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# HABApp Documentation

*Release beta*

**spacemanspiff2007**

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# USER DOCUMENTATION

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## INSTALLATION & USAGE

### 1.1 Virtual environment

#### 1.1.1 Installation

---

**Hint:**

With openhabian the complete installation can be performed through the openhabian-config tool (option 2B). HABApp will be installed into `/opt/habapp`, so it is the same as the installation described here.

---

**Hint:** On Windows use the `python` command instead of `python3`

---

1. Navigate to the folder where the virtual environment shall be created (e.g.):

```
cd /opt
```

2. Create virtual environment (this will create a new folder "habapp"):

```
python3 -m venv habapp
```

3. Go into folder of virtual environment:

```
cd habapp
```

4. Activate the virtual environment

Linux:

```
source bin/activate
```

Windows:

```
Scripts\activate
```

5. Upgrade pip:

```
python3 -m pip install --upgrade pip
```

6. Install HABApp:

```
python3 -m pip install habapp
```

### 7. Run HABApp:

```
habapp --config PATH_TO_CONFIGURATION_FOLDER
```

A good configuration folder for HABApp would be your openhab configuration folder (e.g. `/opt/openhab/conf/habapp` or `/etc/openhab/habapp`) because this is where your other configuration folders are located (e.g. the items and sitemaps folder). Just make sure to manually create the folder `habapp` before the start.

---

**Hint:** After the installation take a look how to configure HABApp. A default configuration will be created on the first start.

---

## 1.1.2 Upgrading

1. Stop HABApp
2. Activate the virtual environment

Navigate to the folder where HABApp is installed:

```
cd /opt/habapp
```

Activate the virtual environment

Linux:

```
source bin/activate
```

Windows:

```
Scripts\activate
```

3. Run the following command in your activated virtual environment:

```
python3 -m pip install --upgrade habapp
```

4. Start HABApp
5. Observe the logs for errors in case there were changes

## 1.1.3 Autostart after reboot

Check where habapp is installed

```
which habapp
```

To automatically start HABApp from the virtual environment after a reboot call:

```
nano /etc/systemd/system/habapp.service
```

and copy paste the following contents. If the user which is running openhab is not “openhab” replace accordingly. If your installation is not done in “`/opt/habapp/bin`” replace accordingly as well:

```
[Unit]
Description=HABApp
Documentation=https://habapp.readthedocs.io
After=network-online.target

[Service]
Type=simple
User=openhab
Group=openhab
UMask=002
ExecStart=/opt/habapp/bin/habapp -c PATH_TO_CONFIGURATION_FOLDER

[Install]
WantedBy=multi-user.target
```

Press Ctrl + x to save.

Now execute the following commands to enable autostart:

```
sudo systemctl --system daemon-reload
sudo systemctl enable habapp.service
```

It is now possible to start, stop, restart and check the status of HABApp with:

```
sudo systemctl start habapp.service
sudo systemctl stop habapp.service
sudo systemctl restart habapp.service
sudo systemctl status habapp.service
```

### 1.1.4 Error message while installing ujson

Under windows the installation of ujson may throw the following error but the download link is not working. Several working alternatives can be found [here](#).

```
Running setup.py install for ujson ... error
ERROR: Complete output from command 'C:\Users\User\Desktop\HABApp\habapp\Scripts\
↳python.exe' -u -c 'import setuptools, tokenize;__file__='''C:\\Users\\User\\AppData\\
↳Local\\Temp\\pip-install-4y0tobjp\\ujson\\setup.py'''';f=getattr(tokenize, '''open''
↳''', open)(__file__);code=f.read().replace('''\r\n''', '''\n''');f.close();
↳exec(compile(code, __file__, '''exec''')))' install --record 'C:\Users\User\AppData\
↳Local\Temp\pip-record-6t2yo712\install-record.txt' --single-version-externally-managed_
↳--compile --install-headers 'C:\Users\User\Desktop\HABApp\habapp\include\site\python3.
↳7\ujson':
ERROR: Warning: 'classifiers' should be a list, got type 'filter'
running install
running build
running build_ext
building 'ujson' extension
error: Microsoft Visual C++ 14.0 is required. Get it with "Microsoft Visual C++ Build_
↳Tools": https://visualstudio.microsoft.com/downloads/
-----
```

## 1.1.5 Error message while installing ruamel.yaml

```
_ruamel_yaml.c:4:10: fatal error: Python.h: No such file or directory
```

Run the following command to fix it:

```
sudo apt install python3-dev
```

## 1.2 Docker

### 1.2.1 Installation

Installation through `docker` is also available:

```
docker pull spacemanspiff2007/habapp
```

To have the proper timestamps in the logs set the `TZ` environment variable of the container accordingly (e.g. `TZ=Europe/Berlin`).

### 1.2.2 Updating docker on Synology

To update your HABApp docker within Synology NAS, you just have to do the following:

On the Synology NAS just select “Download” with tag “latest” to download the new image. It will overwrite the old one on the NAS. Then stop the container. After selecting “Action” -> “Clear” on the HABApp container, the container is there, but without any content. After starting the container again, everything should immediately work again.

## 1.3 Upgrading to a newer version

It is recommended to upgrade the installation on another machine. Configure your production instance in the configuration and set the `listen_only` switch(es) in the configuration to `True`. Observe the logs for any errors. This way if there were any breaking changes rules can easily be fixed before problems occur on the running installation.

## 1.4 HABApp arguments

Execute `habapp` with “-h” to view possible command line arguments

```
habapp -h
```

```
usage: -c [-h] [-c CONFIG] [-wos WAIT_OS_UPTIME] [-b]
```

Start HABApp

optional arguments:

```
-h, --help          show this help message and exit
-c CONFIG, --config CONFIG
                    Path to configuration folder (where the config.yml is
```

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	located)
-wos WAIT_OS_UPTIME, --wait_os_uptime WAIT_OS_UPTIME	Waits for the specified os uptime before starting HABApp
-b, --benchmark	Do a Benchmark based on the current config

