0.0.3-alpha2 document

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MyController.org
The Open Source Controller

Author(s)	Product Version	Date
Jeeva Kandasamy	0.0.3-alpha2	July-2016

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Introduction

MyController.org is a controller for the sensors world! Primarily it was developed to MySensors.org project. Later changed it's architecture to support other projects also. Currently supports for MySensors and Sparkfun. Considered system resources in mind on development. As a result even we can run it on Raspberry PI very first model.

You can control/monitor various sensors with this controller. As this controller is a web application server you can access from anywhere if you have internet/intranet connection. It has various features like, firmware control for nodes, powerful rule engine, timers, custom scripts support(JavaScript, Python, Ruby, Groovy, etc.,). For further details dig into each section.

If you think MyController.org helps you someway on your daily life, kindly consider to **donate** something to MyController. Your donation will help MyController to keep growing. Thank you!

Do you have question? Post your questions on forum or you can ping at gitter chat

Technology

MyController.org is Java based web application server.

- Web Server : TJWS
- REST-API : Jboss RestEasy
- Database : h2 database
- MQTT Broker : andsel/moquette
- Front-end : AngularJS, PatternFly

Installation

System Requirements

MyController.org server is very lightweight, It required very less resource,

- Disk : 50 MB (may require more space, when we store metrics data for long time)
- RAM : 100 MB
- Java SE : 1.8 or later

Test done up to 10 nodes and 30 sensors with the above configuration._

Supported Platforms

We can run it in any platform which supports Java. So far it has been tested in the following platforms, Kindly share your success stories on other platforms we can add it here.

- Linux
- Windows
- Raspberry PI (Oracle Java recommend)

Download

Executable download is available in two formats, zip and tar.gz. You can download suitable compressed flavor of yours.

- mycontroller-dist-standalone-0.0.3.Alpha2-bundle.zip
- mycontroller-dist-standalone-0.0.3.Alpha2-bundle.tar.gz

Kindly visit releases page of MyController.org to get latest version.

Configuration

Extract downloaded bundle where exactly do you want to run. Configuration file is located in `mycontroller/conf`

File name: `mycontroller.properties`

Temporary file

```
mcc.tmp.location=tmp/
```

You can change default location and file name. This file used as server temporary location and for the operation such as backup, restore, etc.,

Database Configuration

For supports only for H2DB, We have a request to support other RDMS databases

```
mcc.db.h2db.location=../conf/mycontroller ①
```

① You can change default location and file name. File will be stored with the file extension `.h2.db`. Do not add file extension here.

Database username and password are pre-configured. We cannot change it for now. Username: `mycontroller` and password is `mycontroller`

Web server configuration

```
mcc.web.bind.address=0.0.0.0 ①
mcc.web.enable.https=true  ②
mcc.web.http.port=8443  ③
mcc.web.file.location=../www/  ④
mcc.web.ssl.keystore.file=../conf/keystore.jks  ⑤
mcc.web.ssl.keystore.password=mycontroller  ⑤
mcc.web.ssl.keystore.type=JKS  ⑤
```

① bind interface address. by default it will bind with all the available interface.

② Enable/disable https. Only one protocol supported at a time. true - `https`, false - `http`.

③ Port number of `http/https` to access MyController.org server.

④ web files location, no need to touch this one.

⑤ If `https` is enabled these fields are mandatory.

Default URL: `https://<ip>:8443` (ex: `https://localhost:8443`)

Default username/password: `admin/admin`

Important: Change default `mcc.web.ssl.keystore.file` and `mcc.web.ssl.keystore.password` and `https` protocol is recommended

Logger configuration

Configuration File Name: `logback.xml`

Default log file location: `logs/mycontroller.log`

When to change log level, you can change it for specific package. Supported log levels are

- `TRACE` - It prints all the available logs
- `DEBUG` - It prints only debug, info, warn and error logs
- `INFO` - It prints only info, warn and error logs

- `WARN` - It prints only warn and error logs
- `ERROR` - It prints only error logs

Start/Stop Server

Executable scripts are located under `mycontroller/bin/`

- Linux
  - Start : `./start.sh`
  - Stop : `./stop.sh`
- Windows
  - Start : Double click on `start.bat`
  - Stop : `Ctrl+C`
- Other Platforms
  - Execute from 'mycontroller/bin/'
  - `java -Xms8m -Xmx100m -Dlogback.configurationFile=../conf/logback.xml -Dmc.conf.file=../conf/mycontroller.properties -cp "../lib/*" org.mycontroller.standalone.StartApp`

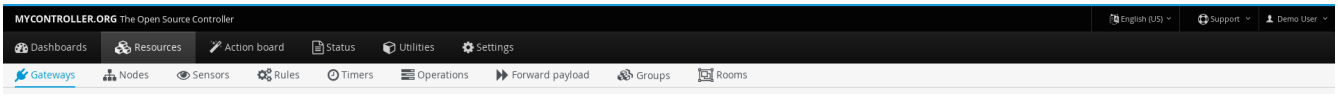
Assigning `-cp classpath` might vary on platforms, kindly refer java documents to know for your platform

Login

Enter valid username and password to log in to MyController.org server.

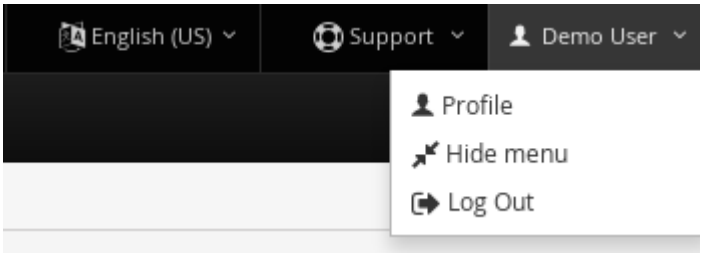
Default username is `admin` and password is `admin`

Menus



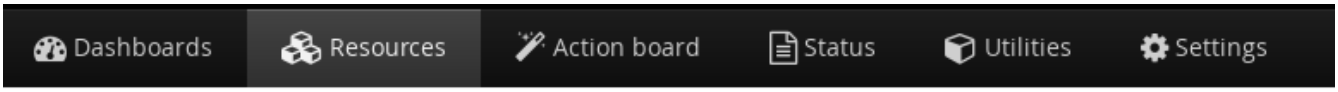
Menu divided in to two parts.

Utility menu



You can perform changing display language(locale), changing password, email of logged in user, logout actions

Main menu



Sub menu

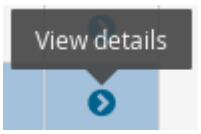
When you click on main menu you get list of sub menus list related to main menu.

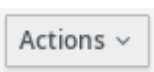
Across pages

You can see the following icons across pages.

-

- Filters
  - You change filter with available options.
  - Filter works with AND operation and case sensitive.
-

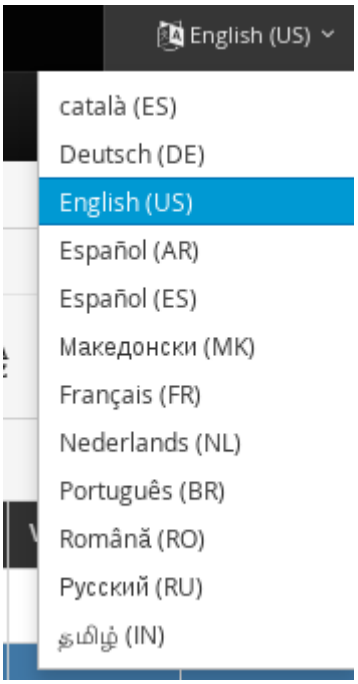
- Sort
  - you can sort based on fields listed in this menu
  - - Ascending order
  - - Descending order
  - To change order click on this icon
- 

- View details
  - click this icon to know more about specified item
- 

- Actions

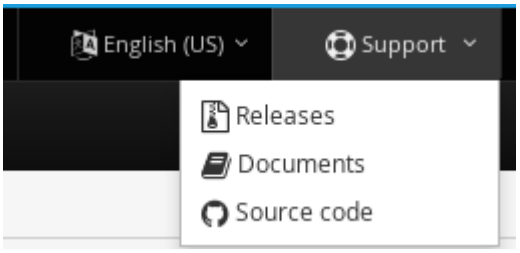
    - page to page list of actions will be different
    - Select item(s) and perform action with this menu
- Icons
    - - Enabled
    - - Disabled
    - - Up
    - - Down
    - - Unavailable

Language (locale)



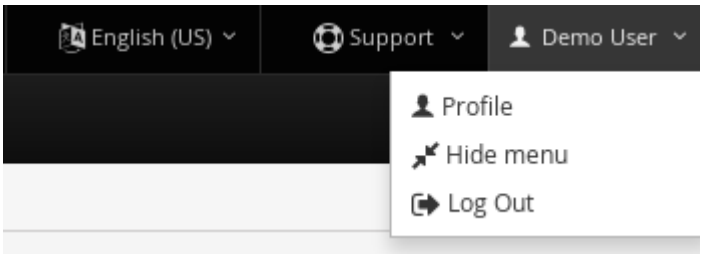
MyController supports multiple locales. You can change to your language by selecting top right corner of language menu.

Support



- `Releases` - take you to MyController.org releases page
- `Documents` - take you to MyController.org documents page
- `Source code` - take you to MyController.org source code page

Utility menu



- `Profile` - take you to profile page. you can change password, email id and name.
- `Log out` - safely log out from MyController.org server

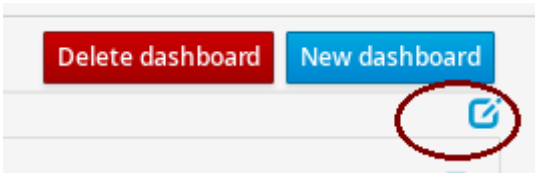
Dashboards

MyController dashboard supports for many number of widgets. If you do not find suitable on for you, you can use custom widget and use scripts for your requirements.

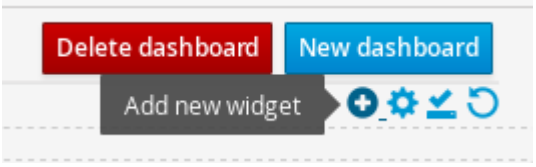
You can keep any number of dashboards. By default maximum dashboard count is set as 5. You can change this settings under `Settings >> System >> MyController`.

To remove a dashboard, select dashboard and click on `Delete dashboard`.

Add new widgets

To add new widgets click on 

edit dashboard and select



Type of widgets

- `Sensors`
- `A sensor graphical view`
- `Grouped sensors graph`
- `Mixed sensors graph`
- `Sensors bullet graph`
- `Heatmap chart`
- `Sensors custom button`
- `Display image file`
- `Groups`
- `MyController time`
- `Sunrise and Sunset time`

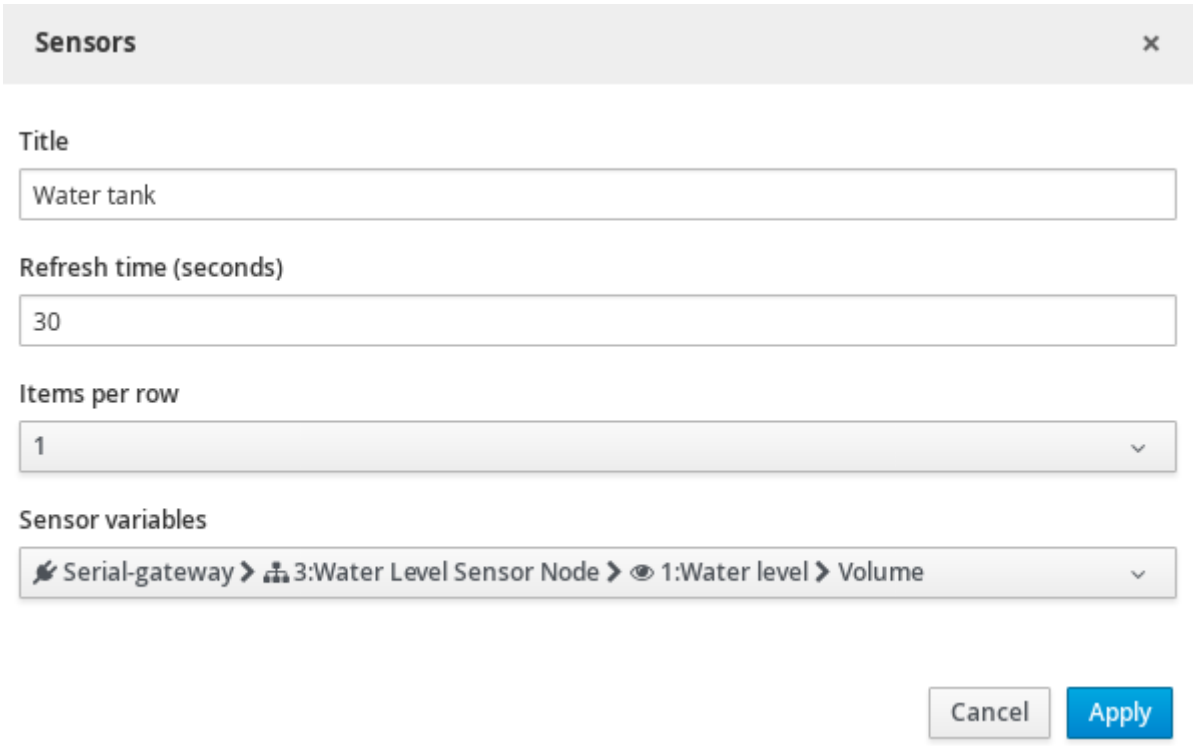
- `News`
- `Custom widget`

Common settings across widgets

- `Title` - widget title
- `Refresh time` - refresh widget content, in seconds

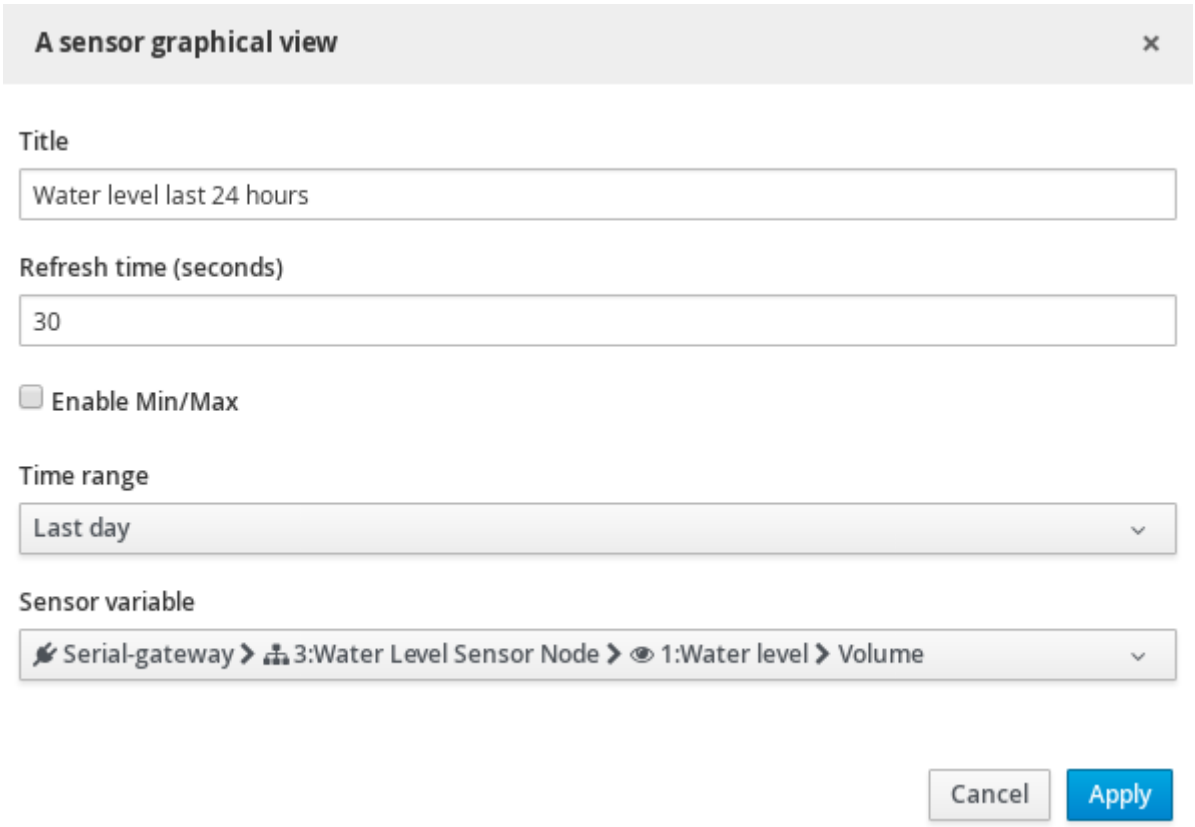
Sensors

You can select any number of sensors to be displayed on this widget. You can limit number items per row by setting `Items per row`



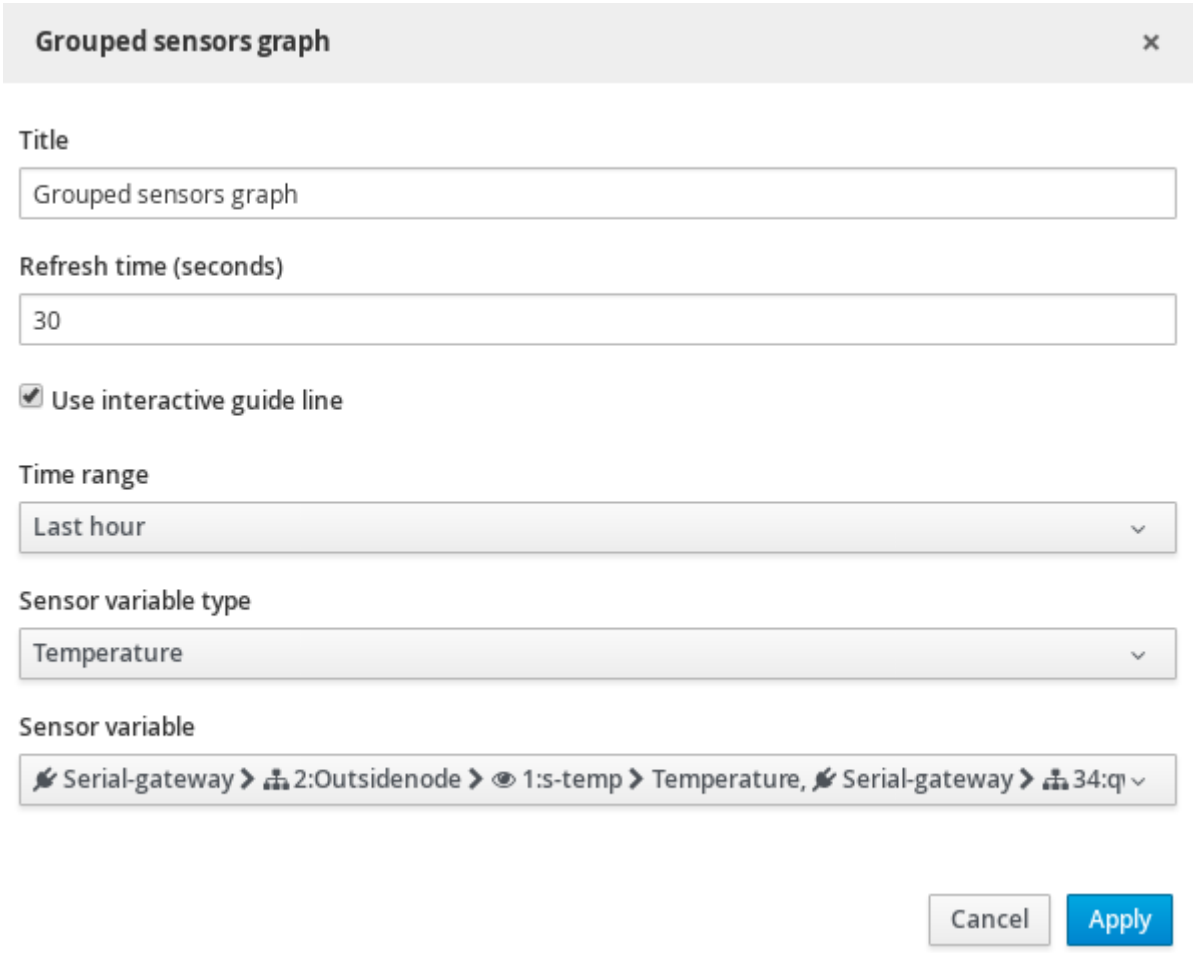
A sensor graphical view

When you want to show only one `Sensor variable` graph you can use this widget.



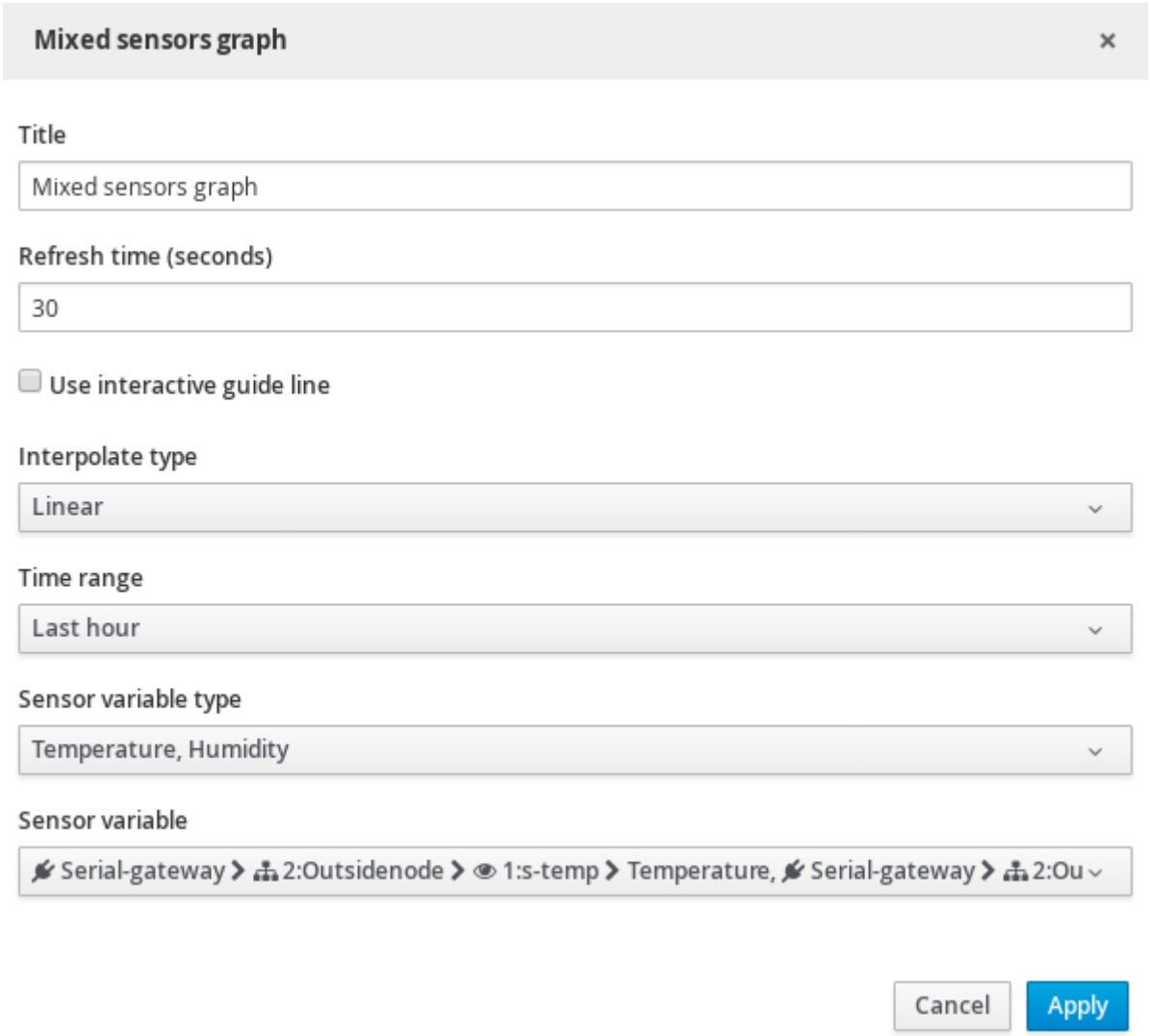
Grouped sensors graph

You can group similar type of `Sensor variable` with this widget. In this example I have added all the `Temperature` sensor variables.



