FuseSource

A Progress Software Company

Fuse HQ

Getting Started With Fuse HQ

Version 4.4

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The experts in open source integration and messaging

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Legal Notices

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Chapter 1. Introduction to Fuse HQ

This chapter introduces basic concepts and terminology and helps the administrator get ready to set up and monitor a Fuse HQ system.

Overview

What is Fuse HQ?

Fuse HQ is a set of tools that let you monitor a wide range of activity on any group of machines that you can access via HTTP. It is highly customizable, letting you determine what activity you want to see, what conditions cause alerts and what actions are taken in response, and who has access to the tools.

This book focuses on using Fuse HQ to monitor other components of the , Fuse Message Broker and Fuse ESB. As installed, Fuse HQ can automatically detect and monitor these and many other processes, including, for example, Web servers, database servers, and CPU activity. In addition, you can develop plugins that enable monitoring of other processes that are not automatically supported.

Fuse HQ architecture

A Fuse HQ system comprises one or more *agents*, a *server*, and a *database*.

- **Agent** — An agent runs on each machine that you want to monitor. Each agent discovers resources and monitors activity on its host machine, and sends information about the resources and activity to the server. In the context of a system, typically a Fuse HQ agent runs on each machine that hosts a Fuse Message Broker.
- **Server** — The server runs on a single host. The server gathers information from the agents and manages the database. It includes the browser-based user interface component, called the HQ Portal, which displays metrics and alerts and provides the necessary tools for configuration, administration, and reporting. (A command line interface, not described in this book, is also available.)
- **Database** —The database stores all HQ-related data, including system inventory information, data gathered by the agents, and configuration data governing behavior and access. You have the option of using a built-in PostgreSQL database installed with Fuse HQ, or a standalone database (Oracle, PostgreSQL, or MySQL). In this guide, it is assumed that you are using the built-in database, which requires no setup or configuration.

Fuse HQ terminology

The components of your system that Fuse HQ can monitor are called *resources*. From the resources available on your system, you choose the

specific ones that you want to monitor. This set of resources is your *inventory*. The inventory comprises both basic resources and composite resources.

Basic resources include *platforms*, *servers*, and *services*.

- **Platform** — A platform is typically a computer (a combination of a machine and an operating system). It can also be a network device or a storage device. Platforms host servers.
- **Server** — A server is a process, running on a platform, that provides services. Each server provides multiple services. In the , the Fuse Message Broker and the Fuse ESB container are servers.
- **Service** — A service is a server component that provides a specific, discrete function. In the , services include the connectors, topics, and queues running on a Fuse Message Broker, and the various services deployed in a Fuse ESB container.

You combine selected basic resources, according to your own criteria, to define and add to your inventory two types of composite resources: *groups* and *applications*.

- **Group** — A group can consist of any combination of platforms, servers, and services. Groups can be *mixed* or *compatible*. If a group is compatible, meaning that its member resources share the same metrics and control actions, you can monitor and act on all of those resources as a single entity. Groups have an important function in setting permissions, as the groups assigned to a user's role determine the resources that are visible to that user.
- **Application** — Any set of services can be aggregated as an application, as appropriate. This allows you to focus logically on the actual work that your deployed services perform.

Fuse HQ Capabilities

Discovering, monitoring, and controlling resources

The Fuse HQ agent automatically discovers your platforms and resources (as well as many other types of resources) and sends information about them to the server. The Fuse HQ server lets you monitor their state and activity from any Web browser. You use the Fuse HQ Dashboard (the UI's home page) and related views to select the resources you are interested in and inspect details about their availability and levels of activity.

In addition to monitoring the resources in your inventory, you can perform various control actions on some of the servers and services. For example, with Fuse Message Broker, you can start and stop a broker or send a text message to a queue or topic. Available control actions depend on the specific type of server or service.

Managing problems and alerts

Fuse HQ can show you at a glance where problems are occurring or are likely to occur. Resources that are unavailable are automatically highlighted. You can define custom alert conditions based on any metric values and events that the selected resources generate. For example, you can choose to be notified when the number of messages on a given queue exceeds a specific value. As another example, you might define an alert to be raised whenever a resource logs a warning message.

Tracking events

You can use Fuse HQ to view entries in the log files of any of the platforms and servers in your inventory. Configuration options let you specify precisely which events you want Fuse HQ to capture for each resource. Using the event-tracking feature is far more convenient than opening the individual files, which may be scattered across the network and typically are cluttered with messages that are not of interest. You can also define alerts to be triggered by logged events.

Managing users and permissions

Each user of the Fuse HQ Portal has a login ID and password. Two factors determine what a given user can see and do when logged in: the user's role, and the resource groups that are assigned to that role. The role consists of a set of permissions that allow specific actions (such as viewing, modifying, or creating) on each different resource type. The groups delimit the resources to which the user has access.

