

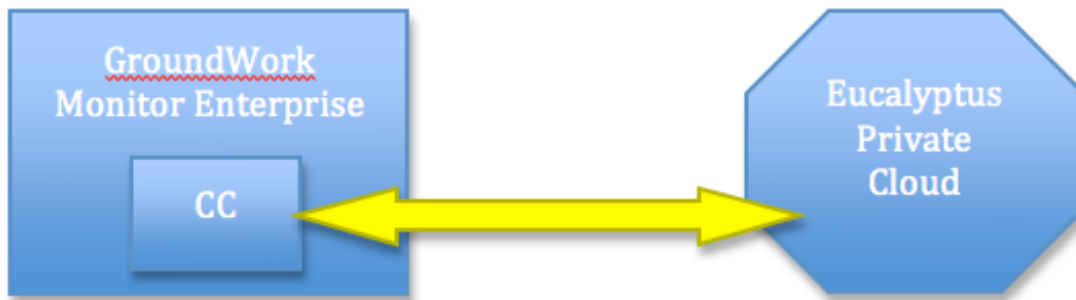
## GroundWork Monitor Cloud Connector For Eucalyptus

Release: 20100702 (v1.0)

### Introduction

The GroundWork Monitor Cloud Connector Eucalyptus is an add-on software solution for GroundWork Monitor Enterprise Edition. It provides the ability to monitor Eucalyptus and Ubuntu Enterprise Cloud-based private clouds alongside traditional datacenter infrastructure. Your feedback and suggestions for improving this solution are very welcome via the GroundWork Support portal.

### How it Works



The Cloud Connector to Eucalyptus extends your existing Enterprise installation with additional components:

- A “Cloud” tab within the user interface to configure the cloud monitoring settings.
- A cloud synchronization module that periodically synchronizes the monitoring system with the current configuration of the cloud.
- Additional profiles for monitoring cloud capacity, and a basic up-down availability monitoring profile for cloud instances.
- Low-level utilities such as the EC2 command-line tools (ec2-api-tool-1.3-46266) used to access the cloud infrastructure. See these web pages for more information:

<http://docs.amazonwebservices.com/AWSEC2/latest/CommandLineReference/>  
<http://docs.amazonwebservices.com/AWSEC2/latest/CommandLineReference/index.html?command-reference.html>

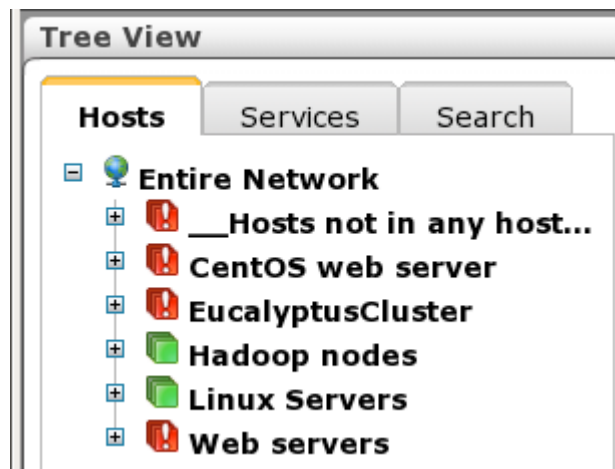
### Basic Operation

The cloud synchronization script runs periodically (every 15 minutes, by default) to update the monitoring system with the current status and configuration of all clouds (multiple Eucalyptus clouds may be monitored.) Security credentials and certificates are used to access the cloud infrastructure. During each synchronization

run, the monitoring system is automatically updated to reflect the current state of the running cloud, as follows:

- Each instance running in the cloud is configured as a host on the monitoring system.
- If the instance image matches an available monitoring profile, that profile is automatically applied to the host.
- A host group is created for each applied machine-instance profile, grouping similar instances together in the GroundWork Monitor interface.
- A host group is created for each availability zone in the cloud, and each instance running in the zone is added to the group.
- Each availability zone is configured as a virtual host, with the instances as subordinate children. This ensures properly conditioned alarms in the event of the failure of an entire availability zone.
- The overall cloud capacity is monitored, showing the number of instances that may be created of different sizes.