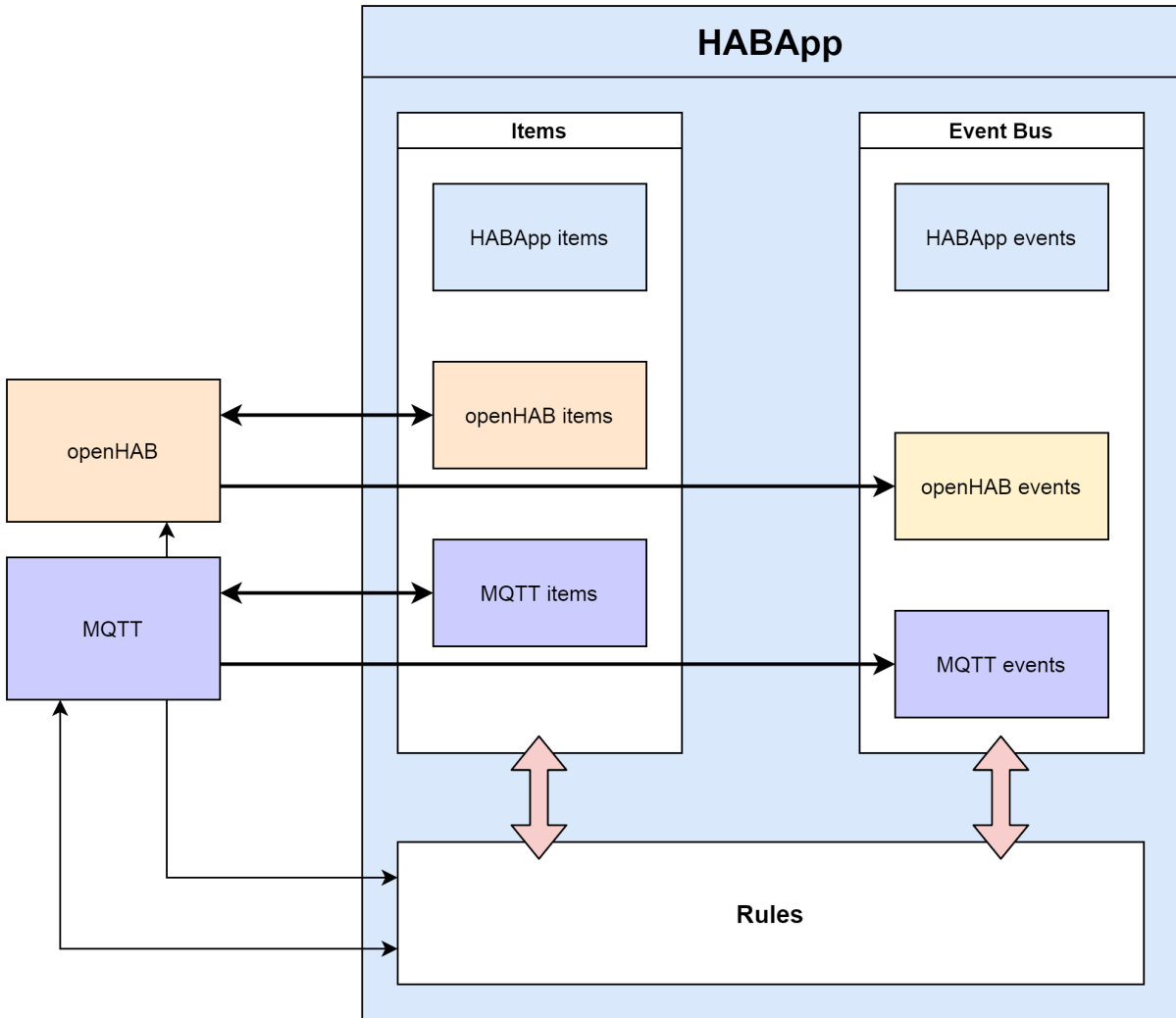


## ABOUT HABAPP

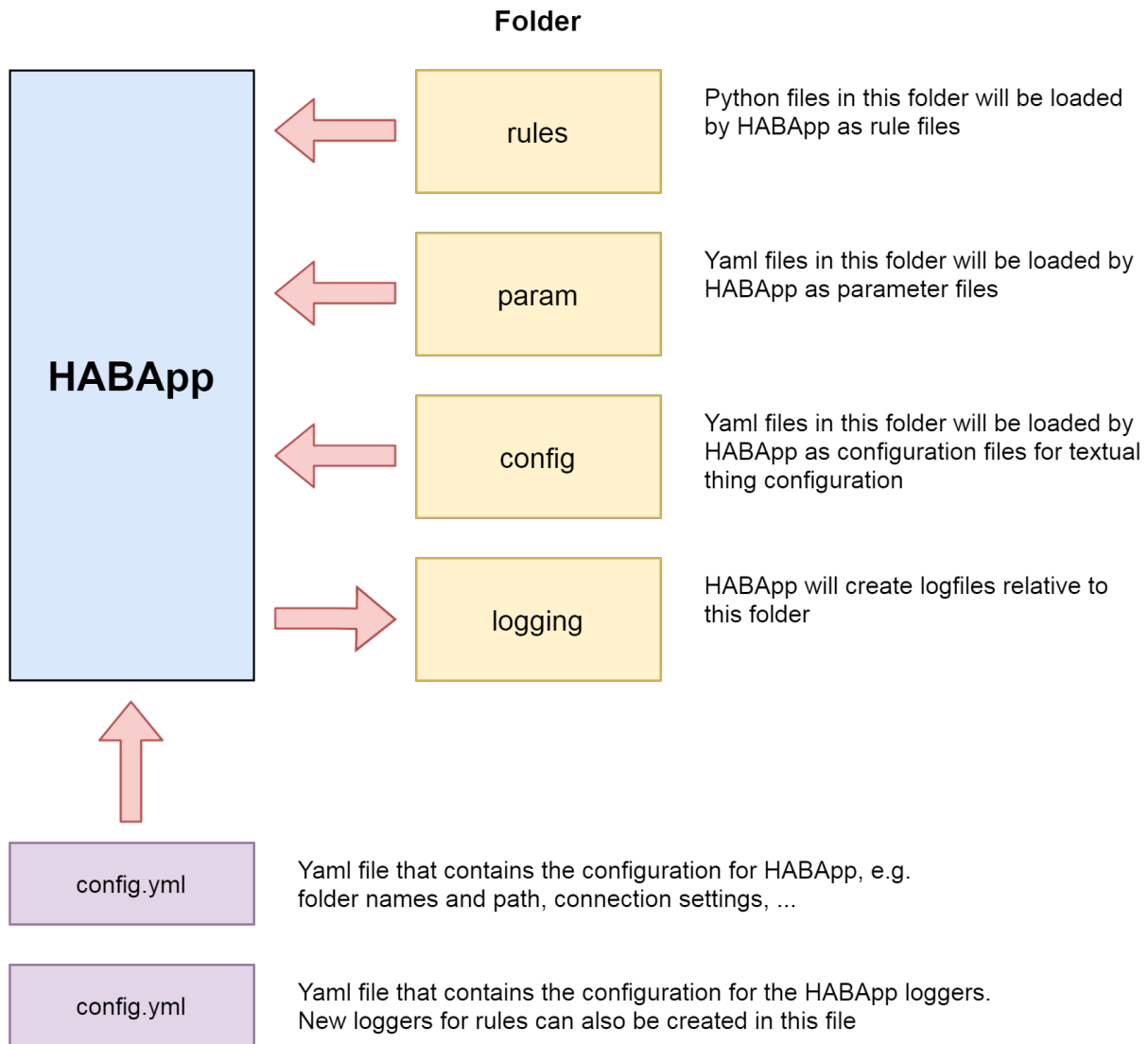
### 2.1 About

HABApp is a Python rule engine for home automation. It has local items, an event bus and can integrate external systems, e.g. openHAB and MQTT. Rules can listen to events from the event bus. These events are generated by HABApp or by the external systems. Additionally there is a scheduler available that makes time based triggering very easy.

## 2.2 HABApp architecture



## 2.3 HABApp folder structure



## 2.4 Integration with openHAB

HABApp connects to the openhab event stream and automatically updates the local openhab items when an item in openhab changes. These item values are cached, so accessing and working with items in rules is very fast. The events from openhab are also mirrored to the internal event bus which means that triggering on these events is also possible.

When HABApp connects to openhab for the first time it will load all items/things from the openhab instance and create local items. The name of the local openhab items is equal to the name in openhab.

Posting updates, sending commands or any other openhab interface call will issue a corresponding REST-API call to change openhab.

## 2.5 Integration with MQTT

HABApp subscribes to the defined mqtt topics. For every MQTT message with the `retain` flag HABApp will automatically create an *MqttItem* so these values can be accessed later. The name of the created item is the the mqtt topic. All other messages will **not** automatically create an item but still create an event on the event bus.

MqttItems created by rules will automatically be updated with the latest value once a message is received. These item values are cached, so accessing and working with items in rules is very fast.

