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# CloudThing Documentation

*Release 0.1*

**Hadron IT Sp. z o.o.**

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# General Concept

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CloudThing Cloud Platform is a software layer between hardware devices and Internet of Things applications. It may be considered as middleware for end-to-end IoT solutions.

CloudThing features set of APIs for connecting and managing devices, as well as for services and apps development and management.

The CT cloud platform is multi-tenant application with strong separation between tenants' data. Every new tenant has his own virtual host created accessible by {shortName}.cloudthing.io. Short names are automatically generated bundles of two words, if you want custom one get in touch [hello@cloudthing.io](mailto:hello@cloudthing.io).

Example: if generated name was *vanilla-ice* then tenant's vhost would be exposed via *vanilla-ice.cloudthing.io* and services would be accessible via:

- **Control Center:** *https://vanilla-ice.cloudthing.io*,
- **HTTP API:** *https://vanilla-ice.cloudthing.io/api/v1*,
- **MQTT API:** *mqtt://vanilla-ice.cloudthing.io:8883*,
- **MQTT Websockets API:** *wss://vanilla-ice.cloudthing.io:9001/mqtt*,
- **HTTP connector API:** *http://vanilla-ice.cloudthing.io:81/v1*,

etc.





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## Getting Started

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- *Quickstart with web application*
  - *Registration*
  - *Create new product*
  - *Register & connect device*
  - *Create analytics flow*

### Quickstart with web application

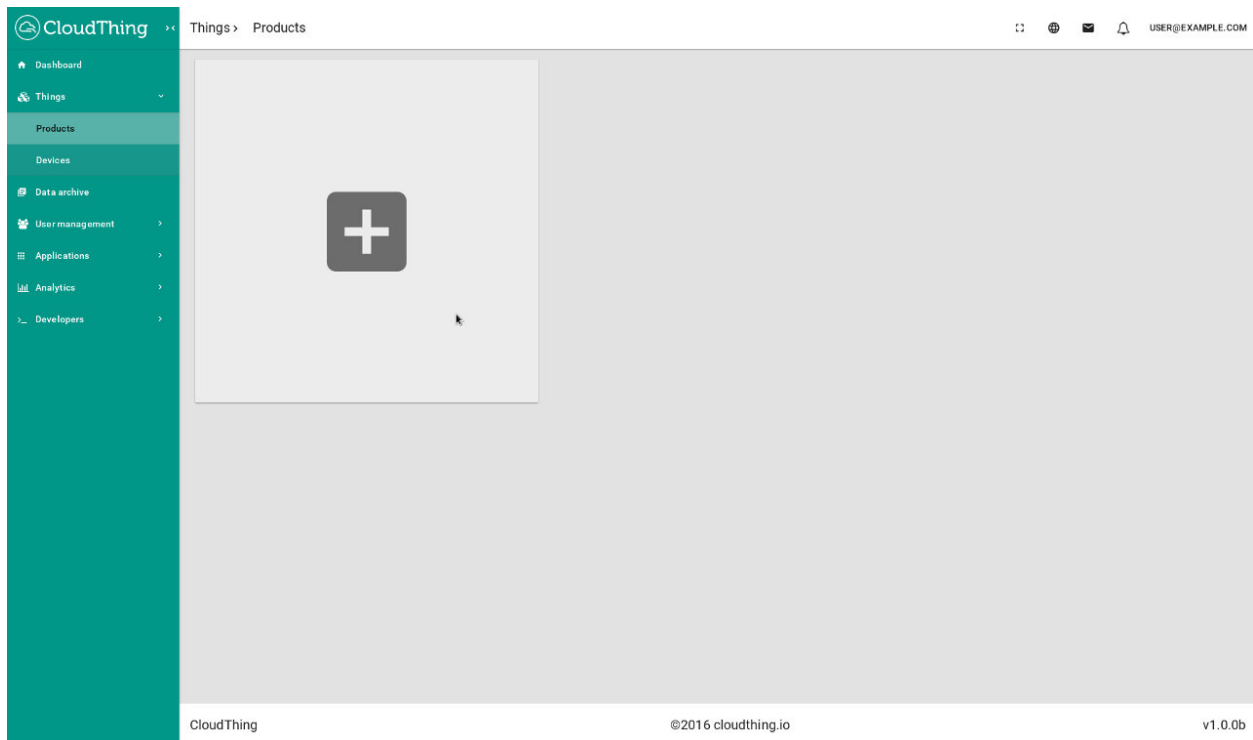
During this 5 minute quickstart, you'll create and model heat controller, register new device, automate it and set an alert with SMS notification.

## Registration

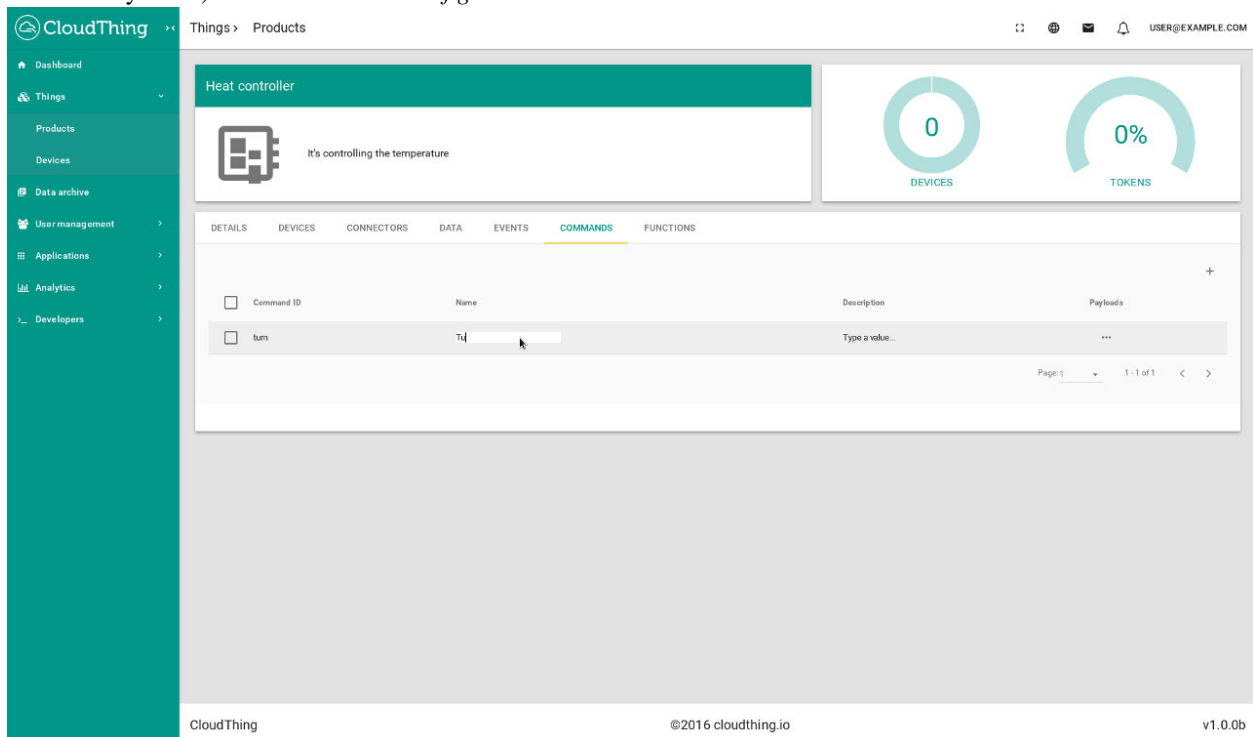


Go to <https://app.cloudthing.io>, choose *I don't have an account* and follow the instructions. After a successful registration, you will receive a new virtual host with autogenerated tenant's name. We will send you an email with confirmation link. Without the confirmation, you won't be able to log into your account, so make sure that you entered correct email address. Please remember your tenant's name and the URL to your instance of the CloudThing platform!

## Create new product



Once you’ve logged in into the web application, navigate to *Things > Product* and create a new one by clicking on plus mark. Choose name and (optionally) description (e.g. “Heat controller”, “This Heat Controller is a set of Smart Home ecosystem”). Click on *Save & configure*.



