate nodes before Crowbar will implement optional services.

4.1 Life Cycle

Understanding the Barclamp life cycle is essential to understanding Crowbar interface layout.

Crowbar progresses all deployments through a fixed lifecycle. It is important to understand this lifecycle to use Crowbar.

Figure 1 shows the entire of a barclamp within the Crowbar user interface. A Barclamp defines the capability for a service but cannot be deployed. To deploy a barclamp, you must create a Proposal. Once the proposal is created, you must selection nodes to operate on. As discussed in the next sections, you may also edit the Proposal's attributes as needed.

Applying the Proposal tells Crowbar to deploy the proposal onto the nodes. While deploying, nodes return to the Ready state when deployment is completed. Once a proposal has become an Active Role, you cannot edit it. You must delete the Role and repeat the Apply process.

Several barclamps, noteably OpenStack Nova and Swift, require multiple nodes before they can be deployed. A proposal will not being to deploy until it has sufficient capacity.

You must edit a barclamp in the Crowbar databag in Chef to change the attribute defaults of a barclamp.
At the time a proposal is applied, Crowbar updates the Run List of the selected nodes.

The Nova barclamp is *not* currently enabled to allow multiple proposals. This is should be corrected in future versions.

Barclamps section has a much more detailed discussion of Barclamps and Roles.

✓ When a role or barclamp is selected in the details panel, the nodes that share the same barclamp or role are highlighted in the group panel. This helps quickly identify groups of nodes that are similarly configured.

The buttons on the top of the details panel (Identify, Power On, Shutdown and Reboot) use the node's IPMI interface to change the node's physical state. These states will cause the node status to be "unknown."

The buttons on the bottom of the details panel (Delete, Reset, Reinstall and Hardware Update) will reset the node's deployment state. These functions are very useful during lab configurations when the system is being continuously reconfigured. The buttons take the following actions:

Button	Action	Config Lost?	Reboot?	Useful When
Delete	Completely remove all records of the node from the Crowbar/Chef database. If a node is deleted, it will be rediscovered if it reboots.	Yes	No	Removing nodes
Reset	Remove all the roles assigned to the node and reimage it back to an unassigned node.	Yes	Yes	Reallocate the node for a new purpose
Reinstall	Reimage the node and then reapply the current deployment profile to the node. This effectively rebuilds the server back to a pristine state.	No	Yes	Tuning the Chef recipes or configuration details
Hardware Update	Keeps the current configuration, but forces the node to reboot.	No	Yes	To apply BIOS or RAID updates.

Using the Edit link (after the node name in the top left) allows you to make per node decisions about how the node will be deployed.

✓ You **must** "Allocate" the node to allow Crowbar to complete the deployment group panel. The allocate step acts as a pause state for deployment so that you have time choose a node's role in the system before Crowbar provisions it. It can also be used to simulate white listing.

5 Overview

This user screen is available in the Dell version.

The Overview page shows a reference taxonomy for a Cactus version OpenStack deployment. Crowbar highlights the sections of the taxonomy that have been enabled in the system. Like most Crowbar pages, this page updates automatically so change in the system status are automated reflected.

There are no user actions for the Overview page. It is a view only page.

✓ For the API components of the taxonomy (Nova, Glance and Swift), Crowbar will provide the IP address on which these components may be accessed. This is the fastest way to determine which identify which nodes are hosting API services.