An example of the user view when monitoring a cloud is shown below:



EucalyptusCluster = availability zone

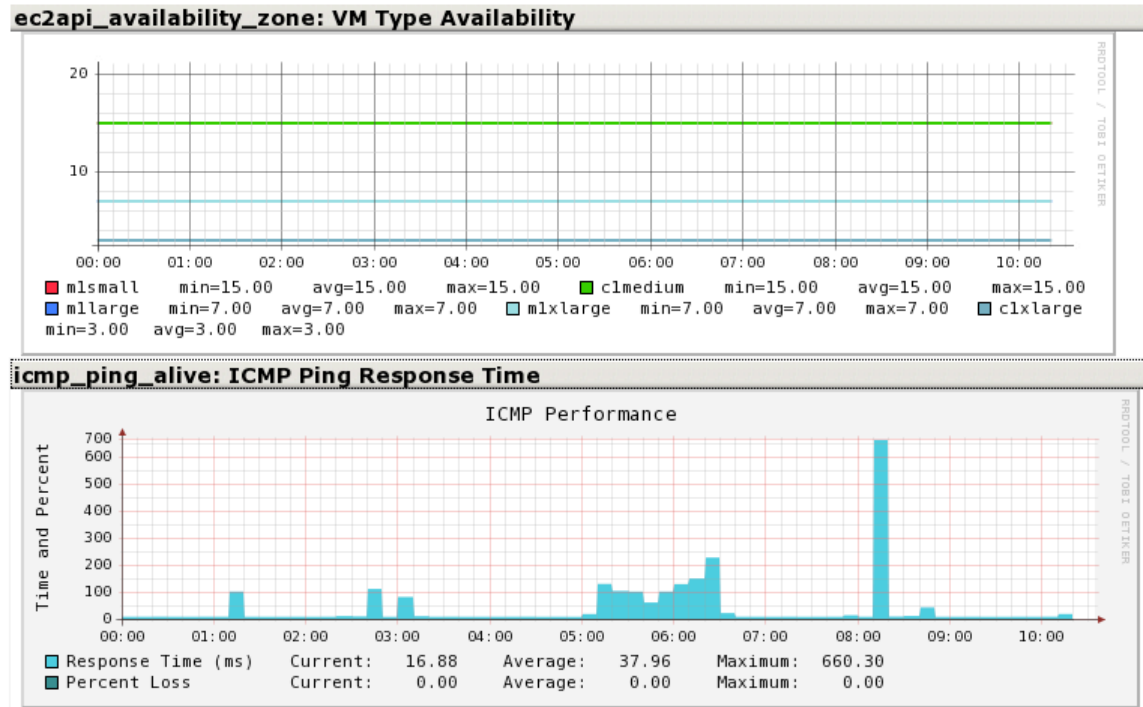
Hadoop nodes = Instance type grouping (based on image)

Web Servers = Instance type grouping (based on image)

Each availability zone is also configured as a virtual host, with performance (available capacity) and availability (ping) service monitoring drawn from the parent region service endpoint (for EC2) or Cloud Controller (for Eucalyptus):

Service Name	Duration	Status Information Details	Acknowledged
ec2api_availability_zone (EucalyptusCluster)	0 days, 15 hours, 36 mins	VM Types: m1.small (15 free) c1.medium (15 free) m1.large (7 free) m1.xlarge (7 free) c1.xlarge (3 f...	N/A
icmp_ping_alive (EucalyptusCluster)	0 days, 15 hours, 30 mins	OK - 172.28.115.213: rta 16.901ms, lost 0%	N/A

Performance data is automatically graphed for these services:



## Configuring Cloud Monitoring

The “Cloud” top-level menu item is available to the GroundWork Monitor administrator and provides the following features:

Cloud Connector Configuration

Enable cloud processing: ? ☒

**Host Profiles**

These host profiles are automatically applied by the cloud connector in certain circumstances.

Default host profile: ? host-profile-cloud-machine-default ▾

Availability zone host profile: ? host-profile-cloud-availability-zone ▾

**Orphaned Host Disposition**

☐ *Delete*: Deleting a host immediately when it is orphaned will wipe all traces of that host as soon as the instance disappears from the cloud (i.e., when it is terminated).

☒ *Move* (default): Moving the host will transfer it into the specified single inactive-hosts hostgroup, which will apply to all instances regardless of their machine type.

Inactive hosts hostgroup: Inactive Cloud Hosts ▾

☐ *Keep*: Keeping the host will cause it to remain in the hostgroup to which it belonged while it was still active.

Orphaned host retention period: ? 1 day ▾

**Monitored Clouds**

Configure the clouds that you will monitor. Monitoring of configured clouds may be enabled or disabled on a per-region basis.

