SpotCloud Provider Guide Documentation

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Welcome to the SpotCloud Provider Integration Guide.

This guide contains technical information for Cloud Service Providers on integrating your platform with the SpotCloud market place.

If you are using Enomaly ECP (either the full-featured Service Provider Edition, or the free SpotCloud edition), support for SpotCloud is built in. You can read more about using SpotCloud with Enomaly ECP, and you can ‘download the free SpotCloud Edition of Enomaly ECP <http://dl.enomaly.com/ecpspotcloud>_.

If you are using your own cloud platform, this guide is for you.

CHAPTER

ONE

WHAT IS SPOTCLOUD?

Enomaly's SpotCloud is an open marketplace for cloud computing capacity. For Cloud Service Providers, SpotCloud drives traffic and revenue to your cloud, and offers a way to monetize cloud capacity that would otherwise go unused. For end-users, SpotCloud provides the ability to find the ideal cloud service provider anywhere in the world – based on price, quality, and location – and to quickly and easily run their Virtual Machine appliances on that provider's cloud through the integrated SpotCloud control panel.

This guide is for Service Providers who want to sell cloud capacity through SpotCloud. This includes primarily Service Providers who would like to integrate third party cloud infrastructure software platforms or services with the SpotCloud market.

Providers who are using the Enomaly ECP cloud infrastructure platform software (either the free SpotCloud Edition, or the full-featured Service Provider Edition) in order to participate in the SpotCloud market place will not need to perform the integration steps described here – both editions of Enomaly ECP, versions 3.5 and higher, are pre-integrated with SpotCloud. However, service providers using Enomaly ECP may find this document useful as background on how SpotCloud operates.

For more information, please visit www.spotcloud.com.

CHAPTER

TWO

INTEGRATING WITH SPOTCLOUD

This section provides a brief overview of how to integrate your own cloud platform with SpotCloud. Subsequent sections in this guide go into further detail on integration.

2.1 API

SpotCloud uses a simple a RESTful HTTP-based *API* to communicate with capacity providers. SpotCloud initiates most API calls. The cloud provider must therefore provide an endpoint able to handle these calls. This RESTful API endpoint can be located at a hostname or IP address of your choice (configured through the SpotCloud service provider control panel) and will be accessed by SpotCloud using HTTPS (HTTP with SSL). Spotcloud also provides its own RESTful HTTP-based API endpoint, which cloud providers can access as described below.

SpotCloud communicates with providers over this API to carry out several operations:

- Retrieve available hardware profiles
- Retrieve installed packages
- Retrieve installed machines
- Retrieve utilization data
- Delete existing machines
- Create new machines

SpotCloud requires cloud providers to support only a handful of API calls in order to carry out these essential operations. These are detailed in the following sections of this document. Cloud providers must also be able to make certain HTTPS requests to the SpotCloud API handler; this is also described below.

2.2 Hardware Profiles

Hardware profiles dictate the physical resources available to a virtual machine. A SpotCloud buyer must select a hardware profile available from the provider before they can create a machine with that provider. The provider can set additional constraints such as maximum lifespan and hourly cost from the SpotCloud management interface.

2.3 Packages

Packages are used to create virtual machines. SpotCloud stores packages in XVM2 format which is a compressed archive containing the raw disk or ISO image the machine is based on. Providers must download these packages when

a buyer wants to create a machine using that package. The package can be stored locally on the provider for the next request to create machine using that package. The package APIs required by SpotCloud are used to determine which packages are installed on the provider.

2.4 Machines

SpotCloud buyers purchase computing capacity in the form of *virtual machines*. Buyers aren't necessarily interested in the virtualization platform used for this - they want the best value for their dollar. SpotCloud providers need to provide the required APIs for SpotCloud to create virtual machines, delete virtual machines, and list all virtual machines created on SpotCloud's behalf.

2.5 Utilization

SpotCloud maintains a quality rating for each service provider, to enable buyers of cloud capacity to differentiate between providers. Providers are rated on SpotCloud based largely on *utilization* data obtained from the provider. The utilization data consists of memory usage, storage usage, and load metrics. The data is fairly straightforward to understand.

CHAPTER

THREE

PROVIDER API

Each SpotCloud provider must implement a simple RESTful API endpoint for communication with SpotCloud. This section describes common features of the required REST calls.

3.1 Authentication

Each API request sent from SpotCloud to a provider must be authenticated. Each request is sent using SSL (HTTPS) and a username and a computed authentication digest. The username and password is specified during the SpotCloud provider registration process. For instance, providers using Enomaly ECP will have a single "broker" user, used to represent all requests coming from SpotCloud.

Here are the authentication fields sent with every SpotCloud provider API request:

- **ecp_username** - The API username registered with the provider.
- **ecp_auth_digest** - The computed authentication digest for ecp services.
- **ecp_auth_digest_B** - The computed authentication digest for external providers.