## CONFIGURATION

Configuration is done through `config.yml`. The parent folder of the file can be specified with `-c PATH` or `--config PATH`. If nothing is specified the file `config.yml` is searched in the subdirectory `HABApp` in

- the current working directory
- the venv directory
- the user home

If the config does not yet exist in the folder a blank configuration will be created

### 3.1 Configuration contents

```
directories:
  logging: log      # If the filename for the logfile in logging.yml is not absolute it
↳will be placed in this directory
  rules: rules     # All *.py files in this folder (and subfolders) will be loaded.
↳Load order will be alphabetical by path.
  param: param     # Optional, this is the folder where the parameter files will be
↳created and loaded from
  config: config   # Folder from which configuration files for openhab will be loaded
  lib: lib         # Custom modules, libraries and files can be placed there.
                  # (!) Attention (!):
                  # Don't create rule instances in files inside the lib folder! It will
↳lead to strange behaviour.

location:          # Specify the location where your HABApp instance is running
  latitude: 0.0    # The value is used to calculate the Sunrise/Sunset etc accordingly
  longitude: 0.0
  elevation: 0.0

openhab:
  ping:
    enabled: true  # If enabled the configured item will show how long it
↳takes to send an update from HABApp
                  # and get the updated value back in milliseconds
    item: 'HABApp_Ping' # Name of the Numberitem that will show the ping
    interval: 10     # Seconds between two pings

connection:
```

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```
host: localhost
port: 8080
user: ''
password: ''

general:
  listen_only: False # If True HABApp will not change any value on the openhab_
↳instance.
                    # Useful for testing rules from another machine.
  wait_for_openhab: True # If True HABApp will wait for items from the openHAB_
↳instance
                    # before loading any rules on startup

mqtt:
  connection:
    client_id: HABApp
    host: ''
    port: 8883
    user: ''
    password: ''
    tls: true
    tls_insecure: false # do not check certificate
    tls_ca_cert: '' # Path to a CA certificate that will be treated as trusted
                  # (e.g. when using a self signed certificate)

  subscribe: # Changes to Subscribe get picked up without restarting HABApp
    qos: 0 # Default QoS for subscribing
    topics:
      - '#' # Subscribe to this topic
      - 0 # QoS for previous topic, can be omitted

  publish:
    qos: 0 # Default QoS when publishing values
    retain: false # Default retain flag when publishing values

  general:
    listen_only: False # If True HABApp will not publish any value to the broker.
                      # Useful for testing rules from another machine.
```



## GETTING STARTED

It is really recommended to use a python IDE, for example PyCharm. The IDE can provide auto complete and static checks which will help you write error free rules and vastly speed up your development.

First start HABApp and keep it running. It will automatically load and update all rules which are created or changed in the configured rules directory. Loading and unloading of rules can be observed in the HABApp logfile.

It is recommended to use HABApp from the console for these examples so the print output can be observed.

### 4.1 First rule

Rules are written as classes that inherit from `HABApp.Rule`. Once the class gets instantiated the will run as rules in the HABApp rule engine. So lets write a small rule which prints something.

```
import HABApp

# Rules are classes that inherit from HABApp.Rule
class MyFirstRule(HABApp.Rule):
    def __init__(self):
        super().__init__()

        # Use run.at to schedule things directly after instantiation,
        # don't do blocking things in __init__
        self.run.soon(self.say_something)

    def say_something(self):
        print('That was easy!')

# Rules
MyFirstRule()
```

```
That was easy!
```

## 4.2 A more generic rule

It is also possible to instantiate the rules with parameters. This often comes in handy if there is some logic that shall be applied to different items.

```
import HABApp

class MyFirstRule(HABApp.Rule):
    def __init__(self, my_parameter):
        super().__init__()
        self.param = my_parameter

        self.run.soon(self.say_something)

    def say_something(self):
        print(f'Param {self.param}')

# This is normal python code, so you can create Rule instances as you like
for i in range(2):
    MyFirstRule(i)
for t in ['Text 1', 'Text 2']:
    MyFirstRule(t)
```

```
Param 0
Param 1
Param Text 1
Param Text 2
```

## 4.3 Interacting with items

HABApp uses an internal item registry to store both openhab items and locally created items (only visible within HABApp). Upon start-up HABApp retrieves a list of openhab items and adds them to the internal registry. Rules and HABApp derived libraries may add additional local items which can be used to share states across rules and/or files.

An item is created and added to the item registry through the corresponding class factory method

```
from HABApp.core.items import Item

# This will create an item in the local (HABApp) item registry
item = Item.get_create_item("an-item-name", "a value")
```

Posting values from the item will automatically create the events on the event bus. This example will create an item in HABApp (locally) and post some updates to it. To access items from openhab use the correct openhab item type (see *the openhab item description*).

```
import HABApp
from HABApp.core.items import Item
```

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```

class MyFirstRule(HABApp.Rule):
    def __init__(self):
        super().__init__()
        # Get the item or create it if it does not exist
        self.my_item = Item.get_create_item('Item_Name')

        self.run.soon(self.say_something)

    def say_something(self):
        # Post updates to the item through the internal event bus
        self.my_item.post_value('Test')
        self.my_item.post_value('Change')

        # The item value can be used in comparisons through this shortcut ...
        if self.my_item == 'Change':
            print('Item value is "Change"')
        # ... which is the same as this:
        if self.my_item.value == 'Change':
            print('Item.value is "Change"')

```

MyFirstRule()

## Output

```

[HABApp.EventBus]      INFO |           Item_Name: <ValueUpdateEvent name: Item_Name, ↵
↵value: Test>
[HABApp.EventBus]      INFO |           Item_Name: <ValueChangeEvent name: Item_Name, ↵
↵value: Test, old_value: None>
[HABApp.EventBus]      INFO |           Item_Name: <ValueUpdateEvent name: Item_Name, ↵
↵value: Change>
[HABApp.EventBus]      INFO |           Item_Name: <ValueChangeEvent name: Item_Name, ↵
↵value: Change, old_value: Test>
Item value is "Change"
Item.value is "Change"

```

## 4.4 Watch items for events

It is possible to watch items for changes or updates.

```

import HABApp
from HABApp.core.items import Item
from HABApp.core.events import ValueUpdateEvent, ValueChangeEvent

class MyFirstRule(HABApp.Rule):
    def __init__(self):
        super().__init__()
        # Get the item or create it if it does not exist
        self.my_item = Item.get_create_item('Item_Name')

```

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```

# Run this function whenever the item receives an ValueUpdateEvent
self.listen_event(self.my_item, self.item_updated, ValueUpdateEvent)

# Run this function whenever the item receives an ValueChangeEvent
self.listen_event(self.my_item, self.item_changed, ValueChangeEvent)

# If you already have an item you can use the more convenient method of the item
self.my_item.listen_event(self.item_changed, ValueChangeEvent)

# the function has 1 argument which is the event
def item_changed(self, event: ValueChangeEvent):
    print(f'{event.name} changed from "{event.old_value}" to "{event.value}"')
    print(f'Last change of {self.my_item.name}: {self.my_item.last_change}')

def item_updated(self, event: ValueUpdateEvent):
    print(f'{event.name} updated value: "{event.value}"')
    print(f'Last update of {self.my_item.name}: {self.my_item.last_update}')

```

MyFirstRule()

```

Item_Name updated value: "Changed value"
Last update of Item_Name: 2021-06-17T05:14:40.137878
Item_Name changed from "Some value" to "Changed value"
Last change of Item_Name: 2021-06-17T05:14:40.137878
Item_Name changed from "Some value" to "Changed value"
Last change of Item_Name: 2021-06-17T05:14:40.137878

```

## 4.5 Trigger an event when an item is constant

```

import HABApp
from HABApp.core.items import Item
from HABApp.core.events import ItemNoChangeEvent

class MyFirstRule(HABApp.Rule):
    def __init__(self):
        super().__init__()
        # Get the item or create it if it does not exist
        self.my_item = Item.get_create_item('Item_Name')