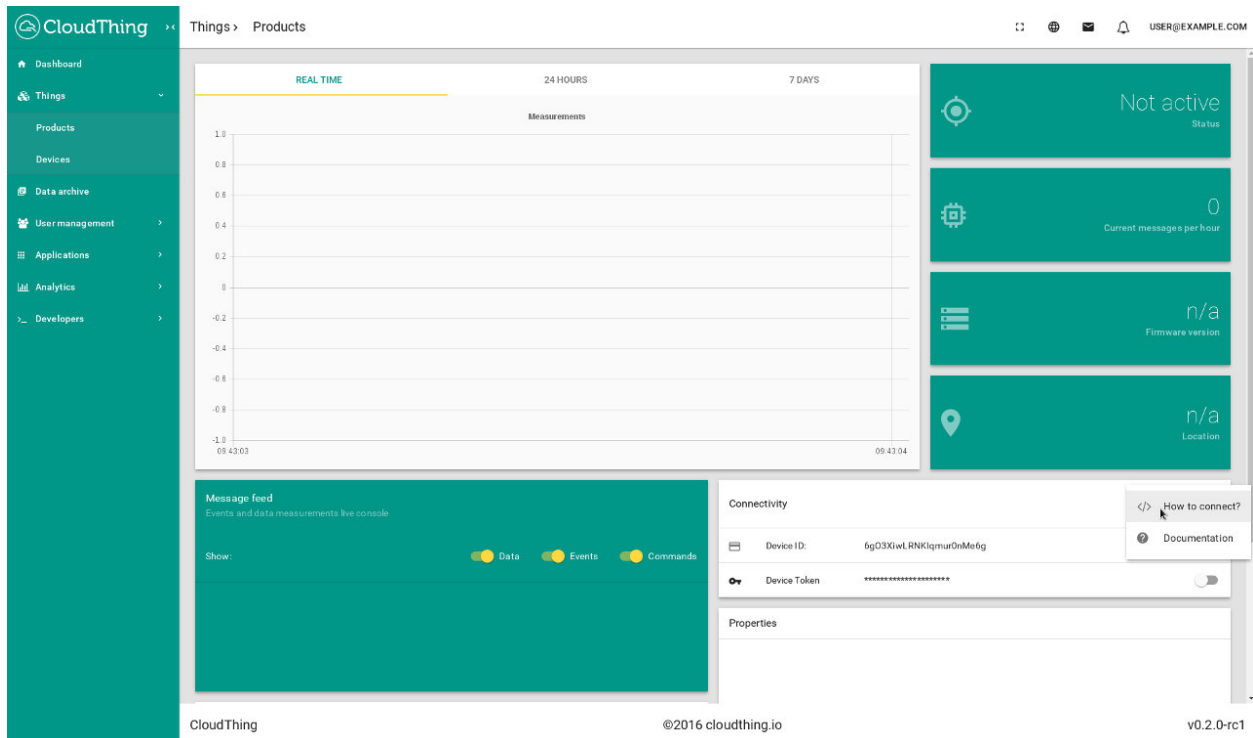
Go to *DATA* tab and add a new entry, set values in columns ‘Data ID’, ‘Name’ and ‘Description’ to “temp”, “Tem-

perature” and “Temperature reported by controller” respectively. Then go to *COMMANDS* and add new entry with “turn”, “Turn” and “Turns heating on or off” in ‘Command ID’, ‘Name’ and ‘Description’ columns. That way you declare what information is sent by devices and what messages they receive. This step is not necessary - the platform will register new data at arrival, however setting these resources beforehand makes it easier to configure the system.

## Register & connect device

The screenshot displays the CloudThing web application interface. On the left is a teal sidebar with navigation links: Dashboard, Things, Products, Devices, Data archive, User management, Applications, Analytics, and Developers. The top header shows 'Things > Products' and user information 'USER@EXAMPLE.COM'. The main content area features a 'Heat controller' card with a description 'It's controlling the temperature' and two circular progress indicators: '1 DEVICES' and '25% TOKENS'. Below the card is a tabbed interface with tabs for DETAILS, DEVICES, CONNECTORS, DATA, EVENTS, COMMANDS, and FUNCTIONS. The DEVICES tab is active, showing a table with one device entry. The table has columns for ID, Token, Status, and Actions. The device entry has an ID of 'lgG33xwLpZc9gmr0nMe1g', a token, a status of 'Offline', and actions for edit and delete. The footer shows 'CloudThing', '@2016 cloudthing.io', and 'v0.2.0-rc1'.

If you completed the previous step, go to *DEVICES* and add a new one. A new ID/token pair will be generated, click on ID and go to Device card.

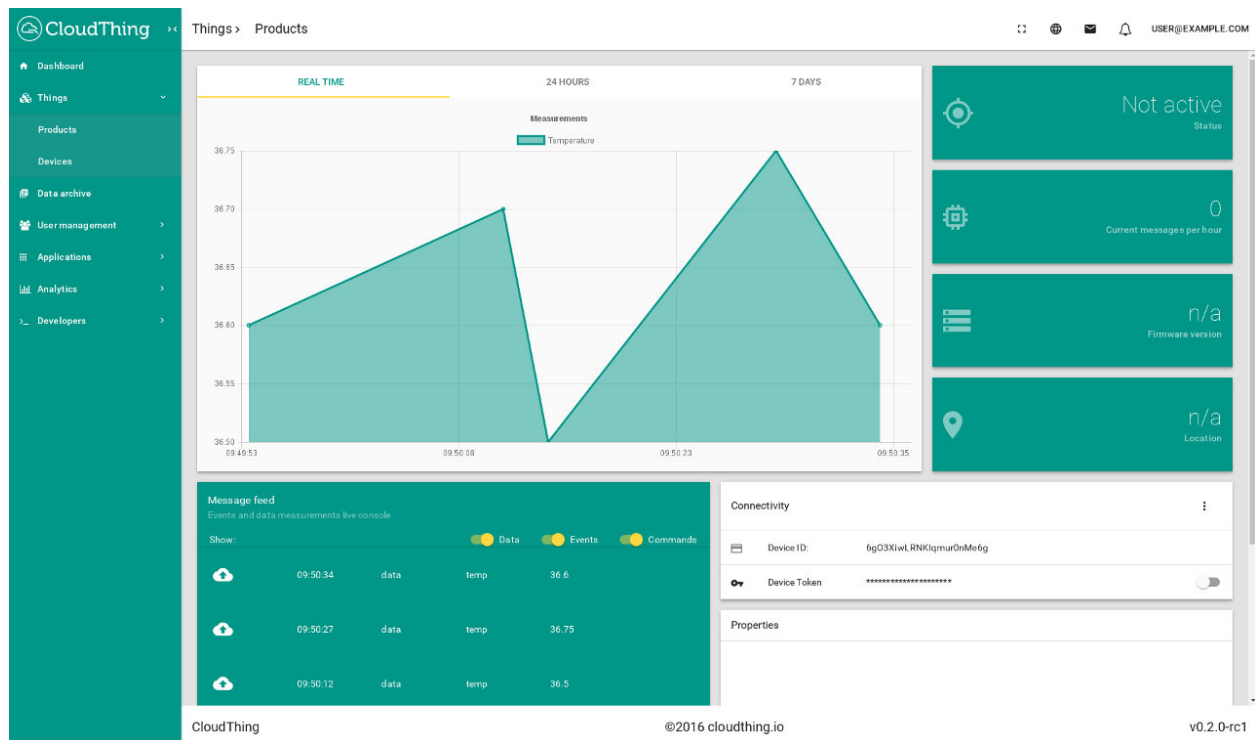


As you can see the device is not active which means that it has never sent any messages to the platform. To start sending measurements expand a menu on *Connectivity* card and choose *How to connect?*. Copy value from MQTT or HTTP card (you'll have to have a MQTT client installed on your computer if want to use it, for HTTP you just need *curl* which is preinstalled on most Linux distributions).

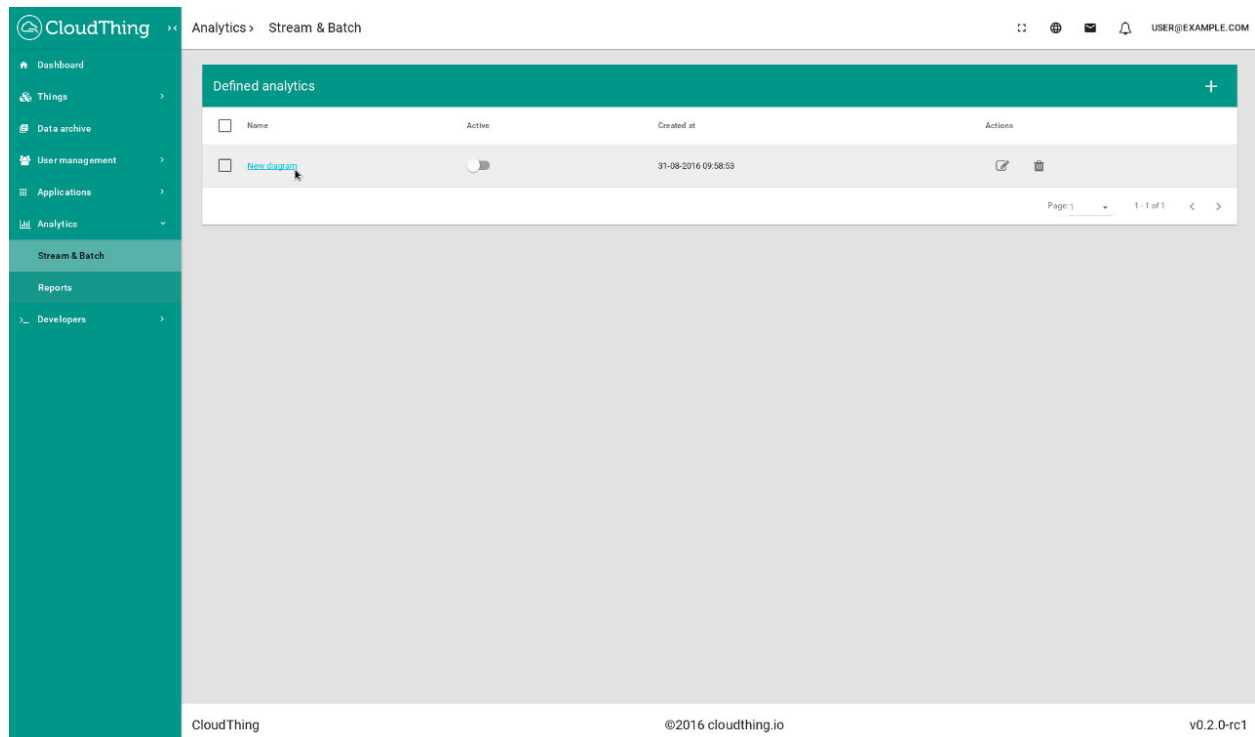
Execute command from your computer's console, for example:

```
curl -H "Content-Type: application/json" \
-u "dxM18Pd_T3yfsdds1x9AxFQ:HMb7Ug0nv3h8duyVfwwh5jIgc81dg31" \
-X POST https://vanilla-ice.cloudthing.io:444/v1/dxM18Pd_T3yfsdds1x9AxFQ/data \
-d '{"r":[{"k":"temp","v":36.6}]}'
```