Mixed sensors graph

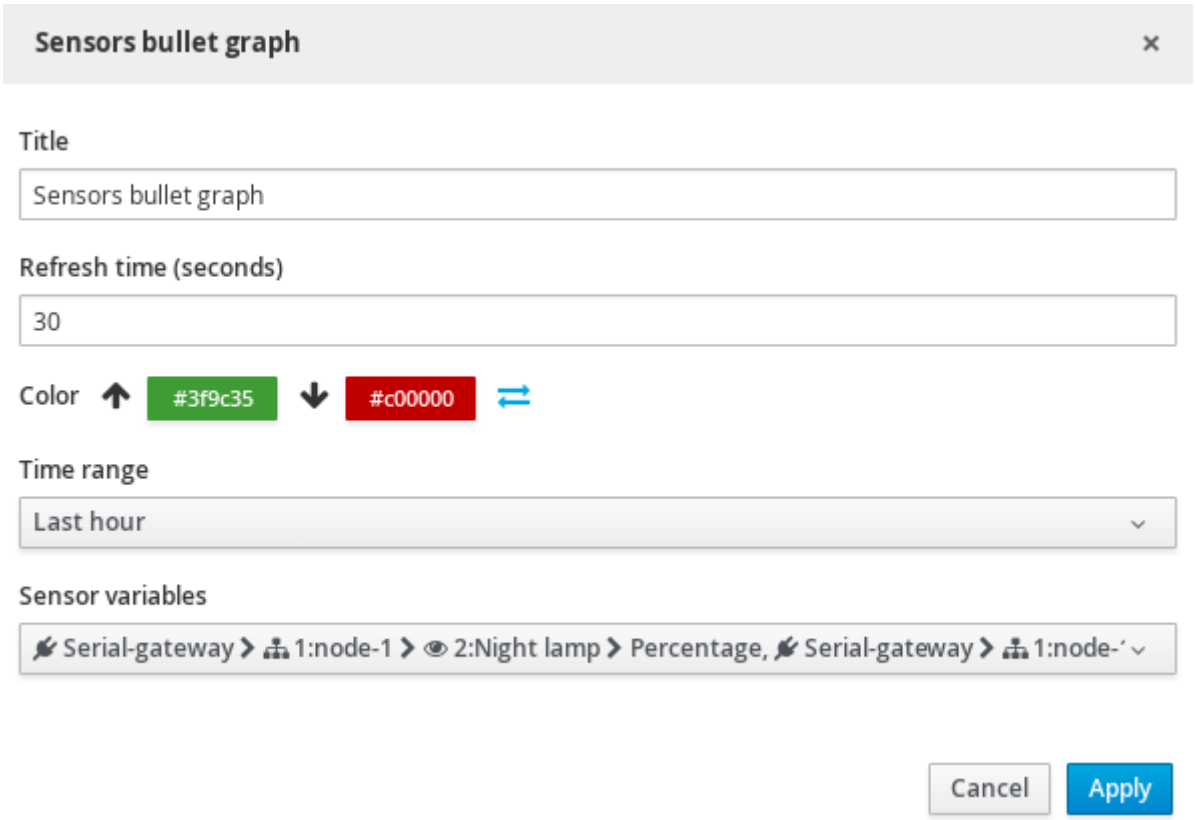
You can mix two types of sensors with this widget. One will be shown in `Y1` axis and another will be in `Y2` axis



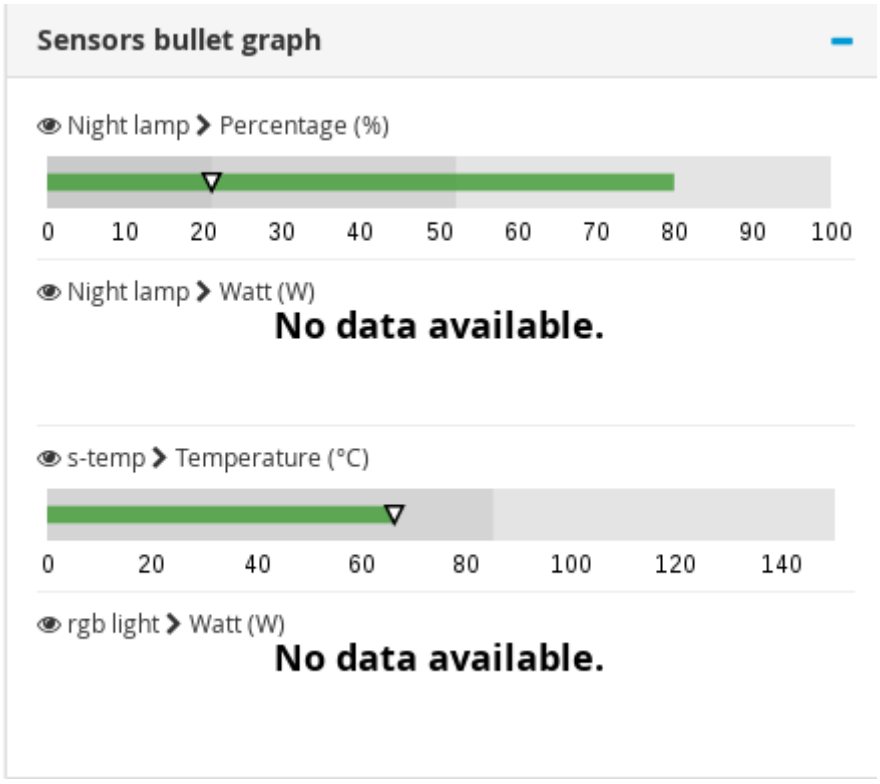
There is an open issue on this widget

Sensors bullet graph

Bullet graph used to watch current status, last value and average value.

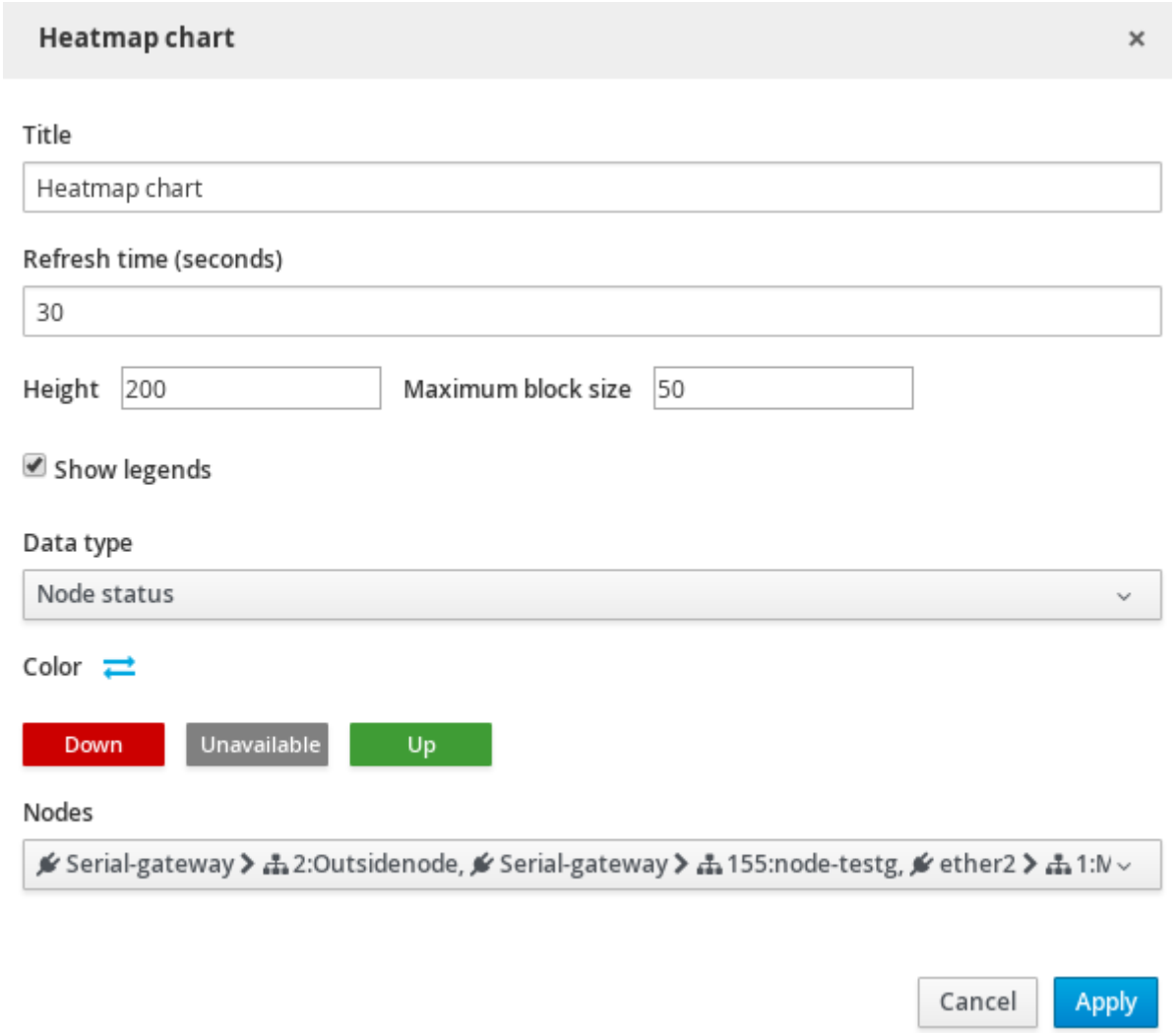


Displays like this,

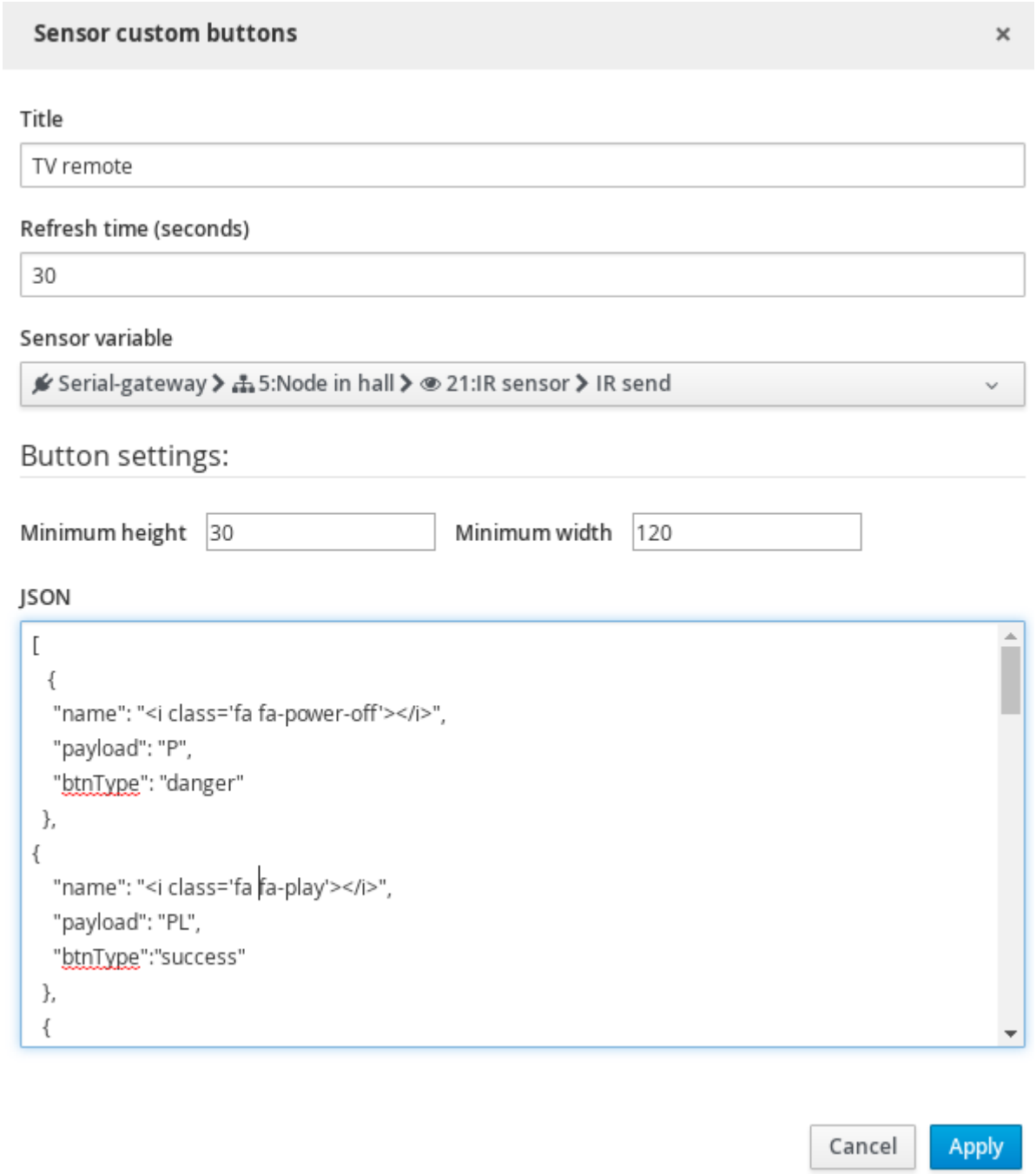


Heatmap chart

Heatmap chart used to show resources status in single with with different colors.



Sensors custom button



Buttons detail should be in `JSON` format. To create `json` configuration error free way use http://www.jsoneditoronline.org/ We can include button names as HTML or icons(recommended: font awesome icons)

In configuration `name` and `payload` are mandatory fields. `btnType` is optional and can be any one of `default`, `primary`, `success`, `info`, `warning`, `danger`

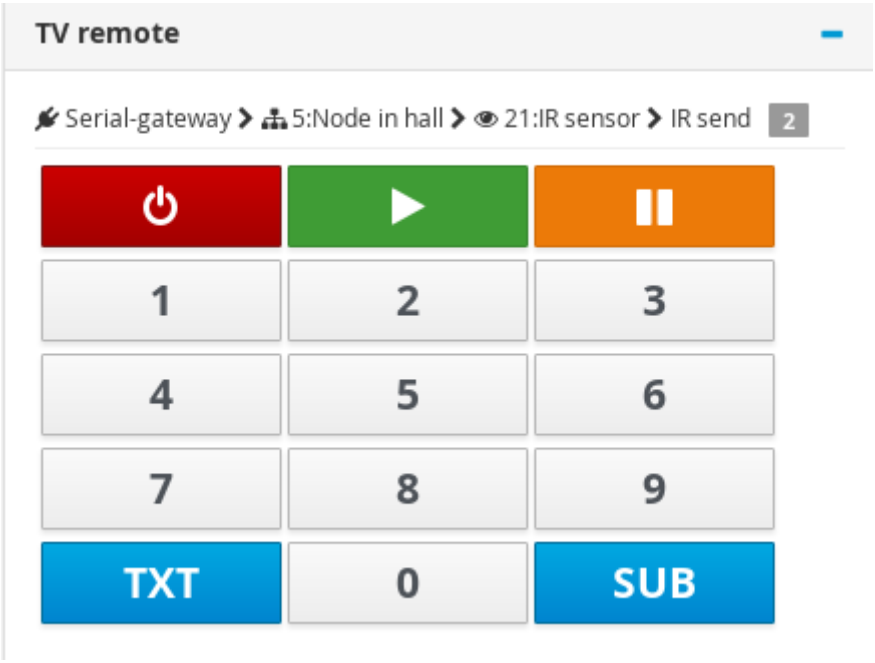
Example `json` as follows,

```
[
   {
    "name": "<i class='fa fa-power-off'></i>",
    "payload": "P",
    "btnType": "danger"
  },
```

```
 {
    "name": "<i class='fa fa-play'></i>",
    "payload": "PL",
    "btnType":"success"
  },
  {
    "name": "<i class='fa fa-pause'></i>",
    "payload": "PA",
    "btnType":"warning"
  },
 {
    "name": "1",
    "payload": "1"
  },
  {
    "name": "2",
    "payload": "2"
  },
  {
    "name": "3",
    "payload": "3"
  },
  {
    "name": "4",
    "payload": "4"
  },
  {
    "name": "5",
    "payload": "5"
  },
  {
    "name": "6",
    "payload": "6"
  },
  {
    "name": "7",
    "payload": "7"
  },
  {
    "name": "8",
    "payload": "8"
  },
  {
    "name": "9",
    "payload": "9"
  },
{
    "name": "TXT",
    "payload": "TXT",
    "btnType":"primary"
  },
```

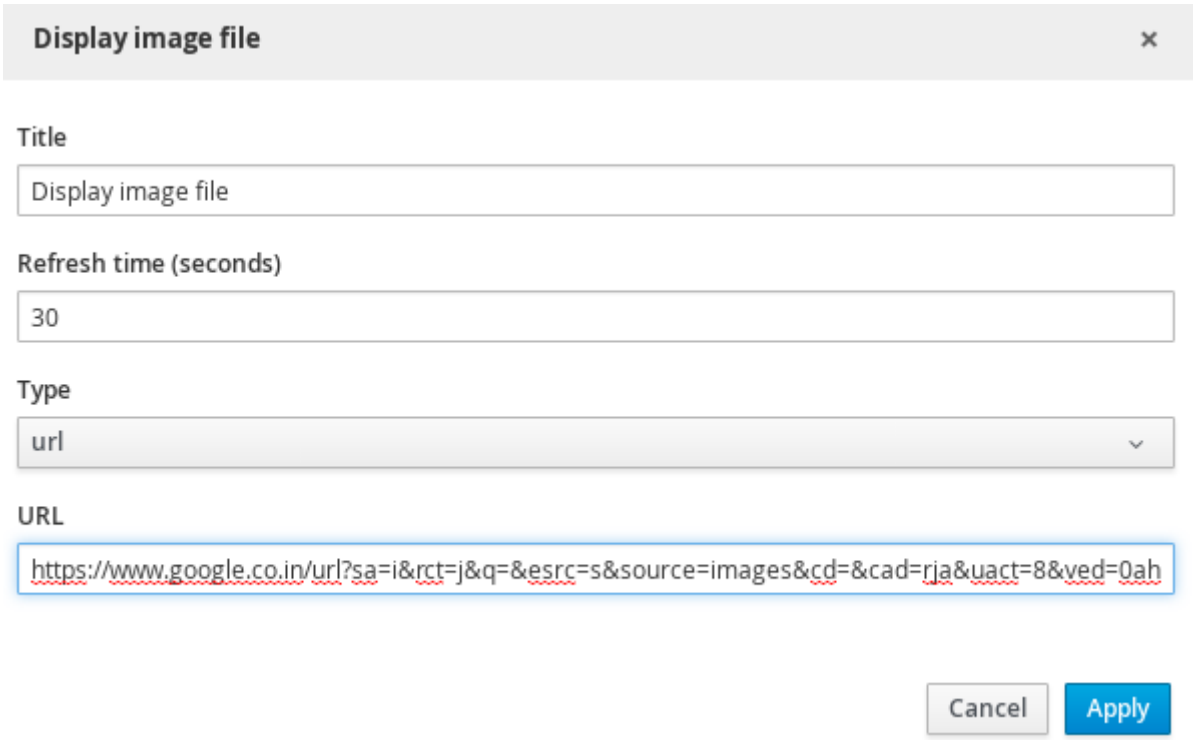
```
  {
    "name": "0",
    "payload": "0"
  },
{
    "name": "SUB",
    "payload": "SUB",
    "btnType":"primary"
  }
]
```

Example produces,



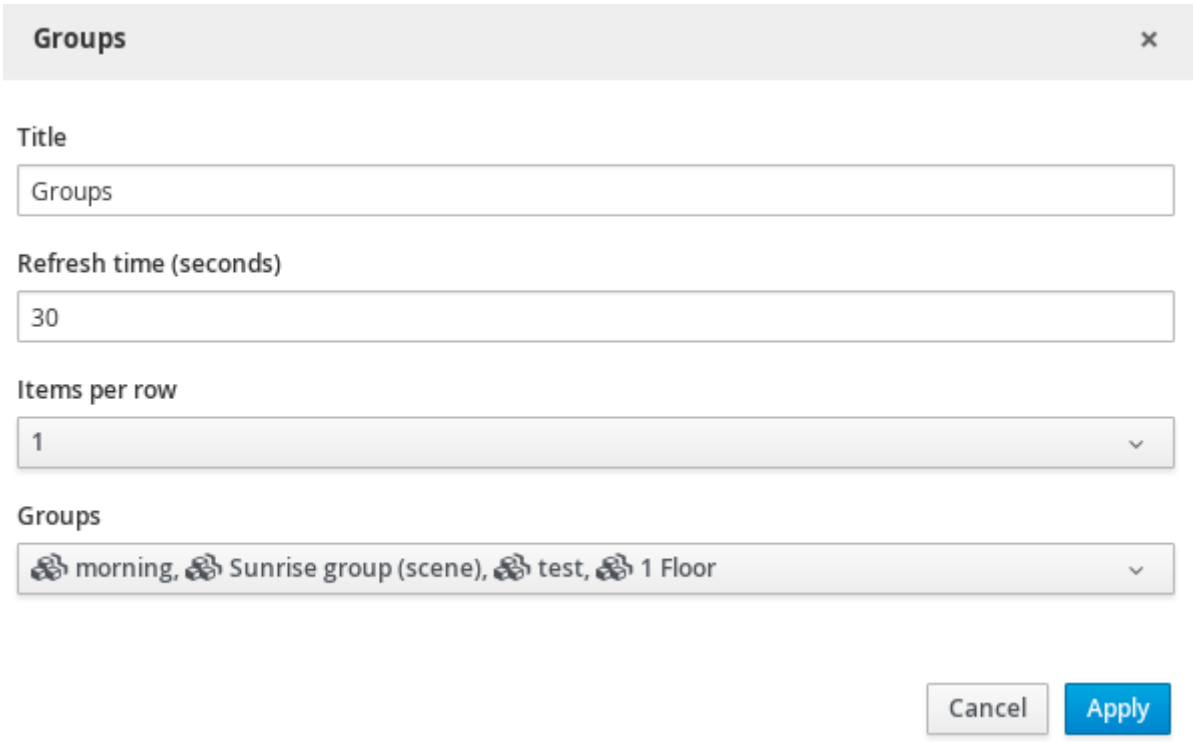
Display image file

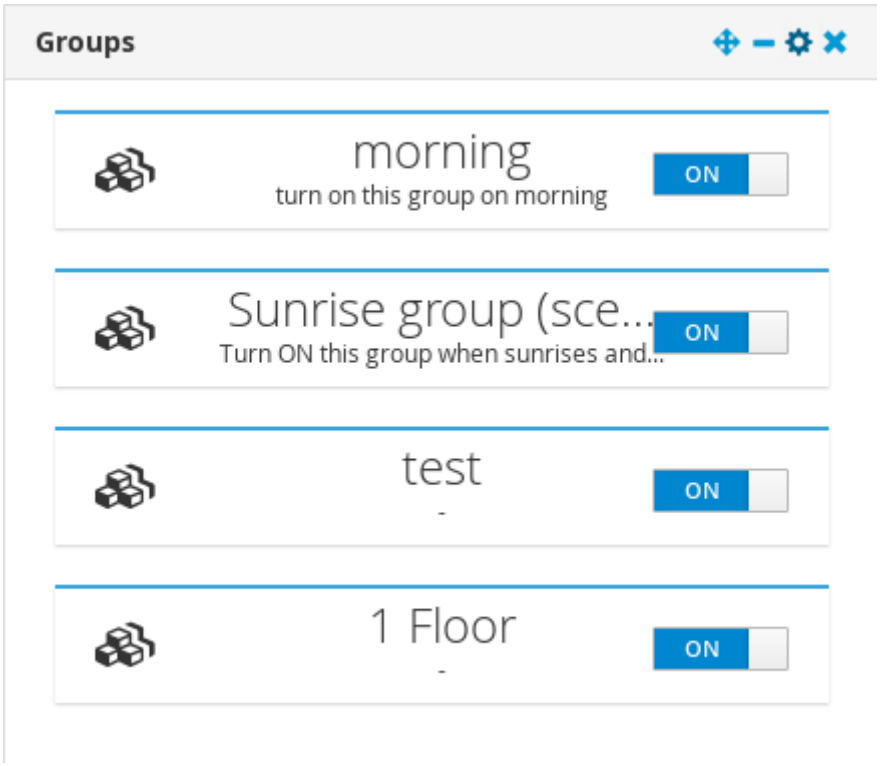
When you want to display image file from an `url` for from local `disk` you can use this widget. This can be used when you are updating image file with some other services and want to show in MyController dashboard.



Groups

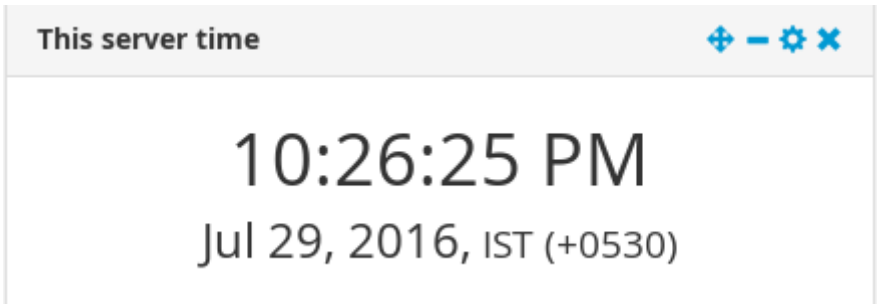
When you want to control you groups from dashboard, you can use this widget.





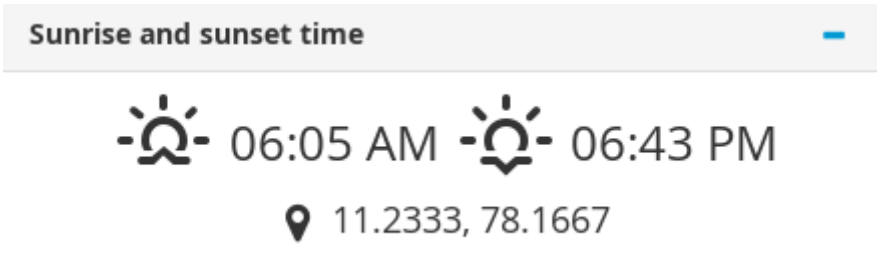
MyController time

Displays MyController time where MyController server is running.



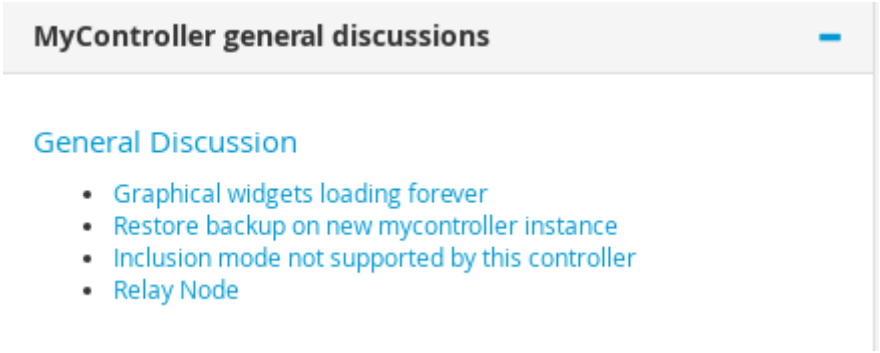
Sunrise and Sunset time

Displays `Sunrise` and `Sunset` time based on location settings



News

Add `rss` feed and displays news from the feed.



Custom widgets

With the custom widget you can add on your interest. You have to write script for your custom widget.