Here is an example of what the HTTP authentication parameters look like using a **GET** request:

```
https://api.provider.com/rest/path/to/endpoint?ecp_username=remoteuser&paramA=value&Timestamp=2006-12
```

Here is an example, in Python, of how the **ecp_auth_digest** value is computed:

```
parameters = {}
parameters['Timestamp'] = '2006-12-08T07:48:03Z' #15 minutes later, this digest expires.
parameters['ecp_username'] = 'spotcloudusername' #remote user
parameters['paramA']='value' #dummy data

#sorts by key.lowercase(). ie A b c Dee e ffFf
sorted_keys = sorted(parameters.keys(), key=lambda k: k.lower())

#concatenates key,value pairs. a=1,b=2,C=32 becomes "a1b2C32"
data = ''.join(key + parameters[key] for key in sorted_keys)

#Data is now: ecp_usernamespotcloudusernameparamAvalueTimestamp2006-12-08T07:48:03Z
digest = hmac.new('spotcloudpassword', data, sha).digest()

#Takes the binary output of the digest and returns a base64 encoded version.
parameters['ecp_auth_digest_B'] = base64.b64encode(digest)

#The ecp_auth_digest_B == 'BfEngBvw+3D6GWLokZQnrsXtQaM='. Add this to your querystring at the very
#end and send the request with it, and you will be digest authenticated!
```

3.2 HTTP Methods

SpotCloud sends HTTP requests using the following HTTP methods:

- **GET** - For retrieving data.
- **POST** - For updating data.
- **PUT** - For creating new data, such as virtual machines.

Each API call is made with a specific HTTP method; this is documented with each API call below.

3.3 JSON Format

SpotCloud expects all returned provider API data in the JSON data format. Any XML data can be transformed to JSON data. For example, here is some XML data:

```
<object field1="value1" field2="value2"/>
```

Here is the same thing as JSON:

```
{field1: "value1", field2: "value2"}
```

3.4 Unique Identifiers

Providers must be able to uniquely identify every object returned by the API. SpotCloud expects individual objects to be identified by a UUID. This includes hardware profiles, packages, and machines.

CHAPTER

FOUR

HARDWARE PROFILES

Hardware profiles describe the resources available to virtual machines on a provider. This section shows providers how to implement the required hardware profile APIs.

4.1 Hardware Fields

Each hardware profile offered by a provider must have the following fields:

- **uuid** - The unique hardware profile identifier.
- **name** - A human-readable hardware profile name.
- **cpu** - The number of CPUs offered by this profile.
- **memory** - The amount of memory, in MB, offered by this profile.

4.2 Hardware API

The provider API needs to list the available hardware profiles. This call uses the **GET** HTTP method. Here is an example request made by SpotCloud:

```
https://api.provider.com/htemplate/list?login=Login&ecp_username=39480304&ecp_auth_digest=lfOBcOAfcLI
```

The request path is **/htemplate/list**. Here is an example API response returned by the provider:

```
{

  errno: 0,

  templates: [

    {

      uuid: "6f482c32-ee83-11df-9e94-001a929face2",
      name: "Small",
      cpu: 1,
      memory: 512

    },

    {
```

```
      uuid: "b67064c6-ee83-11df-9716-001a929face2",
      name: "Medium",
      cpu: 2,
      memory: 1024

    }

  ]

}
```


The **templates** field in the response contains the list of actual hardware profile objects.

CHAPTER

FIVE

PACKAGES

SpotCloud buyers can upload virtual machine packages to SpotCloud. These are then used to create virtual machines on a provider registered with SpotCloud. The packages are stored in a compressed format, and are downloaded from SpotCloud by the provider when required.

5.1 Package Fields

Each package object returned by a SpotCloud provider API must have the following fields:

- **uuid** - The unique identifier of the package object.

5.2 XVM2 Format

The XVM2 format is used to store SpotCloud packages. It is a compressed tar archive containing the following files:

- **description.xml** - Describes requirements of virtual machines created using this package. See the libvirt domain documentation for more details.
- **manifest.txt** - Contains a single line with the disk image name, the disk image size, and the MD5 sum of the image.
- **hd0.gz** - A gzip copy of the raw disk image.

Raw disk images can be created in any convenient way, for example by using the **dd** command, a common Linux / Unix utility, to copy an existing physical or virtual disk volume.

5.3 Package API

The provider API needs to be able to list the installed packages. The HTTP method used is **GET**. The request path is **/htemplate/list**. Here is an example request made by SpotCloud:

```
https://api.provider.com/ptemplate/list?login=Login&ecp_username=39480304&ecp_auth_digest=lfOBcOAfcLI
```

Here is an example API response returned by the provider:

```
{
  errno: 0,
  packages: [
```

```
    {
      uuid: "3cc52972-ee9c-11df-b092-001a929face2"
    },
    {
      uuid: "47450be2-ee9c-11df-ac39-001a929face2"
    }
  ]
}
```


5.4 Downloading Packages

Each package on a SpotCloud provider is identified by a UUID. When it is necessary to download a package from SpotCloud (because a SpotCloud buyer wants to create a machine with it, and the provider does not have a cached copy of that package), the provider can use the UUID to download the package. Here is an example of a package download URL. This is accessed by the provider using the **GET** HTTP method to access the SpotCloud API endpoint, **https://spotcloud.appspot.com/api**. Here is an example **GET** request made by the provider to SpotCloud:

```
https://spotcloud.appspot.com/api/package/download?uuid=dc947566-ee9c-11df-83c5-001a929face2
```

This will return a copy of the XVM2 package stored on SpotCloud under that UUID.