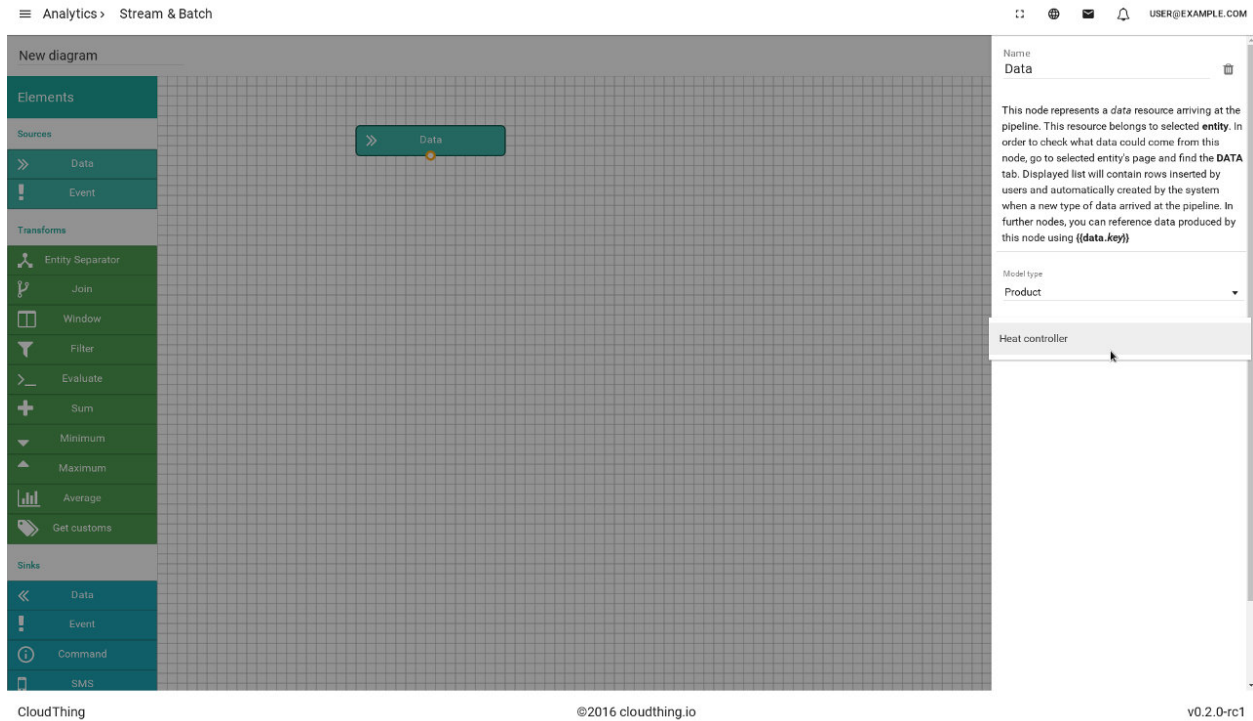
You should see a new message and a point on application's chart. Try replacing default value with others and see how the chart is changing.



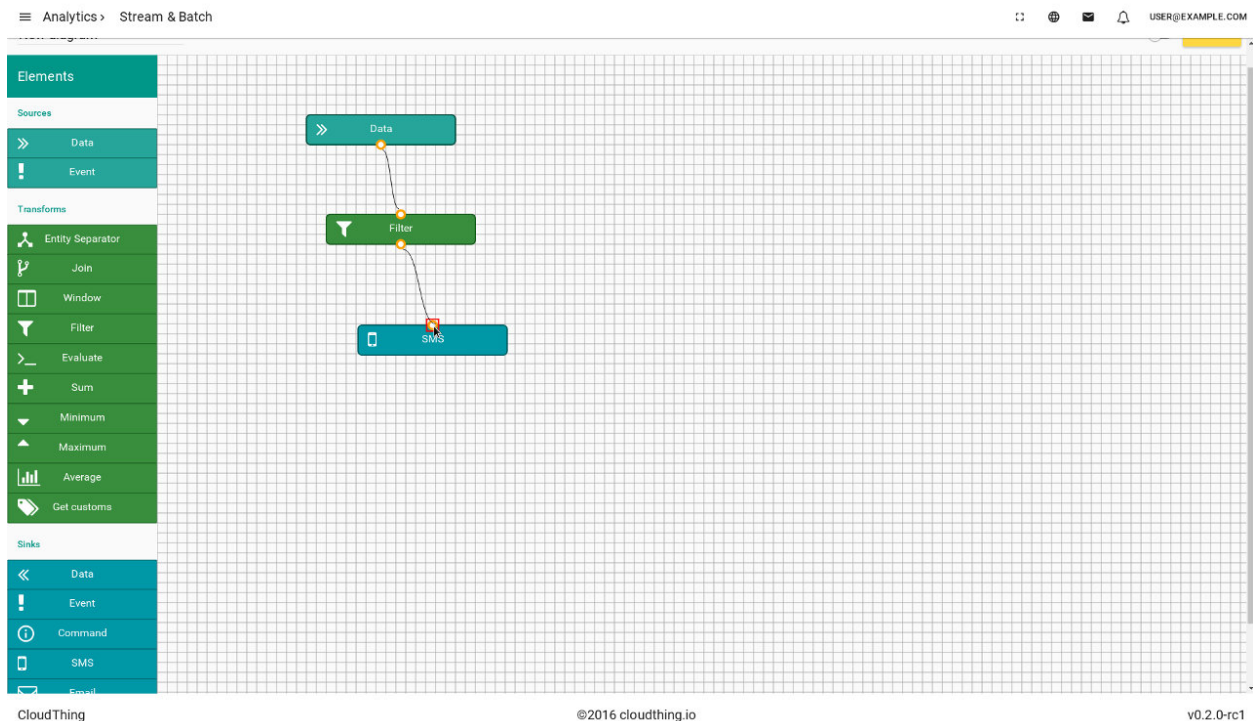
## Create analytics flow



Now, when you have a working simulated device, you can create data flows and analytics. Navigate to *Analytics > Stream & Batch* and create new pipeline. Click on its name in order to edit the diagram.



You will see a blank canvas with nodes on the side to choose from. Drag a *Data* node and drop it on the canvas. This node represents data that arrive to the system. Click on it to edit options within the node. Choose the product which you defined earlier as a source *entity*. Add a *Filter* node and set its *expression* to `{{data.temp}} > 40`. Connect *Data* node to the filter. *Filter* node will pass only those packets which fulfill given condition. The last step is to add a sink node - it will perform an action for every packet it receives. Choose an *SMS* node, fill the phone number (with '+' sign and your country's calling code) and write a message for you, e.g. The temperature is `{{data.temp}}`. It is too hot!. Connect filter node to the SMS node.



When nodes are ready, click the *SAVE* button. If everything is fine with the diagram, you will see *The diagram was successfully saved. It can be deployed now.* message. Otherwise, warning signs will appear on the nodes and you will have to resolve these errors in order to proceed. When the diagram is ready to be deployed, you can “turn it on”: just click the switch next to *SAVE* button. You should see a message *The diagram was successfully deployed..* That means that your flow is operational and is waiting for data to arrive.

You can test it by sending messages, just like you did it earlier. Try sending some messages with different *temp* values and see if you receive an SMS!



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## CloudThing APIs

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Contents:

### Connectors APIs

Connectors are connectivity layer of CloudThing software stack and consist of APIs for Open Source IoT protocols, networking stacks (Sigfox, LoRaWAN) and others. It is possible to develop custom connector if required (ask us about it: [hello@cloudthing.io](mailto:hello@cloudthing.io)).

#### General

The connectors share a general concept of channels. CloudThing creates 4 messaging channels for every device in system:

- **Data:** v1/{deviceId}/data
- **Events:** v1/{deviceId}/events
- **Commands:** v1/{deviceId}/commands
- **Responses:** v1/{deviceId}/responses

**Data** channel is used for device-to-cloud communication and is intended to be used as ordinary, regular measurements stream (eg. temperature, pressure).

**Events** channel is used for device-to-cloud communication and is intended to be as non-regular event reporting stream (eg. button pressed). It is possible for device to get response from cloud using this channel, so one may consider it as a remote (on cloud) function execution.

**Commands** channel is used for cloud-to-device communication and is intended to be used for sending execution commands or configuration options from user/application to device (eg. turn on LED, set config).

**Responses** is bidirectional channel supporting commands and events. It differs between connectors.

#### Serialization formats

CloudThing connectors support different serialization formats including:

- JSON,
- CBOR,

- Google Protocol Buffers,
- custom formats.

Only messages sending via *data* channel requires to use one of supported serialization formats.

## JSON

The basic stucture of *data* message is:

```
{
  "records": [
    {"key": "temp", "value": 36.6},
    {"key": "bat", "value": 3.5}
  ]
}
```

*Value* can by any JSON base type object (number, string, bool). Soon, we'll enable usage of nested JSON object.

