

SteamCannon

Java and Ruby Platform-as-a-Service

0.2.0

by The SteamCannon Project

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What is SteamCannon?

SteamCannon is a JavaEE and Ruby Platform-as-a-Service (PaaS). It provides a consistent platform for your applications regardless of the underlying public or private cloud. Your applications are deployed on [mod_cluster](http://www.jboss.org/mod_cluster) [http://www.jboss.org/mod_cluster], [JBoss AS](http://www.jboss.org/jbossas/) [http://www.jboss.org/jbossas/] w/ [TorqueBox](http://torquebox.org) [http://torquebox.org], and [PostgreSQL](http://www.postgresql.org/) [http://www.postgresql.org/] with unrestricted access to all APIs.

The user-facing portion of SteamCannon is a Rails application that can be run locally or in the cloud. It's used to start, stop, and configure the environments that applications are deployed to.

1. Terminology

1.1. Organization

An organization is a collection of users that all share a common set of Amazon credentials. When a new user requests an invite or registers for an account, a new organization is created and that user is flagged as the administrator of that organization. The administrator can then invite other users into the organization and these additional users will not be prompted to enter Amazon credentials to use SteamCannon. The administrator can also promote or demote other users in the organization to administrator status.

1.2. Artifact

An artifact is a deployable file. Examples of valid Java artifacts would be war files, ear files, jar files, and datasources. Valid Ruby artifacts would be .rails archives, *-rack.yml deployment descriptors, or any other type supported by TorqueBox.

1.3. Service

A service is the smallest building block of a platform. SteamCannon currently has three services - mod_cluster, JBoss AS, and PostgreSQL.

1.4. Image

An image is a virtual machine that provides one or more services. SteamCannon's images are created by [BoxGrinder](http://www.jboss.org/boxgrinder) [http://www.jboss.org/boxgrinder] from the [steamcannon-appliances](http://github.com/steamcannon/steamcannon-appliances/) [http://github.com/steamcannon/steamcannon-appliances/] repository.

1.5. Platform

A platform is a predefined collection of 1 - N images shared by all users of SteamCannon. SteamCannon currently ships with three platforms - JBoss Developer Instance, JBoss 2-Tier, and JBoss 3-Tier.

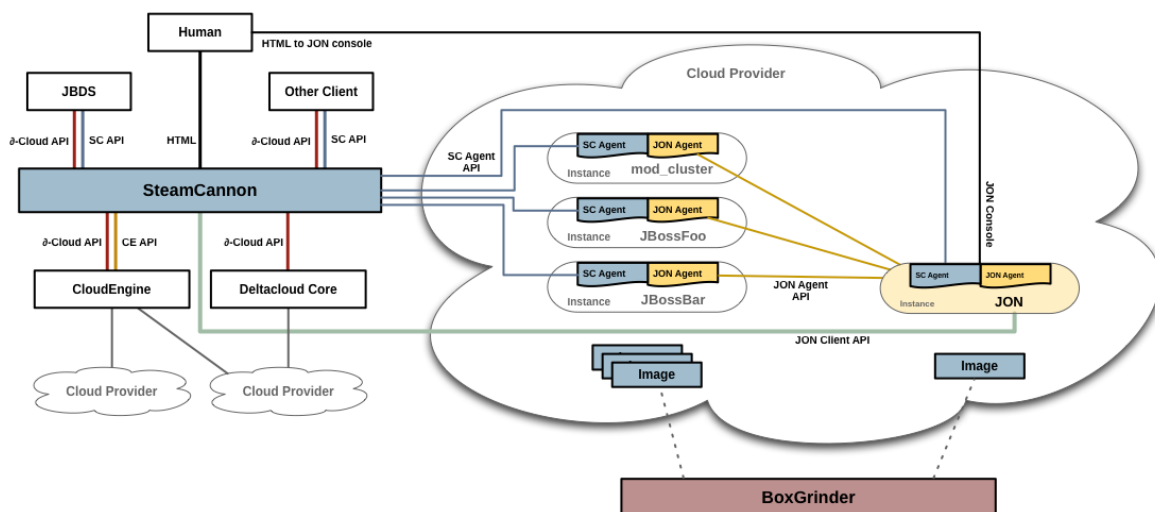
1.6. Environment

An environment is an instance of a platform and the thing that artifacts are deployed into. A user can have many environments from multiple platforms. For example, you might have a Development environment based off of the developer platform and QA and Production environments based off of the 3-Tier Platform.