As installed, Fuse HQ provides two predefined roles: A Guest role allows view-only access to all resource types, and a Super User role allows

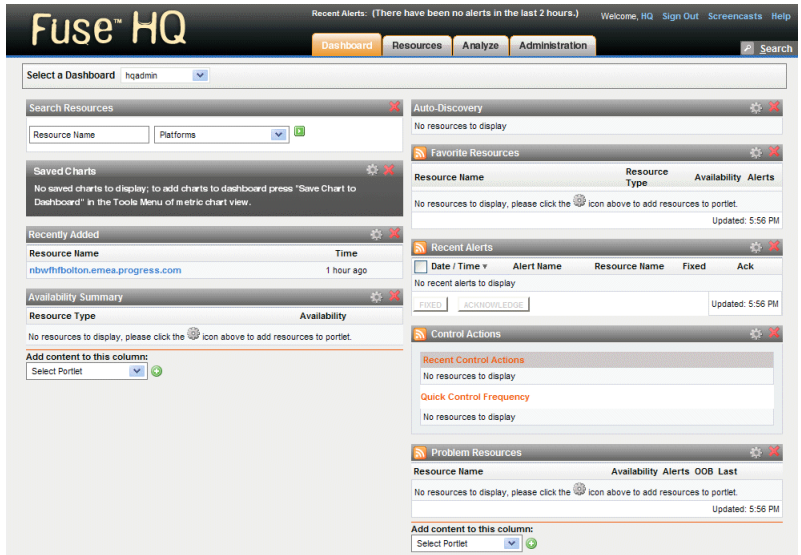
unrestricted access to all resources and functions. The Super User role is exceptional in that no group assignment is required in order to enable access to resources.

The first person to log in to Fuse HQ uses the administrator ID and password chosen during installation. This account belongs to the Super User role, enabling the administrator to create custom roles and assign users and groups to them. A user can have multiple roles.

Customizing information display

The Fuse HQ Dashboard, shown in Fuse HQ Dashboard, is the starting point for each session.

Figure 1.1. Fuse HQ Dashboard



The Dashboard is flexible with respect to the information it shows. Each user has access to two or more versions of the Dashboard: a personal version, and the version associated with each of the user's roles. You can customize your own personal Dashboard. You can adjust the layout of the various windows (called *portlets*), choose the resources and alerts that you want to see, and control various other display settings.

The administrator determines the layout and content of the role-based Dashboards. Users cannot modify a role-based Dashboard unless they belong to a role that has explicit permission to modify roles.

Setting up Fuse HQ

Installation

The discussions in this book assume that you have a working Fuse HQ system. Specifically, make sure that:

- The Fuse HQ Server is installed on the appropriate host.
- At least one Fuse HQ Agent is installed. In an actual working environment, there are likely to be agents running on multiple machines. However, an agent running on the same host as the server (or on a separate machine) is sufficient for the purpose of following the discussions here.
- Fuse Message Broker is running on at least one platform. The examples in this book refer to Fuse Message Broker processes.

For installation procedures, see *Installing Fuse HQ*.

Note

With Fuse HQ versions 4.0 and earlier, the server host and all agent hosts must have static IP addresses to ensure stability.

Startup

Start Fuse Message Broker first, followed by the Fuse HQ Server and then the Fuse HQ Agents. Starting Fuse Message Broker first is not a requirement, but by doing so, you ensure that the HQ Agent will discover it and report it to the HQ Server immediately.

To start the Fuse Message Broker:

If Fuse Message Broker is not already running, start it as follows:

1. In a command prompt or terminal window, change directory to the Fuse Message Broker installation directory.
2. Change directory to the `bin` directory.
3. Type the following:
   - Windows:

     ```
     activemq.bat
     ```

- UNIX or Linux:

```
./activemq
```

To start the Fuse HQ Server:

It is recommended that you install the Fuse HQ Server as a Windows service or, on non-Windows platforms, include it in a startup script so that it runs automatically each time the host is booted. See " Starting and Stopping the Fuse HQ Server" in *Installing Fuse HQ* for details.

To start the Fuse HQ Agent:

You can install the Fuse HQ Agent as a Windows service or include it in a startup script. However, the first time you run the Agent, you must start it from a command shell and provide certain required information. Fuse HQ stores this information so that subsequent sessions can start without user intervention. See "Starting and Stopping the Fuse HQ Agent" in *Installing Fuse HQ* for details.