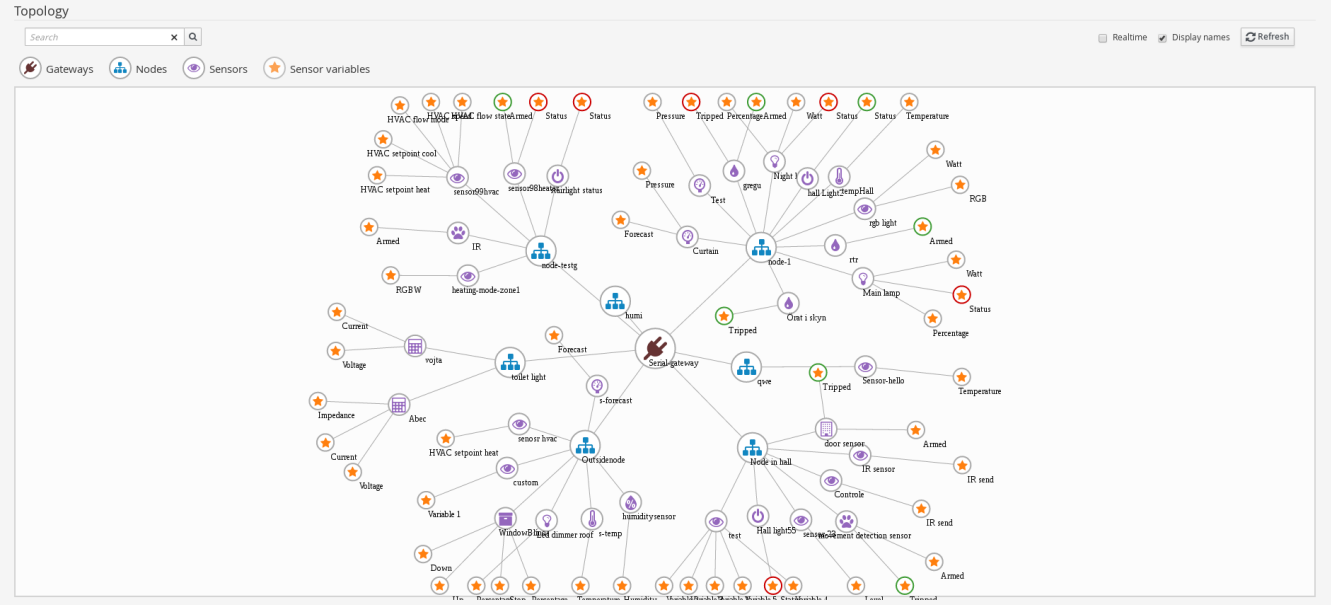
Rooms detail

When you mapped your sensors with room. You can access your room and get your sensors easily. You can perform actions also on sensor.

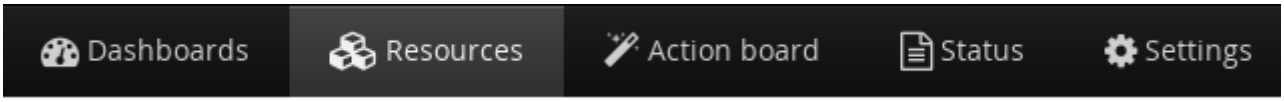
Topology

In topology graph you can see how the things connected in a quick view.

- `Realtime` - How is connected on real time (for now mysensors only supports) When you uncheck this option,shows how the things connected in MyController database.
- By clicking on top legends, you can show hide type of resource.
- You may notices that circle color for nodes and gateways, If node or gateways is `UP` shows in green, other wise based on status.
- Mouse over to resource, displays status of resource as tooltip
- `Display names` - Check/Uncheck to display/hide resources names
- When you click refresh topology graph gets refreshed (also doing automatic refresh also)
- You can filter resources on graph based on name
- When you double click on resources it wll take you to resource details page.

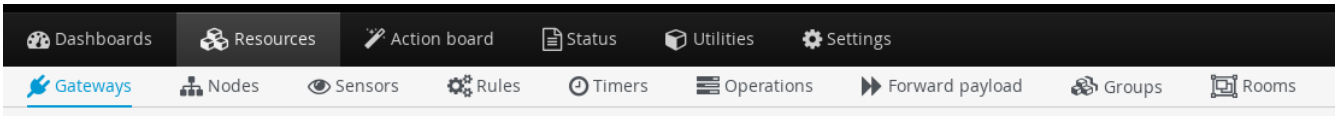


Resources



Under resources you can do almost all actions related to sensors. can do actions on Gateways, Nodes, Sensors,Rules, Timers, Operations, Forward payload, Groups, Rooms.

Gateways



You can add remove any number of gateways. Supports 2 type of networks

MySensors

When you choose MySensors network type it supports 3 types

1. Serial gateway
2. Ethernet gateway
3. MQTT gateway

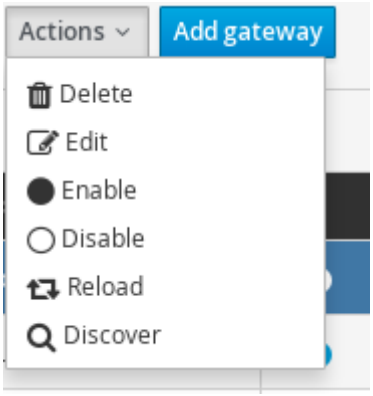
Sparkfun [phant.io]

It support REST API. Polls on configured REST API for every `N` seconds with `X` limits of data. It will not add duplicate data

Add gateway

Navigate to `Gateways` menu and click `Add gateway`.

Gateways actions



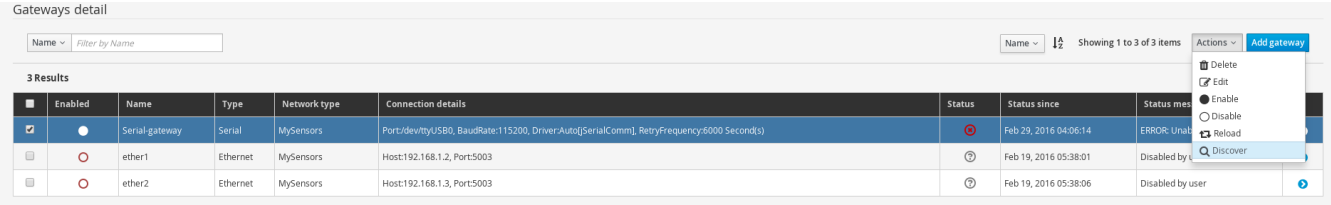
Gateway supports multiple actions. Select an item from the list and choose the desired action.

- `Reload` - reload operation performs stop and start of the gateways.

`Reload` can happen only for enabled gateways.

When you delete gateway. All the resources belongs to the gateways will be removed permanently. Always do backup when you perform this kind of operation.

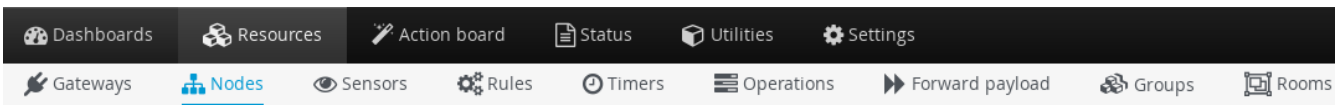
Discover



Sends broadcast packet to all the node on this gateway. Will receive parent node details. Used in Topology page to show real time connection

`Discover` action supports only for MySensors

Node



Under this page you can see node information's like, Node EUI(Node Id), Node Name, Node Type,

Firmware Version, Core lib Version, Battery Level, Assigned firmware, etc.,

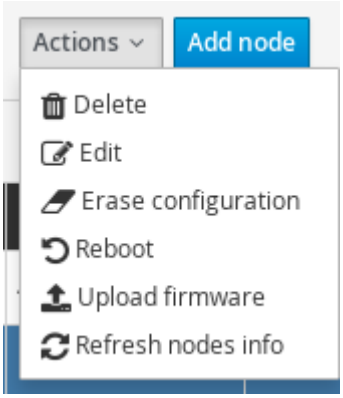
By default `Register nodes automatically` will be enabled under `Settings >> System >> MyController`. If this option is disabled, sensor data of the node will not be added in to MyController until node `Registration status` changed to `Registered`. You can also change a node `Registration status` to one of `New`, `Registered` or `Blocked`

Add manually

Navigate to node page, by clicking

button you can add new node.

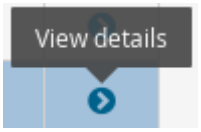
Actions



- `Delete` - delete node
- `Erase configuration` - Ask node to erase complete configuration.
- `Reboot` - reboot the node
- `Upload firmware` - Request node to get firmware update
- `Refresh nodes info` - Requests presentation details from selected nodes

When you delete a node. All the resources belongs to the node will be removed permanently. Always do backup when you perform this kind of operation.

Node details

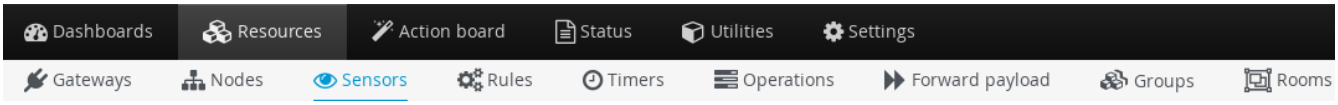
When you click 

icon you will complete node details. includes battery usage report.

Mapping Firmware

Before doing this action, firmware should be added in MyController.org. Refer Firmware section to add new firmware. To update selected firmware in to selected node perform `Reboot` or `Update firmware` action.

Sensors



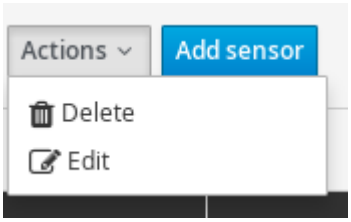
Navigate to sensors Page. In this page you see sensor details like Gateway Id, Node EUI, Sensor Id, Name, Type, Variable Type, Last seen. You can add, edit and delete sensors from here.

Add sensor

We can add sensors in two methods, via node and manually. If node sends any data related to sensors and if the sensor detail is not available in MyController.org new sensor will added automatically. To add new sensor manually click on the buttom

If MyController.org receives any data related to sensor that you have added already will be overwritten.

Actions

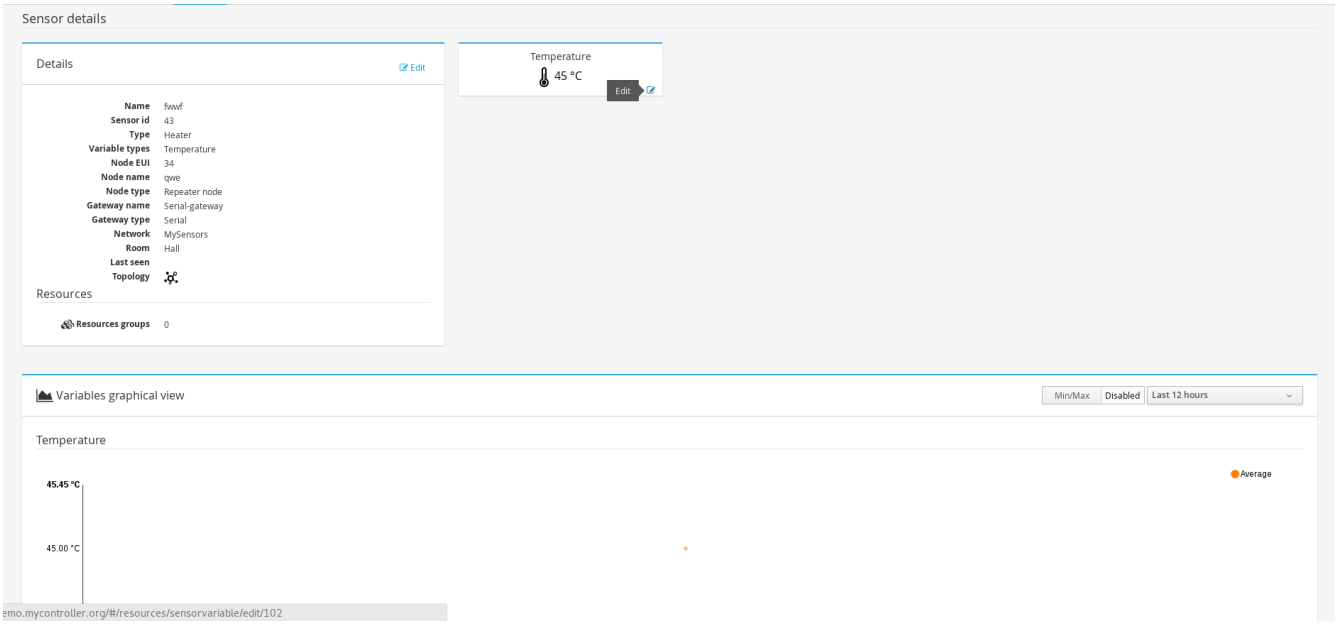


- `Delete` - delete selected sensor
- `Edit` - edit selected sensor

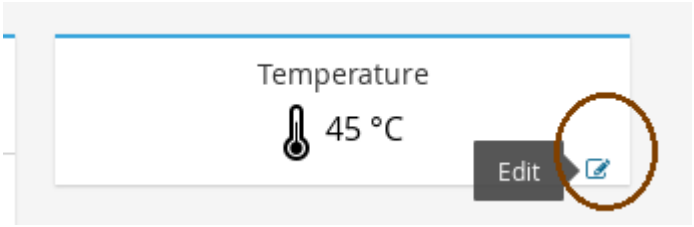
Deletion sensor will delete all the data relevance to that sensor. We cannot recover it back.

Edit Sensor variable

You can change sensor variable type, metric type, read only, graph type, etc., Go to sensors detail page.

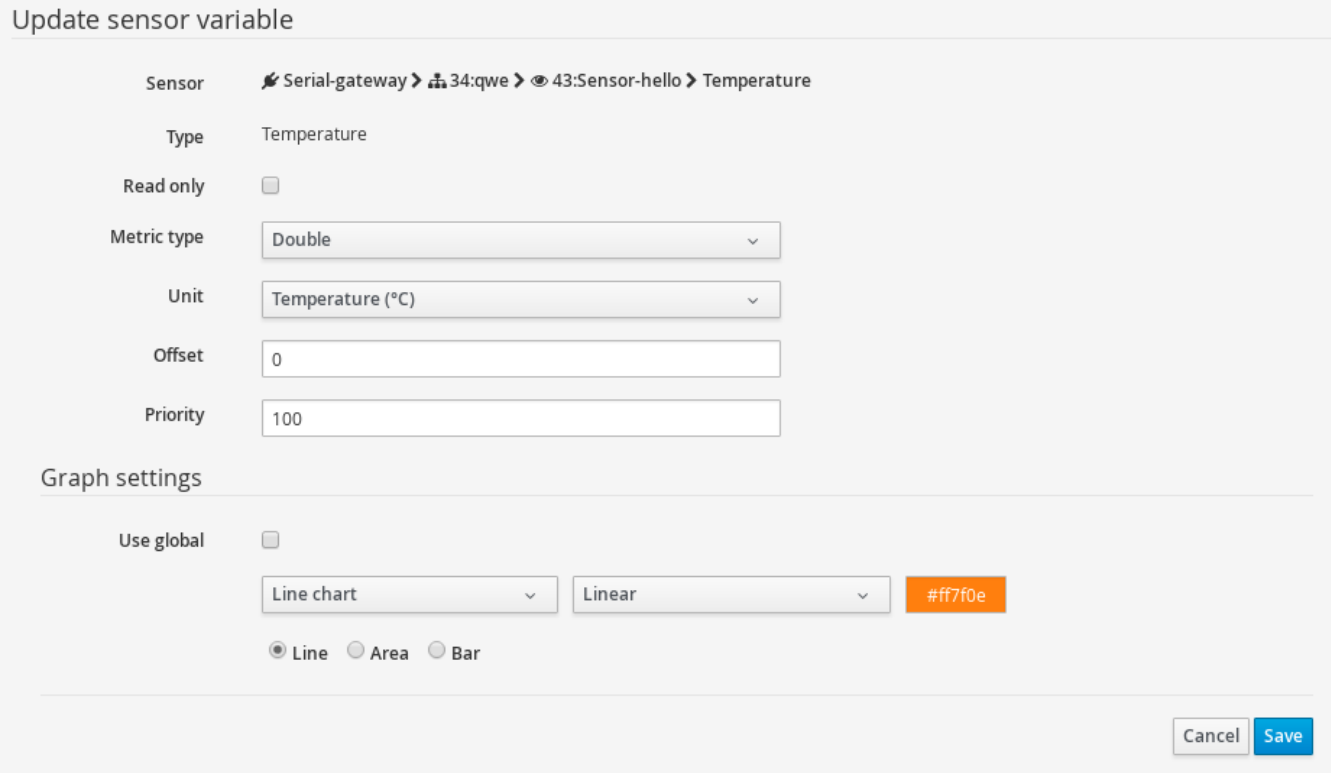


Click on edit on `Sensor variable`



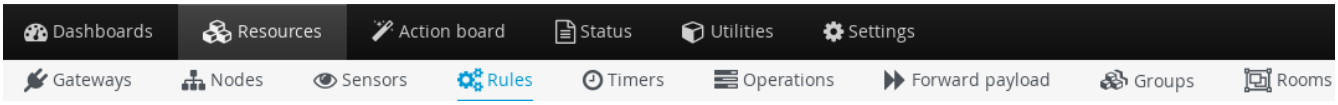
You can change the following settings,

- `Read only` - Makes this variable read only, you cannot send payload.
- `Metric type` - You can change metric type
  - `None` - When you do not want to record metric of a variable
  - `Double` - Used for double typed variables, like Temperature, Pressure, etc.,
  - `Binary` - Used for ON and OFF devices
  - `Counter` - Used to record counter type devices, like energy meters
- `Unit` - You can change any type of units. Can select `None` of no units measurement
- `Offset` - Only available for `Double` types metrics. You can enter `+` or `-` values. When MyController.org receives a data from this variable this `offset` will be added with actual value. When sending `offset` will be ignored(offset will not be included).
- `Priority` - This value used to display variables on different locations. When you give lowest number will get higher priority and vice versa.
- `Use global` - When this option set, will use global graph settings. Or you can override with your custom settings.



Rules

Formally called `Alarms`



Click on the button to add new rule.

- `Name` - name of the rule definition
- `Enabled` - enable/disable this rule definition
- `Disable when trigger` - will be disabled automatically when triggers
- `Ignore duplicate` - ignore subsequent triggers. Will trigger again at least condition should not satisfy once.
- `Resource` - Select a resource, Supported resources,
  - `Gateway` - based on gateway status
  - `Node` - based on node status
  - `Sensor variable` - based on sensor variable value
  - `Resources group` - based on resources group status
- `Trigger when` - is a condition.
- `Dampening` - With dampening feature we can control trigger further. Types,
  - `None` - dampening option disabled
  - `Consecutive` - If the condition satisfies continuously for N occurrences.

    - `Last N evaluations` - If the condition mets N occurrences in X evaluations.
    - `Active time` - If the condition stays active in the specified time.
- `Operations` - We can add any number of operations for a rule definition.

`Rules` are used to trigger set of `Operations` when a condition met the specification. MyController supports multiple conditions.

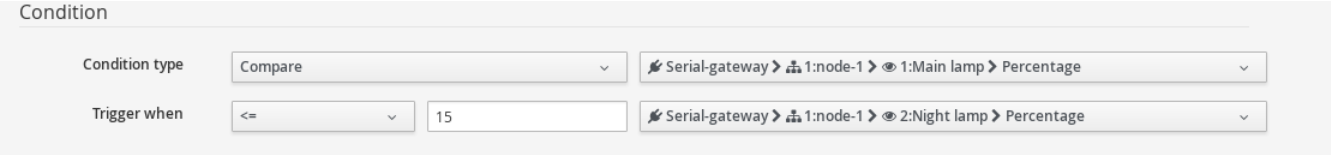
Conditions type:

- Compare
- State
- Script
- String
- Threshold
- Threshold range

To add new `Rule`, Navigate to `Resources` >> `Rules` >> `Add rule`.

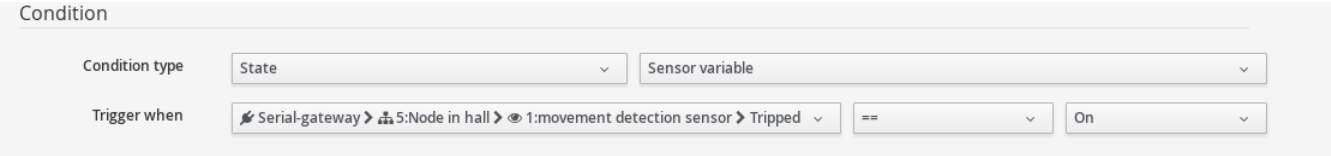
Condition - `Compare`

We can compare `Sensor variable1` with `Sensor variable2`. **Example:** Hall-temperature >= 20% outside-temperature

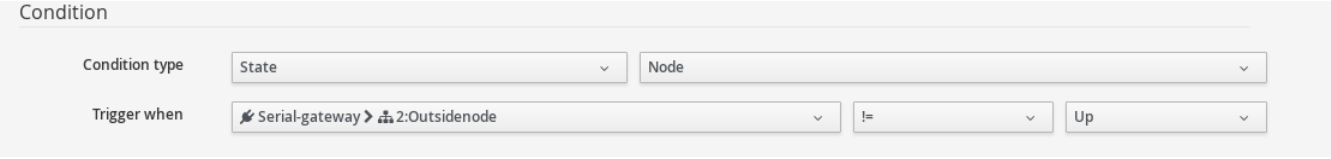


Condition - `State`

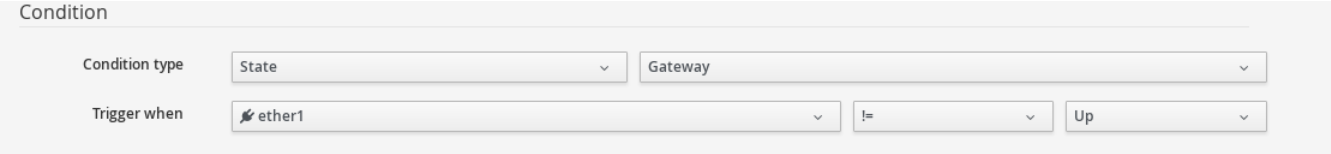
With this condition we con monitor state of `Binary` type sensor variables, `Node`, `Gateway` and `Resources group`. **Example for `Sensor variable`**



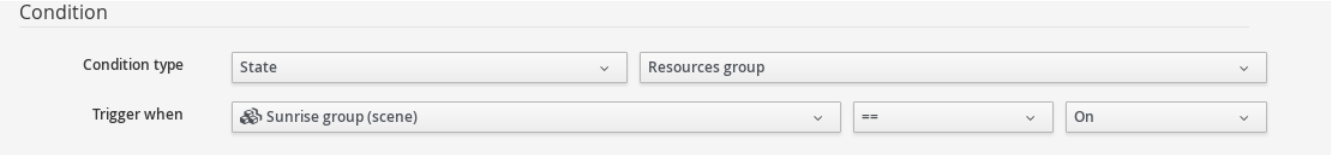
Example for `Node`



Example for `Gateway`



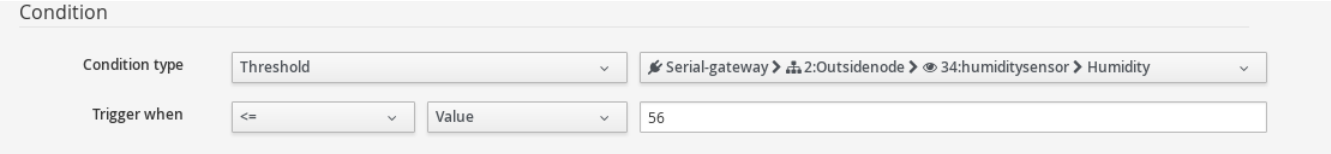
Example for `Resources group`



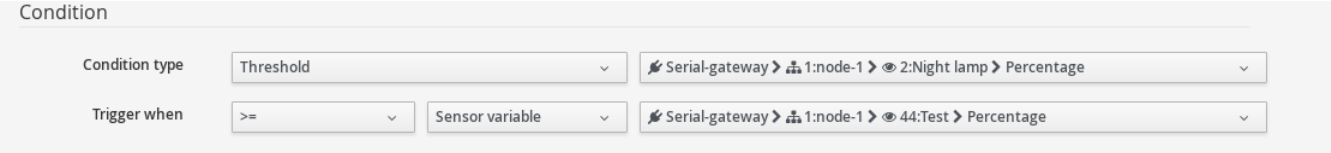
Condition - `Threshold`

With this condition we can monitor `Sensor variable` values with a static value or with another `Sensor variable` value

Example with static value:



Example with another Sensor variable:



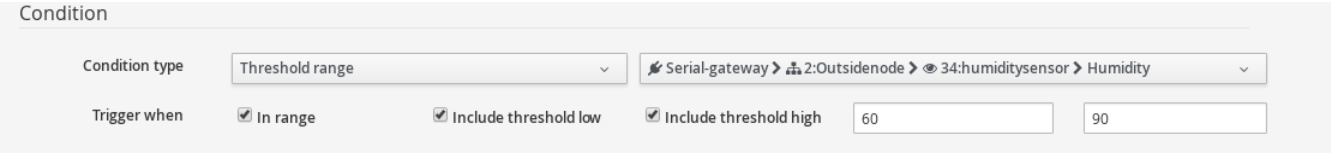
Condition - `Threshold range`

With this condition we can monitor `Sensor variable` value **Is in range?** or **Is in outside range?**

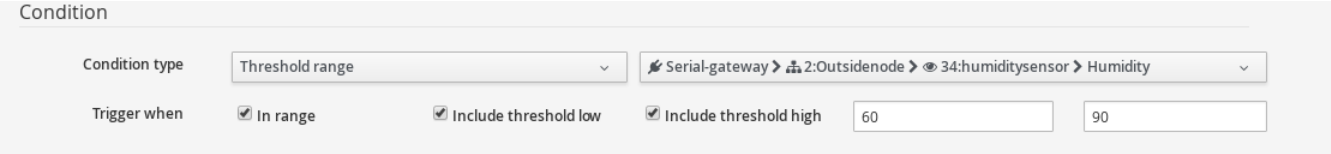
- `Threshold value low` (1) - low value of threshold
- `Threshold value high` (2) - high value of threshold
- `Include threshold low` - When we check this field included (1) in boundary
- `Include threshold high` - When we check this field included (2) in boundary
- `In range` - When you check this box will be act as `In range` check, otherwise `Out side range` check

Example: X inside [10,56], X outside [45, 200]

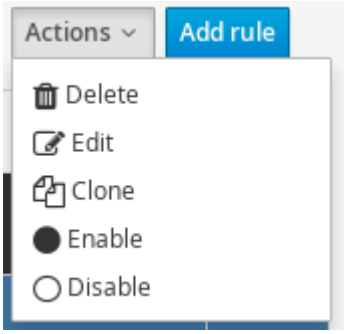
Example for `In range`:



Example for `Out side range`:



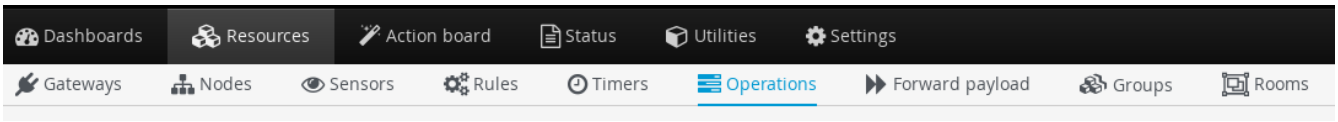
Actions



- `Enable` - enable selected items
- `Disable` - disable selected items
- `Delete` - delete selected item
- `Clone` - clone the selected rule and create duplicate

Operations

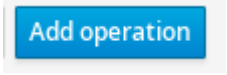
Formally called `Notifications`



You can define any number of operations here. These operations will be mapped with `Rules` and `Timers`.