1.7. Instance

An instance represents a running image. One or more instances is contained in every running environment. When an environment is started a configurable number of instances is started for each image in the environment's platform. When an environment is stopped, all running instances in that environment are stopped.

2. Architecture



3. Technology

SteamCannon consists of several components each with its own distinct technologies.

3.1. Web Interface

The user-facing portion of SteamCannon is built on top of [Torquebox](http://torquebox.org) [http://torquebox.org], [Rails](http://rubyonrails.org) [http://rubyonrails.org], and [JRuby](http://jruby.org) [http://jruby.org].

<http://github.com/steamcannon/steamcannon>

3.2. Agent

The agent runs on each instance launched by SteamCannon and is responsible for configuring, deploying, and monitoring instances. It's built on [Sinatra](http://www.sinatrarb.com) [http://www.sinatrarb.com] and [Ruby](http://www.ruby-lang.org) [http://www.ruby-lang.org].

<http://github.com/steamcannon/steamcannon-agent>

3.3. Images

The SteamCannon appliance and the images for each platform are built by [BoxGrinder](http://www.jboss.org/boxgrinder) [http://www.jboss.org/boxgrinder].

<http://github.com/steamcannon/steamcannon-appliances>

3.4. Platforms

SteamCannon's platforms are based on [JBoss AS 6 Candidate Release 1](http://community.jboss.org/wiki/AS600CR1ReleaseNotes) [http://community.jboss.org/wiki/AS600CR1ReleaseNotes], [mod_cluster 1.1.0](http://docs.jboss.org/mod_cluster/1.1.0/html/changelog.html) [http://docs.jboss.org/mod_cluster/1.1.0/html/changelog.html], and [PostgreSQL 8.4.5](http://www.postgresql.org/docs/8.4/static/release-8-4-5.html) [http://www.postgresql.org/docs/8.4/static/release-8-4-5.html].

3.5. steamcannon.org

The steamcannon.org website is built using [Awestruct](http://awestruct.org) [http://awestruct.org].

<http://github.com/steamcannon/steamcannon.org>

Installation

1. Amazon AMI

To run SteamCannon on Amazon EC2, start an instance of ami-6ea25307 in the us-east-1 region. The c1.medium instance size is recommended; m1.small may also be used but will take much longer to boot. SteamCannon does not support t1.micro at this time. Make sure the instance is started in a security group that allows tcp traffic over port 8080.

2. VMware Appliance

To run SteamCannon in a desktop VMware product (Fusion, Workstation, Player) [download](http://steamcannon.org/download/) [http://steamcannon.org/download/] the VMware Appliance for version 0.2.0. Extract the downloaded .tgz file and open steamcannon.vmx in VMware. The root user's password is 'boxgrinder'.

3. Create a New User

Open `http://ip_address_of_appliance:8080` in your web browser and click the Register link under the Login button to create a new user. All appliances are configured for open registration, meaning anyone that can access the SteamCannon running on that appliance can create an account.

4. Enter AWS Credentials

After registering, you'll be prompted to enter your Amazon Web Services (AWS) credentials. If you don't already have credentials, you'll need to [sign up](http://aws.amazon.com/) [http://aws.amazon.com/] for an AWS account. Note that Amazon places very low quotas on newly-created AWS accounts so you may have to wait several hours after registering to successfully start an environment.

Upgrading From 0.1.0 (previously 1.0.0.beta1)

The only supported upgrade path from 0.1.0 to 0.2.0 is to start a new virtual machine or AMI and migrate the data. In all directions below, the source machine is the one running 0.1.0 and the target machine is the one running 0.2.0.

On target machine:

```
$ /etc/init.d/jboss-as stop
$ su postgres -c "/usr/bin/dropdb steamcannon_production"
$ su postgres -c "/usr/bin/createdb steamcannon_production -O steamcannon"
$ su postgres -c "/usr/bin/psql -c 'GRANT ALL ON DATABASE steamcannon_production TO steamcannon'"
```

On source machine:

```
$ su postgres -c 'pg_dump -c steamcannon_production' | psql -h $TARGET
steamcannon_production -U steamcannon
```

Replace \$TARGET with the IP address of your target machine. The password for the steamcannon user is 'steamcannon'.