Every entry may also include *time* as RFC3339-formatted string, Unix timestamp (number) of diff between previous point (number):

```
{
  "records": [
    {"key": "temp", "value": 36.6, "time": "2016-05-03T13:24:16Z"},
    {"key": "bat", "value": 3.5, "time": 6}
  ]
}
```

It is also possible to geo-locate measurements by adding:

```
{
  "records": [
    {
      "key": "temp",
      "value": 36.6,
      "geo": {
        "lat": 52.24325,
        "lon": 26.32256
      }
    },
    {"key": "bat", "value": 3.5}
  ]
}
```

JSON serialization supports also indexing of entries what is really helpful in decreasing message size when sending lot of entries in one message:

```
{
  "index": ["temp", "bat"],
  "records": [
    {"key": 0, "value": 36.6},
    {"key": 1, "value": 3.5}
  ]
}
```

To reduce size even more, one can use shorter field names:

```
{
  "i": ["temp", "bat"],
  "r": [
    {

```

```

        "k":0,
        "v": 36.6,
        "g": {
            "lt": 52.24325,
            "ln": 26.32256
        }
    },
    {"k":1, "v": 3.5}
]

```

## CBOR

CBOR or Constrained Binary Object Representation is JSON-compatible binary format designed for constrained devices.

**This serialization format is highly recommended for production and most use-cases.**

When using it, one can pack data as shown for JSON with short field names.

## Google Protocol Buffers

Since Protobuf is unstructured format and requires struct definitions when (de)serializing, you'll need to provide us with your .proto file. Get in touch [hello@cloudthing.io](mailto:hello@cloudthing.io).

## Custom

You can use custom format and transform it to our internal one by implementing transform function which we use on every incoming data point.

## MQTT API

MQTT is a lightweight messaging protocol implementing publish/subscribe model.

MQTT connector allows devices to use it for cloud communication.

### Broker

MQTT connector broker allows TCP and TLS connections on ports 1883 and 1884 respectively of virtual host (eg. *tenant-name.cloudthing.io:1883*).

### Authentication

Device has to provide proper authentication credentials as MQTT's username and password. Client ID is not taking into account during authentication process.

- **Username:** {tenant-name}:{deviceId},
- **Password:** {deviceToken}.

### Topics

For publishing measurements to *data* channel one has to use topic *v1/{deviceId}/data?ct=json* where *ct* parameter defines content type and may be on of:

- json,
- cbor,
- proto,
- custom.

*custom* is default one.

The publish example using *mosquitto\_pub*:

```
mosquitto_pub -h short-name.cloudthing.io \  
-u short-name:SoMEc0MpLlCat3D1D \  
-P 3xAmpLeT0K3n \  
-t v1/SoMEc0MpLlCat3D1D/data?ct=json \  
-m '{"r":[{"k":"temp","v":36.6}]}'
```

New event may be generated by publish to topic *v1/{deviceId}/events/{eventId}*.

To receive commands, device needs to subscribe on topic *v1/{deviceId}/commands/+*. Every incoming message will have command id (name) as a last part of MQTT topic.

## HTTP API

HTTP is a well-known and widely implemented protocol, although it is considered as too heavy for small, constrained devices.

### Host

HTTP connector allows devices to use unencrypted or encrypted (TLS) version of protocol.

The HTTP server listens on port 81 and HTTPS on port 444 of tenant's virtual host.

### Authentication

The connector supports Basic authentication with:

- Username: {deviceId},
- Password: {deviceToken}

### Content Type

Connector supports all available serialization formats and maps "Content-Type" header to format as follows:

- "application/json" -> JSON,
- "application/cbor" -> CBOR,
- "application/octet-stream" -> PROTOBUF,
- other -> CUSTOM.

### Endpoints

Endpoints are created by appending channel name to base path:

- **Data** (POST): {scheme}://{short-name}.cloudthing.io:{port}/v1/{deviceId}/data
- **Events** (POST): {scheme}://{short-name}.cloudthing.io:{port}/v1/{deviceId}/events/{eventId}
- **Commands** (GET): {scheme}://{short-name}.cloudthing.io:{port}/v1/{deviceId}/commands
- **Firmware** (GET): {scheme}://{short-name}.cloudthing.io:{port}/v1/{deviceId}/fw/dl/{firmwareId}

**Commands** supports streaming (subscription) and long connections (similar to MQTT's subscribe). Streaming must be enabled by adding *?stream={keepAliveMilliseconds}* as query parameter, where *keepAliveMilliseconds* is a period of time after which cloud will send blank message to keep connection alive. Chunked streaming is implemented with respect to Chunked responses specification, command id (key) is send as parameter of every chunk.

Example sending data:

```
curl -H "Content-Type: application/json" \
-u "SoMEc0MpLlCat3D1D:3xAmpleT0K3n" \
-X POST https://short-name.cloudthing.io:444/v1/SoMEc0MpLlCat3D1D/data \
-d '{"r":[{"k":"temp","v":36.6}]}'
```

Example subscription for commands:

```
curl -H "Content-Type: application/json" \
-u "SoMEc0MpLlCat3D1D:3xAmpleT0K3n" \
-X GET https://short-name.cloudthing.io:444/v1/SoMEc0MpLlCat3D1D/commands?stream=10000
```

## CoAP API

CoAP connector and API will be released soon. Note, that it will be **recommended way of connecting constrained devices**.

## Sigfox

CloudThing is integrated with Sigfox backend and it is possible to gather all data from Sigfox deployment in our cloud. To start using it, you need to enable Sigfox connector and choose parsing JavaScript function in Control Center application. Then, you need to configure your Sigfox backend with HTTP POST callback as follows:

```
http://short-name.cloudthing.io:82/sigfox/{productId}?id={device}&data={data}
```

Example:

```
http://vanilla-ice.cloudthing.io:82/sigfox/SoMEc0MpLlCat3D1D?id={device}&data={data}
```

## The Things Network

CloudThing is integrated with TTN network and it is possible to create devices and connect them via OTAA to cloud. The connector will be enabled in Week 22.

## LoRaWAN networks

It is possible to connect to commercial LoRaWAN network or deploy private one with our software stack. Ask us about it [hello@cloudthing.io](mailto:hello@cloudthing.io).

## Application APIs

The family of Application APIs have been designed for integrating 3rd party services, creating custom applications and managing your data and devices.

Contents:

## HTTP REST API Reference

- *REST API Core Concepts*
  - *Base URL*
  - *Methods*
  - *Serialization format*
  - *TLS*
  - *Authentication & authorization*
  - *Collections*
  - *Linking & expanding*
- *Tenant*
  - *Tenant Operations*
- *Directory*
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  - *Usergroup Operations*
- *User*
  - *User Operations*
- *Membership*
  - *Membership Operations*
- *API Key*
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- *Application*
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- *Product*
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  - *Group Operations*
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## REST API Core Concepts

The following information is essential to understanding how the CloudThing API works.

- *Base URL*
- *Methods*
- *Serialization format*
- *TLS*
- *Authentication & authorization*
  - *Basic auth*
  - *JWT token auth*
- *Collections*
- *Linking & expanding*

## Base URL

This API is accessible via `/api/v1`. The full path for example tenant `vanilla-ice` would be: `https://vanilla-ice.cloudthing.io/api/v1`

## Methods

API uses following HTTP verbs (methods):

Method	Target	Action
GET	collection	Retrieves collection.
GET	item	Retrieves single item.
POST	collection	Creates new item in collection.
POST	item	Updates item.
DELETE	item	Deletes item.

**Note:** API **does not** support **PUT** since it is not possible to replace objects and **PATCH** which as we believe is commonly misunderstood and being used in wrong way (for updates).

## Serialization format

Currently REST API uses only JSON as serialization format and requires proper `Content-Type` (POST) and `Accept` (POST, GET) headers in every client request.

## TLS

HTTP API accepts only encrypted (TLS) requests. All HTTP non-TLS requests will be redirected. The HTTP server listens on standard port 443 of tenant's virtual host.

**Warning:** Note that due to redirection of HTTP request port 80 is open, so your credentials will still be exposed if you send request without TLS encryption.

## Authentication & authorization

CloudThing REST API supports Basic and Bearer (JWT) authentication. Since API can be used with not only API keys but also users' (official and end) credentials, one should provide following authorization data.

<b>Basic auth</b>	Re-quester	User-name	Pass-word	Header & query
	API key	key	secret	Header: Authorization: Basic base64({key}:{secret})
	Official user	email	password	Header: Authorization: Basic base64({email}:{password})
	User	email	password	Header: Authorization: Basic base64({email}:{password}), Query: application=applicationId

**JWT token auth** To obtain JWT token one should send POST request to `/api/v1/auth/token` endpoint with Basic auth.

Requester	Token	Header & query
API key/Official user/User	access_token	Header: Authorization: Bearer {access_token}

## Collections

When requesting collection you can add additional query parameters:

Attribute	Type	Default Value	Description
limit	Integer	25	Requested maximum number of returned items in single response.
page	Integer	1	Requested page of returned items.

API will return meta data in top level of object and items in `items` array. Metadata is:

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
size	Integer	N/A	Number of all items in collection.
limit	Integer	N/A	Requested maximum number of returned items in single response.
page	Integer	N/A	Requested page of returned items in current response.
prev	Link	N/A	The URL to previous page of collection.
next	Link	N/A	The URL to next page of collection.