6 Deployment Functions

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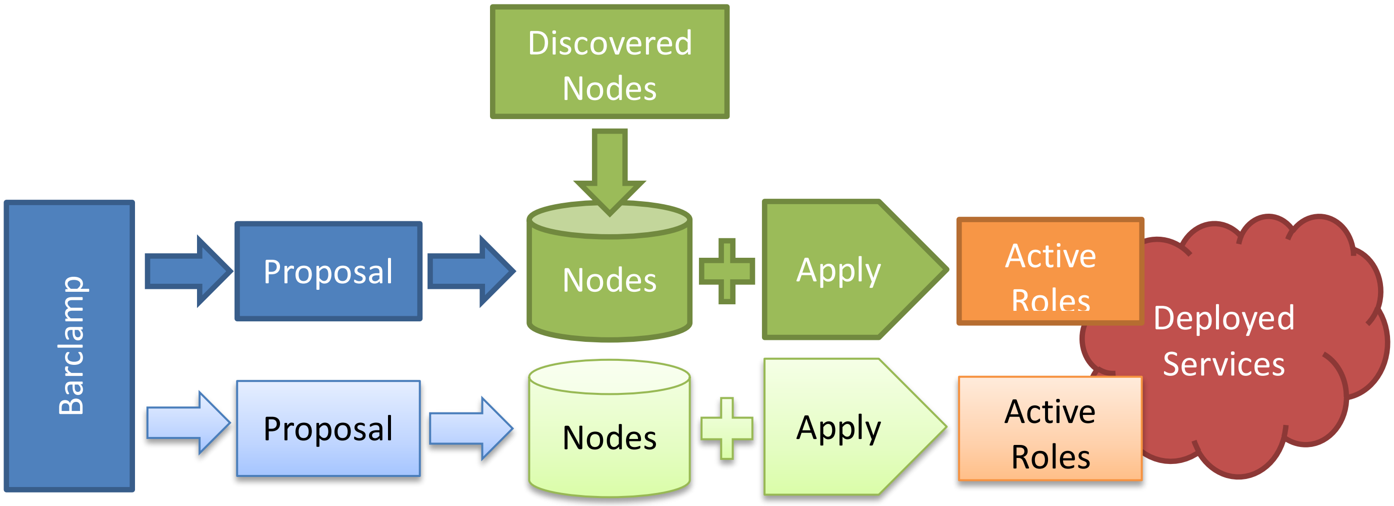

Figure 1 shows the life cycle of a barclamp from concept to proposal and deployment.

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6.2 Barclamps

The Barclamp page shows a list of all available barclamps (see table below). Selecting a barclamp displays the details for the selected barclamp.

The details page shows the Proposals created and the Active Roles deployed for the barclamp. You can jump directory to the relevant proposal or role by clicking on its name.

From the barclamp details page, you may create a new proposal for the system.

✓ Naming for proposals is limited to letters and numbers only (not spaces). Capitalization is allowed.

This limitation is necessary because activated proposals are created as roles in Chef and follow a prescribed naming convention.

As of July 2011, the following barclamps are included with the Dell EULA version Crowbar. Exceptions for the open source version are noted.

Barclamp	Function / Comments	Role	License
Crowbar	The roles and recipes to set up the barclamp framework. References other barclamps.	Core	Apache 2
Deployer	Initial classification system for the Crowbar environment (aka the state machine)	Core	Apache 2
Provisioner	The roles and recipes to set up the provisioning server and a base environment for all nodes	Core	Apache 2
Network	Instantiates network interfaces on the crowbar managed systems. Also manages the address pool.	Core	Apache 2
RAID	Sets up LSI RAID controllers in a variety of configurations. If missing, can be performed manually.	Core / Optional	Dell EULA
BIOS	Configures BIOS options for Dell PowerEdge C servers. If missing, can be performed manually.	Core / Optional	Dell EULA
IPMI	Allows management of the IP Management Interface (IPMI) on servers when the BMC network is enabled.	Extendable	Apache 2
NTP	Common NTP service for the cluster (required for secure access). An NTP server can be specified.	Extendable	Apache 2
DNS	Manages the DNS subsystem for the cluster	Extendable	Apache 2
Logging	Centralized logging system based on syslog	Extendable	Apache 2
Nova	Installs and configures the Cactus release of Openstack Nova. It relies upon the network and glance barclamps for normal operation.	OpenStack	Apache 2
Swift	part of Openstack, and provides a distributed blob storage	OpenStack	Apache 2
Glance	Glance service (Nova image management) for the cloud	OpenStack	Apache 2
Nagios	System monitoring service for the cluster that can be	Optional	GPL 2

Barclamp	Function / Comments	Role	License
	used by other barclamps		
Ganglia	Performance monitoring service for the cluster that can be used by other barclamps	Optional	BSD
Test	Provides a shell for writing tests against	Internal	Apache 2

6.3 Proposals

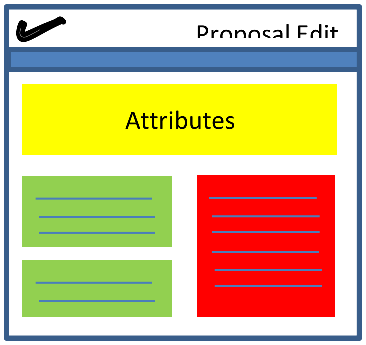
The Proposals page allows you to review and deploy a proposal.

The list page shows you all proposals in the system. If a barclamp has multiple proposals then the barclamp is listed twice but with different proposals in the name column. The proposals created automatically by Crowbar will be named "default."

Crowbar stores barclamps in the Chef under the Crowbar data bag using *bc-template-[barclamp]* as the naming pattern. When a proposal is created, the instance copy is also stored in the Crowbar data bag. Only active proposals have roles created for them.