        # This will create an event if the item is 10 secs constant
        watcher = self.my_item.watch_change(10)

        # this will automatically listen to the correct event
        watcher.listen_event(self.item_constant)

        # To listen to all ItemNoChangeEvent/ItemNoUpdateEvent independent of the_
↪ timeout time use
        # self.listen_event(self.my_item, self.item_constant, watcher.EVENT)

```

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```
def item_constant(self, event: ItemNoChangeEvent):  
    print(f'{event}')
```

```
MyFirstRule()
```

```
<ItemNoChangeEvent name: Item_Name, seconds: 10>
```



## 5.1 Configuration

### 5.1.1 Example usage

The logging library is the standard python library.

```
import logging

import HABApp

log = logging.getLogger('MyRule')

class MyLoggingRule(HABApp.Rule):

    def __init__(self):
        super().__init__()

        # different levels are available
        log.debug('Debug Message')
        log.info('Info Message')
        log.warning('Warning Message')
        log.error('Error Message')

MyLoggingRule()
```

### 5.1.2 Example configuration

Configuration of logging is done through `logging.yml`. During the first start a default configuration will be created. It is recommended to extend the default configuration.

The complete description of the file format can be found [here](#), but the format should be pretty straight forward.

---

**Hint:**

It is highly recommended to use absolute paths as file names

e.g.: `/HABApp/logs/my_logfile.log` or `c:\HABApp\logs\my_logfile.log`

---

```

# describes the output format
formatters:
  HABApp_format:
    format: "[%asctime)s] [%name)25s] %(levelname)8s | %(message)s"

# describes the available file handlers
handlers:
  HABApp_default:
    class: HABApp.core.lib.handler.MidnightRotatingFileHandler
    filename: 'HABApp.log'
    maxBytes: 10_000_000
    backupCount: 3

    formatter: HABApp_format # use the specified formatter (see above)
    level: DEBUG

  MyRuleHandler:
    class: HABApp.core.lib.handler.MidnightRotatingFileHandler
    filename: 'c:\HABApp\Logs\MyRule.log' # absolute filename is recommended
    maxBytes: 10_000_000
    backupCount: 3

    formatter: HABApp_format # use the specified formatter (see above)
    level: DEBUG

# List all available loggers
loggers:
  HABApp:
    level: DEBUG
    handlers:
      - HABApp_default # This logger does log with the default handler
    propagate: False

  MyRule: # Name of the logger, see example usage
    level: DEBUG
    handlers:
      - MyRuleHandler # This logger uses the MyRuleHandler
    propagate: False

```

### 5.1.3 Custom log levels

It is possible to add custom log levels or rename existing levels. This is possible via the optional `levels` entry in the logging configuration file.

```

levels:
  WARNING: WARN # Changes WARNING to WARN
  5: TRACE # Adds a new loglevel "TRACE" with value 5

formatters:
  HABApp_format:
  ...

```



## 6.1 Interacting with items

Items are like variables. They have a name and a value (which can be anything). Items from openhab use the item name from openhab and get created when HABApp successfully connects to openhab or when the openhab configuration changes. Items from MQTT use the topic as item name and get created as soon as a message gets processed.

Some item types provide convenience functions, so it is advised to always set the correct item type.

The preferred way to get and create items is through the class factories `get_item` and `get_create_item` since this ensures the proper item class and provides type hints when using an IDE! Example:

```
from HABApp.core.items import Item
my_item = Item.get_create_item('MyItem', initial_value=5)  # This will create the item.
↳if it does not exist
my_item = Item.get_item('MyItem')                        # This will raise an.
↳exception if the item is not found
print(my_item)
```

If an item value gets set there will be a `ValueUpdateEvent` on the event bus. If it changes there will be additionally a `ValueChangeEvent`, too.

It is possible to check the item value by comparing it

```
from HABApp.core.items import Item
my_item = Item.get_item('MyItem')

# this works
if my_item == 5:
    pass  # do something

# and is the same as this
if my_item.value == 5:
    pass  # do something
```

An overview over the item types can be found on *the HABApp item section*, *the openhab item section* and *the mqtt item section*

## 6.2 Events

It is possible to listen to events through the `listen_event()` function. The passed function will be called as soon as an event occurs and the event will be passed as an argument into the function.

There is the possibility to reduce the function calls to a certain event type with an additional parameter (typically `ValueUpdateEvent` or `ValueChangeEvent`).

An overview over the events can be found on *the HABApp event section*, *the openhab event section* and *the the mqtt event section* Example

```

from HABApp import Rule
from HABApp.core.events import ValueChangeEvent, ValueUpdateEvent
from HABApp.core.items import Item

class MyRule(Rule):
    def __init__(self):
        super().__init__()
        self.listen_event('MyOpenhabItem', self.on_change, ValueChangeEvent) # will_
        ↪trigger only on ValueChangeEvent
        self.listen_event('My/MQTT/Topic', self.on_update, ValueUpdateEvent) # will_
        ↪trigger only on ValueUpdateEvent

        # If you already have an item you can and should use the more convenient method_
        ↪of the item
        # to listen to the item events
        my_item = Item.get_item('MyItem')
        my_item.listen_event(self.on_change, ValueUpdateEvent)

    def on_change(self, event: ValueChangeEvent):
        assert isinstance(event, ValueChangeEvent), type(event)

    def on_update(self, event: ValueUpdateEvent):
        assert isinstance(event, ValueUpdateEvent), type(event)

MyRule()

```

Additionally there is the possibility to filter not only on the event type but on the event values, too. This can be achieved by passing an **instance** of `EventFilter` as event type. There are convenience Filters (e.g. `ValueUpdateEventFilter` and `ValueChangeEventFilter`) for the most used event types that provide type hints.

```

class HABApp.core.events.EventFilter(event_type, **kwargs)
class HABApp.core.events.ValueUpdateEventFilter(value)
class HABApp.core.events.ValueChangeEventFilter(value=<_MissingType.MISSING: <object object>>,
                                                old_value=<_MissingType.MISSING: <object
                                                object>>)

```

Example

```

from HABApp import Rule
from HABApp.core.events import EventFilter, ValueUpdateEventFilter, ValueUpdateEvent
from HABApp.core.items import Item

class MyRule(Rule):

```

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```

def __init__(self):
    super().__init__()
    my_item = Item.get_item('MyItem')

    # This will only call the callback for ValueUpdateEvents where the value==my_
↪value
    my_item.listen_event(self.on_val_my_value, ValueUpdateEventFilter(value='my_value
↪'))

    # This is the same as above but with the generic filter
    my_item.listen_event(self.on_val_my_value, EventFilter(ValueUpdateEvent, value=
↪'my_value'))

def on_val_my_value(self, event: ValueUpdateEvent):
    assert isinstance(event, ValueUpdateEvent), type(event)

MyRule()

```

### 6.3 Scheduler

With the scheduler it is easy to call functions in the future or periodically. Do not use *time.sleep* but rather *self.run.at*. Another very useful function is *self.run.countdown* as it can simplify many rules!

Function	Description
<i>soon()</i>	Run the callback as soon as possible (typically in the next second).
<i>at()</i>	Run the callback in x seconds or at a specified time.
<i>countdown()</i>	Run a function after a time has run down
<i>every()</i>	Run a function periodically
<i>every_minute()</i>	Run a function every minute
<i>every_hour()</i>	Run a function every hour
<i>on_every_day()</i>	Run a function at a specific time every day
<i>on_workdays()</i>	Run a function at a specific time on workdays
<i>on_weekends()</i>	Run a function at a specific time on weekends
<i>on_day_of_week()</i>	Run a function at a specific time on specific days of the week
<i>on_sun_dawn()</i>	Run a function on dawn
<i>on_sunrise()</i>	Run a function on sunrise
<i>on_sunset()</i>	Run a function on sunset
<i>on_sun_dusk()</i>	Run a function on dusk

All functions return an instance of *ScheduledCallbackBase*