Retrieving collection:

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3nAnT/applications?limit=2&page=1" \
  -H 'Accept: application/json'
```

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3nAnT/applications?limit=2&page=1",
  "size": 3,
  "limit": 2,
  "page": 1,
  "items": [
    {
      "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/aPpliCaT10n01"
      // JSON continues here, trunked for readability
    },
    {
      "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/ArFd87gf10n02"
      // JSON continues here, trunked for readability
    }
  ],
  "next": {
```



```

    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3nAnT/applications?limit=2&page=1"
  }
}

```

## Linking & expanding

CloudThing API implements great linking concept developed by awesome people at [stormpath.com](http://stormpath.com). Every response (collection or item) is identified by its URL in `href` field, there is no other `id` provided. All relations between objects use this method and embed `href` in JSON object named as relative. It is possible to expand relations in single request (one level only) by providing relation name to `expand` parameter in query. You can expand several relations by putting them comma-separated and even paginate and limit results if relation is collection by adding (`limit:{limit},offset:{offset}`) after relation name.

In short words:

Just hit `/api/v1/tenants/current` and start exploring!

Link in resource body:

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA" \
  -H 'Accept: application/json'

```

```

{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA",
  // JSON continues here, trunked for readability
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3nAnT"
  }
}

```

Expanded link in resource body:

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA?expand=tenant" \
  -H 'Accept: application/json'

```

```

{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA",
  // JSON continues here, trunked for readability
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3nAnT"
    "shortName": "vanilla-ice",
    // JSON continues here, trunked for readability
  }
}

```

Expanded link to collection:

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA?expand=clusters(limit:2,page:1)" \
  -H 'Accept: application/json'

```

```

{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA",
  // JSON continues here, trunked for readability
  "clusters": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA/clusters",
  }
}

```

```
"size": 3,
"limit": 2,
"page": 1,
"items": [
  {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/cLusCaT10n01"
    // JSON continues here, trunked for readability
  },
  {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/Ar76fya10n02"
    // JSON continues here, trunked for readability
  }
],
"next": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som3lD0faPp1lcA/clusters?limit=2"
}
}
```

## Tenant

- *Tenant Operations*
  - *Retrieve A Tenant*
  - *Using A Tenant for Look-Up*

### Description

Tenant is an organization on behalf of which user or API key requests data. When registering an account at CloudThing.io the organization and user within it are created.

### Tenant URL

/tenants/{tenantId}

### Tenant Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Full name of Tenant, eg. organization/company name.
shortName	String	1 < N <= 63 characters	Human-readable unique key. This key is unique and assigned by CloudThing upon registration. If you would like to change it, please contact us.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
custom	Object	N/A	A custom structure you can store your own custom fields in.
limits	Object	N/A	An embedded object containing information about available limits of tokens, SMSs and emails.
directories	Link	N/A	A link to a Collection of all the Directories mapped to this Tenant.
applications	Link	N/A	A link to a Collection of all the Applications mapped to this Tenant.
products	Link	N/A	A link to a Collection of all the Products mapped to this Tenant.
devices	Link	N/A	A link to a Collection of all the Devices mapped to this Tenant.
analytics	Link	N/A	A link to a Collection of all the Analytics configured for this Tenant.
users	Link	N/A	A link to a Collection of all the Users mapped to this Tenant.
statistics	Link	N/A	A link to a Collection of all the Statistics available for this Tenant.

### Tenant Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT",
  "name": "user@example.com's organization",
  "shortName": "vanilla-ice",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "limits": {
    "tokens": {
      "total": 5,
      "used": 1
    },
    "sms": {
      "total": 5,
      "used": 0
    },
    "emails": {
      "total": 5,
      "used": 0
    }
  },
  "custom": {
  },
  "directories": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/directories"
  },
  "applications": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/applications"
  },
  "products": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/products"
  },
}
```

```
"devices": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/devices"
},
"analytics": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/analytics"
},
"users": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/users"
},
"statistics": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT/statistics"
}
}
```

## Tenant Operations

	Operation	Optional Query Parameters	Description
Retrieve A Tenant	GET /tenants/current	N/A	Retrieves the Tenant associated with the current API key. The response will be a 302 Redirect. You will find the location of the Tenant in a Location header and response body, although most REST libraries and web browsers will automatically issue a request for it.
	GET /tenants/{tenantId}	N/A	Retrieves the Tenant with the specified ID.

**Example Query**   Retrieves link to current tenant:

```
curl -u "user@example.com:password" \
"https://vanilla-ice.cloudthing.io/api/v1/tenants/current" \
-H 'Accept: application/json'
```

Response:

```
HTTP/1.1 302 Found
Content-Type: application/json
Location: https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT

{
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT"
  }
}
```

Retrieves tenant:

```
curl -u "user@example.com:password" \
"https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT" \
-H 'Accept: application/json'
```

**Using A Tenant for Look-Up**   It is possible to retrieve other independent resources using the Tenant for look-up.

Operation	Optional Query Parameters	Description
GET /tenants/{tenantId}/resources	Pagination, Sorting	Retrieves a collection of all of a Tenant's associated resources of the specified type. Possible resource types are: directories, applications, products, devices, analytics, users, and statistics.

### Example Queries Retrieving a Collection Associated with a Tenant

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som3lD0fT3NAnT/products" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Products associated with the specified Tenant.

## Directory

- *Directory Operations*
  - *Create A Directory*
  - *Retrieve A Directory*
  - *Update A Directory*
  - *Delete A Directory*
  - *Using A Directory for Look-Up*

### Description

Directory is a container for User and Usergroup resources. Every user is unique by email within Directory only. You can attach Directory to Application for storing end-users accounts. Your accounts for managing CloudThing are also stored in official Directory which cannot be deleted.

### Directory URL

/directories/{directoryId}

### Directory Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Name of Directory.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
official	Boolean	N/A	Indicates whether it's the official Directory or not.
description	String	N/A	The description of Directory which may describes it's purpose.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this Product.
users	Link	N/A	A link to a Collection of all the Users stored in this Directory.
usergroups	Link	N/A	A link to a Collection of all the Usergroups stored in this Directory.
applications	Link	N/A	A link to a Collection of all the Applications mapped to this Directory.

### Directory Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo",
  "name": "Smart application directory",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "official": false,
  "description": "This directory is used for end-users of our Smart Home application",
  "custom": {
  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT"
  },
  "users": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo/users"
  },
  "usergroups": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo/usergroups"
  },
  "applications": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo/applications"
  }
}
```

## Directory Operations

Create A Directory	Operation	Attributes	Description
	POST /tenants/{tenantId}/directories	Required: name. Optional: description, custom.	Creates new directory.

Retrieve A Directory	Operation	Optional Query Parameters	Description
	GET /directories/{directoryId}	expand	Retrieves the Directory with the specified ID. Expandable links: users, usergroups, applications, tenant.

Update A Directory	Operation	Attributes	Description
	POST /directories/{directoryId}	name, description, custom	Updates the Directory with the specified ID.

Delete A Directory	Operation	Optional Query Parameters	Description
	DELETE /directories/{directoryId}	N/A	Deletes the Directory with the specified ID.

## Example Query

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo" \
  -H 'Accept: application/json'
```

**Using A Directory for Look-Up** It is possible to retrieve other independent resources using the Directory for look-up.

Operation	Optional Query Parameters	Description
GET /directories/{directoryId}/resources/{resourceId}	Pagination, Sorting / {resourceId}	Retrieves a collection of all of a Directory's associated resources of the specified type. Possible resource types are: users, usergroups and applications.

### Example Queries Retrieving a Collection Associated with a Directory

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/directories/Som3lD0fD1r3cTo/users" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Users associated with the specified Directory.

## Usergroup

- *Usergroup Operations*
  - *Create A Usergroup*
  - *Retrieve A Usergroup*
  - *Update A Usergroup*
  - *Delete A Usergroup*
  - *Using A Usergroup for Look-Up*

### Description

Usergroup is a container for User resources. Every user can belong to many Groups.

### Directory URL

/usergroups/{usergroupId}

### Usergroup Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Name of Usergroup.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to the Tenant owning this Usergroup.
directory	Link	N/A	A link to the Directory this Usergroup is stored in.
users	Link	N/A	A link to a Collection of all the Users assigned to this Usergroup.
memberships	Link	N/A	A link to a Collection of all the Memberships of this Usergroup.

### Usergroup Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/usergroups/Som31D0fOoZ3rGru",
  "name": "Home owners",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "custom": {

  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT"
  },
  "directory": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo"
  },
  "users": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/usergroups/Som31D0fOoZ3rGru/users"
  },
  "memberships": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/usergroups/Som31D0fOoZ3rGru/memberships"
  }
}
```

### Usergroup Operations

Create A Usergroup	Operation	Attributes	Description
	POST /directories/{directoryId}/usergroups	Required: name. Optional: custom.	Creates new usergroup.

Retrieve A Usergroup	Operation	Optional Query Parameters	Description
	GET /usergroups/{usergroupId}	expand	Retrieves the Usergroup with the specified ID. Expandable l users, memberships, directory, tenant.

Update A Usergroup	Operation	Attributes	Description
	POST /usergroups/{usergroupId}	name, custom	Updates the Usergroup with the specified

Delete A Usergroup	Operation	Optional Query Parameters	Description
	DELETE /usergroups/{usergroupId}	N/A	Deletes the Usergroup with the specified ID.

### Example Query

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/usergroups/Som31D0fOoZ3rGru" \
  -H 'Accept: application/json'
```

**Using A Usergroup for Look-Up** It is possible to retrieve other independent resources using the Usergroup for look-up.



Operation	Optional Query Parameters	Description
GET /usergroups/{usergroup}/resources	Pagination, Sorting	Retrieves a collection of all of a Usergroup's associated resources of the specified type. Possible resource types are: users and memberships.

### Example Queries Retrieving a Collection Associated with a Usergroup

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/usergroups/Som31D0fOoZ3rGru/users" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Users associated with the specified Usergroup.