Region Name	Cloud Type	Endpoint / Controller	Credentials	Enabled	
cirrus	Eucalyptus	eucalyptus	<span>Upload</span> (needed)	<input type="checkbox"/>	<span>remove</span>
cumulus	Eucalyptus	euca	<span>Upload</span>	<input checked="" type="checkbox"/>	<span>remove</span>

To configure another cloud, enter the data requested and click Add.

- An EC2 region name must be specified exactly as it is used within EC2.
- Eucalyptus has no explicit "region" concept, so use a descriptive name for this cloud instead.
- A region name should not include spaces or shell metacharacters.
- Region names must be unique across all endpoints/controllers.
- For an EC2 region, the Endpoint/Controller is the region service endpoint machine. This hostname must be fully qualified, and will look something like **us-east-1.ec2.amazonaws.com**.
- For a Eucalyptus region, the Endpoint/Controller is the machine that runs a Eucalyptus Cloud Controller.

Region name:

Cloud type: Eucalyptus ▾

Add

Endpoint / Controller:

You will then need to upload credentials and enable the region to begin actively monitoring this new region.

Reset to Current Configuration Save Run Batch Processing

The fields in the configuration screen should be adjusted as follows:

<b>Feature</b>	<b>Purpose</b>
Enable cloud processing	Global switch for all cloud monitoring. Unchecking this box disables all cloud related operations. This is recommended when making manual configuration changes using Monarch.
Default host profile	The host profile to apply to new instances if no other monitoring profile applies. This rarely needs to be changed.
Availability zone host profile	The profile to apply for availability zone monitoring. This rarely needs to be changed.
Orphaned Host Disposition	Determines what to do when an instance is terminated. <ul style="list-style-type: none"><li>• Keep – do nothing. Terminated instances will continue to be monitored (and likely be down)</li><li>• Move – keep the system configured but move it to a special host group. This preserves any availability information associated with the host. After the retention period, they will be removed.</li><li>• Delete – permanently remove it from the monitoring system.</li></ul>
Monitored Clouds	Each cloud to be monitored must be configured in this section. The parameters to provide are: <ul style="list-style-type: none"><li>• Region name – A name for the cloud, e.g. the location or purpose of the cloud.</li><li>• Cloud type – This is Eucalyptus for Eucalyptus and UEC clouds.</li><li>• Endpoint/Controller – The fully qualified hostname or IP address of the Cloud Controller in your Eucalyptus installation.</li><li>• Credentials – Access keys for probing the cloud for information about its zones and instances.</li><li>• Enabled – Selection to enable or disable monitoring of individual regions.</li></ul>

To enable monitoring of each cloud, the access credentials for the cloud must be provided. This is performed by uploading the `euca2-admin-x509.zip` file specific to your installation, via the Upload button in the previous screen. That leads to the following screen, in which you can choose and upload the credentials file:

Cloud Access Credentials Upload	
<b>Upload Eucalyptus credentials file</b>	
Select the credentials file you wish to install for this region. This will be a ZIP file named <b>euca2-admin-x509.zip</b> which is available for download from the Eucalyptus web page immediately after login. The set of values in your file will replace the complete set of access values for this region.	
Region name:	cirrus
Cloud type:	Eucalyptus
Cloud controller:	eucalyptus
Upload file:	<input type="text"/> <input type="button" value="Browse..."/>
<input type="button" value="Upload"/>	<input type="button" value="Cancel"/>

## Operating Instructions

By default, each availability zone will be monitored using ping, and each instance will be monitored by checking its SSH port. More complex monitoring is configured by creating host profiles that match the names of EMIs (Eucalyptus Machine Images, used to create cloud machine instances) in your Eucalyptus cloud.

For example, to automatically monitor Hadoop nodes using Hadoop specific checks, perform the following steps, starting on your Eucalyptus Cloud Controller machine. (The “eucalyptus” word on the “source” command is the Region name for the cloud you are interested in.)

```
[root@eucamon ~]# tcsh
[root@eucamon ~]# setenv JAVA_HOME /usr/local/groundwork/java
[root@eucamon ~]# source /usr/local/groundwork/cloud/scripts/setenv-cloud eucalyptus
[root@eucamon ~]# ec2-describe-images | fgrep hadoop
IMAGE    emi-88631793    centoshadoopfinal/centos_hadoop.5-3.x86.img.manifest.xml
admin    available      public         x86_64  machine eki-87A21373    eri-C6491458
         instance-store
```

The EMI identifier for our Hadoop stack in this example is `emi-88631793`.