```

class HABApp.rule.scheduler.HABAppSchedulerView(rule)

```

```

at(time, callback, *args, **kwargs)
    Create a a job that will run at a specified time.

```

**Parameters**

- **time** (Union[None, datetime, timedelta, time, int]) –
- **callback** – Function which will be called

- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *OneTimeJob*

**Returns** Created job

**countdown**(*expire\_time, callback, \*args, \*\*kwargs*)

Run a job a specific time after calling `reset()` of the job. Another subsequent call to `reset()` will start the countdown again.

**Parameters**

- **expire\_time** (Union[timedelta, float, int]) – countdown in seconds or a timedelta obj
- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *CountdownJob*

**Returns** Created job

**every**(*start\_time, interval, callback, \*args, \*\*kwargs*)

Create a job that will run at a specific interval.

**Parameters**

- **start\_time** (Union[None, datetime, timedelta, time, int]) – First execution time
- **interval** (Union[int, float, timedelta]) – Interval how the job is repeated
- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *ReoccurringJob*

**Returns** Created job

**on\_day\_of\_week**(*time, weekdays, callback, \*args, \*\*kwargs*)

Create a job that will run at a certain time on certain days during the week.

**Parameters**

- **time** (Union[time, datetime]) – Time when the job will run
- **weekdays** (Union[str, Iterable[Union[str, int]]]) – Day group names (e.g. 'all', 'weekend', 'workdays'), an iterable with day names (e.g. ['Mon', 'Fri']) or an iterable with the isoweekday values (e.g. [1, 5]).
- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *DayOfWeekJob*

**Returns** Created job

**on\_every\_day**(*time, callback, \*args, \*\*kwargs*)

Create a job that will run at a certain time of day

**Parameters**

- **time** (Union[time, datetime]) – Time when the job will run
- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *DayOfWeekJob***on\_sunrise**(*callback*, \*args, \*\*kwargs)

Create a job that will run on sunrise, requires a location to be set

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *SunriseJob***Returns** Created job**on\_sunset**(*callback*, \*args, \*\*kwargs)

Create a job that will run on sunset, requires a location to be set

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *SunsetJob***Returns** Created job**on\_sun\_dawn**(*callback*, \*args, \*\*kwargs)

Create a job that will run on dawn, requires a location to be set

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *DawnJob***Returns** Created job**on\_sun\_dusk**(*callback*, \*args, \*\*kwargs)

Create a job that will run on dusk, requires a location to be set

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *DuskJob*

**Returns** Created job

**soon**(*callback*, \*args, \*\*kwargs)

Run the callback as soon as possible.

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *OneTimeJob*

**every\_minute**(*callback*, \*args, \*\*kwargs)

Picks a random second and runs the callback every minute

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *ReoccurringJob*

**every\_hour**(*callback*, \*args, \*\*kwargs)

Picks a random minute and second and run the callback every hour

**Parameters**

- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *ReoccurringJob*

**on\_weekends**(*time*, *callback*, \*args, \*\*kwargs)

Create a job that will run at a certain time on weekends.

**Parameters**

- **time** (Union[time, datetime]) – Time when the job will run
- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *DayOfWeekJob*

**Returns** Created job

**on\_workdays**(*time*, *callback*, \*args, \*\*kwargs)

Create a job that will run at a certain time on workdays.

**Parameters**

- **time** (Union[time, datetime]) – Time when the job will run
- **callback** – Function which will be called
- **args** – Positional arguments that will be passed to the function
- **kwargs** – Keyword arguments that will be passed to the function

**Return type** *DayOfWeekJob*

**Returns** Created job

## 6.4 Running external tools

External tools can be run with the `execute_subprocess()` function. Once the process has finished the callback will be called with an `FinishedProcessInfo` instance as first argument. Example:

```
import HABApp

class MyExecutionRule(HABApp.Rule):

    def __init__(self):
        super().__init__()

        self.execute_subprocess( self.func_when_finished, 'path_to_program', 'arg1',
        ↪capture_output=True)

    def func_when_finished(self, process_info):
        assert isinstance(process_info, HABApp.rule.FinishedProcessInfo)
        print(process_info)

MyExecutionRule()
```

`class HABApp.rule.FinishedProcessInfo(returncode, stdout, stderr)`  
Information about the finished process.

### Variables

- **returncode** (*int*) – Return code of the process (0: IO, -1: Exception while starting process)
- **stdout** (*str*) – Standard output of the process or None
- **stderr** (*str*) – Error output of the process or None

## 6.5 How to properly use rules from other rule files

This example shows how to properly get a rule during runtime and execute one of its function. With the proper import and type hint this method provides syntax checks and auto complete.

Rule instances can be accessed by their name (typically the class name). In the `HABApp.log` you can see the name when the rule is loaded. If you want to assign a custom name, you can change the rule name easily by assigning it to `self.rule_name` in `__init__`.

---

**Important:** Always look up rule every time, never assign to a class member! The rule might get reloaded and then the class member will still point to the old unloaded instance.

---

*rule\_a.py:*

```
import HABApp
```

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```
class ClassA(HABApp.Rule):
    ...

    def function_a(self):
        ...

ClassA()
```

*rule\_b.py:*

```
import HABApp
import typing

if typing.TYPE_CHECKING:
    from .rule_a import ClassA # This is only here to allow
                               # type hints for the IDE

class ClassB(HABApp.Rule):
    ...

    def function_b(self):

        r = self.get_rule('ClassA') # type: ClassA
        # The comment "# type: ClassA" will signal the IDE that the value returned from
↪the # function is an instance of ClassA and thus provide checks and auto complete.

        # this calls the function on the instance
        r.function_a()
```

## 6.6 All available functions

**class** HABApp.Rule

### Variables

- **async\_http** – Async http connections
- **mqtt** – MQTT interaction
- **openhab** – Openhab interaction
- **oh** – short alias for openhab openhab

**post\_event**(name, event)

Post an event to the event bus

### Parameters

- **name** – name or item to post event to
- **event** – Event class to be used (must be class instance)

### Returns

**listen\_event**(name, callback, event\_type=<class 'HABApp.core.events.events.AllEvents'>)

Register an event listener



**Parameters**

- **name** (Union[*BaseValueItem*, str]) – item or name to listen to. Use None to listen to all events
- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[Type[AllEvents], *EventFilter*, Any]) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openhab or mqtt. Additionally it can be an instance of *EventFilter* which additionally filters on the values of the event. There are also templates for the most common filters, e.g. *ValueUpdateEventFilter* and *ValueChangeEventFilter*

**Return type** EventBusListener

**execute\_subprocess**(*callback*, *program*, \**args*, *capture\_output=True*)

Run another program

**Parameters**

- **callback** – Function which will be called after process has finished. First parameter will be an instance of *FinishedProcessInfo*
- **program** – program or path to program to run
- **args** – Positional arguments that will be passed to the function
- **capture\_output** – Capture program output, set to *False* to only capture return code

**Returns**

**register\_on\_unload**(*func*)

Register a function with no parameters which will be called when the rule is unloaded. Use this for custom cleanup functions.