## User

- *User Operations*
  - *Create A User*
  - *Retrieve A User*
  - *Update A User*
  - *Delete A User*
  - *Using A User for Look-Up*

### Description

User represents a real person's account - either managing CloudThing's Tenant or using end solutions.

### User URL

/users/{userId}

### User Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
email	String	1 < N < 256 characters	User's email address.
firstName	String	1 < N < 256 characters	User's first name.
surname	String	1 < N < 256 characters	User's surname.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
activated	Boolean	N/A	Indicates wheter user activated the account (eg. by email verification).
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to the Tenant owning this User.
directory	Link	N/A	A link to the Directory this User is stored in.
applications	Link	N/A	A link to a Collection of all the Applications this User has access to.
usergroups	Link	N/A	A link to a Collection of all the Usergroups this User belongs to.
memberships	Link	N/A	A link to a Collection of all the Memberships of this User.
devices	Link	N/A	A link to a Collection of all the Devices this User has rights to.

### User Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f",
  "email": "john.doe@cloudthing.io",
  "firstName": "John",
  "surname": "Doe",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "activated": true,
  "custom": {
  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3NAnT"
  },
  "directory": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo"
  },
  "applications": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f/applications"
  },
  "usergroups": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f/usergroups"
  },
  "memberships": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f/memberships"
  },
  "devices": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f/devices"
  }
}
```

## User Operations

Create A User	Operation	Attributes	Description
	POST /directories/{directoryId}/users	<b>Required:</b> email, password. <b>Optional:</b> firstName, surname, custom.	Creates new user.

Retrieve A User	Operation	Optional Query Parameters	Description
	GET /users/current	N/A	Retrieves the User associated with the current authorization data. The response will be a 302 Redirect. You will find the location of the User in a Location header and response body, although most REST libraries and web browsers will automatically issue a request for it.
	GET /users/{userId}	expand	Retrieves the Usergroup with the specified ID. Expandable links: applications, usergroups, memberships, devices, directory, tenant.

Update A User	Operation	Attributes	Description
	POST /users/{userId}	email, password, firstName, surname, custom	Updates the User with the specified ID.

Delete A User	Operation	Optional Query Parameters	Description
	DELETE /users/{userId}	N/A	Deletes the User with the specified ID.

**Example Query** Retrieves link to current User:

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/users/current" \
  -H 'Accept: application/json'
```

**Response:**

```
HTTP/1.1 302 Found
Content-Type: application/json
Location: https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f

{
  "user": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f"
  }
}
```

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f" \
  -H 'Accept: application/json'
```

**Using A User for Look-Up** It is possible to retrieve other independent resources using the User for look-up.

Operation	Optional Query Parameters	Description
GET /users/{userId}/resources/{resourceName}	Pagination, Sorting	Retrieves a collection of all of a User's associated resources of the specified type. Possible resource types are: applications, devices, usergroups and memberships.

### Example Queries Retrieving a Collection Associated with a User

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f/applications" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Applications associated with the specified User.

## Membership

- *Membership Operations*
  - *Create A Membership*
  - *Retrieve A Membership*
  - *Delete A Membership*

### Description

Membership represents assignment of User to Usergroup.

### Membership URL

/memberships/{membershipId}

### Membership Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
user	Link	N/A	A link to the User this Membership is about.
usergroup	Link	N/A	A link to the Usergroup this Membership is about.

### Membership Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/memberships/Som31D0fMeM83rSh1P",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "user": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/users/Som31DUuZ3R0f"
  },
  "usergroup": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/usergroups/Som31D0fOoZ3rGru"
  }
}
```

## Membership Operations

<b>Create A Membership</b>	Operation	Attributes	Description
	POST /usergroups/{usergroupId}/memberships	Required: user.	Assigns given user to usergroup.
	POST /users/{userId}/memberships	Required: usergroup.	Assigns user to given usergroup.

<b>Retrieve A Membership</b>	Operation	Optional Query Parameters	Description
	GET /memberships/{membershipId}	expand	Retrieves the Membership with the specified ID. Expandable links: user, usergroup.

<b>Delete A Membership</b>	Operation	Optional Query Parameters	Description
	DELETE /memberships/{membershipId}	N/A	Deletes the Membership with the specified ID.

**Example Query**

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/memberships/Som31D0fMeM83rSh1P" \
  -H 'Accept: application/json'
```

**API Key**

- *API key Operations*
  - *Create An API key*
  - *Retrieve An API key*
  - *Update An API key*
  - *Delete An API key*

**Description**

API keys are used for authorization during CloudThing API operations.

**API Key URL**

/apikeys/{apikeyId}

**API Key Attributes**

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Name of API key.
key	String	25 characters	API key.
secret	String	32 characters	API secret. May be obtained only once in response for API key create request.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
status	String (enum)	ENABLED, DISABLED	Presents status of API key.
description	String	N/A	The description of API key which may describes it's purpose.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this API key.

### API key Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/apikeys/AP1k3y1D3XamP13",
  "name": "CRM key",
  "key": "cJyGHVM1yIKoGQZowZXQz934e",
  "secret": "sIe7QxDach1l4xNzmrKNTH5TVn9eV9PJ",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "status": "ENABLED",
  "description": "This API key is used in our custom CRM integration",
  "custom": {
  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NanT"
  }
}
```

**Warning:** The API key secret will be returned only once as a part of response for API key create request. You will not be able to retrieve that secret again. You can also create API key and download secret through CloudThing Control Center web application or CloudThing CLI.

### API key Operations

Create An API key	Operation	Attributes	Description
	POST /tenants/{tenantId}/apikeys	Optional: name, description, custom, status.	Creates new API key.
Retrieve An API key	Operation	Optional Query Parameters	Description
	GET /apikeys/{apiKeyId}	expand	Retrieves the API key with the specified ID. Expand links: tenant.

<b>Update An API key</b>	Operation	Attributes	Description
	POST /apikeys/{apikeyId}	name, description, custom, status	Updates the API key with the specified ID.
<b>Delete An API key</b>	Operation	Optional Query Parameters	Description
	DELETE /apikeys/{apikeyId}	N/A	Deletes the API key with the specified ID.

**Example Query**

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/apikeys/AP1k3y1D3XamP13" \
  -H 'Accept: application/json'
```

**Application**

- *Application Operations*
  - *Create An Application*
  - *Retrieve An Application*
  - *Update An Application*
  - *Delete An Application*
  - *Using An Application for Look-Up*
  - *Associated subresources of Application*

**Description**

Application is a resource representing real-world application or integration with it's own resources and limited access to tenants' data. You can attach a Directory of Users to Application and use it to limit scope of operations for them.

**Application URL**

/applications/{applicationId}

**Application Attributes**

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Name of Application.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
official	Boolean	N/A	Indicates whether it's the official Application or not. Visible only for Api Key or official User.
status	String (enum)	ENABLED, DISABLED	Indicates whether Application is enabled or not. Visible only for Api Key or official User.
description	String	N/A	The description of Application which may describes it's purpose.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this Product.
directory	Link	N/A	A link to a Directory attached to this Application if exists.
devices	Link	N/A	A link to a Collection of all the Devices available in this Application (if requester is Api Key or official User) or assigned to current User (if requester is User).
clusters	Link	N/A	A link to a Collection of all the Clusters created in this Application (if requester is Api Key or official User) or owned by current User (if requester is User).
exports	Link	N/A	A link to a Collection of all the Exports created for this Application. Visible only for Api Key or official User.

### Application Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA",
  "name": "Smart home application",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "official": false,
  "status": "ENABLED",
  "description": "This application is our Smart Home app for end-users",
  "custom": {
  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NANt"
  },
  "directory": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/directories/Som31D0fD1r3cTo"
  },
  "devices": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA/devices"
  },
  "clusters": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA/clusters"
  },
  "exports": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA/exports"
  }
}
```



## Application Operations

<b>Create An Application</b>	Operation	Attributes	Description
	POST /tenants/{tenantId}/applications	Required: name. Optional: description, custom, status, directory.	Creates new application.
<b>Retrieve An Application</b>	Operation	Optional Query Parameters	Description
	GET /applications/{applicationId}	expand	Retrieves the Application with the specified ID. Expandable resources are: devices, clusters, exports, tenant, directory.
<b>Update An Application</b>	Operation	Attributes	Description
	POST /applications/{applicationId}	name, description, custom, status, directory	Updates the Application with the specified ID.
<b>Delete An Application</b>	Operation	Optional Query Parameters	Description
	DELETE /applications/{applicationId}	N/A	Deletes the Application with the specified ID.

### Example Query

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA" \
  -H 'Accept: application/json'
```

**Using An Application for Look-Up** It is possible to retrieve other independent resources using the Application for look-up.

Operation	Optional Query Parameters	Description
GET /applications/{applicationId}/resources	Pagination, Sorting	Retrieves a collection of all of an Application's associated resources of the specified type. Possible resource types are: devices, clusters and exports.

### Example Queries Retrieving a Collection Associated with an Application

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA/clusters" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Clusters associated with the specified Application.

**Associated subresources of Application** It is possible to retrieve subresources of Application

Operation	Optional Query Parameters	Description
GET /applications/{applicationId}/resources	Pagination, Sorting	Retrieves a set of available in Application resources belonging to Application, Products, Clusters and Groups.

### Example Queries Retrieving an available resources in Application

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/applications/Som31D0faPp11cA/resources" \
  -H 'Accept: application/json'
```

## Product

- *Product Operations*
  - *Create A Product*
  - *Retrieve A Product*
  - *Update A Product*
  - *Delete A Product*
  - *Using A Product for Look-Up*

### Description

Product is a model of your real-world product. You can create particular devices within it.