Opening the Fuse HQ Portal

Accessing the login screen

You can log in to Fuse HQ from any machine, provided firewall settings allow HTTP communication between that machine and the Fuse HQ Server host. In the address field of your Web browser, enter the following URL:

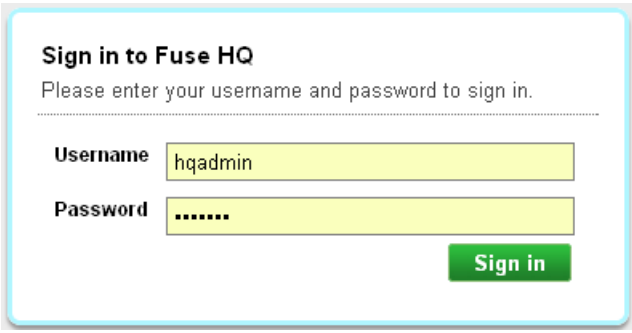
```
http://fuse-server-IP-address:7080
```

Note

This URL assumes that the Fuse HQ Server was installed with the default HTTP port, 7080. If not, substitute the correct port number. You can find this and other installation settings in the file `hq-server-install.conf` in the *`install_dir`*`/data` directory. The HTTP port setting appears in the file as `server.webapp.port`.

The Fuse HQ login prompt appears, as shown in Fuse HQ login prompt.

Figure 1.2. Fuse HQ login prompt



Logging in to Fuse HQ

To log in for the first time, enter the administrator ID and password (both `hqadmin` by default) that were specified on installation of the Fuse HQ Server, and click `LOGIN`. The Fuse HQ Dashboard appears (Figure 1.1 on page 15).

Among the user administration tasks you perform, you should change the as-installed administrator password before implementing Fuse HQ in a production environment.

Chapter 2. Discovering Resources

After you have the Fuse HQ Server installed and running, the next step is to start monitoring some applications. This section explains how to initiate monitoring of applications by adding resources to the Fuse HQ Server's resource inventory.

Adding a Platform Resource

Overview

This section describes how to add a *platform resource* to Fuse HQ, where a platform resource is identified with an Agent running on a particular host.

Prerequisites

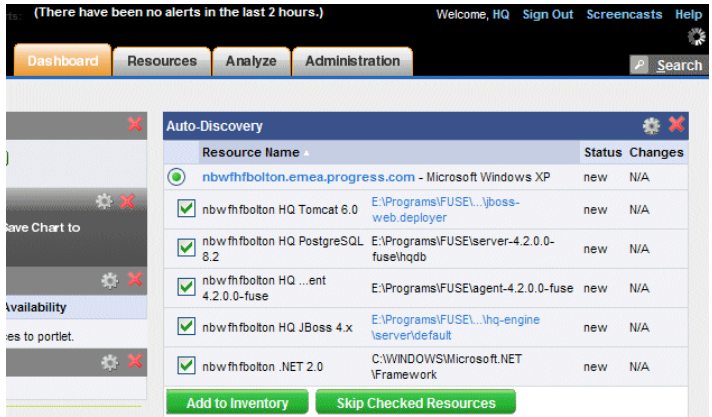
This tutorial assumes the following starting point:

- The Fuse HQ Server is already installed and running (for details, see *Installing Fuse HQ*).
- You are logged on to the Fuse HQ console, currently viewing the dashboard (for example, see "Opening the Fuse HQ Portal" on page 19 and Figure 1.1 on page 15).
- The Fuse HQ Agent is *not* yet started on the host you want to monitor.

Steps

To add a platform resource to the set of resources monitored by the Fuse HQ Console, perform the following steps:

1. On the host that you want to monitor, start the Fuse HQ Agent (the platform resource). See "Starting and Stopping the Fuse HQ Agent" in *Installing Fuse HQ* for details of how to start the Agent.
2. The newly started agent is *not visible right away on the console*. The Agent must complete an initial scan before it appears on the console. Wait a few minutes (typically, 5 minutes, or more on some platforms), then click your browser's refresh button to renew the dashboard screen. If there is no change on the dashboard, wait a minute and try again. Keep refreshing until a new platform resource appears in the **Auto-Discovery** portlet on the dashboard, as follows:



3. To start monitoring the newly-discovered platform resource, click Add to Inventory.

Adding Resources

Overview

This tutorial explains how to start monitoring a application on a particular host, assuming that an Agent is already running on that host.