CHAPTER

SIX

MACHINES

SpotCloud providers execute virtual machines on behalf of SpotCloud capacity buyers. It is therefore necessary that providers implement a set of APIs for controlling these machines.

6.1 Machine Fields

Each machine object returned by a SpotCloud provider API must have the following fields:

- **uuid** - The unique identifier of the machine object.
- **state** - The current state of the machine.
- **ip** - The IP address of the machine.

6.2 Machine API

The provider API must be able to list all machines created on behalf of SpotCloud buyers. This call uses the **GET** HTTP method. Here is an example request:

```
https://api.provider.com/vm/list?login=Login&ecp_username=39480304&ecp_auth_digest=lfOBcOAfcLPqPUz1b
```

The request path is **/vm/list**. Here is an example API response returned by the provider:


```
{

  errno: 0,

  vms: [

     {

       uuid: "3cc52972-ee9c-11df-b092-001a929face2"
       state: "running"
       ip: "192.168.1.10"

     },

     {

       uuid: "47450be2-ee9c-11df-ac39-001a929face2"
       state: "pending"
```

```
        ip: "127.0.0.1"
      }
  ]
}
```

The provider API must be able to create a new machine. Here is an example API request:

```
https://api.provider.com/vm
```

The HTTP method used is **PUT**. The request path is **/vm**. Here is an example showing the **PUT** parameters used when creating a new machine:

- **login** - *Login*
- **user_name** - *39480304*
- **password** - *394839384932*
- **package** - *416fa6e0-f0c3-11df-abf5-001a929face2*
- **hardware** - *5c125542-f0c3-11df-a306-001a929face2*

The provider API must be able to delete existing machines. The HTTP method used is **POST**. Here is an example API request line:

```
https://api.provider.com/vm/959a1cd2-f0c3-11df-99a2-001a929face2
```

The request path is **/vm/959a1cd2-f0c3-11df-99a2-001a929face2** where the UUID is that of the machine being deleted. Here is an example showing the parameters used when deleting a machine:

- **login** - *Login*
- **user_name** - *39480304*
- **password** - *394839384932*
- **action** - *delete*

CHAPTER

SEVEN

UTILIZATION

Utilization data sent to SpotCloud from the provider API is used to compute a quality metric for providers, which is presented to buyers.

The utilization data is used to rate providers. Higher ratings will increase buyer demand for any given provider. The rating is visible to prospective buyers and is used to sort providers in search results.

The SpotCloud provider rating is not a fixed value is updated at regular intervals to reflect the provider's performance.

7.1 Utilization Fields

The following fields are required by the provider utilization API:

- **total_memory** - The total amount of memory, in MB, available to all virtual machines in the provider's cloud (or the segment of the cloud available to SpotCloud). This includes both used and unused memory.
- **free_memory** - The total amount of memory, in MB, that is unused by virtual machines in the provider's cloud (or the segment of the cloud available to SpotCloud).
- **total_storage** - The total amount of storage, in MB, available to all virtual machines in the provider's cloud (or the segment of the cloud available to SpotCloud). This includes both used and unused storage.
- **free_storage** - The amount of storage, in MB, that is unused by virtual machines in the provider's cloud (or the segment of the cloud available to SpotCloud).
- **loadfifteen** - The average across all available virtualization hosts in the provider's cloud (or the segment of the cloud available to SpotCloud) of a number computed for each virtualization host as: the Linux-style load average over the past fifteen minutes, divided by the number of CPU cores in the host.

7.2 Accuracy of utilization data

A provider can return invalid data in response to SpotCloud's utilization queries, but it is not in their best interest to do so. If a provider returns inaccurate utilization data to increase their rating, buyers' machines may start to fail, or new machines may no longer be created successfully, or buyers may register complaints that the provider does not met their clamed quality rating. Any of these events will have a strong negative effect on the provider's quality rating.

7.3 Utilization API

The following API must be implemented by providers to return utilization data. The HTTP method used by SpotCloud is **GET**. The request path is **/utilization**. Here is example request from SpotCloud:

```
https://api.provider.com/utilization?login=Login&ecp_username=39480304&ecp_auth_digest=lfOBcOAfcLPqPU
```

Here is an example API response returned by the provider:

```
{

  total_memory: 4085,
  free_storage: 84146,
  free_memory: 1397,
  total_storage: 291618,
  loadfifteen: 1.7

}
```

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