Create a host profile with the special name format: `cloud-machine-emi-xxxx`:

GWES Welcome, admin New Window My Preferences Help Log Out  
 Friday, July 2 2010, 11:25:28 AM

**Dashboards** **My GroundWork** **Event Console** **Status** **Reports** **Clouds** **Configuration** **Auto Discovery** **Administration** **Nagios** **Resources**

**Services** **Profiles** **Hosts** **Contacts** **Escalations** **Commands** **Time Periods** **Groups** **Control** **Tools** **Performance**

**Profiles**

**Profiles**  
 Host profiles  
   New  
   Modify  
     cloud-availability-zone  
     cloud-machine-default  
     cloud-machine-emi-0C17117F  
     cloud-machine-emi-88631793  
     cloud-machine-emi-D22F14DB  
     cloud-machine-emi-F8A2191B  
     host-profile-cloud-availability-zone  
     host-profile-cloud-machine-default  
     host-profile-service-ping  
     host-profile-snmp-network  
     host-profile-ssh-unix  
   Service profiles  
   Profile importer

**Host Profile**  
 Host Detail | Parents | Hostgroups | Escalation Trees | Service Profiles | Assign Hosts | Assign Hostgroups | Apply  


---

 Host profile name: cloud-machine-emi-88631793  
 Description: ? Hadoop nodes  
 Host template: ? generic-host -  
**Inherit from template**  
 Inherit all values from template: Set all directives to inherit values from the selected template. Uncheck the left checkbox on the directives below to override the template values.  
☒ Process performance data: ? ☒  
☒ Retain status information: ? ☒  
☒ Flap detection enabled: ? ☒  
☒ Low flap threshold: ?   
☒ High flap threshold: ?   
☒ Retain nonstatus ?

Set the Description field to be a short description of this instance type – it is displayed as a group in the status viewer.

**GWOS**  
GEMINORUM WORKSPACE OPERATING SYSTEM

Welcome, admin

New Window My Preferences Help Log Out  
Friday, July 2 2010, 11:31:43

Dashboards	My GroundWork	Event Console	Status	Reports	Clouds	<b>Configuration</b>	Auto Discovery
Administration	Nagios	Resources					
Services	<b>Profiles</b>	Hosts	Contacts	Escalations	Commands	Time Periods	Groups
Performance		Control	Tools				

### Profiles

**Profiles**

- Host profiles
  - New
  - Modify
    - cloud-availability-zone
    - cloud-machine-default
    - cloud-machine-emi-0C17117F
    - cloud-machine-emi-88631793
    - cloud-machine-emi-D22F14DB
    - cloud-machine-emi-F8A2191B
    - host-profile-cloud-availability-zone
    - host-profile-cloud-machine-default
    - host-profile-service-ping
    - host-profile-snmp-network
    - host-profile-ssh-unix
- Service profiles
- Profile importer

#### Host Profile

Host Detail	Parents	Hostgroups	Escalation Trees	Service Profiles	Assign Hosts	Assign Hostgroups	Apply
Host profile name: cloud-machine-emi-88631793							

#### Service Profiles

Add or remove service profiles for hosts using this profile. After saving, use the apply tab to push changes to the hosts. This option also sets the default service profiles in the Hosts -> Host Wizard.

Service profiles:	
ssh-hadoop	cloud-availability-zone cloud-availability-zone-service-profile service-http service-mysql service-ping snmp-network snmp-traps snmp-win2k3 ssh-apache ssh-named ssh-unix

Remove >>  
<< Add

Save



## Hints and Tips

Manual changes to the monitoring configuration for cloud infrastructure will be reset each time the synchronization script is run. Modify the cloud monitoring behavior by creating new host profiles. Non-cloud host groups, hosts, and services are not affected by the Cloud Connector and can be manually administered.

Monitoring data can be collected using an agent or agentless approaches. For private cloud installations, the following approaches are recommended:

- Agent monitoring. Existing agents (NSClient++, GDMA, NRPE) can be included in EMI images to avoid manual agent distribution. Use of a configuration management tool such as Puppet or RightScale is recommended for larger deployments. Appropriate ports must be explicitly opened in the security group in most cases.
- Agentless monitoring. Active monitoring via SSH is a convenient way to collect data given that TCP port 22 is generally available. This approach requires the plugins to be located in `~nagios/libexec` and the `~nagios/.ssh/.authorized_keys` file to be updated in each EMI. For larger installations, a configuration management tool is recommended.
- GroundWork Monitor + Cloud Connector can monitor private clouds from outside or within the cloud itself. When running in a private cloud, the extra large instance size is recommended.