Prerequisites

This tutorial assumes the following starting point:

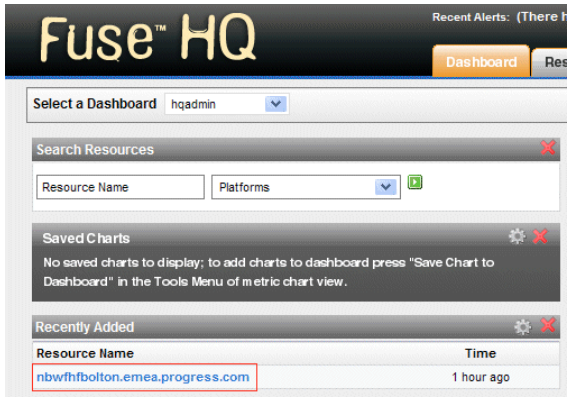
- The Fuse HQ Server is already installed and running (for details, see *Installing Fuse HQ*).
- You have already added a platform resource (Agent running on a host) for the host where you intend to run the applications (see the preceding tutorial).
- You are logged on to the Fuse HQ console, currently viewing the dashboard (for example, see "Opening the Fuse HQ Portal" on page 19 and Figure 1.1 on page 15).

Steps

To add resources and view their properties in the Fuse HQ Console, perform the following steps:

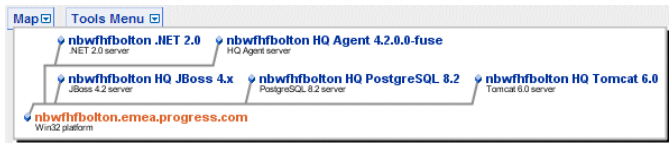
1. Start your application on the target host. In this example, we start a Fuse Message Broker 5.3.0 broker.
2. From the dashboard, in the **Recently Added** portlet, identify the platform resource corresponding to the host where you intend to run your application. Click on the relevant hostname.

   For example, the following illustration shows the clickable `nbwfhfbolton.emea.progress.com` platform resource, highlighted by a red rectangle:



After clicking, you should see the **Resources** tab for the selected platform resource.

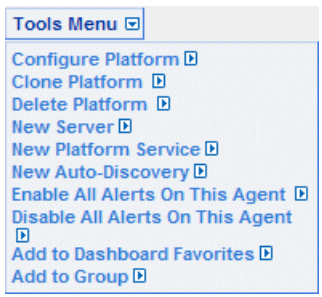
3. In the **Resources** tab, locate the **Map** and **Tools Menu** drop-down menus, as shown:



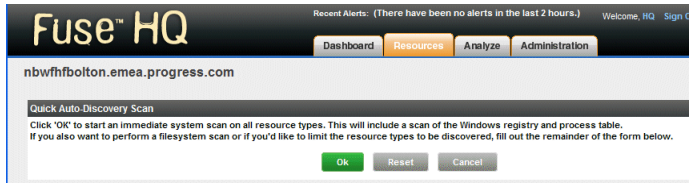
If you find that the **Map** graphic obscures your view of the **Tools Menu** drop-down menu, close the map by clicking the small button next to **Map**, 

, which is highlighted here in red.

4. From the **Tools Menu** drop-down menu, select the **New Auto-Discovery** menu option:



5. Directly under the **Quick Auto-Discovery Scan** title, click the green **Ok** button, as shown:

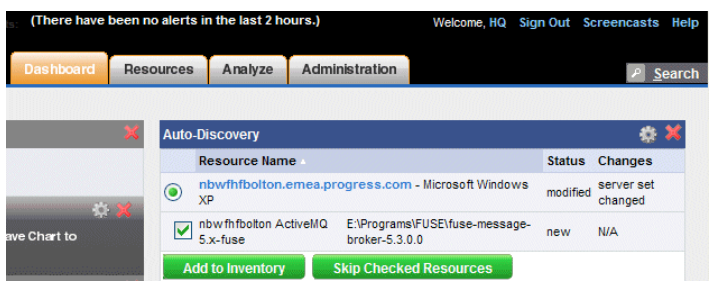


The next screen that appears *does not yet include the newly-started resources*.

Note

You could use the **Extended Filesystem Scan Configuration** section to perform an additional filesystem scan and to restrict the server types that are scanned. *But be careful:* if you let the filesystem scan roam over your entire file system, the scan will take a very long time to complete.

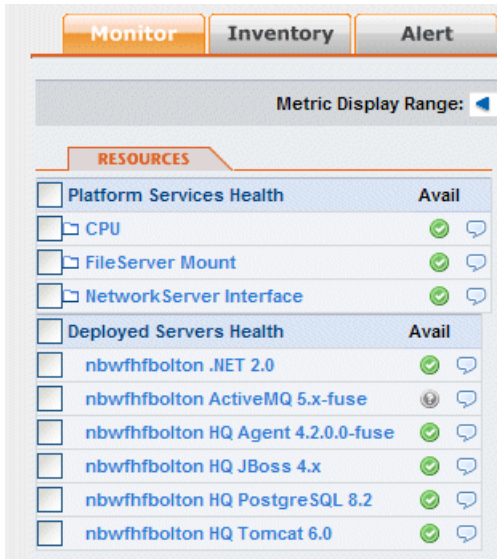
6. Click the **Dashboard** tab. Wait a few minutes (typically, 5 minutes, or more on some platforms), then click your browser's refresh button to renew the dashboard screen. If there is no change on the dashboard, wait a minute and try again. Keep refreshing until a new platform resource appears in the **Auto-Discovery** portlet on the dashboard, as follows:



Click **Add to Inventory**.