When a operation is in `Disabled` state, Even it's configured active `Rules` or `Timers` will no trigger disabled operations.

Add operation

To add new operation click on the button 

- `Name` - name of the notification
- `Enabled` - enable/disable notification.
- `Public access` - allow to use other users
- `Type` - type of operations
  - `Send payload` - Do resource operations.

- `Request payload` - Do resource operations.
- `Send SMS` - send SMS
- `Send email` - send email
- `Pushbullet note` - send pushbullet note
- `Execute script` - Executes mentioned script

Send payload

- Select resource and update payload
- `delay time in seconds` update this field with delay time. Using this option payload will send to the resource after x seconds of delay. If you do not want delay leave this field as blank.
- on the payload you can use `Special operations`. Refer Special operations section for further details.

Request payload

- Select a sensor variable to request current payload

This type supports only for MySensors

Send SMS

For SMS we can use Plivo or Twilio vendors. When you create trail account you will get some credit. To use SMS notifications you should configure either Plivo or Twilio SMS API settings under `Settings->Notifications->SMS`.

- `Phone numbers` - Give destination numbers with '+' with country code then mobile number without any space. If you want to give more than one number use comma(,)
- `Custom message` - If you leave this field blank, default message will be generated. ===== Send email To send email, SMTP email settings should be configured under "Settings->Notifications->Email"
- `Subject` - subject of this email. Mandatory field. You can apply `keys` for this filed.
- `Email(s)` - list of email address with comma(,) separated. Email subject as well as body message supports for `key's

Pushbullet note

To send pushbullet note, Pushbullet settings should be configured under "Settings->Notifications->Pushbullet"

- `Devices` - comma(,) separated device `iden`. If you leave blank will send to all the devices.
- `Title` - Title of the pushbullet note. You can apply `keys` for this filed.
- `Custom message` - You can add your own custom message. If you leave this field blank default message will be taken. You can apply `keys` for this filed.

`SMS`, `Email`, `Pushbullet note` supports for custom messages with `keys`. `key's will be replaced with actual value on runtime.'

Supported keys on custom messages

You can apply the following `keys` for this filed.

- `notification.ruleName` - Rule definition name
- `notification.ruleCondition` - Rule condition details
- `notification.actualValue` - Actual value of the resource at the time of trigger
- `notification.triggeredAt` - Rule trigger time
- `notification.operationName` - Operation name

Custom message example: `Inside temperature goes too high! Current temperature is ${notification.actualValue}`

Special operations

While defining payload you can assign following special operations, All the special operation reads last received/sent value from target senor and doing this operation on top of that value and sends to target sensor.

Toggle

By assigning the value: `Toggle` You can select this operation. It is doing toggle operation. This will be useful for 'BINARY' devices. For example if switch is `ON` it will be turned `OFF` vise versa.

Increment

By assigning the value: `++` You can select this operation. Adding 1 with the value. Example: last rx/tx value is 45, on resulting this operation will send 46 to target sensor.

Decrement

By assigning the value: `--` You can select this operation. Subtracting 1 with the value. Example: last rx/tx value is 45, on resulting this operation will send 44 to target sensor.

Addition

By assigning the value: `+3` You can select this operation. Here + meant for addition and 3 is the value should add. Example: last rx/tx value is 45, on resulting this operation will send 48 to target sensor.

Subtraction

By assigning the value: `-4` You can select this operation. Here - meant for addition and 3 is the value should add. Example: last rx/tx value is 45, on resulting this operation will send 48 to target sensor.

Multiplication

By assigning the value: `*2` You can select this operation. Here * meant for multiplication and 2 is the value should multiple. Example: last rx/tx value is 45, on resulting this operation will send 90 to target sensor.

Division

By assigning the value: `/3` You can select this operation. Here / meant for division and 3 is the value should divide by. Example: last rx/tx value is 45, on resulting this operation will send 15 to target sensor.

Modulus

By assigning the value: `%4` You can select this operation. Here % meant for modulus and 3 is the value used for modulus. Example: last rx/tx value is 45, on resulting this operation will send 1 to target sensor.

Start

By assigning the value: `start` You can select this operation. On this operation target resource will be started.

Stop

By assigning the value: `stop` You can select this operation. On this operation target resource will be rebooted.

Reboot

By assigning the value: `reboot` You can select this operation. On this operation target resource will be rebooted.

Reload

By assigning the value: `reload` You can select this operation. On this operation target resource will be rebooted.

Enable

By assigning the value: `enable` You can select this operation. On this operation target resource will be enabled.

Disabled

By assigning the value: `disable` You can select this operation. On this operation target resource will be disabled.

ON

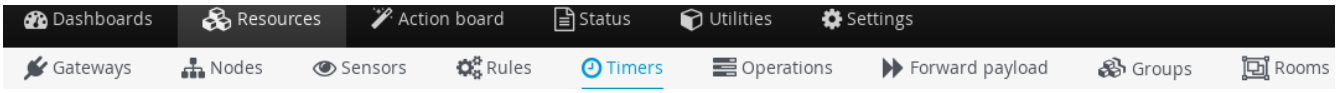
By assigning the value: `ON` You can select this operation. On this operation target resource will be ON.

OFF

By assigning the value: `OFF` You can select this operation. On this operation target resource will be OFF.

Timers

MyController.org using Sundial scheduler which foked from Quartz Scheduler

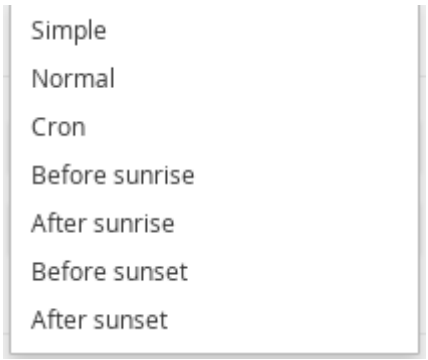


With the timer you can schedule timely operations for resources which configurable in `Operations`. Different types of timers are supported by MyController.org. You can schedule a timer till seconds(via API only, in GUI supports only till minutes only except `cron` type). Means you can schedule a task for time `21:45:23` like that. By Clicking button

you will be taken to add timer page.

- `Name` - name of the timer
- `Enabled` - enable/disable the timer
- `Timer type` - type of the timer
- `Validity` - validity of the timer. If you leave blank never get expired.
- `Operations` - Select list of operations that you want to run when this timer triggers

Timer types



Simple

Simple timer operates with `Repeat interval` and `Repeat count`. Specify repeat interval in seconds. If you want to run this job count less specify `Repeact count` as `-1`

Normal

Normal is a very basic and classic timer. You can select `Normal` in the type drop down.

Cron

Cron is for advanced users. It is simple and easy. Visit Quartz-Scheduler page for further detailed configuration

Quartz-Scheduler cron supports from seconds.

Before Sunrise, After Sunrise, Before Sunset and After Sunset

If your task based on Sunrise or Sunset you have to go with this option. Say you want to control your garden light based on your location sun rise and sun set time. You can use this option. You can specify time offset.

Frequency

3 types of frequencies supported by MyController.org

1. Daily – you can select all the 7 days or day(s) only you want to run
2. Weekly – Select a day in week
3. Monthly – Select a day in month

Time

Time format: `HH:mm:ss`

`HH` – hour in 24 hours format (0~23)

`mm` – minutes (0~59)

`ss` – seconds (0~59)

For sunrise and sunset options "Time" will react differently. If you select After Sunrise and After Sunset time offset will be added with "Time" mentioned in task + "Sunrise" or "Sunset" time. If you select "Before Sunrise or Before Sunset" "Time" mentioned in task time offset will be subtracted from actual "Sunrise or Sunset" time.

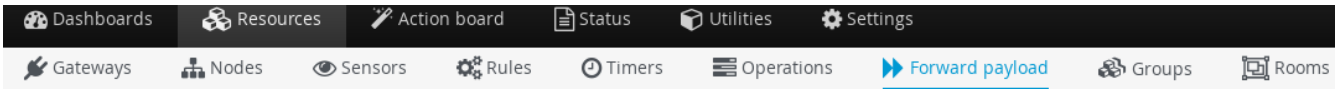
Validity

You may feel you do not want to run this job all the time and want to run only on particular window period. In that case you can select validity. You can select "Validity From" and "Validity To" or only either or nothing. If you do not select any validity that job will be treating like never end. If you select only "Validity From" job will run from that date and never end. If you select only "Validity To" that job will start immediately and will end on the specified date.

Operations

You can select `N` number of operations for a timer. All the operations will be executed when a timer triggers

Forward Payload

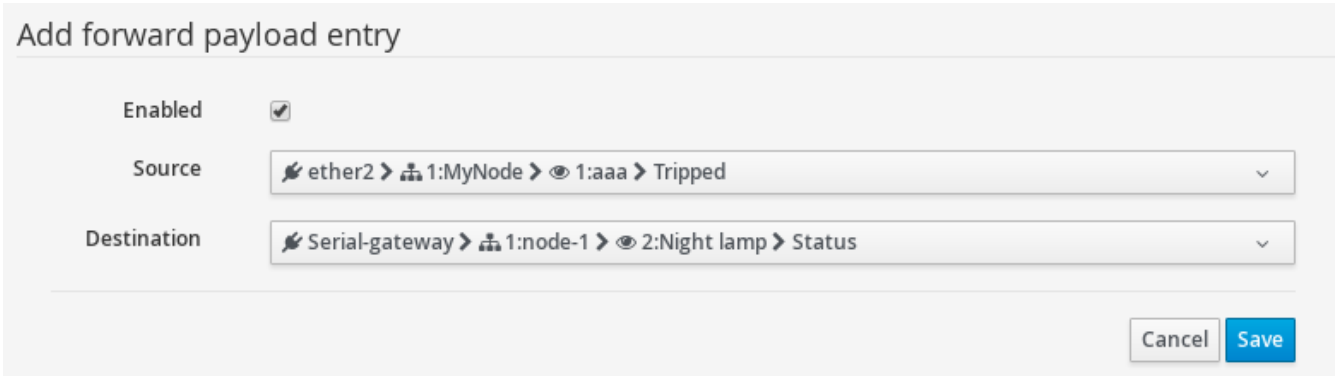


You can forward the data received by this sensor to another sensor directly without any condition. This will be useful when you want to send your sensor data to multiple sensors. No need to do any code change on sensor side. Simply add an entry in MyController.org and be happy, MyController.org will take care rest of the things.

This operation supported across gateways too. Which means you can forward data from one network to another network.

Add new entry

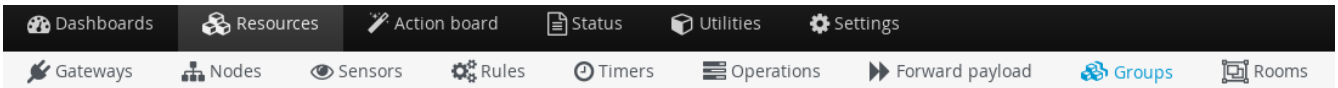
To add new entry click on the button



Actions

- `Delete` - Delete selected entries
- `Edit` - If there is a change required
- `Disable` - Temporarily you do not want to forward
- `Enable` - Enable disabled entries

Groups



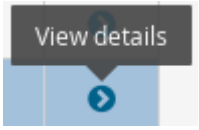
`Groups` is the place where you want to keep group of resources and perform actions on all resources on single click. Generally it needs `On paylaod` and `Off payload` for each resource.

Add group

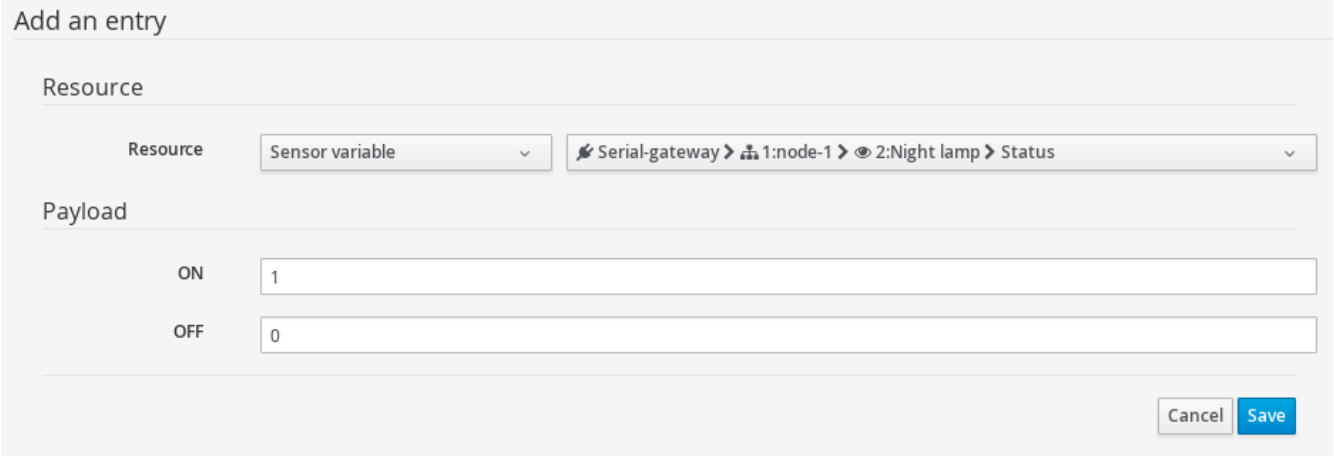
To add new group click on the button

and update `Name` of the group and group `Description`

Add resource

Supports for resource `Gateway`, `Node` and `Sensor variable`. To add resources in to a groups click on 

of the groups. Then click on



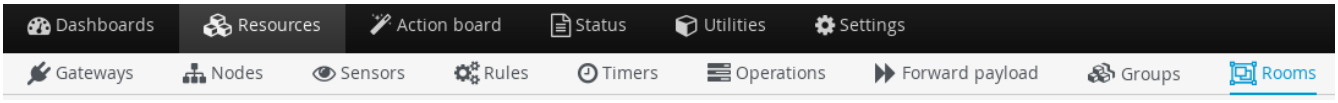
Payloads for Gateway

- `Start`
- `Stop`
- `Enable`
- `Disable`
- `Reload`

Payloads for Node

- `Reboot`

Rooms



Rooms is used to organize your sensors as you see in your home/office. You can create nested rooms also. Example: `Floor1 >> Hall >> TV`

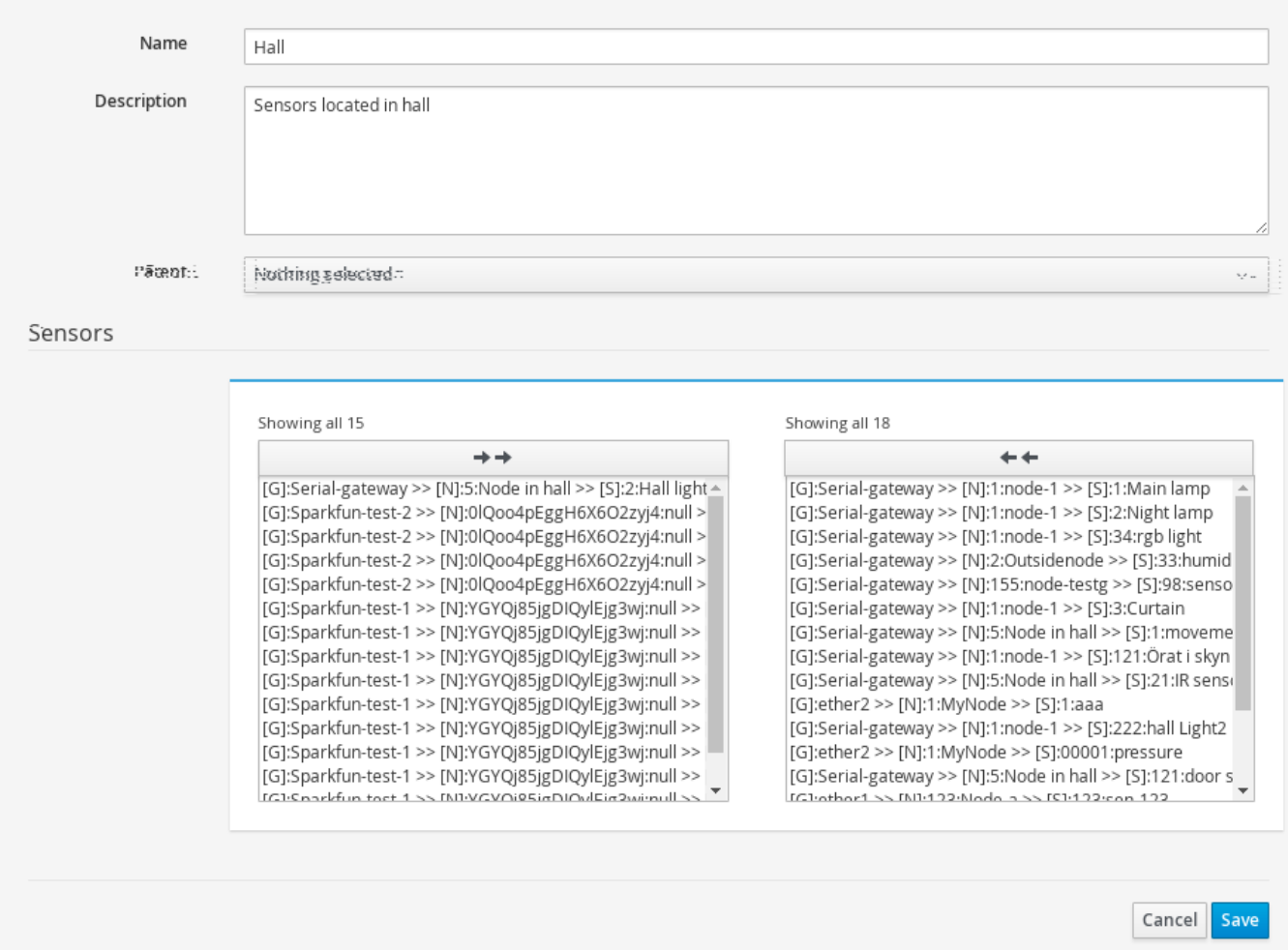
Add room

To add new room click on the button

and update `Name` of the room and room

`Description` If it is nested room, select parent room. You can select `Sensor` from here as well as from sensors page.

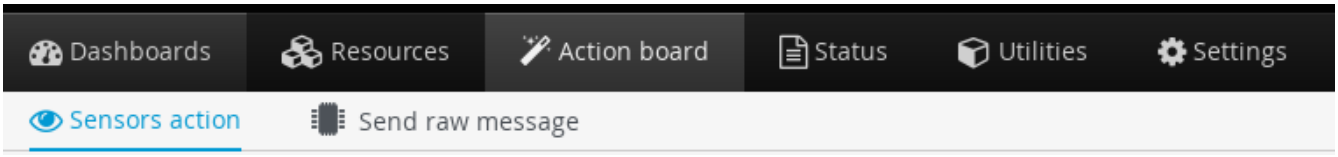
A sensor can be mapped with only one room!



Action board

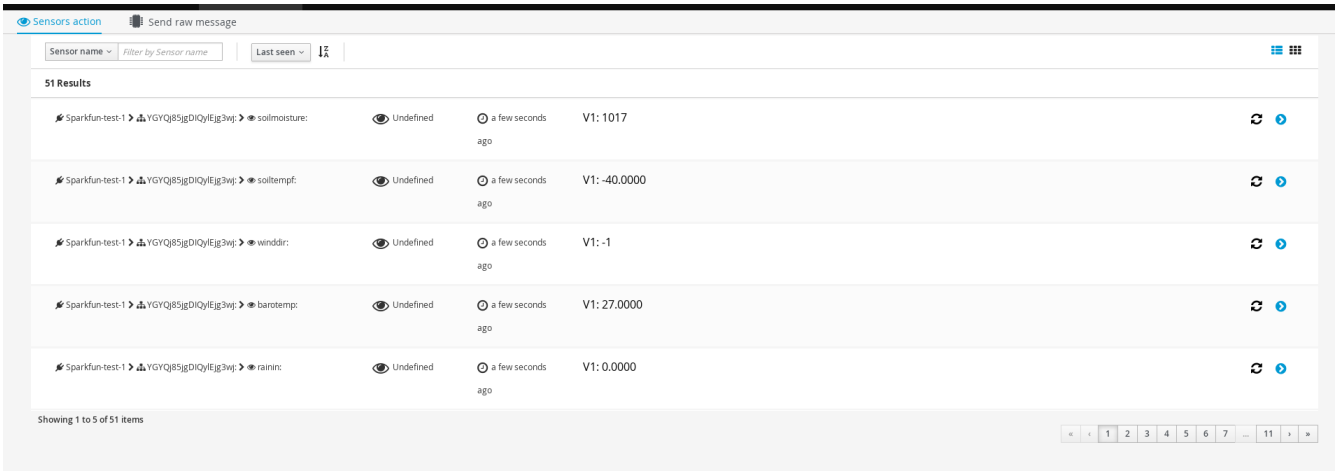
You can perform set of actions here.

Sensors action

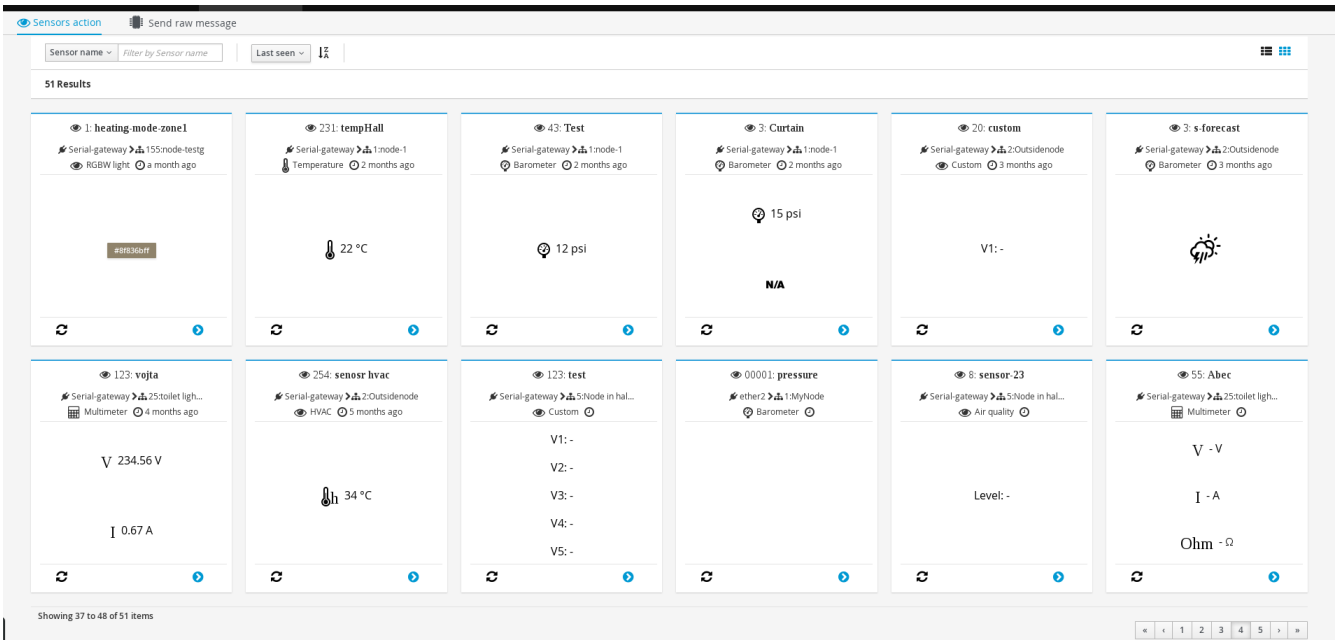


All available sensors will be listed here. You can perform any action on any sensor. This board can be changed to `List view` (default) or in `Card view`. You can change view by selecting menu on top right corner of the page.