**Parameters** **func** (Callable[[], Any]) – function which will be called

**register\_cancel\_obj**(*obj*)

Add a weakref to an obj which has a cancel function. When the rule gets unloaded the cancel function will be called (if the obj was not already garbage collected)

**Parameters** **obj** –



## PARAMETERS

### 7.1 Parameters

Parameters are values which can easily be changed without having to reload the rules. Values will be picked up during runtime as soon as they get edited in the corresponding file. If the file doesn't exist yet it will automatically be generated in the configured *param* folder. Parameters are perfect for boundaries (e.g. if value is below param switch something on). Currently there are *Parameter* and *DictParameter* available.

```
import HABApp

class MyRuleWithParameters(HABApp.Rule):
    def __init__(self):
        super().__init__()

        # construct parameter once, default_value can be anything
        self.min_value = HABApp.Parameter('param_file_testrule', 'min_value', default_
↪value=10)

        # deeper structuring is possible through specifying multiple keys
        self.min_value_nested = HABApp.Parameter(
            'param_file_testrule',
            'Rule A', 'subkey1', 'subkey2',
            default_value=['a', 'b', 'c'] # defaults can also be dicts or lists
        )

        self.listen_event('test_item', self.on_change_event, HABApp.core.events.
↪ValueChangeEvent)

    def on_change_event(self, event):

        # the parameter can be used like a normal variable, comparison works as expected
        if self.min_value < event.value:
            pass

        # The current value can be accessed through the value-property, but don't cache_
↪it!
        current_value = self.min_value.value

MyRuleWithParameters()
```

Created file:

```
min_value: 10
Rule A:
  subkey1:
    subkey2:
      - a
      - b
      - c
```

Changes in the file will be automatically picked up through *Parameter*.

## 7.2 Validation

Since parameters used to provide flexible configuration for automation classes they can get quite complex and error prone. Thus it is possible to provide a validator for a file which will check the files for constraints, missing keys etc. when the file is loaded.

`HABApp.parameters.set_file_validator(filename, validator, allow_extra_keys=True)`

Add a validator for the parameter file. If the file is already loaded this will reload the file.

### Parameters

- **filename** (str) – filename which shall be validated (without extension)
- **validator** (Any) – Description of file content - see the library *voluptuous* for examples. Use *None* to remove validator.
- **allow\_extra\_keys** – Allow additional keys in the file structure

Example

```
import HABApp
import voluptuous

# Validator can even and should be specified before loading rules

# allows a dict e.g. { 'key1': { 'key2': '5' }}
HABApp.parameters.set_file_validator('file1', {str: {str: int}})

# More complex example with an optional key:
validator = {
    'Test': int,
    'Key': {
        'mandatory_key': str,
        voluptuous.Optional('optional'): int
    }
}
HABApp.parameters.set_file_validator('file1', validator)
```

## 7.3 Create rules from Parameters

Parameters are not bound to rule instance and thus work everywhere in the rule file. It is possible to dynamically create rules from the contents of the parameter file.

It's even possible to automatically reload rules if the parameter file has changed: Just add the “reloads on” entry to the file.

Listing 1: my\_param.yml

```
key1:
  v: 10
key2:
  v: 12
```

rule

```
import HABApp

class MyRule(HABApp.Rule):
    def __init__(self, k, v):
        super().__init__()

        print(f'{k}: {v}')

cfg = HABApp.DictParameter('my_param')    # this will get the file content
for k, v in cfg.items():
    MyRule(k, v)
```

```
key1: {'v': 10}
key2: {'v': 12}
```

## 7.4 Parameter classes

**class** HABApp.parameters.**Parameter**(filename, \*keys, default\_value='ToDo')

Class to dynamically access parameters which are loaded from file.

### Parameters

- **filename** (str) – filename (without extension)
- **keys** – structure in the file
- **default\_value** (Any) – default value for the parameter. Is used to create the file and the structure if it does not exist yet. Use None to skip creation of the file structure.

**property value:** Any

Return the current value. This will do the lookup so make sure to not cache this value, otherwise the parameter might not work as expected.

**Return type** Any

**class** HABApp.parameters.**DictParameter**(filename, \*keys, default\_value='ToDo')

Implements a dict interface

Class to dynamically access parameters which are loaded from file.

### Parameters

- **filename** (`str`) – filename (without extension)
- **keys** – structure in the file
- **default\_value** (`Any`) – default value for the parameter. Is used to create the file and the structure if it does not exist yet. Use `None` to skip creation of the file structure.

### property value: `dict`

Return the current value. This will do the lookup so make sure to not cache this value, otherwise the parameter might not work as expected.

**Return type** `dict`

This page describes the HABApp internals

## 8.1 Items

### 8.1.1 Item



**class** HABApp.core.items.Item(*name*, *initial\_value=None*)

Simple item, used to store values in HABApp

**classmethod** get\_create\_item(*name*, *initial\_value=None*)

Creates a new item in HABApp and returns it or returns the already existing one with the given name

**Parameters**

- **name** (str) – item name
- **initial\_value** – state the item will have if it gets created

**Returns** item

**classmethod** get\_item(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback*, *event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been updated (read only)

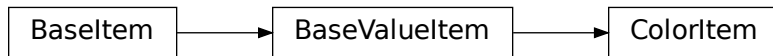
**property name:** `str`

**Return type** str



**Returns** Name of the item (read only)

## 8.1.2 ColorItem



**class** HABApp.core.items.ColorItem(*name*, *hue=0.0*, *saturation=0.0*, *brightness=0.0*)

Item for dealing with color related values

**classmethod** get\_item(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** *name* (str) – Name of the item

**get\_rgb**(*max\_rgb\_value=255*)

Return a rgb equivalent of the color

**Parameters** *max\_rgb\_value* – the max value for rgb, typically 255 (default) or 65.536

**Return type** Tuple[int, int, int]

**Returns** rgb tuple

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** *default\_value* – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**is\_off**()

Return true if item is off

**Return type** bool

**is\_on**()

Return true if item is on

**Return type** bool

**listen\_event**(*callback*, *event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**post\_rgb**(*r, g, b, max\_rgb\_value=255*)

Set a new rgb value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters**

- **r** – red value
- **g** – green value
- **b** – blue value
- **max\_rgb\_value** – the max value for rgb, typically 255 (default) or 65.536

**Return type** *ColorItem*

**Returns** self

**post\_value**(*hue=0.0, saturation=0.0, brightness=0.0*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters**

- **hue** – hue (in °)
- **saturation** – saturation (in %)
- **brightness** – brightness (in %)

**set\_rgb**(*r, g, b, max\_rgb\_value=255, ndigits=2*)

Set a rgb value

**Parameters**

- **r** – red value
- **g** – green value
- **b** – blue value
- **max\_rgb\_value** – the max value for rgb, typically 255 (default) or 65.536
- **ndigits** (Optional[int]) – Round the hsb values to the specified digits, None to disable rounding

**Return type** *ColorItem*

**Returns** self

**set\_value**(*hue=0.0, saturation=0.0, brightness=0.0*)

Set the color value

**Parameters**

- **hue** – hue (in °)
- **saturation** – saturation (in %)
- **brightness** – brightness (in %)

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 8.1.3 AggregationItem

The aggregation item is an item which takes the values of another item in a time period as an input. It then allows to process these values and generate an aggregated output based on it. The item makes implementing time logic like “Has it been dark for the last hour?” or “Was there frost during the last six hours?” really easy. And since it is just like a normal item triggering on changes etc. is possible, too.

```
from HABApp.core.items import AggregationItem
my_agg = AggregationItem.get_create_item('MyAggregationItem')

# Connect the source item with the aggregation item
my_agg.aggregation_source('MyInputItem')

# Aggregate all changes in the last two hours
my_agg.aggregation_period(2 * 3600)

# Use max as an aggregation function
my_agg.aggregation_func = max
```

The value of `my_agg` in the example will now always be the maximum of `MyInputItem` in the last two hours. It will automatically update and always reflect the latest changes of `MyInputItem`.