7. Under the **Recently Added** portlet, click the platform resource link for the host where the application is running. This brings you to the **Resources** tab for the chosen resource.

8. Under the **Monitor** sub-tab of the **Resources** tab, you should now be able to see your newly-added resource. For example, if you added a Fuse Message Broker resource, you should see an **ActiveMQ** resource amongst those listed, as shown:



Initially, the status of the newly-added resource is shown greyed-out. After a few minutes (refresh the browser, if necessary), its status turns to green and you can begin to monitor its properties.

For a brief overview of how to monitor a resource's properties, see "Console Overview" on page 29.

Chapter 3. Console Overview

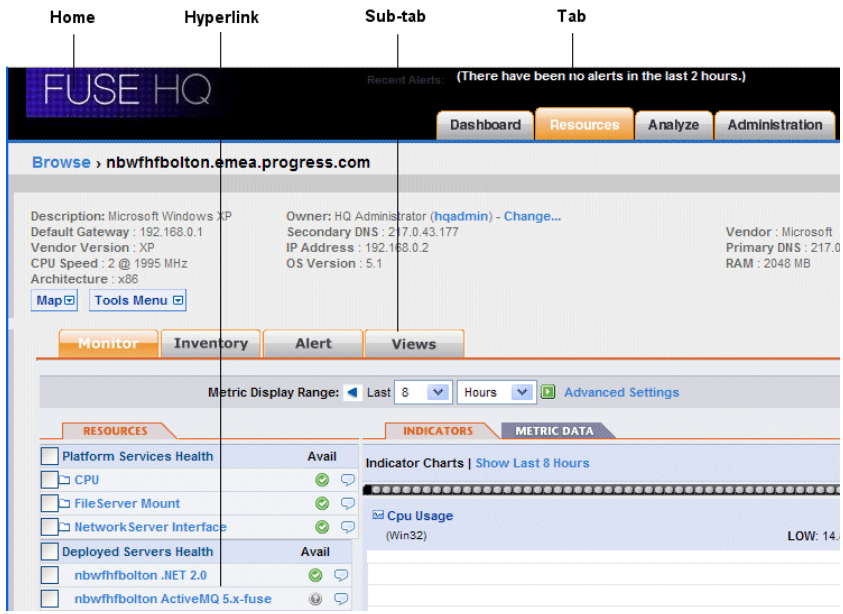
This chapter describes the principal functional areas of Fuse HQ and explains how to find your way around the user interface.

Getting Around in Fuse HQ

A look at some navigation controls

Navigation controls shows examples of some of the controls described in the sections that follow.

Figure 3.1. Navigation controls



Hyperlinks

The Fuse HQ user interface is filled with the familiar blue text that indicates clickable links. Almost anywhere that the name of a resource or other entity appears, you can click it to jump to the logical place for focusing on that item. In the case of a resource, that place is usually the resource's Current Health screen (see "Monitor tab (Current Health screen)" on page 36).

These hyperlinks provide an intuitive way to find the information and tools that you need, so use them freely. Your browser's **Back** command makes it easy to return to your starting point.

Menus

Superimposed on the black strip at the top of the screen are the four main tabs, **Dashboard**, **Resources**, **Analyze**, and **Administration**. Click these tabs and their sub-entries to go to the views described in "The Dashboard and Other Views" on page 32 .

In addition to this main menu, various small menus with self-explanatory options appear as appropriate for different functional areas.

Navigating with the breadcrumb path

Immediately below the black strip at the top of the screen is a *breadcrumb path* that identifies the resource you are currently browsing.

The breadcrumb path includes, from left to right, the category, type, and name of the current resource. You can click either of the first two nodes in this path to navigate back to a browse list of all resources of the same type or category.

Going home

Click the Fuse HQ logo at the top left corner of any page to return to the Dashboard.