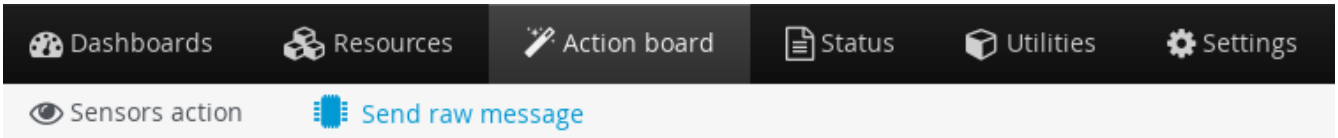
List view



Card view

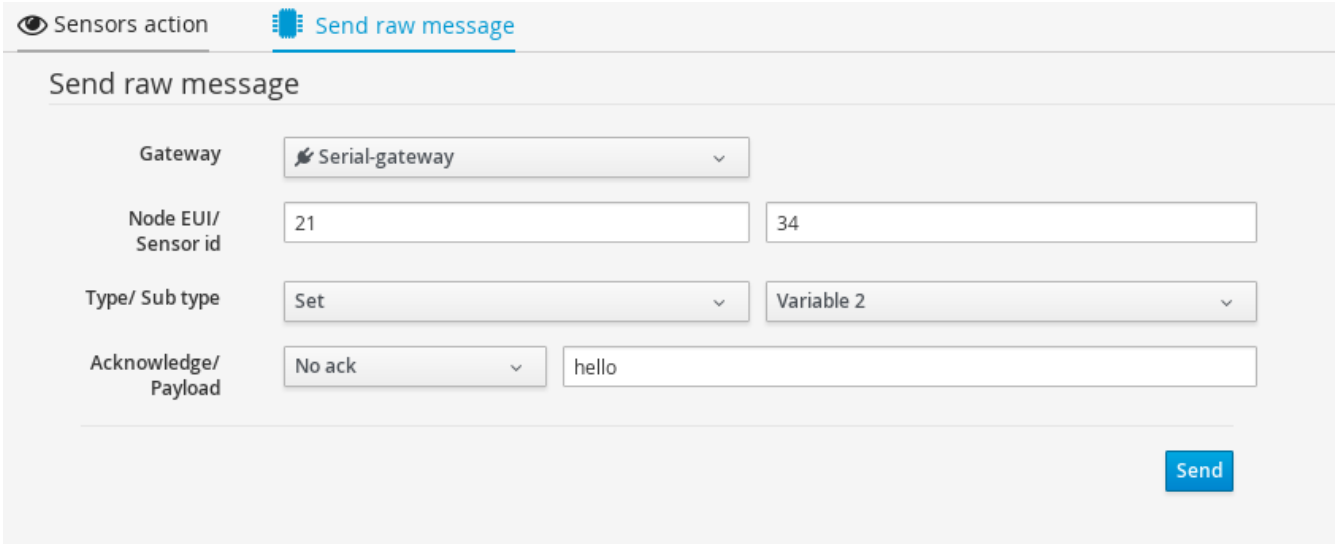


Send raw message



You can send any type of message from here to your sensor. Goal of this page to send not supported types by MyController and user can do some manual test on sensors network

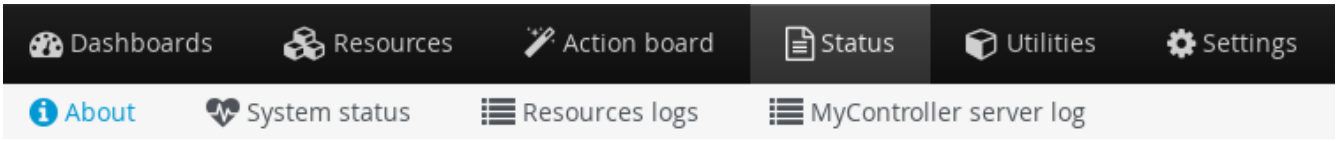
Example



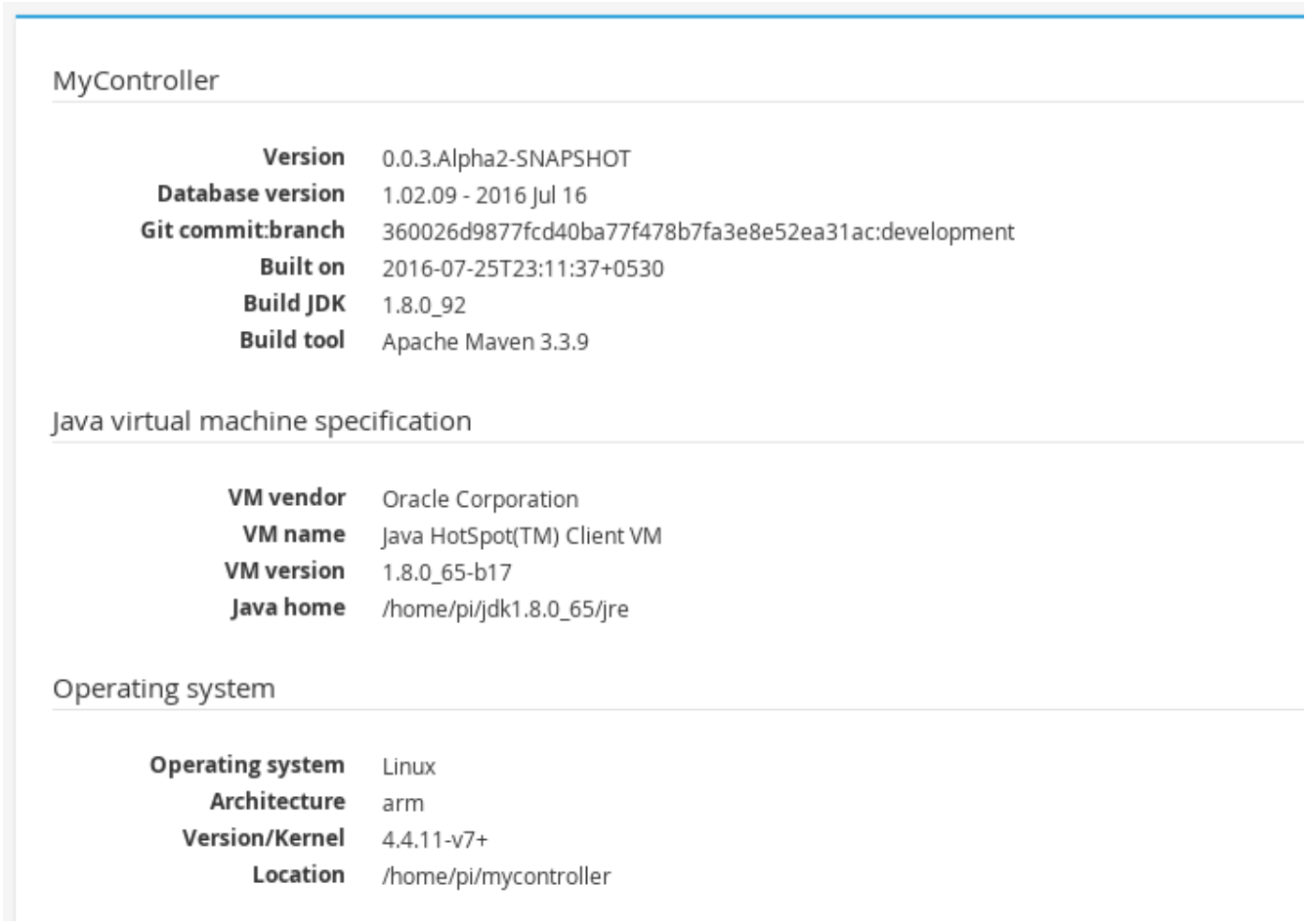
Status

With status pages to can get status about your sensors and MyController. In simple word this is the place to debug the things.

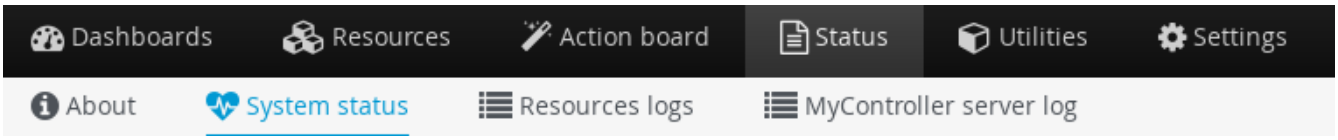
About



About page lists quick details about MyController's configurations.



System status

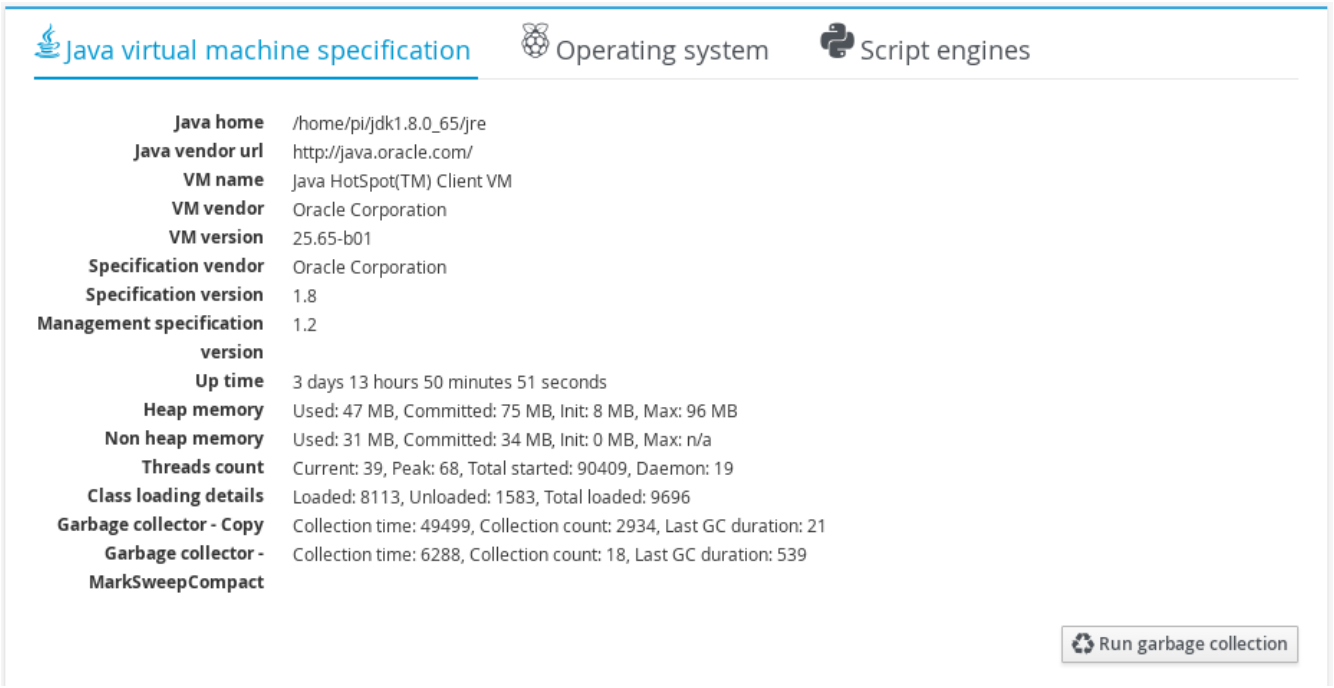


System status page lists bit more about MyController different configurations like,

- Java virtual machine specification
- Operating system
- Script engines

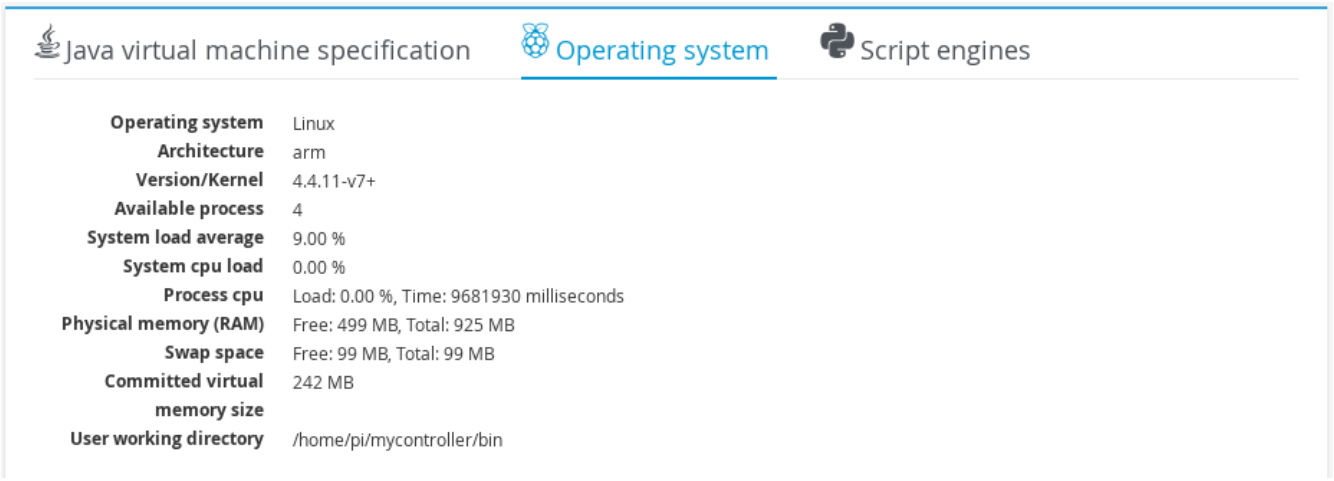
Java virtual machine specification

Lists detail about JVM. You can perform `Run garbage collection` from this page by clicking on



Operating system

Gives detail about current operating system.

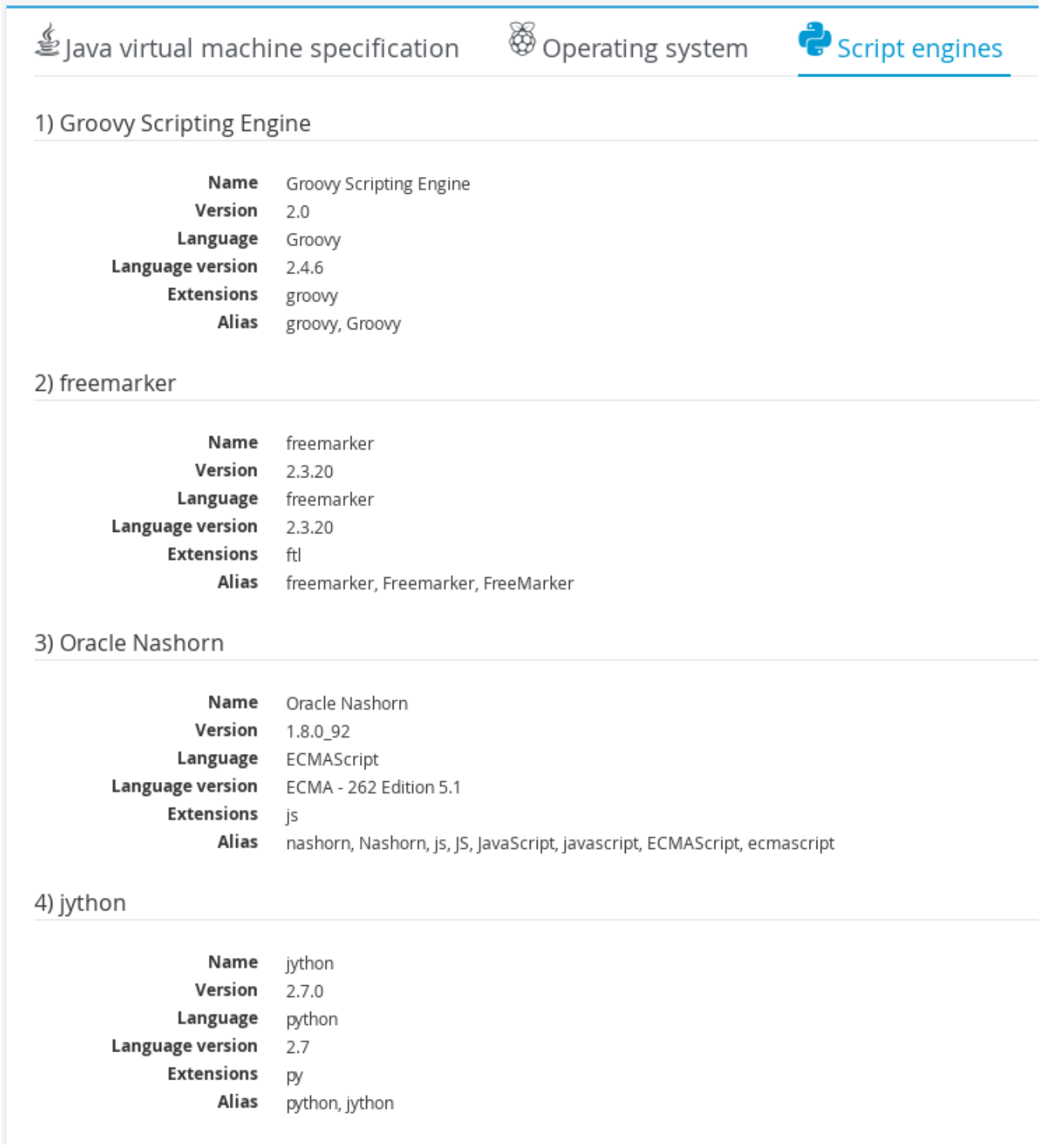


Script engines

Gives detail about supported script engines. By default following script engines are shipped with MyController,

- `Oracle Nashorn` - Supports to execute `Java scripts`
- `Groovy Scripting Engine` - Supports to execute `Groovy` scripts
- `freemarker` - It is template engine used across MyController

You can add any number of script engines. If it supports for `JSR 223` specifications.



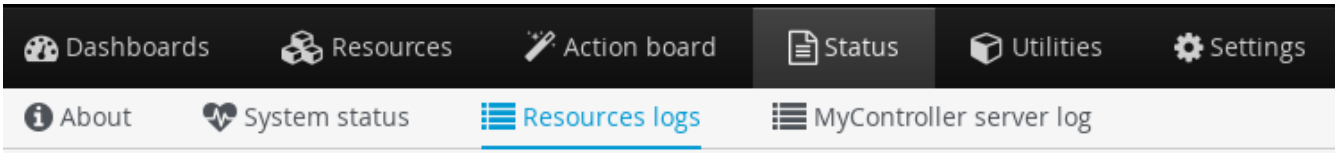
Steps to add new script engine

Download jar file and place it under `mycontroller/lib/` and restart MyController services.

For example if you want to add `Python` support on MyController, you need to add `Jython` library.

- Download `jython-standalone-*.jar` from Jython website.
- Place it under `mycontroller/lib/`
- Stop MyContorller
- Start MyController

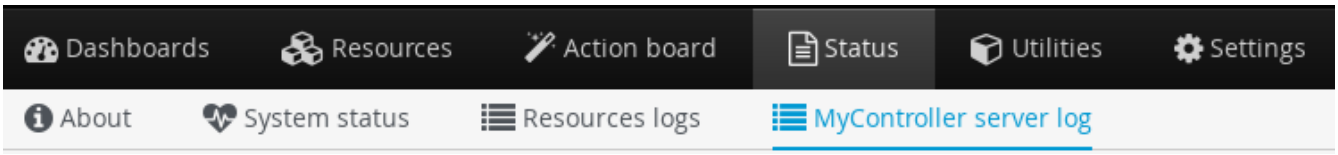
Resources logs



In this page you can understand whats going on about your sensors network. It a is good place to do debugging about your sensors.

By clicking `Purge` button on this page, you can remove all existing logs or selected logs with filter.

MyController server log

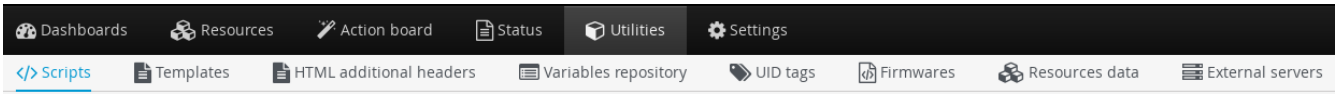


In this page you can watch backend log file `mycontroller/log/mycontroller.log` from GUI.

Utilities

Under utilities you can store scripts, templates, additional headers, variables repository, UID tags, firmwares, external serves details.

Scripts



MyController supports for custom scripts, they can be used to perform any kind of operation or in `Rule`. MyController gives set of API for your needs. With this API's you can query/set data in MyController.

Two types of scripts are available,

- Condition
- Operation

Condition

Condition scripts are used for `Rule` engine. If you are not satisfied with pre defined rule conditions you can write your own script. Your script should return either `true` or `false` or inside script set `mcResult` variable as boolean value.

In python return `true` or `false` will not work. set your result in `mcResult` variable.

Operation

Operation scripts are used for other than `Rule` engine condition type. Can be used on `Operation`, `Dashboard`, etc.,

Script examples

Script's API: javadoc API's are added in script environment. You can access any supported API's with mcApi object.

Java script

Take an example I want to display last seen of node details in dashboard.

```
var myImports = new JavaImporter(java.io, java.lang, java.util); ①

with(myImports) { ②
  var options = new HashMap(); ③
  //Sort by lastSeen.
  options.put("orderBy", "lastSeen"); ④
  //Order by descending
  options.put("order", "desc"); ⑤
  //Page limit, only 5 result
  options.put("pageLimit", new Long(5)); ⑥
  //Get nodes data
  var nodes = mcApi.node().getAll(options); ⑦
}
```

① Import required packages for our coding. `JavaImporter` is used to import packages. You can import any numbe of packages with comma separated.

② Add our imports `with` loop

③ Create a `HashMap` to add our query filter values.

④ Adding a filter `orderBy` as `lastSeen`

⑤ Adding another filter `order` as `desc`

⑥ Adding another filter `pageLimit` as `5`

⑦ Store queried results in the variable `nodes`, can be used in templates(refer templates section) `mcApi` already binded with script engine, you can use it to query/set values from/to MyController.

Groovy script

I want to print serial gateways on MyController log file.

```
import org.mycontroller.standalone.gateway.GatewayUtils.GATEWAY_TYPE ①
def filters = [name: 'Serial-gateway',  pageLimit: 10L, type: GATEWAY_TYPE.SERIAL] ②
def queryResponse = mcApi.gateway().getAll(filters) ③
mcApi.logger().info("Quesry Response:{}", queryResponse) ④
```

① Import `GATEWAY_TYPE` enum, will be used to filter

② Create filter list with filter values, Filtering with gateway `name` contains `Serial-gateway` (case sensitive), `type` as `GATEWAY_TYPE.SERIAL` and limiting count on request as 10 `10L` with the key `pageLimit`

③ Calling MyController API(`mcApi.gateway().getAll(filters) `) with our filter

④ Printing result under `mycontroller/log/mycontroller.log` as `INFO` log.

When log level set at `ERROR`, `INFO` logs will not be printed!

Python script

In this script we are getting gateways detail and printing in log file.

```
from java.util import HashMap ①
from java.lang import Long ②
options = {'pageLimit': Long(20)} ③
gateways = mcApi.gateway().getAll(HashMap(options)) ④
mcApi.logger().info("Quesry Response:{}", gateways) ⑤
```

① Import `HashMap` should be used to send filter queries

② Import `Long` used to send java `Long` type

③ Create filter with `pageLimit` of `20`

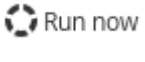
④ Query MyController with `McApi` and store result in `gateways`

⑤ Print result in `mycontroller/log/mycontroller.log` file.

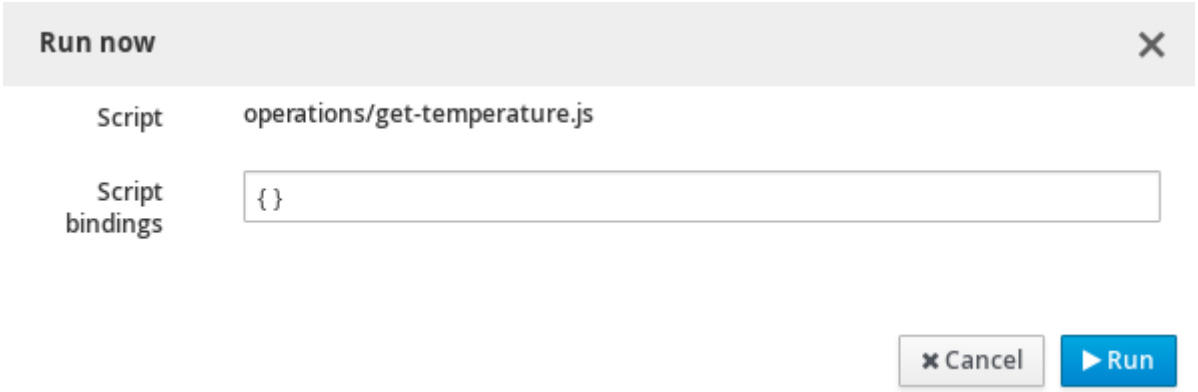
Add script

To add new script click on

Enter `Name` of the script, `Extension` type, script type(`Type`) and script content. You can select script from files also.