On target machine:

```
$ cd /opt/steamcannon
$ RAILS_ENV=production /opt/jruby/bin/jruby -S rake db:migrate
$ RAILS_ENV=production /opt/jruby/bin/jruby -S rake db:seed
$ /etc/init.d/jboss-as start
```


API

Version 0.2

1. Introduction

SteamCannon provides a REST API through which clients may discover and act upon cloud objects from their SteamCannon account. The API exposes a single XML entry point with subsequent traversal and manipulation of objects done via opaque URLs returned by the SteamCannon server. Client requests over HTTP use the standard HTTP verbs: GET, POST, PUT and DELETE.

SteamCannon's API is implemented using HATEOS (Hypermedia as the Engine of Application State) where all a client needs to know is the entry point URL. Subsequent access to objects within the system is made possible by URLs returned in the server response. For more information about REST and HATEOS, please see the reference below.

- [REST APIs must be hypertext driven](http://roy.gbiv.com/untangled/2008/rest-apis-must-be-hypertext-driven) [http://roy.gbiv.com/untangled/2008/rest-apis-must-be-hypertext-driven]

What this means for the purposes of this document is that any URLs noted here are purely hypothetical and should not be used to infer any specific URL structure for elements of the API. The SteamCannon server may send back URLs in any format and the client should not be affected. All URLs are opaque.

1.1. Deltacloud Endpoint

The primary function of the SteamCannon API in this nascent version is to expose a user- and environment-specific Deltacloud endpoint which may be used to start and stop SteamCannon machine instances within a SteamCannon environment. Through this Deltacloud endpoint, clients have access to instances, images, hardware profiles and realms. These entities are abstractions of specific cloud-based objects, allowing programmatic manipulation of cloud assets while freeing the API client from having to know about various specific cloud APIs.

1.2. Authentication

The SteamCannon API is stateless and does not retain any session information between requests from a client. Clients use HTTP basic authentication in every request to authenticate. Standard SteamCannon account email and password may be sent as part of the URL for each request as in `http://username@email.com:pass@try.steamcannon.org/api`. In addition, the server will issue an HTTP Basic authentication challenge, allowing for interactive clients to prompt for username and password as with any HTTP Basic authentication from within a web browser.

Note: Some clients may not properly escape the '@' in the user's email address. In that case, the above URL should be modified as such: `http://username%40email.com:pass@try.steamcannon.org/api`.

1.3. Server Responses

All server responses from the API will be in XML format. In the event that a client attempts to access a resource which does not exist or for which the user is not authorized, the server will issue an HTTP 404 (Not Found) error code in response. Creation of new objects, for example starting a new instance, will return HTTP 201 upon success. Most other API requests will return 200 when successful.

2. The API Entry Point

Access to the SteamCannon API originates at the SteamCannon API Endpoint. The server response from this endpoint provides subsequent URLs to access entities from the authenticated SteamCannon account.

```
<api version='0.1'>
  <link href='http://try.steamcannon.org/environments' rel='environments' />
</api>
```

URLs to SteamCannon resource collections are exposed at the endpoint as `<link>` elements. The `rel` attribute provides the name of the collection. A GET request to the URL in the `href` attribute provides access to the collection itself. As you can see, the API endpoint for version 0.1 contains a single collection — environments.

3. Environments

SteamCannon uses the concept of an "environment" to encapsulate a named collection of machine images. Each environment is based on a pre-defined set of SteamCannon images known as a Platform. For example, SteamCannon provides a JBoss 3-tier Platform with a separate machine image for each application layer, e.g. an image with a frontend web balancer (`mod_proxy`), an image providing a JBoss AS application server, and an image providing a PostgreSQL database. An environment based on this Platform will have 3 images and any number of running instances.