`class HABApp.core.items.AggregationItem(name)`

**aggregation\_func**(*func*)

Set the function which will be used to aggregate all values. E.g. min or max

**Parameters** **func** (Callable[[Iterable], Any]) – The function which takes an iterator and returns an aggregated value. Important: the function must be **non blocking!**

**Return type** *AggregationItem*

**aggregation\_period**(*period*)

Set the period in which the items will be aggregated

**Parameters** **period** (Union[float, int, timedelta]) – period in seconds

**Return type** *AggregationItem*

**aggregation\_source**(*source, only\_changes=False*)

Set the source item which changes will be aggregated

**Parameters**

- **source** (Union[*BaseValueItem*, str]) – name or Item obj
- **only\_changes** (bool) – if true only value changes instead of value updates will be added

**Return type** *AggregationItem*

**classmethod get\_create\_item**(*name*)

Creates a new *AggregationItem* in HABApp and returns it or returns the already existing one with the given name

**Parameters** **name** (str) – item name

**Returns** item

**classmethod get\_item**(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been updated (read only)

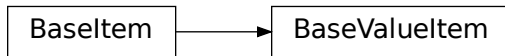
**property name:** `str`

**Return type** str

**Returns** Name of the item (read only)

### 8.1.4 BaseValueItem

Base class for items with values. All items that have a value must inherit from *BaseValueItem* May not be instantiated directly.



```
class HABApp.core.items.BaseValueItem(name, initial_value=None)
```

Simple item

#### Variables

- **name** (*str*) – Name of the item (read only)
- **value** – Value of the item, can be anything (read only)
- **last\_change** (*datetime.datetime*) – Timestamp of the last time when the item has changed the value (read only)
- **last\_update** (*datetime.datetime*) – Timestamp of the last time when the item has updated the value (read only)

```
classmethod get_item(name)
```

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (*str*) – Name of the item

```
get_value(default_value=None)
```

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

```
listen_event(callback, event_type)
```

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (*Callable[[Any], Any]*) – callback that accepts one parameter which will contain the event
- **event\_type** (*Union[AllEvents, EventFilter, Any]*) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openHAB or mqtt.

**Return type** *EventBusListener*

```
post_value(new_value)
```

Set a new value and post appropriate events on the HABApp event bus (*ValueUpdateEvent*, *ValueChangeEvent*)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** str

**Returns** Name of the item (read only)

## 8.2 Events

### 8.2.1 ValueUpdateEvent

This event gets emitted every time a value of an item receives an update

ValueUpdateEvent

```
class HABApp.core.events.ValueUpdateEvent(name=None, value=None)
```

**Variables**

- **name** (*str*) –
- **value** –

## 8.2.2 ValueChangeEvent

This event gets emitted every time a value of an item changes

ValueChangeEvent

```
class HABApp.core.events.ValueChangeEvent(name=None, value=None, old_value=None)
```

**Variables**

- **name** (*str*) –
- **value** –
- **old\_value** –

## 8.2.3 ItemNoUpdateEvent

This event gets emitted when an item is watched for updates and no update has been made in a certain amount of time.

ItemNoUpdateEvent

```
class HABApp.core.events.ItemNoUpdateEvent(name=None, seconds=None)
```



**Variables**

- **name** (*str*) –
- **float** **seconds** (*Union[int,)* –

### 8.2.4 ItemNoChangeEvent

This event gets emitted when an item is watched for changes and no change has been made in a certain amount of time.

ItemNoChangeEvent

```
class HABApp.core.events.ItemNoChangeEvent(name=None, seconds=None)
```

**Variables**

- **name** (*str*) –
- **float** **seconds** (*Union[int,)* –



## 9.1 Additional configuration

### 9.1.1 openHAB 2

For openHAB2 there is no additional configuration needed.

### 9.1.2 openHAB 3

For optimal performance it is recommended to use Basic Auth (available from openHAB 3.1 M3 on). It can be enabled through GUI or through textual configuration.

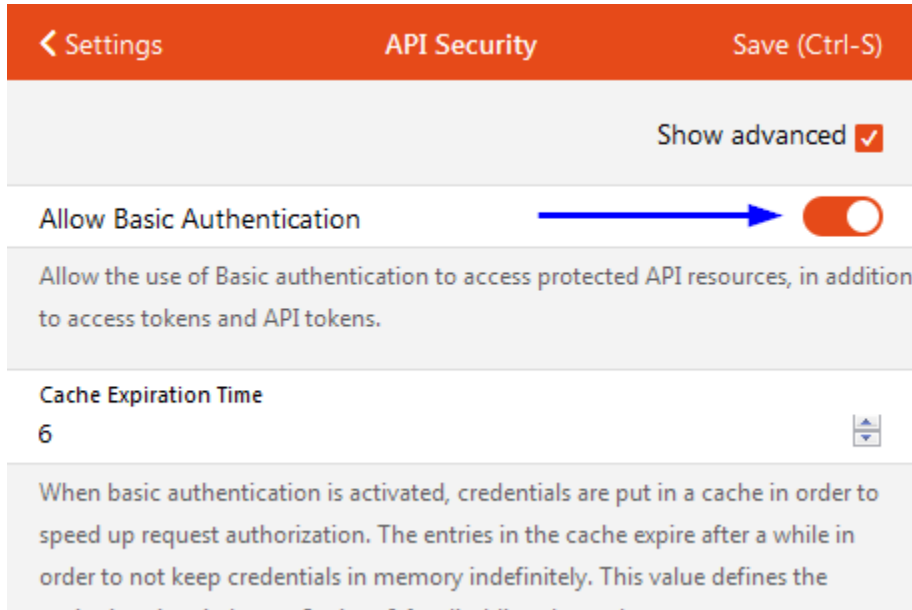
#### Textual configuration

The settings are in the `runtime.cfg`. Remove the `#` before the entry to activate it.

```
##### REST API #####  
org.openhab.restauth:allowBasicAuth=true
```

## GUI

It can be enabled through the gui in settings -> API Security -> Allow Basic Authentication.



## 9.2 Interaction with a openHAB

All interaction with the openHAB is done through the `self.oh` or `self.openhab` object in the rule or through an `OpenhabItem`.

### 9.2.1 Function parameters

`HABApp.openhab.interface.post_update(item_name, state)`

Post an update to the item

#### Parameters

- **item\_name** (str) – item name or item
- **state** (Any) – new item state

`HABApp.openhab.interface.send_command(item_name, command)`

Send the specified command to the item

#### Parameters

- **item\_name** (str) – item name or item
- **command** – command

`HABApp.openhab.interface.get_item(item_name, metadata=None)`

Return the complete OpenHAB item definition

#### Parameters

- **item\_name** (str) – name of the item or item

- **metadata** (Optional[str]) – metadata to include (optional, comma separated or search expression)

**Return type** OpenhabItemDefinition

**Returns**

HABApp.openhab.interface.**item\_exists**(*item\_name*)

Check if an item exists in the OpenHAB item registry

**Parameters** **item\_name** (str) – name

HABApp.openhab.interface.**remove\_item**(*item\_name*)

Removes an item from the openHAB item registry

**Parameters** **item\_name** (str) – name

HABApp.openhab.interface.**create\_item**(*item\_type*, *name*, *label=""*, *category=""*, *tags=[]*, *groups=[]*, *group\_type=""*, *group\_function=""*, *group\_function\_params=[]*)