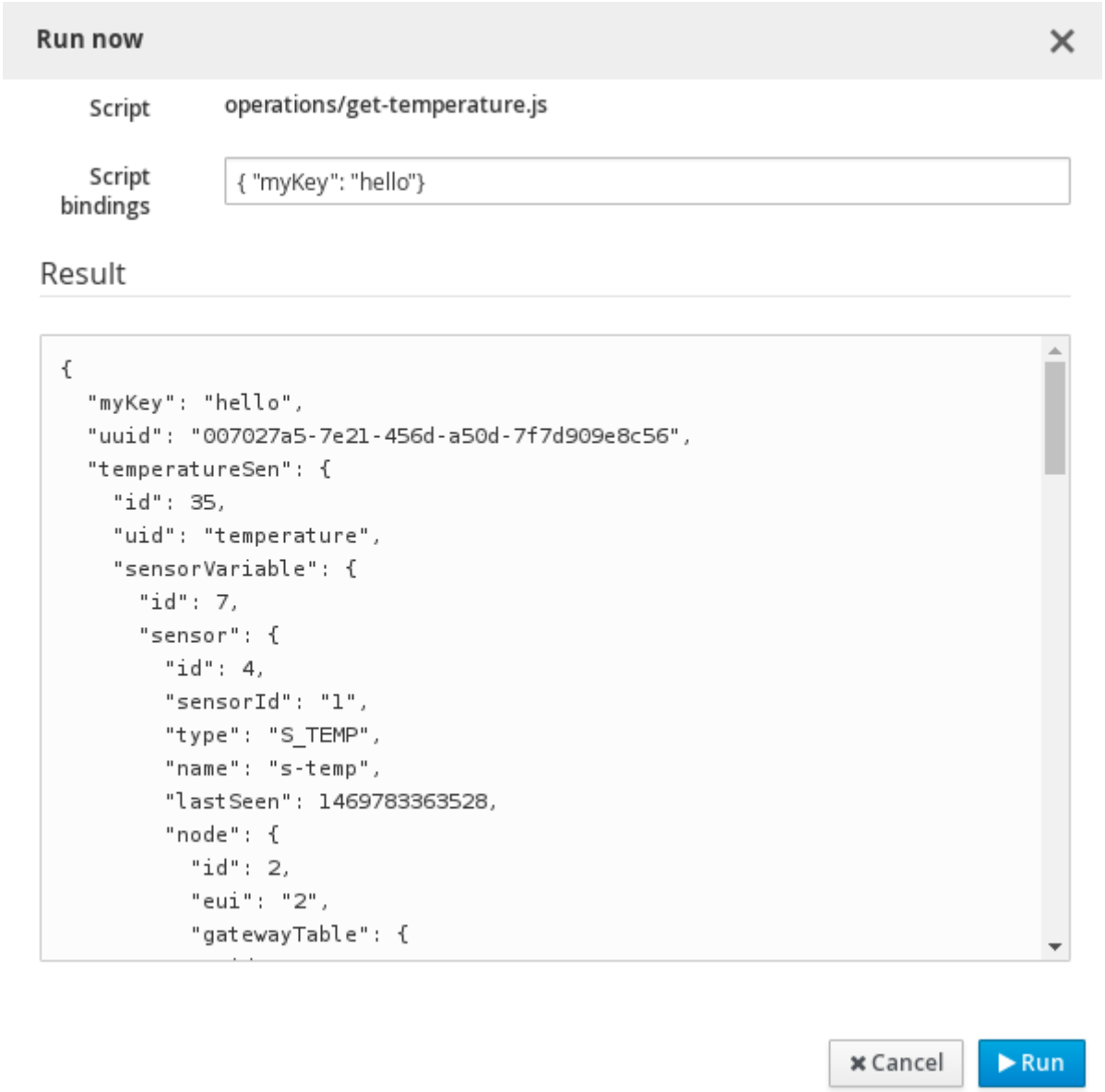
Once you have added script you may want to test, is it working as expected. To test script Select your script and click on 

from actions list. You will get a page to feed bindings options as displayed here,



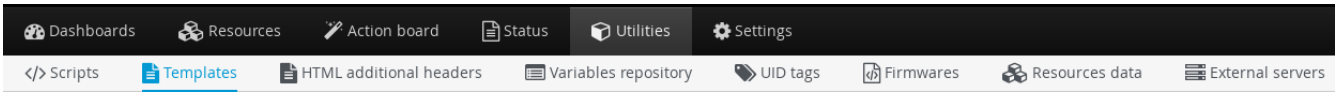
You can feed `script bindings` and click on `Run` Result(`json` format) will be displayed on the same

page as follows,



script bindings should be in `JSON` format.

Templates



Templates are used to send email and in dashboard for custom widgets. MyController uses freemarker as template engine. Refer the docs for the complete format supports.

Syntax example

This template used to display nodes status on dashboard. To run this template you have to select example scripts that queries node status.

```
<table class="table table-hover table-bordered table-striped mc-table">
  <thead>
    <th>Status</th>
    <th>EUI</th>
    <th>Name</th>
    <th>Type</th>
    <th>Battery level</th>
    <th>Last seen</th>
  </thead>
  <tbody>
    <#list nodes.data as item> ①
      <tr>
        <td class="text-center">
          <#if item.state == "UNAVAILABLE"> ①
            <i class="pficon pficon-help text-color-gray fa-lg"></i>
          <#elseif item.state == "DOWN">
            <i class="pficon pficon-error-circle-o fa-lg"></i>
          <#elseif item.state == "UP">
            <i class="pficon pficon-ok fa-lg"></i>
          </#if>
        </td>
        <td>${item.eui}</td>
        <td>${item.name}</td>
        <td>${item.type.text}</td> ③
        <#if item.batteryLevel??>
          <td><span>${(item.batteryLevel)!"-"} %</span></td> ④
        <#else>
          <td><span>-</span></td>
        </#if>
        <td><span uib-tooltip="{{${(item.lastSeen)!} |
date:mchelper.cfg.dateFormat:mchelper.cfg.timezone}}" tooltip-placement="left" am-
time-ago="${(item.lastSeen)!'Never'}"></span></td>
      </tr>
    </#list>
  </tbody>
</table>
```

① for loop in template, from script we will get `nodes` object and fetching items one by one.

② `if` condition, checks node state (enum type)

③ we can call methods with .(DOT) notation. `${item.type.text}` is equalient to `item.getType().getText()`

④ Ignore `null` and assign default value.

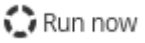
To allow `null` you have to add `!` at the end of statement >> `${(item.lastSeen)!}`, If you want to put default value on `null` value >> `${(item.lastSeen)!"-"}`

Add template

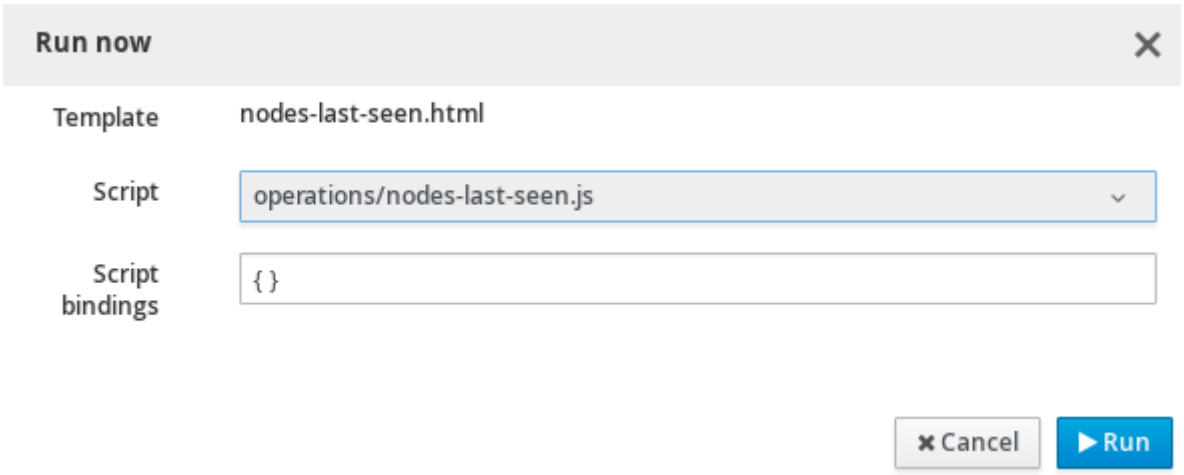
To add new template click on

and save with template `Name` and `Content` as shown in syntax example

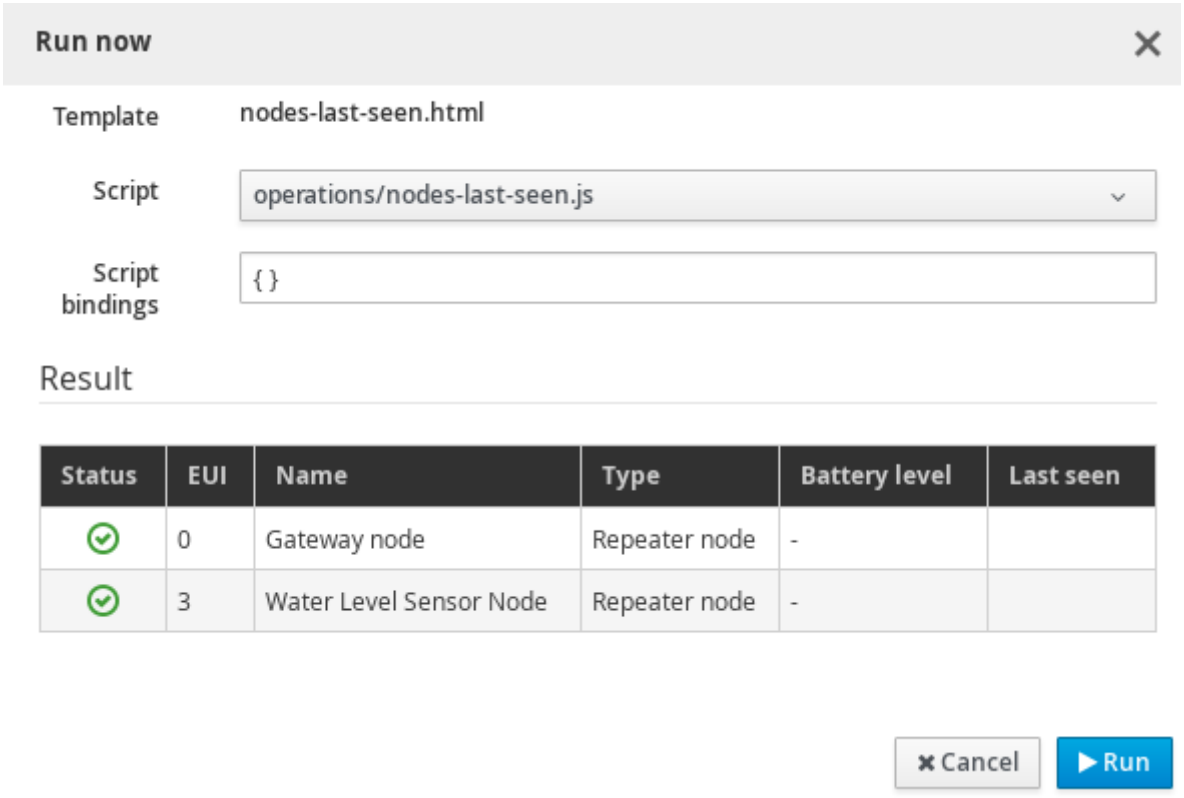
Run template

You may want to test your template immediately. For this go to list templates page and select your template and click on 

you will get a popup. You have select supported script for this template. If script is not required for this template leave this as blank. And add `json` buindings if needed.

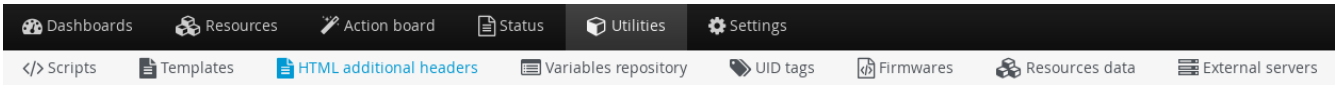


When you click `Run` selected script executed with `Script bindings` on back-end and script out put will be passed to template. Final result will be displayed on the pop-up as shown below.

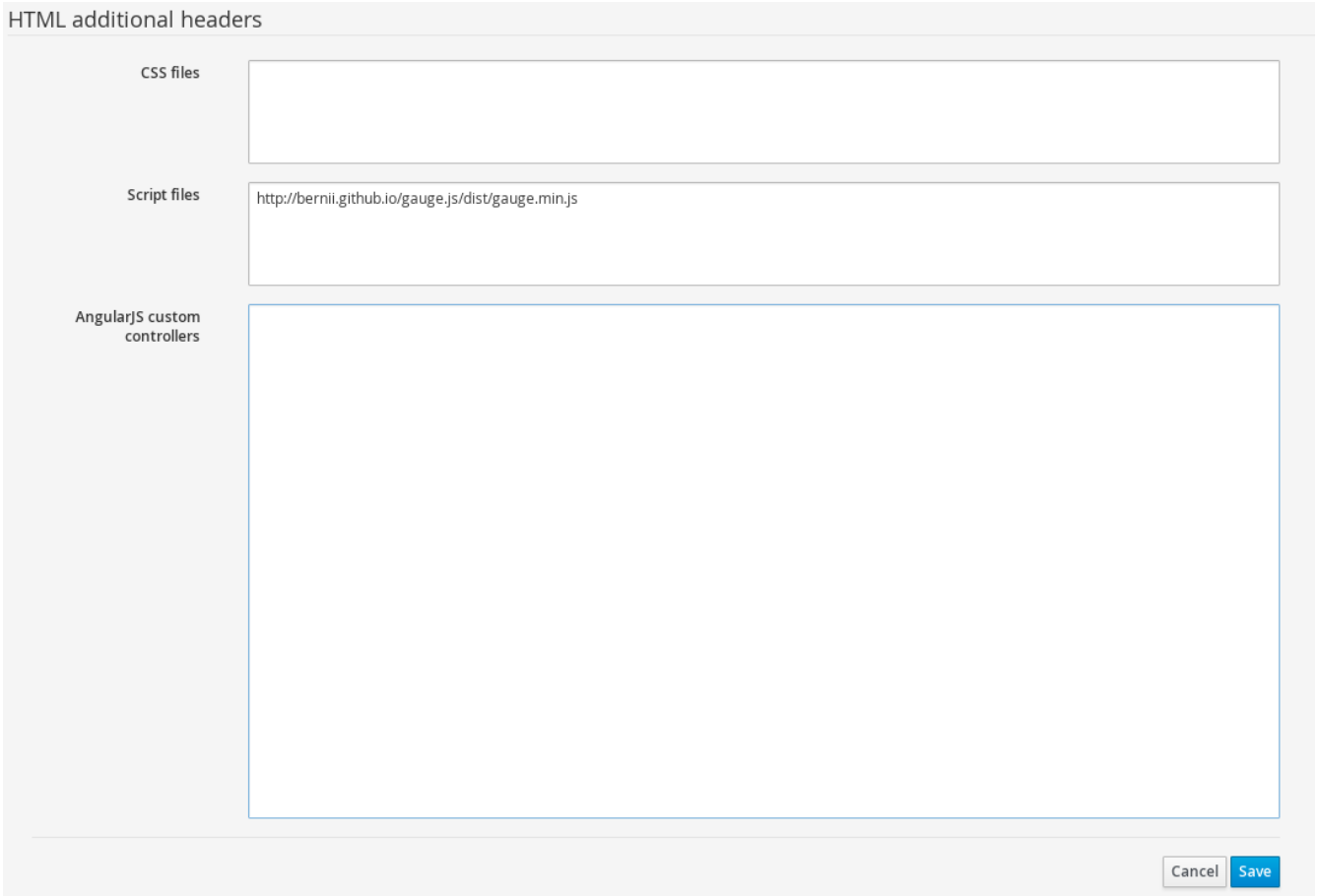


if you do not select any script, `Script bindings` directly passed to template engine.

HTML additional headers

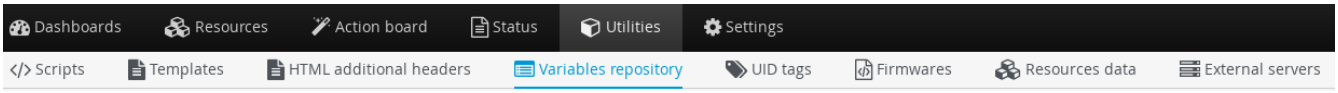


When there is situation like you have different widgets available on different sites and you want to use there own `js` or `css` along with MyController, here is the place to add those scripts and style sheets. You can also add your own custom `angular JS controllers`



When you do changes in `HTML additional header`, once you saved the changes, to reflect changes on your current browser session do browser refresh `F5`

Variables repository



With the support of variables repository you can keep some configurations here and use it across in scripts and templates.

Each reference has 4 fields, `key`, `value`, `value2` and `value3`.

Add a variable

To add a variable click on

buttons and

Example(JavaScript):

```
var variable = mcApi.variable().get("myKey"); ①
variable.getKey() ②
variable.getValue() ③
variable.getValue2() ④
variable.getValue3() ⑤
```

① Get variable called `myKey`

② Get the `key` for this variable, must be `myKey`

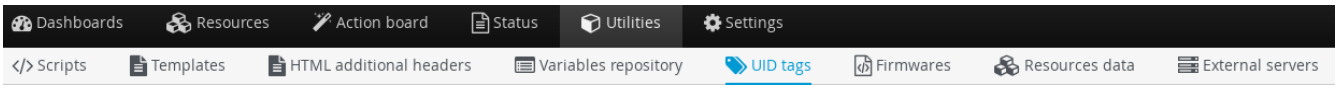
③ Get `value`

④ Get `value2`

⑤ Get `value3`

There is no field called `value1`. Do not try to call `value1`

UID Tags

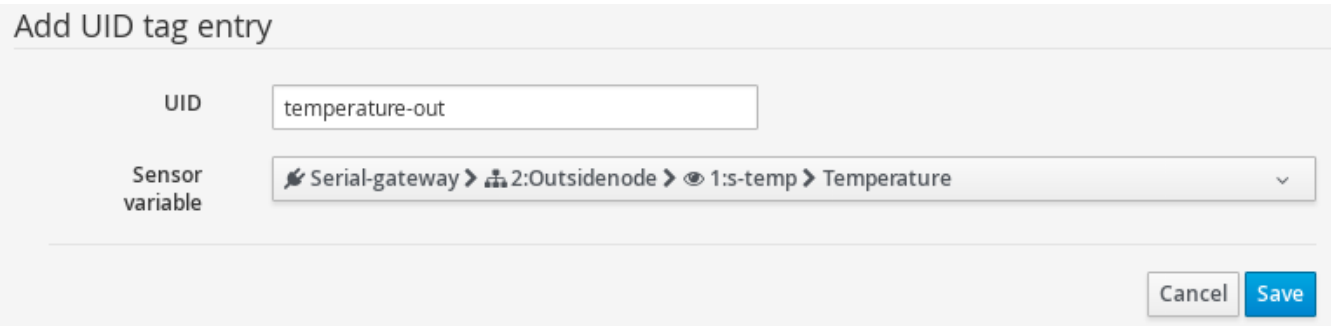


By script calling sensors variables you need lot of info like `gateway` details, `node` details etc., To bypass this we can `tag` a sensor variable with `String UID` and called from your script with this `UID`

Add new entry

To add new entry click on

and follow,



In script (Java script)

```
var sensorVariable = mcApi.uidTag().getByUid("temperature-out"); ①
mcApi.logger().info("Sensor variable Details: {}", sensorVariable); ②
```

① Get `Sensor variable` object with UID `temperature-out`

② Print received object on logger file (`mycontroller/log/mycontroller.log`)

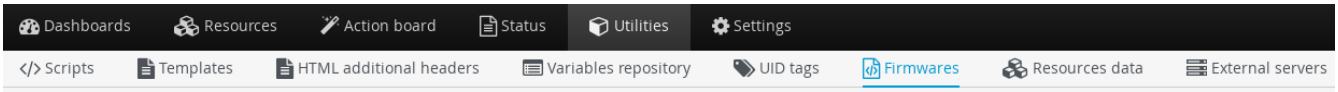
Firmware

You can control node firmware with the help of MYSBootloader or DualOptiboot-bootloader.

Your node should be running with the bootloader either `MYSBootloader` or `DualOptiboot-bootloader`

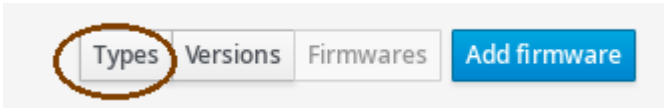
What you can do?

- Upload new firmware
- Change existing firmware to new latest
- Maintain nodes firmware up to date



Each `firmware` is maintainable with `Type` and `Version`. You can keep `N` number of version on each type.

Add Firmware Type



Click on `Type` you will get firmware type page. Clicking `Add firmware type` you can add new firmware type.

`Id` for the firmware type will be generated automatically. If you leave 'Type Id' as blank.

Add Firmware Version

Click on `Version` you will get firmware version page. Clicking on `Add firmware version` you can add new firmware version. While adding firmware version you can leave 'Version Id' as blank. Id will generated automatically. If you have any requirement for specified id add it.

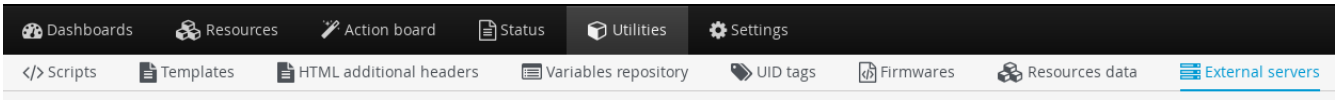
`Id` for the firmware version will be generated automatically. If you leave 'Version Id' as blank.

Add Firmware

When you click `Firmwares` on top menu, you will landed on firmwares page. If you are in firmwares `Type` or `Version` page you will reach by clicking on

Clicking `Add firmware` you can add new firmware. Select Firmware type and version from the pop-up and select .hex from your local computer. Finally click Add. Your firmware is ready for actions.

External servers



When there is need to keep all your sensors metrics on external servers. You have to put an entry here.

Supported external servers

- Emoncms.org
- Influxdb
- Sparkfun [phant.io]

You can add any of the supported server on this page and map your resources with your server. MyController will take care rest of things.

To add external servers click on `Add external server`

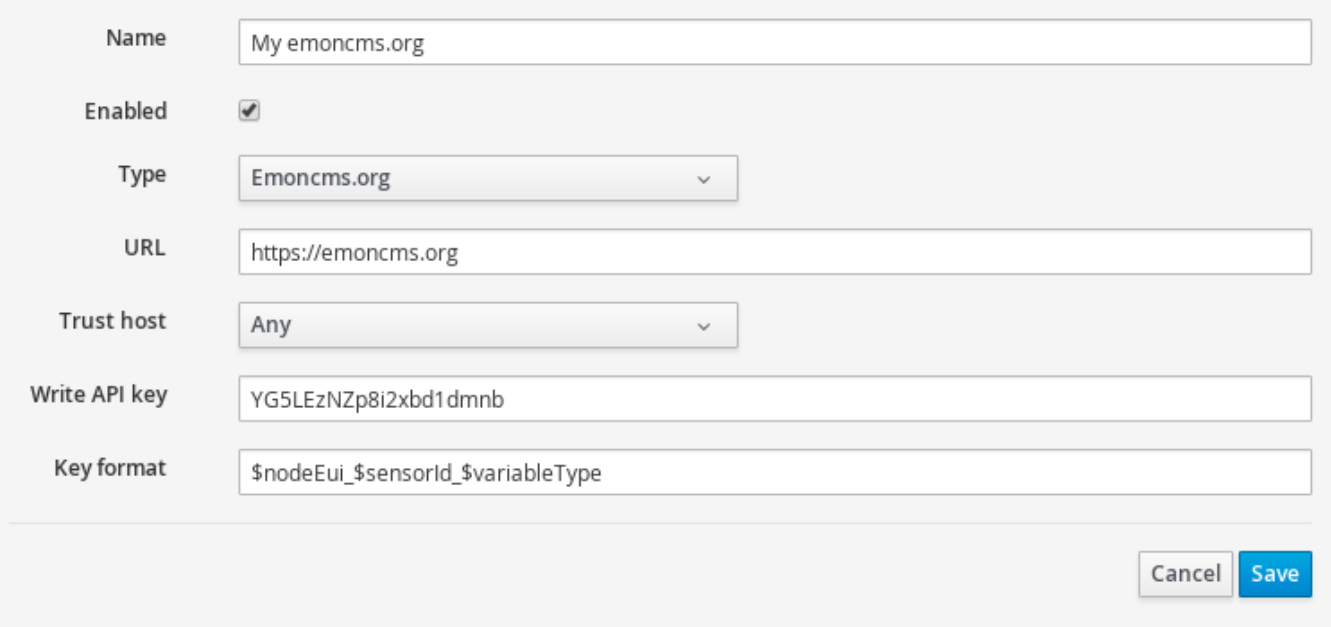
Common fields across servers,

- `Name` - Name it your server
- `Type` - select your server type
- `URL` - Your server url
- `Trust host` - select trust host type
- `Key format` - How your resource `key` should be formed, Supported variables `$nodeName`, `$nodeEui`, `$sensorName`, `$sensorId` and `$variableType`

When your external server configured with `SSL` certificate, connection will fail. To bypass `SSL` certificate use `Any` as `Trust host`

Emoncms.org server

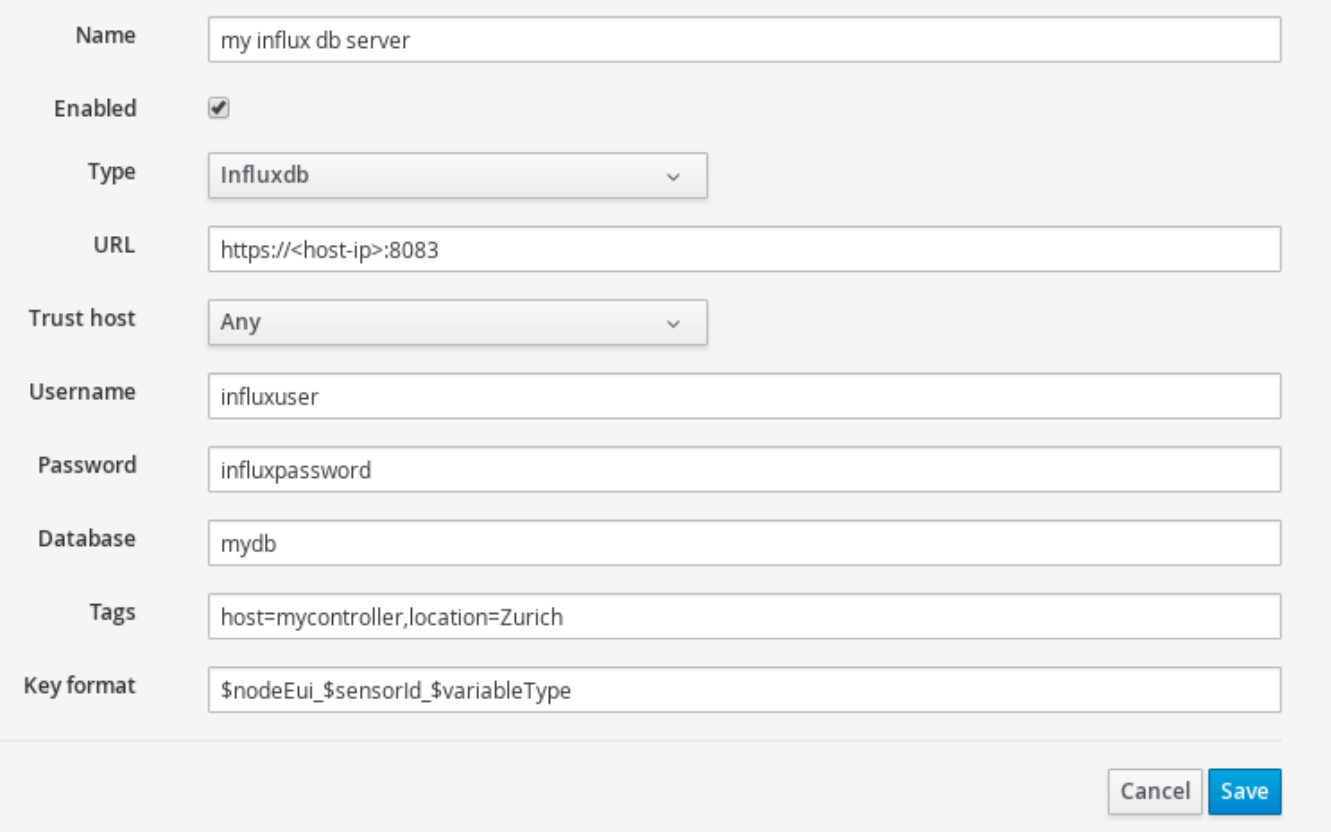
- `Write API key` - get this key from Emoncms.org server account page.