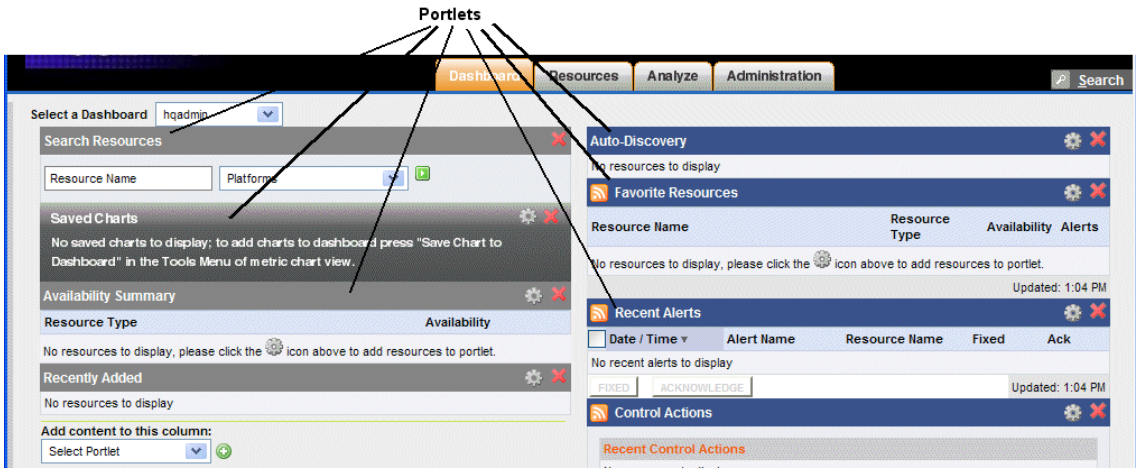
The Dashboard and Other Views

Dashboard

The Dashboard (see Figure 1.1 on page 15), the Fuse HQ home page, appears when you log in. Its purpose is to provide convenient access to the information you are most interested in. Therefore, you have considerable control of the content that appears on your Dashboard.

The Dashboard displays information in two columns, in frames called *portlets* (see Dashboard Columns and Portlets).

Figure 3.2. Dashboard Columns and Portlets



Dashboard Portlets summarizes the portlets that are available on the Dashboard.

Table 3.1. Dashboard Portlets

Column	Portlet	Description
Left	Search Resources	Lets you search for resources in the inventory by a string occurring in the resource name and by resource category.
	Saved Charts	Lets you see a configurable slide show of graphical data for selected resources.

Column	Portlet	Description
	Recently Added	Lists platforms added to the inventory during the preceding 48 hours.
	Availability Summary	Indicates the current availability of a user-selected set of resources. Entries in this list refer to resource types (for example, `ActiveMQ 5.x-fuse Queue` or `Win32`), with resources of like type automatically grouped. For each resource type you select, an icon indicates one of five states: available (green), unavailable (red), partially available (yellow), paused (orange), or no data collected (gray). The number of resources of each type is also shown.
	Summary Counts (hidden by default)	Displays the total number of resources that the user has permission to few, grouped by category and optionally subtotaled by specific resource type.
Right	Auto-Discovery	Lists resources reported by Fuse HQ Agents but not yet added to the inventory. You can select resources to add to or exclude from the inventory.
	Favorite Resources	A user-selected list of any set of resources in the inventory.
	Recent Alerts	A list of alerts that match a user-specified set of criteria for resources, severity, and time of occurrence. You can have multiple Recent Alerts portlets on your Dashboard, each with different criteria.
	Control Actions	A list of actions performed via Fuse HQ on servers, services, and compatible groups in the inventory during a user-specified period ending with the present time. Each server or service type defines the control actions that are available for it.
	Problem Resources	A list of resources that have encountered out-of-bounds conditions during a user-specified period ending with the present time. The administrator defines the conditions that are out of bounds by establishing baseline metrics for specific resources.
	Metric Viewer (hidden by default)	A list of user-selected metrics for selected resources. You can have multiple Metric Viewer portlets on your Dashboard, each with different criteria.

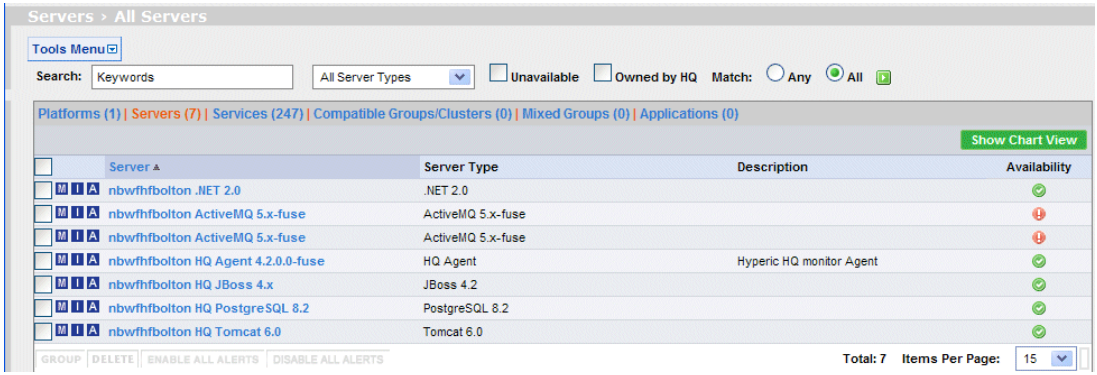
Resources view

To go to the Resources view from the Dashboard (or from most other Fuse HQ screens), hover the cursor over the **Resources** tab on the black strip near