3.1. Environment Collections

By sending a GET request to the endpoint's environments link, you can access a collection of all environments available. The server returns a list of the authenticated user's environments as `<environment>` elements, each containing name and href attributes as shown below.

```
<environments>
  <environment
    href='http://try.steamcannon.org/environments/16'
    name='my development env'>
  </environment>
```

```
<environment
  href='http://try.steamcannon.org/environments/14'
  name='test platform'>
</environment>
<environment
  href='http://try.steamcannon.org/environments/12'
  name='Staging, 2-tier'>
</environment>
<environment
  href='http://try.steamcannon.org/environments/17'
  name='Production, 3-tier'>
</environment>
</environments>
```

3.2. Single Environment

Clients may access a single <environment> using an href from the environments collection. For example <http://try.steamcannon.org/environments/12> provides identifying information about the environment, as well as information about the current state, and a link to a Deltacloud API endpoint for the environment.

```
<environment href='http://localhost:8080/environments/15'>
  <name>Staging, 2-tier</name>
  <owner>lanceball@gmail.com</owner>
  <created>2010-11-04 22:26:03 UTC</created>
  <updated>2010-12-10 22:02:01 UTC</updated>
  <current_state>stopped</current_state>
  <preserve_storage_volumes>false</preserve_storage_volumes>
  <metadata>

  </metadata>
  <link
    href='http://try.steamcannon.org/environments/15/deltacloud'
    rel='deltacloud_endpoint' />
</environment>
```

The data returned in the <environment> element

3.2.1. name

The name of the environment as provided by the user in the SteamCannon user interface.

3.2.2. owner

The login id of the SteamCannon user to whom this environment belongs.

3.2.3. created

The date the environment was created

3.2.4. updated

The date of the environment's most recent change. If there has been no change, this will be identical to created

3.2.5. current_state

The current state of the environment. If there are no instances running, this will be stopped. If instances are running, the environment will be considered running. If no instances are running the environment will be considered stopped

3.2.6. preserve_storage_volumes

This will be either true or false depending upon whether this environment is configured to save storage volumes on shutdown.

3.2.7. metadata

Any metadata associated with this environment.

3.2.8. link

The link tag provides access to the environment-specific Deltacloud endpoint.

4. Deltacloud Endpoint

SteamCannon exposes a user- and environment-specific Deltacloud API endpoint. By following the href URL in an <environment> element's <link> tag, a SteamCannon API client is authorized with the backing Deltacloud server, and has access to the assets and actions available via Deltacloud for images and instances associated with the environment.

SteamCannon's Deltacloud endpoint for this release conforms to the API exposed in steamcannon-deltacloud-core 0.1.1.3. We're running a fork of Deltacloud that contains experimental storage volume support that has not yet been merged with the mainline deltacloud codebase. This fork is based on version 0.1.1 of deltacloud-core and makes no changes to the underlying API exposed by Deltacloud. That's a long way of saying, that our Deltacloud endpoint conforms to deltacloud-core version 0.1.1.

The following sections outline issues specific to SteamCannon's Deltacloud API implementation. For a complete Deltacloud API reference, please see the Deltacloud documentation. <http://deltacloud.org/api.html>

4.1. Endpoint Response

Here is a typical response from the SteamCannon Deltacloud endpoint for a given environment. Notice that, in addition to the the standard `rel` and `href` attributes with all Deltacloud endpoint links, we also expose the underlying DeltaCloud URL using a `proxy-for` attribute.

```
<api driver='ec2' version='1.0'>
  <link
    href='http://try.steamcannon.org/hardware_profiles'
    proxy-for='http://try.steamcannon.org/deltacloud/api/hardware_profiles'
    rel='hardware_profiles' />
  <link
    href='http://try.steamcannon.org/environments/15/instance_states'
    proxy-for='http://try.steamcannon.org/deltacloud/api/instance_states'
    rel='instance_states' />
  <link
    href='http://try.steamcannon.org/realms'
    proxy-for='http://try.steamcannon.org/deltacloud/api/realms'
    rel='realms' />
  <link
    href='http://try.steamcannon.org/environments/15/images'
    proxy-for='http://try.steamcannon.org/deltacloud/api/images'
    rel='images' />
  <link
    href='http://try.steamcannon.org/environments/15/instances'
    proxy-for='http://try.steamcannon.org/deltacloud/api/instances'
    rel='instances' />
</api>
```