Influcxdb server

- `Username` - username of influxdb
- `Password` - Password of influxdb
- `Database` - Database name of influxdb
- `Tags` - You can assign any number of tags with comma separated.

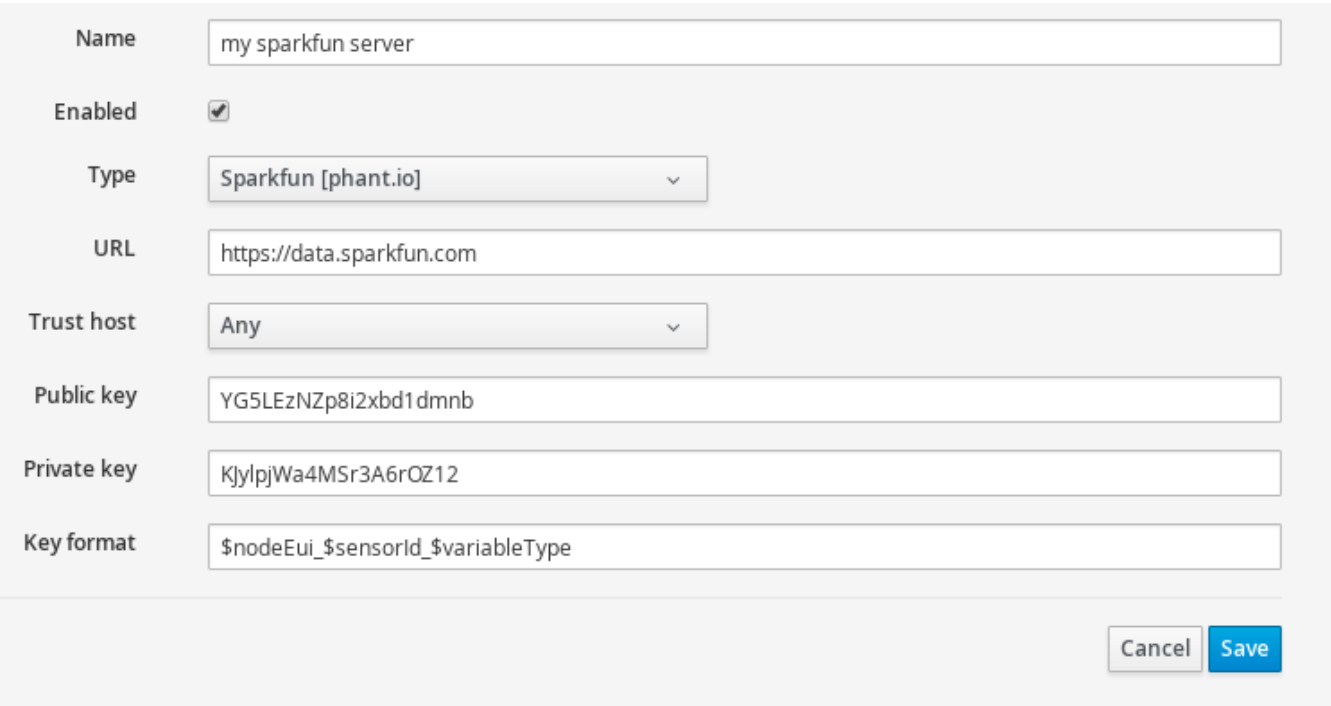
You can leave `username` and `password` fields as blank if you do not have



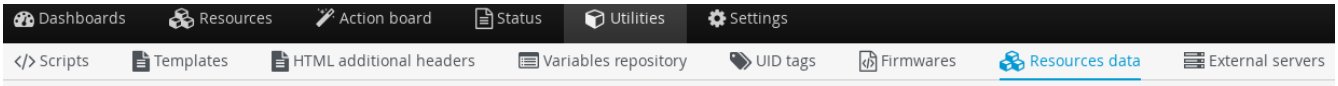
Sparkfun server

- `Public key` - Public key of your Sparkfun account
- `Private key` - Private key of your Sparkfun account

You have to create Sparkfun account with only one field. If you have more than one field sending will failed. Because MyController sends only one sensor variable data with timestamp. Kindly note `key` is case sensitive in Sparkfun.



Resources data



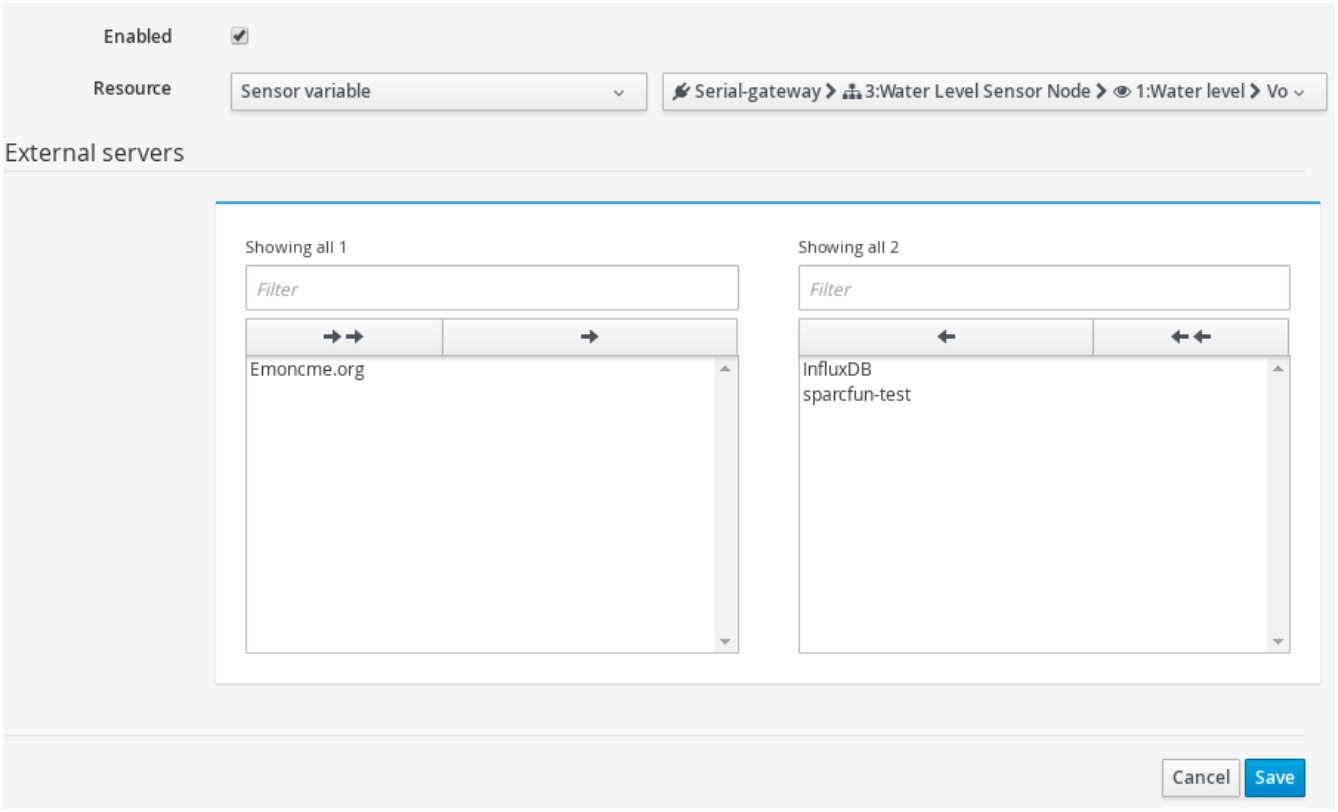
Once you have created `External servers`, now it's time to configure what are resources data to be sent to external server and to who are all. For all these you have to configure `Resources data`

Supports for 4 types of resources,

- `Gateway` - Sends all the `Sensor variable's data under this `Gateway` to external server(s)
- `Node` - Sends all the `Sensor variable's data under this `Node` to external server(s)
- `Sensor` - Sends all the `Sensor variable's data under this `Sensor` to external server(s)
- `Sensor variable` - Sends only this data to external server(s)

Add resources data

To add new entry click on `Add Resource` and follow as shown bellow,



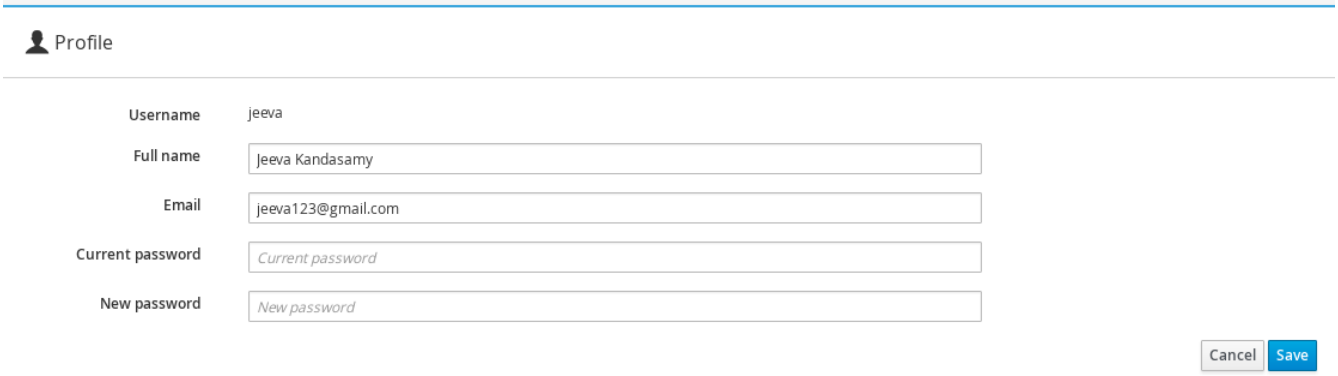
You can disable sending data at any time. We can do disable in two locations. If you do not want to send data to particular server, do disable on `External servers` page. If you do not want to send particular resource data, do disable on `Resources data` page

Settings

This is the location where you can control various global settings.

Profile

You can change your logged in user `Full name`, `Email`, `Password` here.



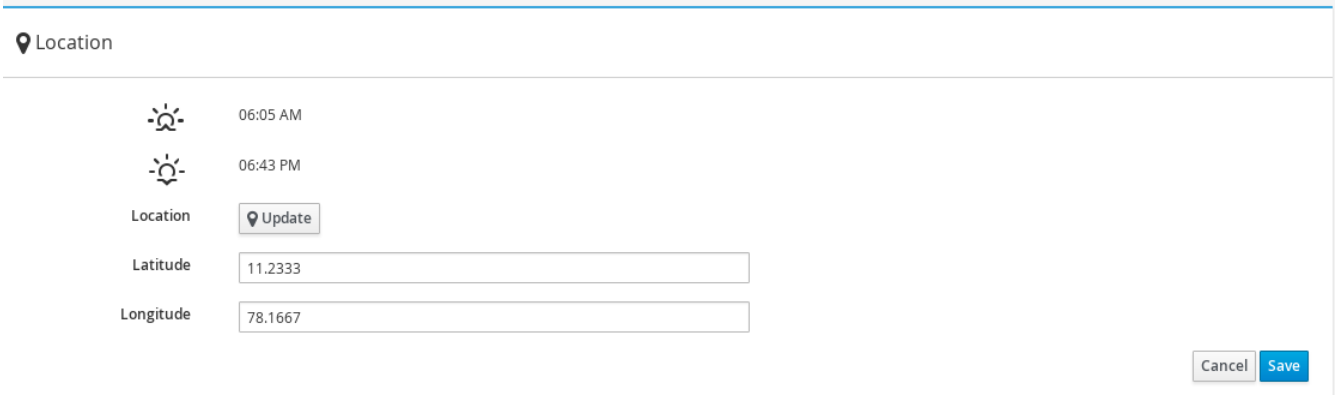
System

Under system, you can see location settings and MyController settngs

Location

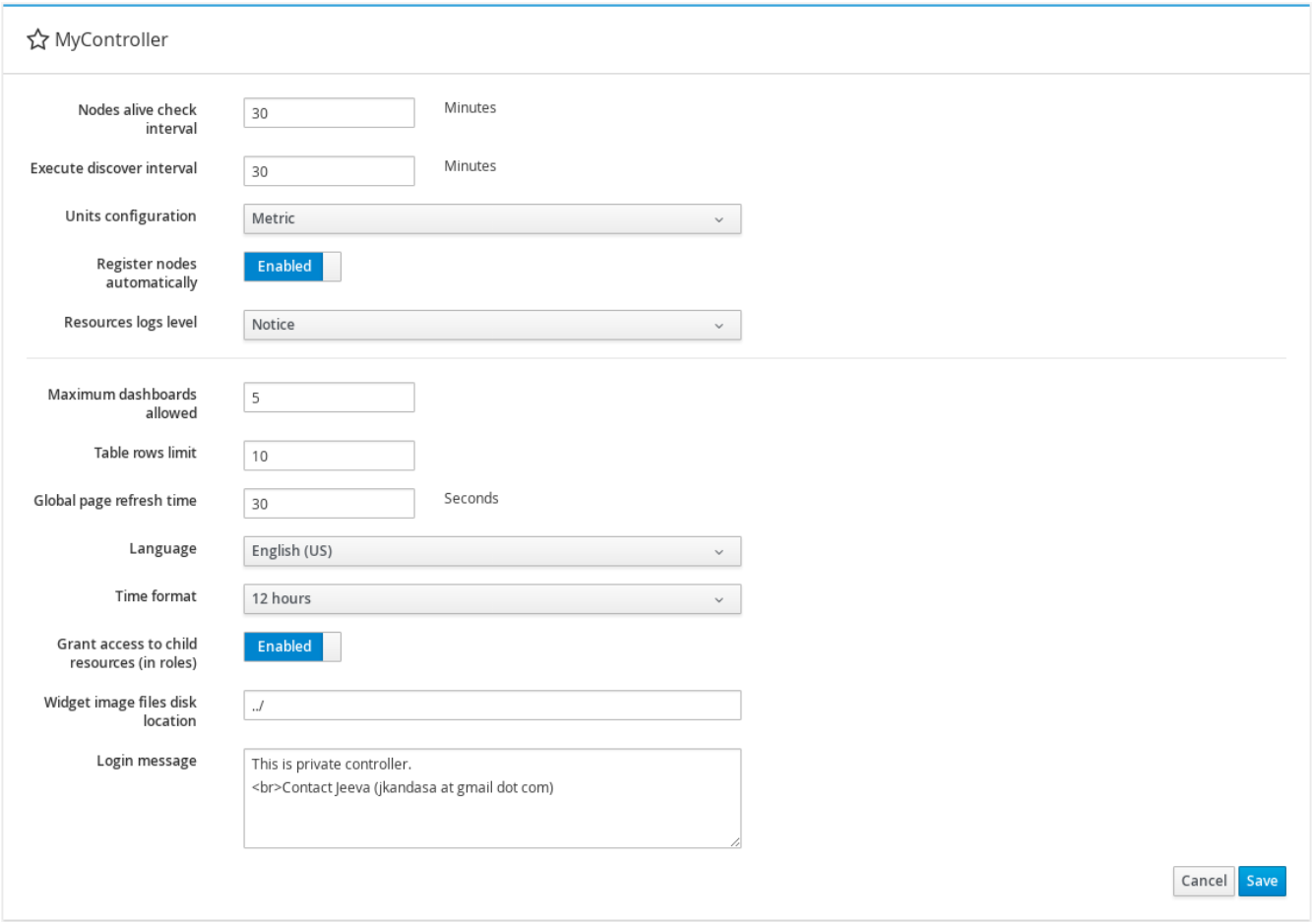
You can see `Sunrise` and `Sunset` on `Rule`. Time will be calculated based on this location settings. By clicking `Update` current location will be taken from your browser and will be updated.

You need internet connection to get current location from browser. however to calculate `sunrise` and `sunset` time, internet is not required.



MyController

Here you can set meny settings, which used globally.



- `Nodes alive check interval` - Every 30 minutes (default) once nodes alive status will be calculated. MyController will send `Ping` to all the nodes. If there is not data for last 30 minutes, node will be marked as down. You can change this interval.
- `Execute discover interval` - Every 30 minutes once this util will be executed. By executing this util real time topology page will be updated.
- `Units configuration` - You have to define here that you want to use `Metric` or `Imperial`
- `Register nodes automatically` - When you disable this button, when new nodes added automatically, `Registration status` will be kept as `New`, data will not be logged from this node until the registration status changed to `Registered`.
- `Resource logs level` - You can define here, what time of sensors logs should be captured.
- `Maximum dashboards allowed` - You can change this settings when you required more than 5 dashboards.
- `Table rows limit` - This settings used across all the tables on MyController
- `Global page refresh time` - Where and all auto page refresh is happening, this interval will be used.
- `Language` - MyController supports many locale. You can set parmenantely your language here.
- `Time format` - You can set MyController should you 12 hours format or 24 hours format
- `Grant access to chield resources` - When you create role, if you assign a `Gateway` do you want to control only the `Gateway` or all the resources on the `Gateway`. This is applicable for nodes too.
- `Widget image file disk location` - There is widget on dashboard `display static image`. Local

images are taken from this location. Due to JVM memory issue. There is a restriction on image size. allowed size only up to 7 MB.

- `Login message` - You can sent your own login message. This message will be displayed on login page.

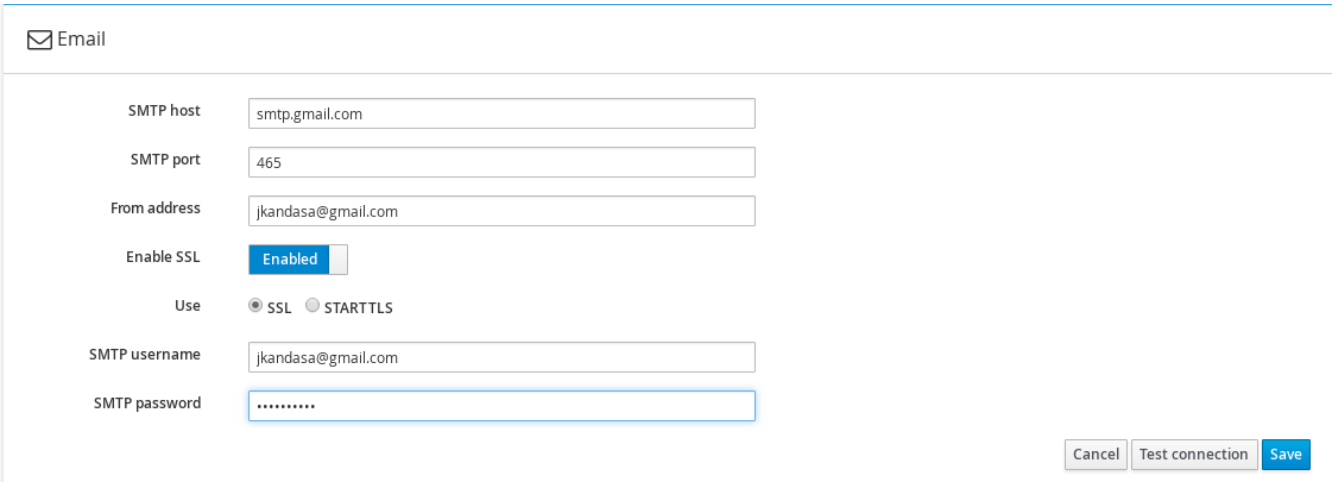
Don't you see you language? Or not fully changed to your locale? Please contribute on Locale project

`Resource logs level` is different than MyController logs. To change MyController log level change it on `mycontroller/conf/logback.xml`

Notifications

In this page you can set `Email`, `SMS` and `Pushbullet` access settings.

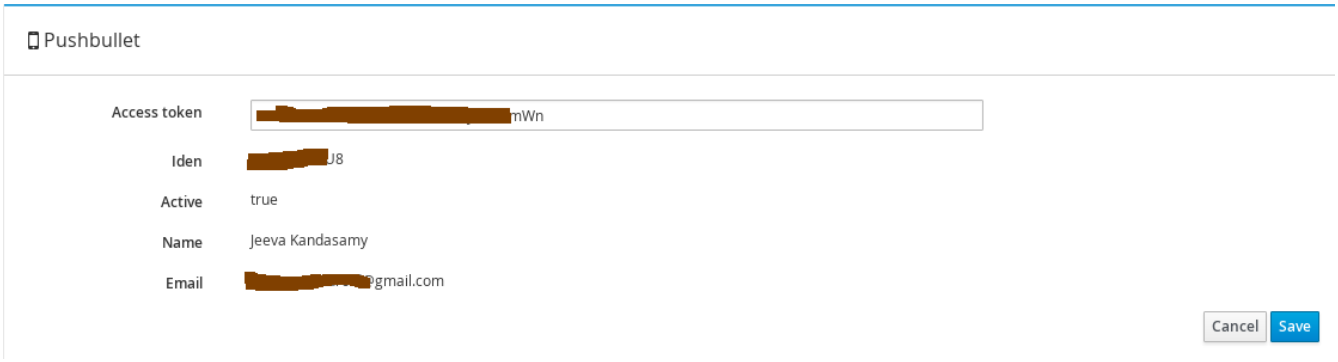
Email



- `SMTP host` - Enter SMTP host of your emails service provider
- `SMTP port` - port number of email server
- `From address` - When sending email from MyController this address will be added as from address
- `Enable SSL` - If your email server supports for SSL, you should enable this option and select use only `SSL` or `STARTTLS`
- `SMTP username` - username for your email server
- `SMTP password` - password for your email server

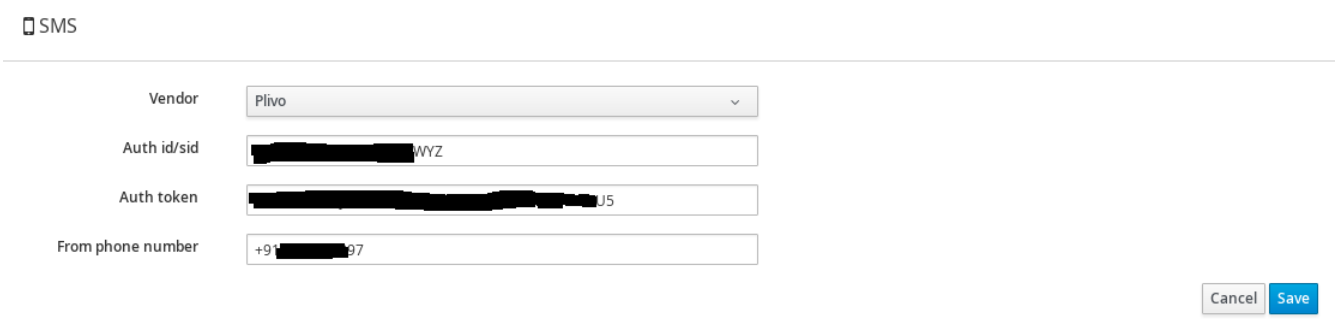
Before adding email server settings detail. You can test settings by clicking on `Test connection`. This action will send an email to your `From address`.

Pushbullet



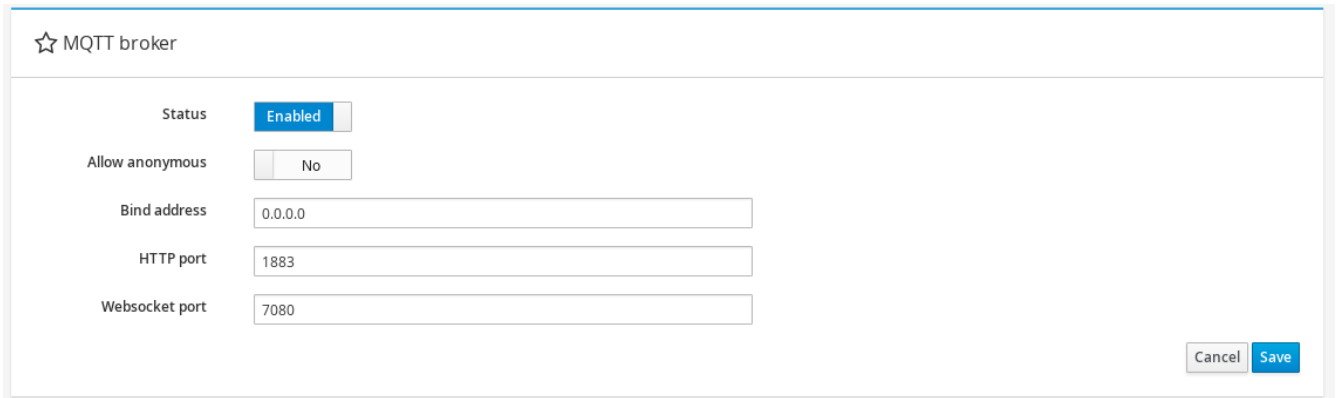
- `Access token` - add access token from your Pushbullet account and click on save. Other settings will be added automatically.