the top. Then select **Browse** from the drop-down menu. (Alternatively, you can select the self-explanatory options **Currently Down** or **Recently Viewed**.)

The Resources view provides comprehensive lists of resources in the inventory, filtered by category and optionally by type. For example, Resources View shows the Resources view filtered to show all *servers*.

Figure 3.3. Resources View



At the top of the shaded list area, the Resources view shows the current inventory count for each resource category (**Platforms**, **Servers**, **Services**, **Compatible Groups/Clusters**, **Mixed Groups**, **Applications**). Click any of these categories to show the resources in that category. To further filter the results, select a resource type from the drop-down list in the **View** field.

To view the list with graphical representations of the available metrics for each resource, click **Chart View**. Switch back to the simple text list by clicking **List View**.

To locate specific resources, enter all or part of the name in the **Search** field and click the arrow button to the right. Note that performing a search filters the lists for *all* resource categories. Therefore, for example, if you search for a given string in the Services list and then switch to the Servers list, you might see few or no entries. This is because the list of servers is filtered to show only those results that match the search criteria. To remove the search filter and show all items in the resource category, clear the **Search** field and click the arrow button again.

Often you will want to proceed from the Resources view to see detailed information about a specific resource. Clicking a button to the left of each name takes you quickly to a specific tab on the resource page for that item:

M for the **Monitor** tab, **I** for the **Inventory** tab, or **A** for the **Alerts** tab. Clicking the name itself takes you to the **Monitor** tab. See "Resource Pages" on page 36 for more information.

The Resources view also lets you perform important inventory-management tasks: defining groups and applications, and removing resources from the inventory.

To group or delete resources, select them by clicking their check boxes at the left. (To select or deselect all items in the current list, click the check box in the list header row.) Then click the **Group** or **Delete** button. (Note that deleting a resource removes it from the inventory, but has no effect on the resource itself. If you decide to add a resource back to the inventory after deleting it, you can perform a new auto-discovery on its host platform.)

To define applications, click **Tools Menu** at the top right and select **New Application**. This menu also gives you another way to define groups, and an option to manually add certain types of platforms.

Analyze view

To go to the Analyze view from the Dashboard (or from most other Fuse HQ screens), hover the cursor over the **Analyze** tab on the black strip near the top. Then select one of the three options on the drop-down menu: **Reporting**, **Alert Center**, or **Event Center**.

The Reporting page lets you generate a variety of reports in various formats. The Alerts Center and the Events Center show all alerts and events for the entire system.

Administration view

To go to the Administration view from the Dashboard (or from most other Fuse HQ screens), click the **Administration** tab on the black strip near the top.

This view provides links to various administrative tasks, notably management of users and roles. Click any link on the page to perform the indicated task or view data contributed by installed plug-ins.

Resource Pages

Getting details on specific resources

For every resource in the inventory, Fuse HQ presents detailed information in a set of tabbed pages. The available tabs and their content depend on the nature of the resource in question, but all basic resources (platforms, servers, and services) and compatible groups have a **Monitor** tab, an **Inventory** tab, and an **Alert** tab. Mixed groups and applications do not have all of these tabs.

Resources that allow control actions have a **Control** tab that provides access to these actions. For example, the **Control** tab for a Fuse Message Broker queue lets you send a text message to the queue.

Clicking any resource name almost anywhere in Fuse HQ takes you directly to the **Monitor** tab for that resource. (There are a couple of exceptions: Clicking a platform name in the **Auto-Discovery** portlet takes you to the Auto-Discovery Results screen for that platform; and clicking the name of a mixed group, which does not have a **Monitor** tab, takes you to the corresponding **Inventory** tab.)

These pages are designed to help you navigate easily through the hierarchical structure that includes the resource. In the top left corner of every page is a **Map** button. Clicking this button reveals a tree diagram showing the current resource along with the other resources associated with it. In general, "parents" appear below and "children" appear above the current resource, as applicable. For example, in the map tree for a server, the host platform (parent) appears below the server, and hosted services (children) appear above. You can click any resource in the tree to go to the resource pages for that item.