### Product URL

/products/{productId}

### Product Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Name of Product.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
properties	Array(Object)	N/A	List of objects, each containing: key, name, setOn and <i>unique</i> .
resource	Object	N/A	An embedded object containing information about resources, contained data, events and commands arrays.
extension	Object	N/A	An embedded object containing information available extensions and their configuration.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this Product.
devices	Link	N/A	A link to a Collection of all the Devices mapped to this Product.
functions	Link	N/A	A link to a Collection of all the Functions mapped to this Product.

### Product Example

```

{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpr0doocT",
  "name": "Smart washing machine",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "properties": [
    {
      "key": "macaddr",
      "name": "MAC address",
      "setOn": "MANUFACTURING",
      "unique": true
    }
  ],
  "resources": {
    "data": [
      {
        "id": "rpm",
        "name": "Revolutions per minute",
        "description": "Reports current RPM"
      }
    ],
    "events": [
      {
        "id": "dmg",
        "name": "Machine damage",
        "description": "Fired if machine damage occurred"
      }
    ],
    "commands": [
      {
        "id": "turn",
        "name": "Turn washing",
        "description": "Turns machine on/off",
        "payloads": [
          {
            "name": "on",
            "value": "ON"
          },
          {
            "name": "off",
            "value": "OFF"
          }
        ]
      }
    ]
  },
  "extensions": {
    "connectors": {
      "sigfox": {
        "autoGenerate": true,
        "contentType": "CUSTOM",
        "parser": {
          "href": "https://vanilla-ice.cloudthing.io/api/v1/functions/SgKSGoEETgSQ0dpNgdA5Qg"
        },
        "status": "ENABLED"
      }
    }
  }
},

```

```

"custom": {
},
"tenant": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT"
},
"devices": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpr0doocT/devices"
},
"functions": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpr0doocT/functions"
}
}

```

## Product Operations

Create A Product	Operation	Attributes	Description
	POST /tenants/{tenantId}/products	Required: name. Optional: properties, resources, custom, extensions.	Creates new product.
Retrieve A Product	Operation	Optional Query Parameters	Description
	GET /products/{productId}	expand	Retrieves the Product with the specified ID. Expandable links: devices, functions, tenant.
Update A Product	Operation	Attributes	Description
	POST /products/{productId}	name, properties, resources, custom, extensions	Updates the Product with the specified ID.
Delete A Product	Operation	Optional Query Parameters	Description
	DELETE /products/{productId}	N/A	Deletes the Product with the specified ID.

## Example Query

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpr0doocT" \
  -H 'Accept: application/json'

```

**Using A Product for Look-Up** It is possible to retrieve other independent resources using the Product for look-up.

Operation	Optional Query Parameters	Description
GET /products/{productId}	Pagination, Sorting, Resource Names	Retrieves a collection of all of a Product's associated resources of the specified type. Possible resource types are: devices and functions.

**Example Queries Retrieving a Collection Associated with a Product**

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpr0doocT/devices" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Devices associated with the specified Product.

**Device**

- *Device Operations*
  - *Create A Device*
  - *Retrieve A Device*
  - *Update A Device*
  - *Delete A Device*
  - *Associated endpoints*

**Description**

Device is a single real-world node or other data source implementing Product model.

**Device URL**

/devices/{deviceId}

**Device Attributes**

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
token	String	32 characters	Device's token.
activated	Boolean	N/A	Indicates whether device has been activated (by connecting with CloudThing platform).
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
properties	Object	N/A	Object with properties where key is a defined in Product property id.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this Product.
product	Link	N/A	A link to a Product this Device implements.

**Device Example**

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/devices/Som31D0fd3V1c3",
  "token": "STPDGtpSNkGpHdasG1BznI0u7w9pK4p",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "activated": true,
  "custom": {
  },
  "properties": {
    "macaddr": "00:11:22:33:44:55"
  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0fT3NAnT"
```

```

},
"product": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpr0doocT"
}
}

```

## Device Operations

Create A Device	Operation	Attributes	Description
	POST /products/{productId}/devices	Optional: properties, custom.	Creates new device.

Retrieve A Device	Operation	Optional Query Parameters	Description
	GET /devices/{deviceId}	expand	Retrieves the Device with the specified ID. Expandable links: tenant, product.

Update A Device	Operation	Attributes	Description
	POST /devices/{deviceId}	properties, custom	Updates the Device with the specified ID.

Delete A Device	Operation	Optional Query Parameters	Description
	DELETE /devices/{deviceId}	N/A	Deletes the Device with the specified ID.

## Example Query

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/devices/Som31D0fd3V1c3" \
  -H 'Accept: application/json'

```

**Associated endpoints** It is possible to use associated endpoint for retrieving additional data.

Operation	Optional Query Parameters	Description
GET /devices/{deviceId}/resources/{type}	Pagination, Sorting	Retrieves a associated resource of the specified type. Possible resource types are: data, events and commands.
POST /devices/{deviceId}/ownership	n/a	Binds this device to current user (end-user only). token must be provided in request body.

## Example Queries Retrieving a temperature measured by Device

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/devices/Som31D0fd3V1c3/resources/data/temp" \
  -H 'Accept: application/json'

```

This query would retrieve a collection containing lat measurments of temp resource by Device.

## Claiming device ownership

```
curl -H "Authorization: Bearer {jwtToken}" -H 'Accept: application/json' \
-H 'Content-Type: application/json' -X POST -d '{"token": "t0k3N0fD3v1c3"}' \
"https://vanilla-ice.cloudthing.io/api/v1/devices/Som3lD0fd3V1c3/ownership" \
```

This request would create a link between user and device.

## Cluster

- *Cluster Operations*
  - *Create A Cluster*
  - *Retrieve A Cluster*
  - *Update A Cluster*
  - *Delete A Cluster*
  - *Using A Cluster for Look-Up*

## Description

Cluster is a container for devices which exists in separate context for every Application. Each Device can belong to only one Cluster per Application (eg. Cluster would represent a home or apartment in Smart Home project).

## Cluster URL

/clusters/{clusterId}

## Cluster Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Cluster's name.
description	String	N/A	Description of Cluster.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this Product.
application	Link	N/A	A link to a Application this Cluster exists within.
users	Link	N/A	A link to a Collection of the Users who has rights to this Cluster.
devices	Link	N/A	A link to a Collection of the Devices which belongs to this Cluster.
groups	Link	N/A	A link to a Collection of the Groups existing within this Cluster.
memberships	Link	N/A	A link to a Collection of the Group Memberships associated with this Cluster.

## Cluster Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX",
  "name": "NYC apartment",
  "description": "The Does family's New York City apartment",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "custom": {
```

```

},
"tenant": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som3lD0fT3NAnT"
},
"application": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/AppLlCaTl0n1D"
},
"users": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX/users"
},
"devices": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX/devices"
},
"groups": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX/groups"
},
"memberships": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX/memberships"
}
}

```

## Cluster Operations

Create A Cluster	Operation		Attributes	Description
	POST /applications/{applicationId}/clusters		Optional: name, description, custom.	Creates new Cluster.
Retrieve A Cluster	Operation		Optional Query Parameters	Description
	GET /clusters/{clusterId}		expand	Retrieves the Cluster with the specified ID. Expandable links: tenant, application, users, devices, groups, memberships.
Update A Cluster	Operation		Attributes	Description
	POST /clusters/{clusterId}		name, description, custom	Updates the Cluster with the specified ID.
Delete A Cluster	Operation		Optional Query Parameters	Description
	DELETE /clusters/{clusterId}		N/A	Deletes the Cluster with the specified ID.

## Example Query

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX" \
  -H 'Accept: application/json'

```

**Using A Cluster for Look-Up** It is possible to retrieve other independent resources using the Cluster for look-up.



Operation	Optional Query Parameters	Description
GET <code>/clusters/{clusterId}/resources</code>	Pagination, Sorting	Retrieves a collection of all of a Cluster's associated resources of the specified type. Possible resource types are: devices, users, groups and memberships.

### Example Queries Retrieving a Collection Associated with a Cluster

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX/devices" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Devices associated with the specified Cluster.

## Cluster Membership

- *Cluster Membership Operations*
  - *Create A Cluster Membership*
  - *Retrieve A Cluster Membership*
  - *Delete A Cluster Membership*

### Description

Cluster Membership represents assignment of Device to Cluster.

### Cluster Membership URL

`/clusterMemberships/{membershipId}`

### Cluster Membership Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
device	Link	N/A	A link to the Device this Cluster Membership is about.
cluster	Link	N/A	A link to the Cluster this Cluster Membership is about.

### Cluster Membership Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/clusterMemberships/Som31D0fMeM83rSh1P",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "device": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/devices/d3v1C31dExa"
  },
  "cluster": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/cLUzT3r1DS0m3"
  }
}
```

### Cluster Membership Operations

Create A Cluster Membership	Operation	Attributes	Description
	POST /clusters/{clusterId}/memberships	Required: device.	Assigns given Cluster.
	POST /devices/{deviceId}/clusterMemberships	Required: cluster.	Assigns Device Cluster.

Retrieve A Cluster Membership	Operation	Optional Query Parameters	Description
	GET /clusterMemberships/{membershipId}	expand	Retrieves the Cluster Membership with Expandable links: device, cluster.

Delete A Cluster Membership	Operation	Optional Query Parameters	Description
	DELETE /clusterMemberships/{membershipId}	N/A	Deletes the Cluster Membership the specified ID.

### Example Query

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/clusterMemberships/Som31D0fMeM83rSh1P" \
  -H 'Accept: application/json'
```

## Group

- *Group Operations*
  - *Create A Group*
  - *Retrieve A Group*
  - *Update A Group*
  - *Delete A Group*
  - *Using A Group for Look-Up*

### Description

Group is a container for devices of the same Cluster. Each Device can belong to several Groups within one Cluster (eg. Group would represent a room in Smart Home project).