4.2. Hardware Profiles

For hardware profiles, SteamCannon makes no changes to the typical Deltacloud response other than inserting `proxy-for` attributes in each `hardware_profile` element.

```
<hardware_profiles
  proxy-for='http://try.steamcannon.org/deltacloud/api/hardware_profiles'>
  <hardware_profile
    href='http://try.steamcannon.org/hardware_profiles/m1-small'
    id='m1-small'
    proxy-for='http://try.steamcannon.org/deltacloud/api/hardware_profiles/
m1.small'>
```

```
<property kind='fixed' name='architecture' unit='label' value='i386'></property>
  <property kind='fixed' name='storage' unit='GB' value='160.0'></property>
  <property kind='fixed' name='cpu' unit='count' value='1.0'></property>
  <property kind='fixed' name='memory' unit='MB' value='1740.8'></property>
</hardware_profile>
<hardware_profile
  href='http://try.steamcannon.org/hardware_profiles/m1-large'
  id='m1-large'
  proxy-for='http://try.steamcannon.org/deltacloud/api/hardware_profiles/
m1.large'>
  <property kind='fixed' name='architecture' unit='label' value='x86_64'></property>
  <property kind='fixed' name='storage' unit='GB' value='850.0'></property>
  <property kind='fixed' name='cpu' unit='count' value='4.0'></property>
  <property kind='fixed' name='memory' unit='MB' value='7680.0'></property>
</hardware_profile>
<hardware_profile
  href='http://try.steamcannon.org/hardware_profiles/m1-xlarge'
  id='m1-xlarge'
  proxy-for='http://try.steamcannon.org/deltacloud/api/hardware_profiles/
m1.xlarge'>
  <property kind='fixed' name='architecture' unit='label' value='x86_64'></property>
  <property kind='fixed' name='storage' unit='GB' value='1690.0'></property>
  <property kind='fixed' name='cpu' unit='count' value='8.0'></property>
  <property kind='fixed' name='memory' unit='MB' value='15360.0'></property>
</hardware_profile>
<hardware_profile
  href='http://try.steamcannon.org/hardware_profiles/c1-medium'
  id='c1-medium'
  proxy-for='http://try.steamcannon.org/deltacloud/api/hardware_profiles/
c1.medium'>
  <property kind='fixed' name='architecture' unit='label' value='i386'></property>
  <property kind='fixed' name='storage' unit='GB' value='350.0'></property>
  <property kind='fixed' name='cpu' unit='count' value='5.0'></property>
  <property kind='fixed' name='memory' unit='MB' value='1740.8'></property>
</hardware_profile>
</hardware_profiles>
```

4.3. Realms

As with hardware profiles, SteamCannon makes no changes to the typical Deltacloud response for a realms collection other than inserting proxy-for attributes in each realm element.

```
<realms
  proxy-for='http://try.steamcannon.org/deltacloud/api/realms'>
  <realm
    href='http://try.steamcannon.org/realms/us-east-1a'
    id='us-east-1a'
    proxy-for='http://try.steamcannon.org/deltacloud/api/realms/us-east-1a'>
    <name>us-east-1a</name>
    <state>available</state>
    <limit></limit>
  </realm>
  <realm
    href='http://try.steamcannon.org/realms/us-east-1b'
    id='us-east-1b'
    proxy-for='http://try.steamcannon.org/deltacloud/api/realms/us-east-1b'>
    <name>us-east-1b</name>
    <state>available</state>
    <limit></limit>
  </realm>
  <realm
    href='http://try.steamcannon.org/realms/us-east-1c'
    id='us-east-1c'
    proxy-for='http://try.steamcannon.org/deltacloud/api/realms/us-east-1c'>
    <name>us-east-1c</name>
    <state>available</state>
    <limit></limit>
  </realm>
  <realm
    href='http://try.steamcannon.org/realms/us-east-1d'
    id='us-east-1d'
    proxy-for='http://try.steamcannon.org/deltacloud/api/realms/us-east-1d'>
    <name>us-east-1d</name>
    <state>available</state>
    <limit></limit>
  </realm>
</realms>
```