The status of each proposal is indicated by a status light. A red blinking status light indicates that user attention is required. The proposals status updates automatically without a refresh.

Status	Icon	Comment	User Action
Ready	🟢	Proposal has been deployed	Ready for use.
Pending	🟡	Queued for deployment	
Not Ready	🔴 blinking	Proposal is being configured process	Needs additional resources and/or configuration.



Selecting the barclamp on the list will navigate to the barclamp details page.

Selecting the name of the proposal on the list will open the Edit Proposal page. All proposals have two primary edit areas: Attributes (yellow in figure) and Deployment. Attributes are configurable data that is used by the Chef recipes. Deployment is the Chef roles and nodes assigned to those roles.

Since each barclamp has unique attributes and roles you should consult the documentation for each barclamp if you plan to change its defaults.

Each barclamp may provide a custom editor for its attributes and node deployment information. The typical custom editor allows you to set attribute values using a form and drag and drop nodes from the available list (red on figure) into the roles associated with the barclamp (green on figure). Each barclamp may have specific logic that requires minimum or maximums for node assignments.

While most barclamps coordinate with Chef to perform node deployements, Crowbar includes some special function barclamps that can be used to change how Crowbar operates.
These barclamps include: crowbar, deployer, and provisioner.
Editing these barclamps is beyond the scope of this document.

If the barclamp does not have customer editor the Crowbar will automatically use a raw json editor. You can also use this view if you want to see all the configuration details then you should select the Raw view option on the right side of the Attributes or Deployment panel. This option allows you to directly edit the json configuration details for the proposal. This option is typically used when developing new barclamps or for advanced users only.

When you have finished editing the proposal, you may save or apply it. Save will retain your configuration settings. Apply commits your proposal and instructs Crowbar to begin deploying your proposal. Deleting a proposal will remove it from the system and you will lose your configuration.

If you attempt to apply a proposal that does not have sufficient nodes then Crowbar will show that proposal as queued. This is likely to happen if you select nodes that have not been allocated.

When you apply a proposal, Crowbar creates Chef roles and puts them in the run list of the selected nodes.

6.4 Active Roles

The Active Roles page shows barclamp proposals that have been applied in the system.

Selecting a barclamp from the Active Roles list will take you to the associated Barclamp details page.

Selecting a proposal from the Active Roles list will display a view page of details for the proposal. The details page shows the attributes specific to the proposal and the nodes which have Chef roles related to the proposal. Selecting a node will navigate you directly to the node's detail page.

Reminder: You cannot edit an active role, you must edit its proposal and reapply.

During a typical deployment, Crowbar will create and apply the core barclamps for the system; consequently, even a newly installed system will show up to 10 "default" applied proposals.

The Active Roles detail page can show you which nodes are running key infrastructure components. For example, on the Nova barclamp, the node(s) running the *nova-multi-controller* role have the API and mangement components of Nova.

Crowbar uses a naming pattern for Roles that allows you to quickly figure out which barclamp and proposal is being applied to a node's run list in Chef.
The instantiated barclamp naming pattern is *[barclamp]-config-[proposal]*.
Barclamps then use additional roles to control node proposal membership (aka the Run List)

7 Supplemental Material

7.1 System Verification

As a final step, it's important to be able to verify that your deployment has succeeded. Crowbar does *not* provide specific feedback or updates to confirm that the Chef recipes were successfully deployed.

You should consult the getting started guide and barclamps specific to your system for details on verification of deployment.

7.2 Deactivating Barclamps

As of July 2011, there are no methods and few controls to remove barclamps. The best practice is to remove them before completing the Admin node installation. If you must remove them after installation:

1. In Crowbar, delete all proposals associated with the barclamp
2. In Chef, delete the barclamp in the Crowbar data bag
3. Provide an offering of iron enriched carrots to the bunny

7.3 Installing Additional Barclamps

Details pending…

7.4 Creating Barclamps

We are working with the community to develop documentation to support this activity. If you are interested in creating, extending or contributing barclamps, please contact our team at openstack@dell.com.

7.5 Crowbar History

The original code name for this project was offered by Greg Althaus as "you can name it **Purple Fuzzy Bunny** for all I care." While excellent as a mascot, it was cumbersome to say quickly. **Crowbar** was picked up as a code name because it is 1) easy to say, 2) used for unboxing things, 3) a powerful and fast tool and 4) the item you start with in a popular FPS. Once properly equipped, our bunny (designed by Rob Hirschfeld who named him Mesa) was ready to hit IT.