### Group URL

/groups/{groupId}

### Group Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
name	String	1 < N < 256 characters	Group's name.
description	String	N/A	Description of Group.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
custom	Object	N/A	A custom structure you can store your own custom fields in.
tenant	Link	N/A	A link to a Tenant owning this Group.
application	Link	N/A	A link to a Application this Group exists within.
cluster	Link	N/A	A link to a Cluster this Group exists within.
devices	Link	N/A	A link to a Collection of the Devices which belongs to this Group.

### Group Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/groups/gRoUp31xDex",
  "name": "Living room",
  "description": "Living room in New York City apartment",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "custom": {
  },
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3NAnT"
  },
  "application": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/AppL1CaT10n1D"
  },
  "cluster": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/c7UZt3Rs1DeX"
  },
  "devices": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/groups/gRoUp31xDex/devices"
  }
}
```

### Group Operations

Create A Group	Operation	Attributes	Description
	POST /clusters/{clusterId}/groups	Optional: name, description, custom.	Creates new Group.
Retrieve A Group	Operation	Optional Query Parameters	Description
	GET /groups/{groupId}	expand	Retrieves the Group with the specified ID. Expandable links: tenant, application, cluster, devices.
Update A Group	Operation	Attributes	Description
	POST /groups/{groupId}	name, description, custom	Updates the Group with the specified ID.

Delete A Group	Operation	Optional Query Parameters	Description
	DELETE /groups/{groupId}	N/A	Deletes the Group with the specified ID.

**Example Query**

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/groups/gRoUp3lxDex" \
  -H 'Accept: application/json'
```

**Using A Group for Look-Up** It is possible to retrieve other independent resources using the Group for look-up.

Operation	Optional Query Parameters	Description
GET /groups/{groupId}/{resourceName}	Pagination, Sorting	Retrieves a collection of all of a Group's associated resources of the specified type. Possible resource types are: devices.

**Example Queries Retrieving a Collection Associated with a Group**

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/groups/gRoUp3lxDex/devices" \
  -H 'Accept: application/json'
```

This query would retrieve a collection containing all the Devices associated with the specified Group.

**Group Membership**

- *Group Membership Operations*
  - Create A Group Membership
  - Retrieve A Group Membership
  - Delete A Group Membership

**Description**

Group Membership represents assignment of Device to Group.

**Group Membership URL**

/groupMemberships/{membershipId}

**Group Membership Attributes**

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
device	Link	N/A	A link to the Device this Group Membership is about.
group	Link	N/A	A link to the Group this Group Membership is about.

**Group Membership Example**

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/groupMemberships/Som3lD0fMeM83rShlP",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
```

```

"device": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/devices/d3v1C31dExa"
},
"group": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/groups/gRooP1DS0m3"
}
}

```

## Group Membership Operations

	Operation	Attributes	Description
Create A Group Membership	POST /groups/{groupId}/memberships	Required: device.	Assigns given Device to Group.
	POST /devices/{deviceId}/groupMemberships	Required: group.	Assigns Device to Group.

	Operation	Optional Query Parameters	Description
Retrieve A Group Membership	GET /groupMemberships/{membershipId}	expand	Retrieves the Group Membership with the specified ID. Expandable links: device, group.

	Operation	Optional Query Parameters	Description
Delete A Group Membership	DELETE /groupMemberships/{membershipId}	N/A	Deletes the Group Membership specified ID.

## Example Query

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/groupMemberships/Som31D0fMeM83rSh1P" \
  -H 'Accept: application/json'

```

## Export

- *Export Operations*
  - *Create An Export*
  - *Retrieve An Export*
  - *Update An Export*
  - *Delete An Export*

## Description

Export represents access level for different resources granted to Application .

## Export URL

/exports/{exportId}

## Export Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
modelType	String (enum)	DEVICE, GROUP, CLUSTER	Type of exported resource owner.
product	Link	N/A	A link to a Product if modelType is DEVICE.
limitsType	String (enum)	DEVICE, GROUP, CLUSTER	Type of container limiting exporting resources.
limits	Link	N/A	A link to a Device if limitsType is DEVICE, a Group if limitsType is GROUP or a Cluster if limitsType is CLUSTER.
export	Array (Object)	N/A	An array of objects defining exported resources.
tenantExportingPermissions	String (enum)	PRIMARY, EXPORT	Indicates wheter exporting Tenant has a primary permission for this resource or imported it.
tenantExporting	Link	N/A	A link to a Tenant owning this Product.
application	Link	N/A	A link to a Application importing this Export.

### Export Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/exports/3xP0rT1D1234",
  "modelType": "DEVICE",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "product": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpR0do0cT"
  },
  "limitsType": "CLUSTER",
  "limits": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/clusters/cLo0zt3rz1D"
  },
  "export": [
    {
      "type": "DATA",
      "name": "temp",
      "read": true,
      "write": true,
      "grantRead": false,
      "grantWrite": false
    },
    {
      "type": "COMMAND",
      "name": "turn",
      "read": true,
      "write": true,
      "grantRead": true,
      "grantWrite": false
    }
  ]
}
```

```

    "type": "PROPERTY",
    "name": "macaddr",
    "read": true,
    "write": false,
    "grantRead": false,
    "grantWrite": false
  }
],
"tenantExportingPermission": "PRIMARY",
"tenantExporting": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3NAnT"
},
"application": {
  "href": "https://vanilla-ice.cloudthing.io/api/v1/applications/aPpl1Cat10n1D"
}
}

```

## Export Operations

	Operation	Attributes	Description
<b>Create An Export</b>	POST /applications/{applicationId}/exports	<b>Required:</b> modelType, export, tenantId, exportingPermission. <b>Required if modelType is DEVICE:</b> product. <b>Optional:</b> limitsType, limits.	Creates new Export.

	Operation	Optional Query Parameters	Description
<b>Retrieve An Export</b>	GET /exports/{exportId}	expand	Retrieves the Export with the specified ID. Expandable links: product, limits, application, tenantExporting.

	Operation	Attributes	Description
<b>Update An Export</b>	POST /exports/{exportId}	modelType, export, product, limitsType, limits	Updates the Export with the specified ID.

	Operation	Optional Query Parameters	Description
<b>Delete An Export</b>	DELETE /exports/{exportId}	N/A	Deletes the Export with the specified ID.

## Example Query

```

curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/exports/3xP0rT1D1234" \
  -H 'Accept: application/json'

```

## Firmware

- *Firmware Operations*
  - *Create A Firmware*
  - *Retrieve A Firmware*
  - *Update A Firmware*
  - *Delete A Firmware*

## Description

Firmware represents binary firmware file for devices

## Firmware URL

/firmwares/{firmwareId}

## Firmware Attributes

Attribute	Type	Valid Value(s)	Description
href	Link	N/A	The resource's fully qualified location URL.
createdAt	String	RFC3339 Datetime	Indicates when this resource was created.
updatedAt	String	RFC3339 Datetime	Indicates when this resource's attributes were last modified.
size	Number	>0	Size of firmware image.
md5	String	N/A	A md5 sum of firmware image.
module	String	N/A	Name of the module firmware image is valid for.
version	String	N/A	Version of firmware image.
product	Link	N/A	A link to a Product this Firmware is associated with.
tenant	Link	N/A	A link to a Tenant owning this Firmware.

## Firmware Example

```
{
  "href": "https://vanilla-ice.cloudthing.io/api/v1/firmwares/3xP0rT1D1234",
  "createdAt": "2016-05-15T11:18:33Z",
  "updatedAt": "2016-05-15T11:18:33Z",
  "product": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/products/Som31D0fpR0do0cT"
  },
  "size": 1445864,
  "md5": "4de8a06df40a257e31263c11be12d77a",
  "module": "rootfs",
  "version": "v1.3.7",
  "tenant": {
    "href": "https://vanilla-ice.cloudthing.io/api/v1/tenants/Som31D0ft3NAnT"
  }
}
```

## Firmware Operations

	Operation	Attributes	Description
Create A Firmware	POST /products/{productId}/firmwares	Required: module, version.	Creates new Firmware.
	POST /firmwares/{firmwareId}/blob	Content-Type: multipart/form-data, Required: file.	Uploads new Firmware image.



<b>Retrieve A Firmware</b>	Operation	Optional Query Parameters	Description
	GET /firmwares/{firmwareId}	expand	Retrieves the Firmware with the specified ID. Expandable links: <code>product</code> , <code>tenant</code> .
	GET /firmwares/{firmwareId}/blob	N/A	Downloads Firmware image.

<b>Update A Firmware</b>	Operation	Attributes	Description
	POST /firmwares/{firmwareId}	module, version	Updates the Firmware with the specified

<b>Delete A Firmware</b>	Operation	Optional Query Parameters	Description
	DELETE /firmwares/{firmwareId}	N/A	Deletes the Firmware with the specified ID.

**Example Query**

```
curl -u "user@example.com:password" \
  "https://vanilla-ice.cloudthing.io/api/v1/exports/3xP0rT1D1234" \
  -H 'Accept: application/json'
```

**MQTT Pub/Sub API Reference**



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## Indices and tables

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- `genindex`
- `modindex`
- `search`