The **Tools Menu** at the top right of each page provides options appropriate to the current resource type.

A prominent label at the top right identifies the resource category of the current item: platform, server, service, group, or application.

Monitor tab (Current Health screen)

The **Monitor** tab, also called the Current Health screen, provides the most detailed information available about the performance and activity of a given resource. The right column of this page offers both graphical and numerical displays of metric data collected from the resource during a specified time period. The left column, headed by a sub-tab labeled **Resources**, shows resources related to the current one and provides controls for specifying which metrics are charted in the graphical display.

In the right column, to switch between the graphical and numerical displays, click the **Indicators** and **Metric Data** sub-tabs. To see a full-size chart for any individual metric, click the metric name on either tab.

On the Indicators sub-tab:

Column charts appear for each selected metric. The horizontal axis is a time line that applies to all charts in the display. Click a circle in the row either above or below the charts to highlight and display the precise time of a specific point on the axis.

The colors of the circles in the top row indicate availability, as follows: green, 100 percent available; yellow, partially available; red, unavailable; orange, paused; and gray, no data collected.

If log tracking is enabled for the resource, a blue square appears just above the bottom row of circles for any time segment during which Fuse HQ has recorded an event. Click the blue square to display the available log messages.

You can remove and rearrange the charts, and save any configuration as a custom view that is specific to the current resource. To move a chart up or down in the column, use the and buttons above the top right corner of the chart; to remove the chart from the column, click the button. To save the current view, select **Create New View** in the **View** field at the top right corner of the display area, enter a name, and click .

On the Metric Data sub-tab:

Metric values are shown in a tabular format. Various controls allow you to specify the refresh rate, the data collection interval, and other settings. You can select one or multiple metrics in the table and click **Chart Selected Metrics** to display a full-size chart.

The **Metric Data** tab offers a convenient way to establish *baselines*, which are useful for defining alerts and tracking trends, among other purposes. To automatically set the baselines for one or more metrics to the LOW, PEAK, and AVG values currently shown, select the metrics and click **Set Baselines**.

Note

Additional baseline-setting controls appear at the bottom of each full-size chart (provided the chart shows only a single metric).

On the Resources tab:

The related child and parent resources of the current resource are listed. To the right of each related resource name is an availability indicator and a balloon icon. Hover the cursor over the balloon to display a popup window with additional information (and, in some cases, active links) pertaining to the resource.

The other options available on the **Resources** tab vary according to which tab is selected in the right column. With the **Indicators** tab open, you can use the available controls to add charts for metrics of these related resources to the display in the right column. With the **Metric Data** tab open, you can filter the metrics that appear in the table.

To add metrics for a related resource, select the **Indicators** tab on the right. Then, in the left column, check the related resources for which you want to see metrics, and click **View Metrics**. The metrics collected from the selected resource appear in a list below. You can then add a chart for any of these metrics to the **Indicators** tab by clicking the right arrow button to the right of the metric. Remember that you have the option of saving any set of charts on the **Indicators** tab as a view that you can recall whenever you are monitoring the current resource.

To filter the display on the **Metric Data** tab, check the desired categories and types, enter a search string if desired, and click the right arrow button to the right of the **Search** field.

Inventory tab

The **Inventory** tab includes a number of portlets containing different types of information about the current resource and others that are related to it. The exact set of portlets available depends on the type of the current resource. Only one portlet is open at a time. To open a different portlet, click its title bar.

Where appropriate, the portlets provide controls that let you edit the resource's properties or change relationships with composite resources. For example, you can add a resource to a group or remove a service from an application.

For the most part, working with the portlets and controls on the **Inventory** tab is intuitive. It is worth mentioning here that when you want to enable event tracking for a resource, you do so in the **Configuration Properties** portlet on the resource's **Inventory** tab.

Alert tab

The **Alert** tab has two sub-tabs, **Configure** and **Alerts**.

The **Configure** sub-tab lets you define the conditions that trigger an alert on the current resource. These conditions can be based on any metric data or logged event that the resource makes available to Fuse HQ. In addition to defining the conditions, you can specify actions that Fuse HQ should perform when the alert is triggered, such as sending e-mail notifications or executing a script.

To keep the flow of notifications orderly and create an audit trail, you can pair an alert with a corresponding *recovery alert*. The primary alert detects the problem, initiates the specified response, and then disables itself to prevent repeating the response with every data-collection cycle. The recovery alert detects the return to normal conditions, executes its own response (typically, sending notification that the resolution has occurred), and re-enables the primary alert.

The **Alerts** sub-tab lists the alerts that have been triggered on the resource and lets you acknowledge them or mark them as fixed.