SMS



- `Vendor` - Currently supports for `Plivo` and `Twilio`. You can choose either for SMS service.
- `Auth id/sid` - Get from your vendor account details
- `Auth token` - Get from your vensor account details
- `From phton number` - number displayed as from phone number.

MQTT broker



MQTT broker settings can be changed here. You can do enable or disable MQTT broker without restarting MyController server.

- `Status` - Current status of MQTT broker. You can do enable or disable
- `Allow anonymous` - Allow users without authentication(no user name and password)
- `Bind address` - Broker service should be binded with the IP address. `0.0.0.0` meant bind will all

interfaces

- `HTTP port` - MQTT broker HTTP/TCP port
- `Websocket port` - websocket port of MQTT broker

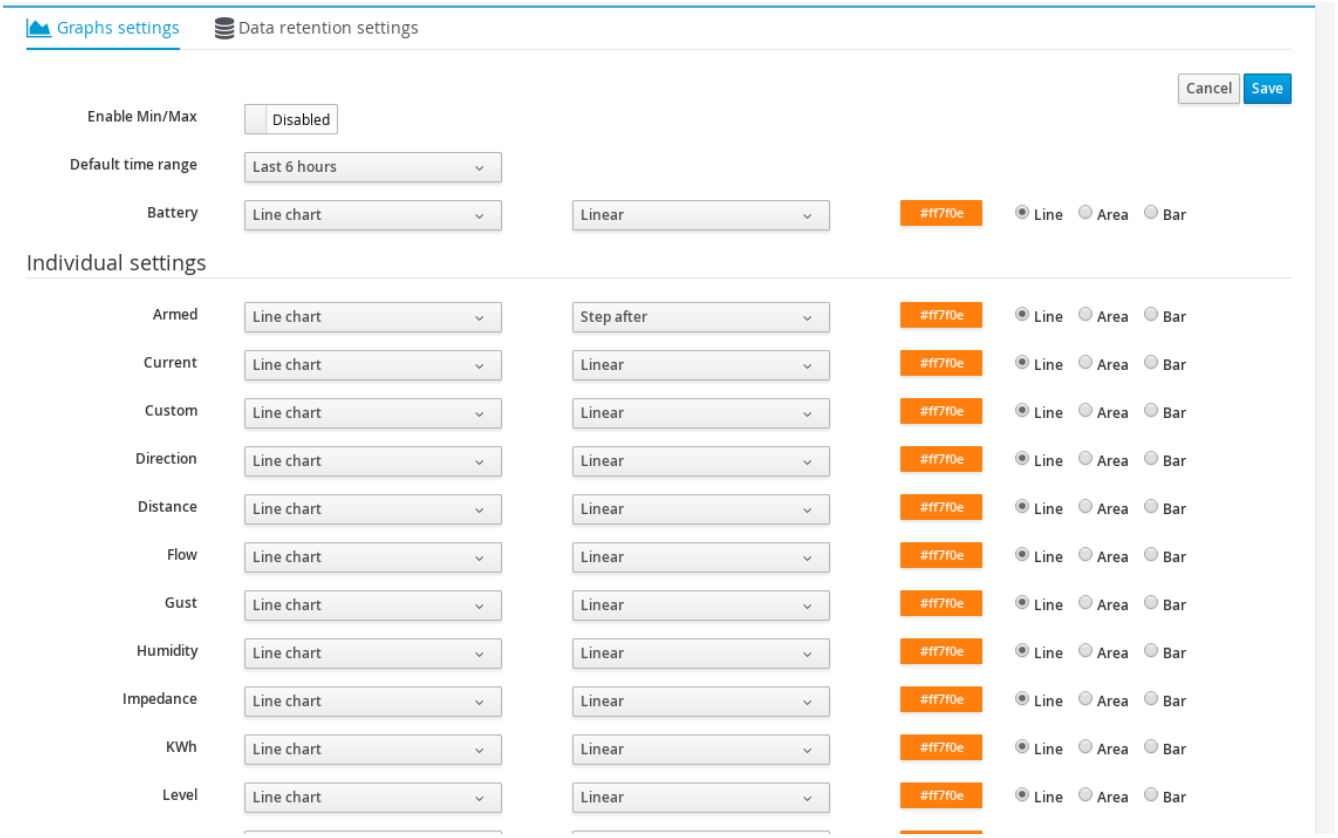
Metrics

Under metrics settings you can change graph settings and data retention settings

Graphs settings

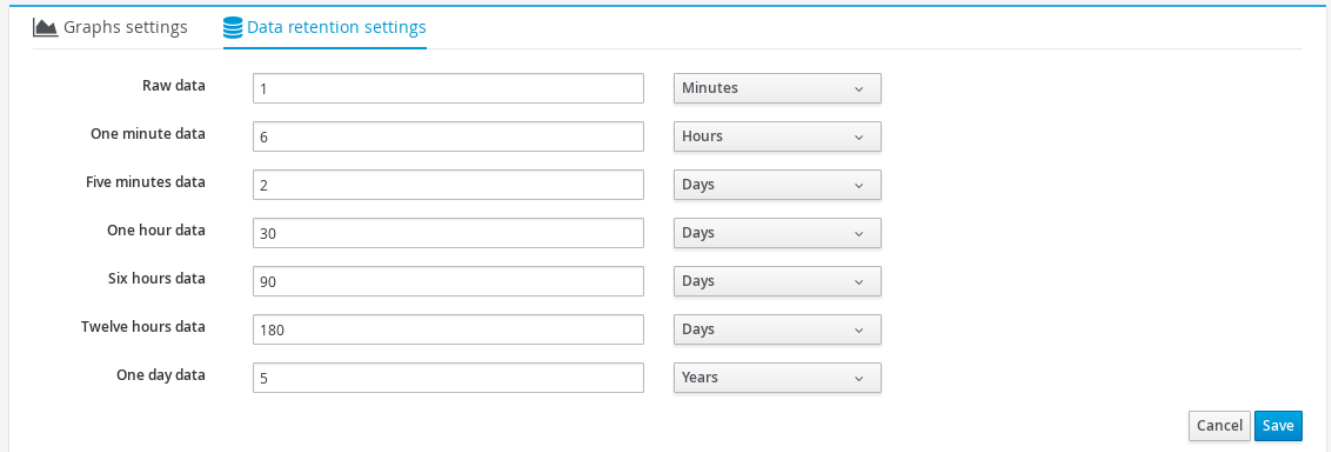
You can change global graph settings here.

- `Enable Min/Max` - Enable or disable Minimum and Maximum graph settings. If you disable this. shows only Average.
- `Default time range` - default time range in all graphs
- `Battery` - battery graph settings
- Sensor variables - set sensor variables graph settings for each type.



Data retention settings

This settings tell how long you want to keep data in MyController.

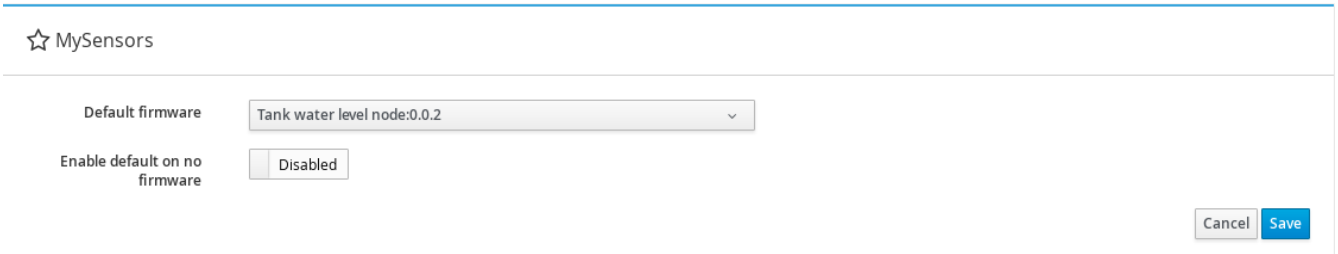


- `Raw data` - how long do you want to keep raw data
- `One minute data` - Every one minute `Raw data` will be calculated
- `Five minutes data` - Five minutes data will be calculated from `One minute data`
- `One hour data` - One hour data will be calculated from `Five minutes data`
- `Six hours data` - calculated from `One hour data`
- `Twelve hours data` - calculated from `Six hours data`
- `One day day` - calculated from `Twelve hours data`

Before do changes in `Data retention settings`, do a MyController backup. If anything you set wrongly can lead data loss. You can avoid this by taking backup.

MySensors

On this page you can set default firmware.



- `Default firmware` - select a default firmware, When there is request from MySensors network for firmware. this default firmware will be sent
- `Enable default on no firmware` - When there is request for specified firmware and that firmware is not available in system send default firmware when this option is enabled.

Variable mapper

You can map `Sensor variable's for each sensor types. This can be changed based on your requirement.

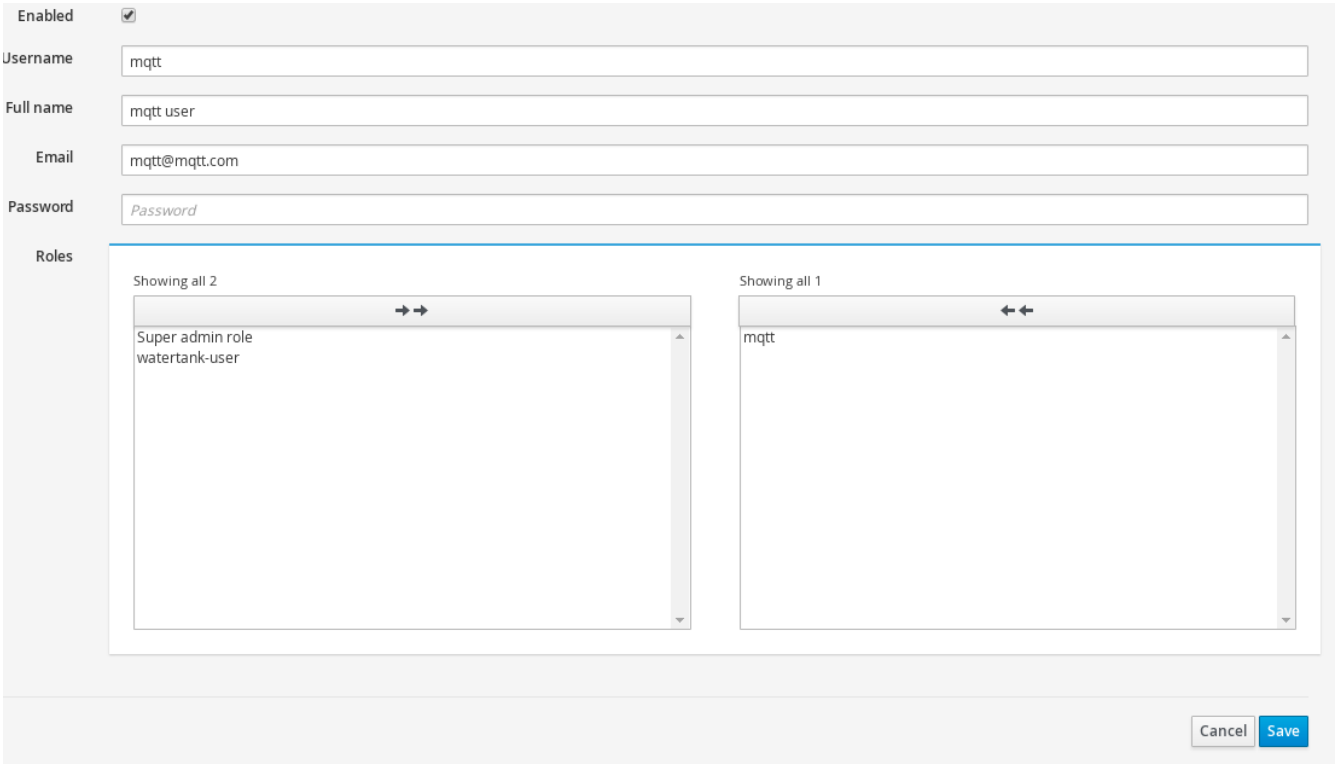
Users

You can add/edit/remove users.

Add user

To add new user click on `Add user`.

You can assign roles from here or on roles page.



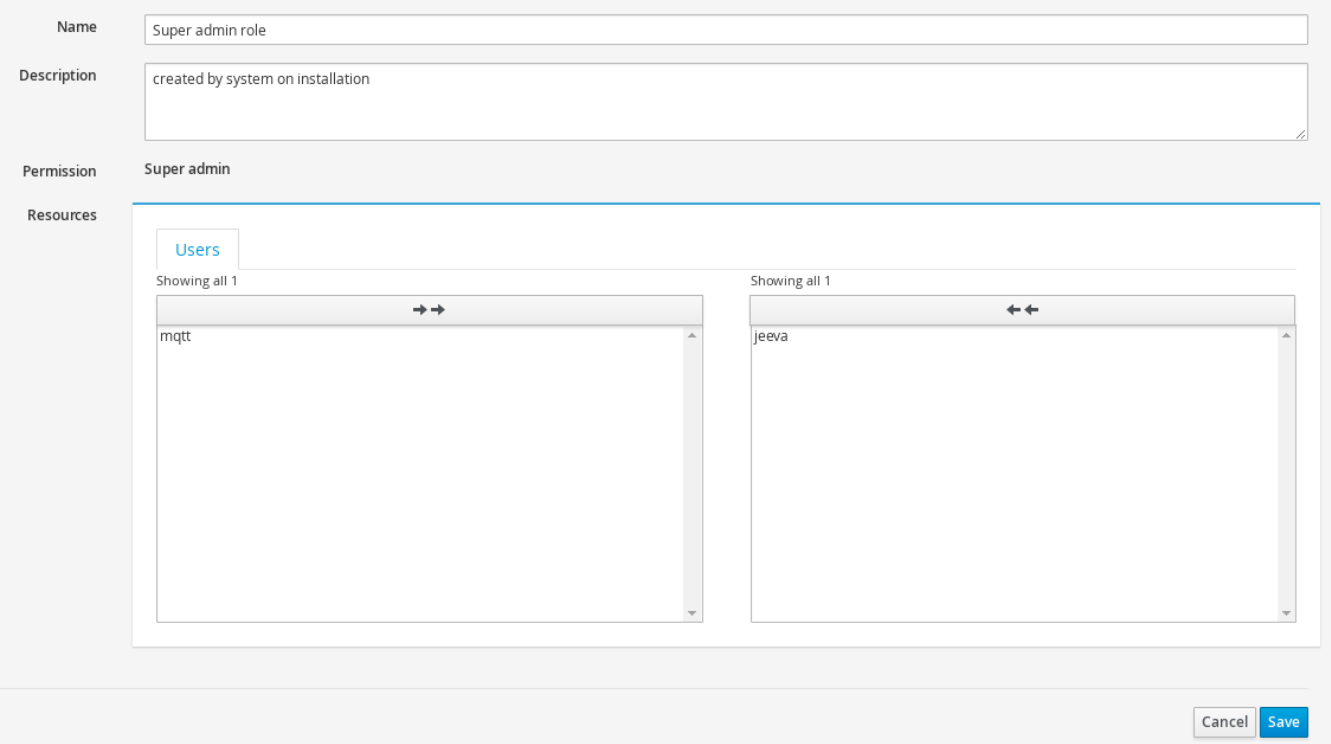
Roles

3 types of roles supported by MyController.

- Super admin
- User
- MQTT user

Super admin

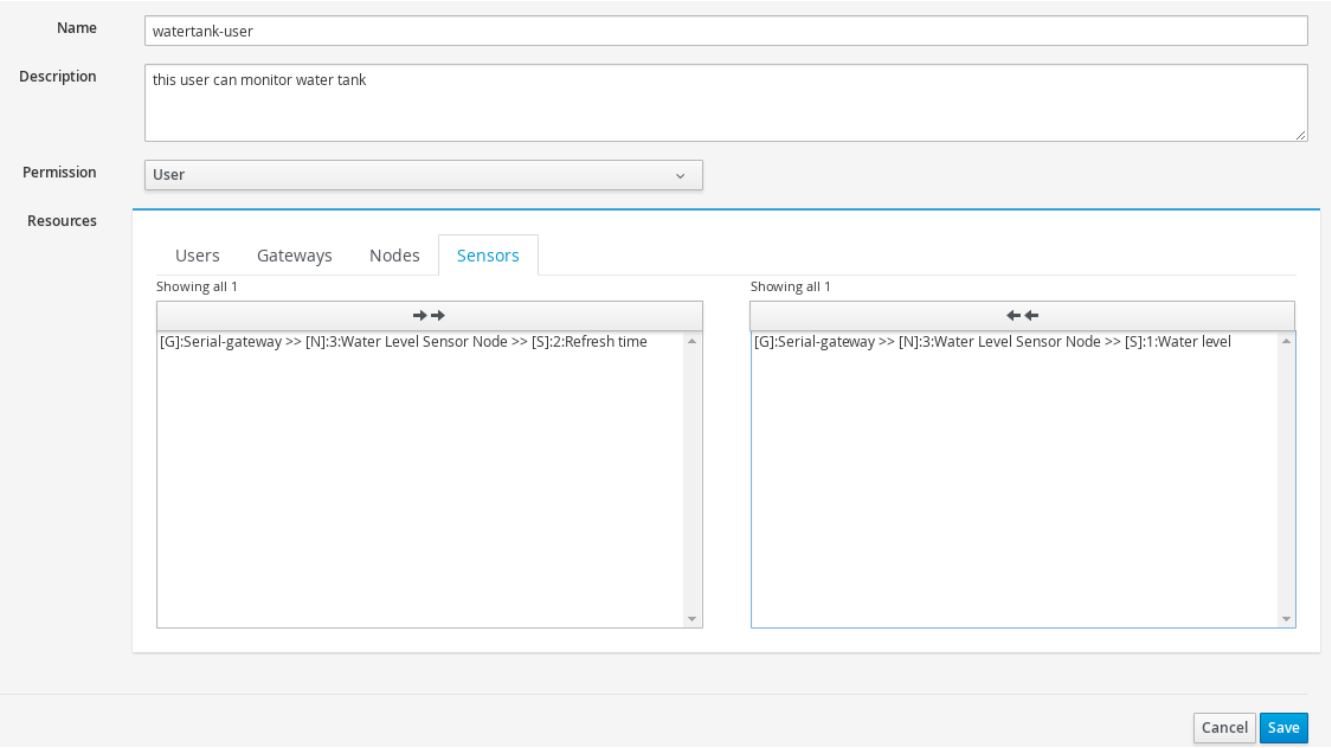
Super admin user can do anything on the controller. Only one super admin role created by controller on installation and you cannot create any new role with `Super admin` power.



Do not delete `Super admin` role. If you delete `Super admin` role, you cannot login.

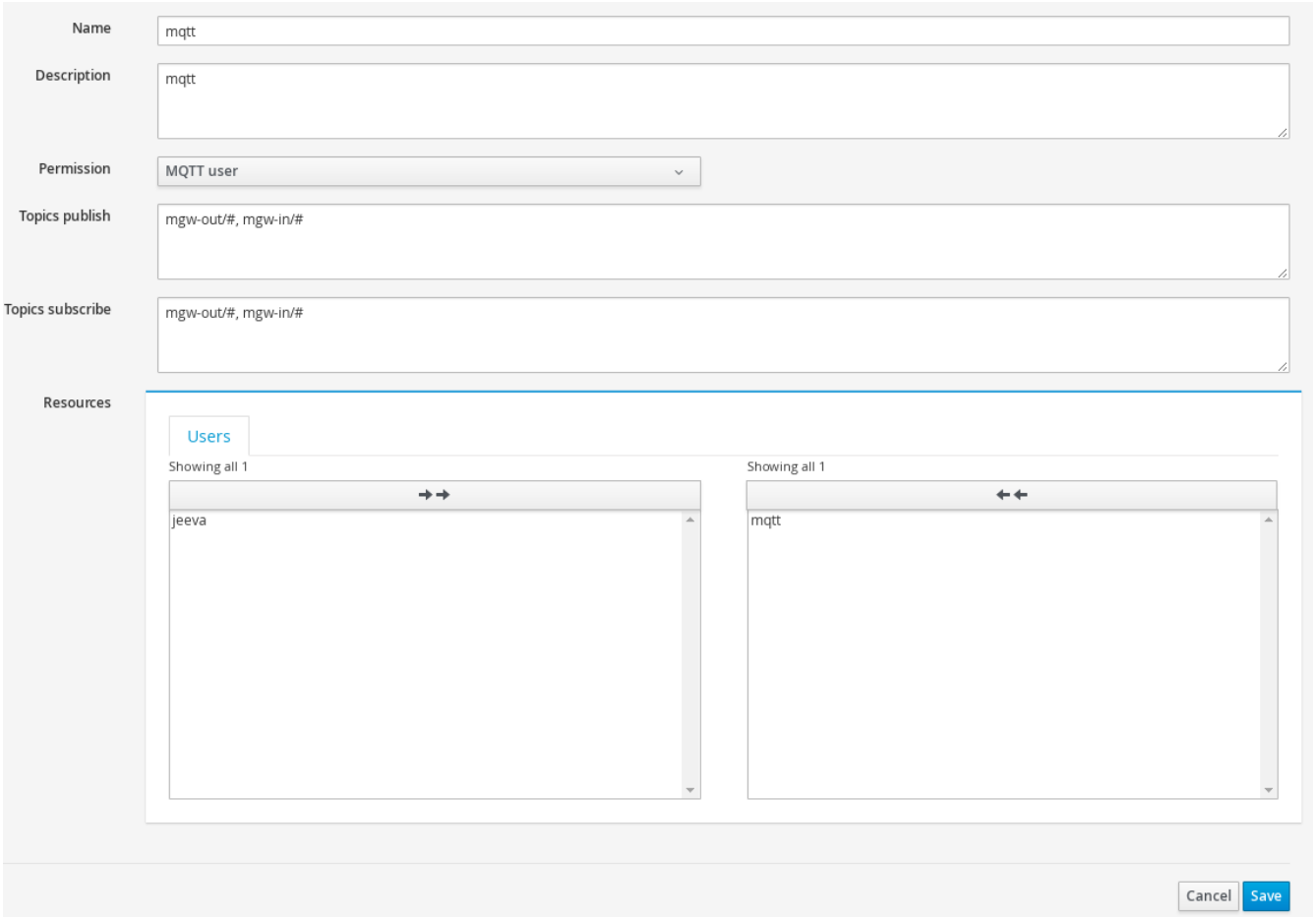
User

You can add any number of user role(s) with different access. You can assign resources for access when user logged in with this role.



MQTT user

You can add any user for `MQTT` authentication. Also you can restrict topics to `subscribe` and `publish`.

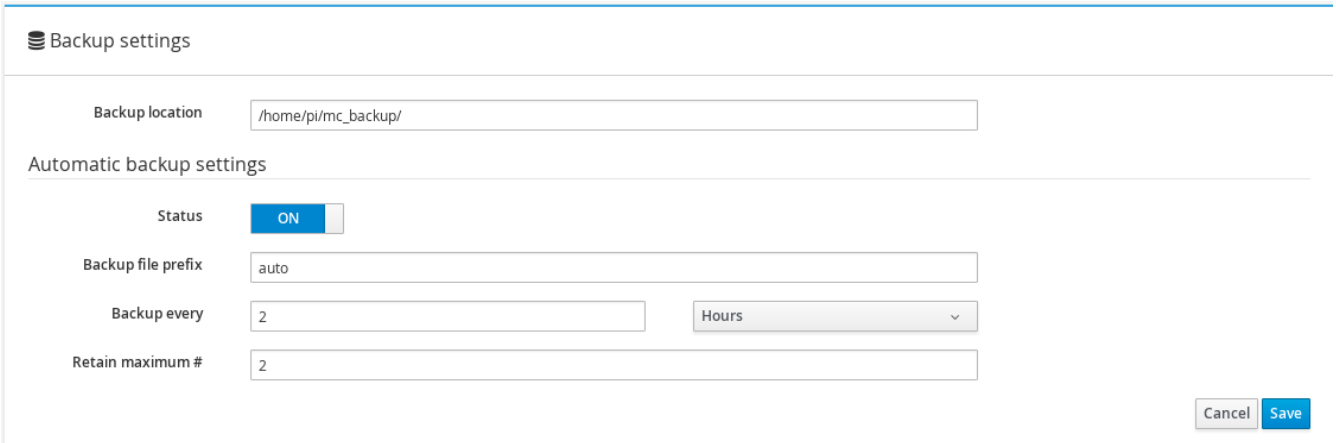


Backup

You can do backup and restore from here. By clicking `Run backup`, backup will be triggered and stored on `backup file location`. can be changed on backup settings. Manual backup always starts with `on-demand_*`

Automatic backup

You can set automatic backup on clicking `Settings` on backup page.



- `Backup location` - location where do you want to keep backup files.
- `Status` - do `ON` or `OFF` automatic backup

`Backup file prefix` - on automatic backup this prefix will be added on file name.

- `Backup every` - do backup every `Minutes`, `Hours` or `Days`
- `Retain maximum #` - Retain maximum number automatic backups. For example if you set 2, only recent 2 automatic backups only kept.

`Retain maximum #` settings not applicable for manual backup files.

Restore

To do restore a backup file, select a backup file and click on `Restore` on actions menu. Restore should be triggered immediately.

After a successful restore you have to start the server manually from back-end. You have to check restore status on `mycontroller/log/mycontroller.log`.

Source Code

MyController.org is an Open Source project. You can contribute/download source code from Github repository

Issue management

Are you facing issue? Wan to file new feature request? Want to give ideas? You are welcome to Github Issues page

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