### Known Issues and Limitations

1. It is recommended that automatic cloud synchronization be disabled when making manual configuration changes in GroundWork Monitor.
2. RPM packaging is not standard on Ubuntu-based systems, though it can be handled via the “alien” package converter.
3. A large DHCP pool is recommended – if the IP address of an instance changes during its lifetime, the system address may be out-of-sync with the cloud state.
4. Crontab scheduling of the background cloud configuration script cannot be modified via the user interface at this time.
5. Cloud health dashboards must be manually created at this time.
6. The orphaned host retention period function is not yet complete. Either select "Delete" as the Orphaned Host Disposition setting in the Cloud Configuration screen, or manually manage the eventual deletion of terminated instances.
7. Host groups are created from scratch each time the cron job runs. As a result, instances that don't show up in the `ec2-describe-instances` command (perhaps because they have been deleted) will not show up in any of the host groups that the `cloud_config.pl` script recreates. This results in orphaned hosts that show up in the Status application in a meta host group called “\_\_Hosts not in any host groups”.
8. EC2 support has been disabled in this release.
9. EC2 API tools will fail, and the monitoring of EC2 regions will return bad results, if the system time on the monitoring server is too far off from Internet time. Use NTP or some similar mechanism to keep the time on your monitoring system properly synchronized.
10. The handling of regions assumes their names are unique across all monitored clouds.

## Installation Instructions

GroundWork Monitor Enterprise Edition 6.1.1 or higher is required. The cloud connector is installed using the following steps:

On RedHat, CentOS, and SuSE:  
Install the supplied RPM directly:

```
rpm -Uvh groundwork-cloud-connector-xxx.rpm
```

On Ubuntu:  
First make sure that "alien" is installed on your machine, then use it to install the supplied RPM:

```
apt-get install alien  
alien -c -k -i groundwork-cloud-connector-xxx.rpm
```

Installation of the RPM will restart part of GroundWork Monitor to have it pick up changes. Once GroundWork Monitor restarts, the Cloud Connector is available for setup. On either type of system, log into GroundWork Monitor as an administrator and take the following steps:

1. Create a hostgroup named "Inactive Cloud Hosts", or an other name you would like to use to contain cloud instances that have terminated.
2. Import the provided host and service profiles:

```
host profile: host-profile-cloud-availability-zone.xml  
host profile: host-profile-cloud-machine-default.xml  
service profile: service-profile-cloud-availability-zone.xml  
service profile: service-profile-ssh-hadoop.xml
```

3. If you wish to monitor particular services associated with your cloud machines, the easiest way to do so is to create host profiles named after instances:

```
cloud-machine-ami-xxxxxxx (for an EC2 cloud instance)  
cloud-machine-emi-xxxxxxx (for a Eucalyptus cloud instance)
```

These host profiles will be used by matching "ami-xxxxxxx" or "emi-xxxxxxx" against the image used for an instance, and the profile will be applied to each new instance of that machine. Also, a host group will be created for these instances, with a name based on the Description field for that host profile.

4. Do the following for each "cloud" you will monitor. A Eucalyptus cloud here refers to a particular machine which is running the Eucalyptus Cloud

Controller. It will be treated by our monitoring as though it were an EC2 region. An EC2 cloud here refers to an EC2 region.

Navigate to the Clouds -> Cloud Configuration screen. Adjust the options as needed for your site. Add the cloud regions you wish to monitor. Note that region names in the monitoring system are not allowed to contain spaces or shell metacharacters. You will probably want to follow the same principle when you name your regions within Eucalyptus.

Obtain the euca2-admin-x509.zip file that can be generated from the Eucalyptus system admin scripts via the Eucalyptus web page download facility. Using the Cloud Configuration screen, upload this file as the credentials for that region.

Once the credentials are uploaded, enable the individual cloud, in the list of Monitored Clouds in the Cloud Configuration screen.

Finally, also make sure the cloud processing as a whole is enabled. This selection is made at the top of the Cloud Configuration screen.

## File layout guide

The following directories are used to hold files related to the Cloud Connector:

Path	Content
/usr/local/groundwork/cloud/	Cloud Connector base location
.../config/	Configuration state managed by the UI
.../credentials/	Credentials, keys, and eucarc
.../doc/	Installation and developer notes
.../ec2-api-tools-1.3-46266/	EC2 command-line tools
.../info/	Build timestamp
.../logs/	Cloud Connector sync script logs
.../perl/	Perl extensions for the Cloud Connector
.../scripts/	Connector and wrapper scripts
.../var/	Lock file to block concurrent syncs