4.4. Instance States

SteamCannon exposes three distinct instance states, running, pending, and stopped. These states map directly to the Deltacloud states of the same name. As with other API responses, a proxy-for attribute is included which points to the underlying Deltacloud URL.

```
<states proxy-for='http://try.steamcannon.org/deltacloud/api/instance_states'>
  <state name='stopped'>
  </state>
  <state name='running'>
    <transition action='stop' to='stopped'></transition>
  </state>
  <state name='pending'>
  </state>
</states>
```

4.5. Images

The <images> element returns a collection of <image> elements which describe the machine images which comprise this environment. SteamCannon filters the full list of images provided by the underlying DeltaCloud URL and exposes only those images that are associated with the environment.

```
<images
  proxy-for='http://try.steamcannon.org/deltacloud/api/images'>
  <image
    href='http://try.steamcannon.org/environments/14/images/frontend-
modcluster'
    id='frontend-modcluster'
    proxy-for='http://try.steamcannon.org/deltacloud/api/images/ami-bab146d3'>
    <owner>steamcannon</owner>
    <name>Frontend - mod_cluster</name>
    <description>Apache 2.2.16 (w/mod_cluster 1.1.0)</description>
    <architecture>i386</architecture>
  </image>
  <image
    href='http://try.steamcannon.org/environments/14/images/backend-jboss'
    id='backend-jboss'
    proxy-for='http://try.steamcannon.org/deltacloud/api/images/ami-4cb04725'>
    <owner>steamcannon</owner>
    <name>Backend - JBoss</name>
    <description>JBoss AS 6 m5 (w/TorqueBox 1.0.0.Beta23-SNAPSHOT)</
description>
    <architecture>i386</architecture>
```



```

</image>
<image
  href='http://try.steamcannon.org/environments/14/images/database-
postgresql'
  id='database-postgresql'
  proxy-for='http://try.steamcannon.org/deltacloud/api/images/ami-2cb04745'>
  <owner>steamcannon</owner>
  <name>Database - PostgreSQL</name>
  <description>PostgreSQL 8.4</description>
  <architecture>i386</architecture>
</image>
</images>

```

4.6. Instances

If the environment contains any running machine instances, those are returned from the instances link. Again, SteamCannon filters what is returned to include only instances running in the context of this environment.

```

<instances
  proxy-for='http://try.steamcannon.org/deltacloud/api/instances'>
  <instance
    href='http://try.steamcannon.org/environments/14/instances/frontend-
modcluster-1'
    id='frontend-modcluster-1'>
    <owner_id>lanceball@gmail.com</owner_id>
    <name>Frontend - mod_cluster #1</name>
    <image
      href='http://try.steamcannon.org/environments/14/images/frontend-
modcluster'
      id='frontend-modcluster'></image>
    <hardware_profile
      href='http://try.steamcannon.org/hardware_profiles/c1-medium'
      id='c1-medium' />
    <realm
      href='http://try.steamcannon.org/realms/us-east-1a'
      id='us-east-1a'></realm>
    <state>RUNNING</state>
    <actions>
    </actions>
    <public_addresses>
      <address>ec2-174-129-68-247.compute-1.amazonaws.com</address>
    </public_addresses>
    <private_addresses>

```

```
<address>ip-10-100-11-184.ec2.internal</address>
</private_addresses>
</instance>
<instance
  href='http://try.steamcannon.org/environments/14/instances/backend-
jboss-2'
  id='backend-jboss-2'>
  <owner_id>lanceball@gmail.com</owner_id>
  <name>Backend - JBoss #2</name>
  <image
    href='http://try.steamcannon.org/environments/14/images/backend-jboss'
    id='backend-jboss'></image>
  <hardware_profile
    href="http://try.steamcannon.org/hardware_profiles/c1-medium"
    id="c1-medium" />
  <realm
    href='http://try.steamcannon.org/realms/us-east-1a'
    id='us-east-1a'></realm>
  <state>RUNNING</state>
  <actions>
  </actions>
  <public_addresses>
    <address>ec2-184-73-126-181.compute-1.amazonaws.com</address>
  </public_addresses>
  <private_addresses>
    <address>ip-10-100-11-231.ec2.internal</address>
  </private_addresses>
</instance>
</instances>
```

Appendix A. Licensing

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Appendix B. GNU Lesser General Public License version 3

SteamCannon License

Version 3, 29 June 2007

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