Creates a new item in the OpenHAB item registry or updates an existing one

**Parameters**

- **item\_type** (str) – item type
- **name** (str) – item name
- **label** – item label
- **category** – item category
- **tags** (List[str]) – item tags
- **groups** (List[str]) – in which groups is the item
- **group\_type** (str) – what kind of group is it
- **group\_function** (str) – group state aggregation function
- **group\_function\_params** (List[str]) – params for group state aggregation

**Returns** True if item was created/updated

HABApp.openhab.interface.**get\_thing**(*thing\_name*)

Return the complete OpenHAB thing definition

**Parameters** **thing\_name** (str) – name of the thing or the item

**Return type** OpenhabThingDefinition

HABApp.openhab.interface.**get\_persistence\_data**(*item\_name*, *persistence*, *start\_time*, *end\_time*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **item\_name** (str) – name of the persisted item
- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**Return type** OpenhabPersistenceData

HABApp.openhab.interface.**remove\_metadata**(*item\_name*, *namespace*)

Remove metadata from an item

### Parameters

- **item\_name** (str) – name of the item or item
- **namespace** (str) – namespace

### Returns

`HABApp.openhab.interface.set_metadata(item_name, namespace, value, config)`  
Add/set metadata to an item

### Parameters

- **item\_name** (str) – name of the item or item
- **namespace** (str) – namespace
- **value** (str) – value
- **config** (dict) – configuration

### Returns

`HABApp.openhab.interface.get_channel_link(channel_uid, item_name)`  
returns the `ItemChannelLinkDefinition` for a link between a (things) channel and an item

### Parameters

- **channel\_uid** (str) – uid of the (things) channel (usually something like AAAA:BBBBB:CCCCC:DDDD:0#SOME\_NAME)
- **item\_name** (str) – name of the item

**Return type** `ItemChannelLinkDefinition`

**Returns** an instance of `ItemChannelLinkDefinition` or `None` on error

`HABApp.openhab.interface.remove_channel_link(channel_uid, item_name)`  
removes a link between a (things) channel and an item

### Parameters

- **channel\_uid** (str) – uid of the (thing) channel (usually something like AAAA:BBBBB:CCCCC:DDDD:0#SOME\_NAME)
- **item\_name** (str) – name of the item

**Return type** `bool`

**Returns** `true` on successful removal, otherwise `false`

`HABApp.openhab.interface.channel_link_exists(channel_uid, item_name)`  
check if a things channel is linked to an item

### Parameters

- **channel\_uid** (str) – uid of the linked channel (usually something like AAAA:BBBBB:CCCCC:DDDD:0#SOME\_NAME)
- **item\_name** (str) – name of the linked item

**Return type** `bool`

**Returns** `true` when the link exists, otherwise `false`

`HABApp.openhab.interface.create_channel_link(channel_uid, item_name, configuration=None)`  
creates a link between a (things) channel and an item

### Parameters

- **channel\_uid** (str) – uid of the (thing) channel (usually something like AAAA:BBBBB:CCCCC:DDDD:0#SOME\_NAME)
- **item\_name** (str) – name of the item
- **configuration** (Optional[Dict[str, Any]]) – optional configuration for the channel

**Return type** bool

**Returns** true on successful creation, otherwise false

## 9.3 Openhab item types

### 9.3.1 Description and example

Items that are created from openHAB inherit all from `OpenhabItem` and provide convenience functions which simplify many things.

Example:

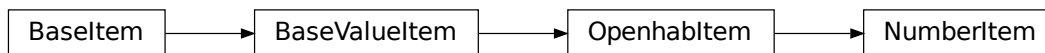
```
from HABApp.openhab.items import ContactItem, SwitchItem

my_contact = ContactItem.get_item('MyContact')
if my_contact.is_open():
    print('Contact is open!')

my_switch = SwitchItem.get_item('MySwitch')
if my_switch.is_on():
    my_switch.off()
```

```
Contact is open!
```

### 9.3.2 NumberItem



**class** `HABApp.openhab.items.NumberItem`(*name*, *initial\_value=None*)  
 NumberItem which accepts and converts the data types from OpenHAB

**classmethod** `get_item`(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_persistence\_data**(*persistence=None*, *start\_time=None*, *end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.



**Parameters** `secs` (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoChangeWatch`

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** `secs` (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoUpdateWatch`

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.3 ContactItem



**class** `HABApp.openhab.items.ContactItem`(*name, initial\_value=None*)

**classmethod** `get_item`(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** `name` (str) – Name of the item

**get\_persistence\_data**(*persistence=None, start\_time=None, end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used

- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**is\_closed**()

Test value against closed-value

**Return type** bool

**is\_open**()

Test value against open-value

**Return type** bool

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(secs)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** DateTime

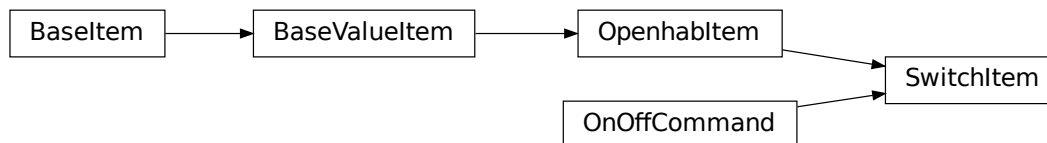
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** str

**Returns** Name of the item (read only)

### 9.3.4 SwitchItem



**class** HABApp.openhab.items.**SwitchItem**(name, initial\_value=None)

**classmethod** **get\_item**(name)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_persistence\_data**(*persistence=None, start\_time=None, end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**is\_off**()

Test value against off-value

**Return type** bool

**is\_on**()

Test value against on-value

**Return type** bool

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**off**()

Command item off

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**on**()

Command item on

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** `new_value` – new value of the item

**Return type** `bool`

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** `new_value` – new value of the item

**Return type** `bool`

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** `secs` (`Union[int, float, timedelta]`) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoChangeWatch`

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** `secs` (`Union[int, float, timedelta]`) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoUpdateWatch`

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

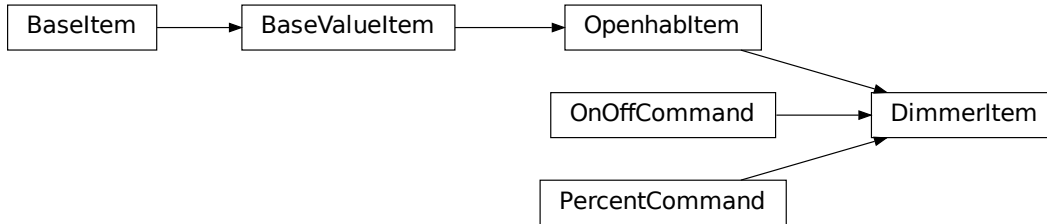
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.5 DimmerItem



```
class HABApp.openhab.items.DimmerItem(name, initial_value=None)
```

**classmethod** `get_item(name)`

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** `name` (str) – Name of the item

**get\_persistence\_data**(*persistence=None, start\_time=None, end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** `default_value` – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**is\_off**()

Test value against off-value

**Return type** bool

**is\_on**()

Test value against on-value

**Return type** bool

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event

- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openHAB or mqtt.

**Return type** *EventBusListener*

**off()**

Command item off

**oh\_post\_update**(*value*=<\_MissingType.MISSING: <object object>>)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value*=<\_MissingType.MISSING: <object object>>)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**on()**

Command item on

**percent**(*value*)

Command to value (in percent)

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (*ValueUpdateEvent*, *ValueChangeEvent*)

**Parameters** **new\_value** – new value of the item

**Return type** *bool*

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** *bool*

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, *timedelta*]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, *timedelta*]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

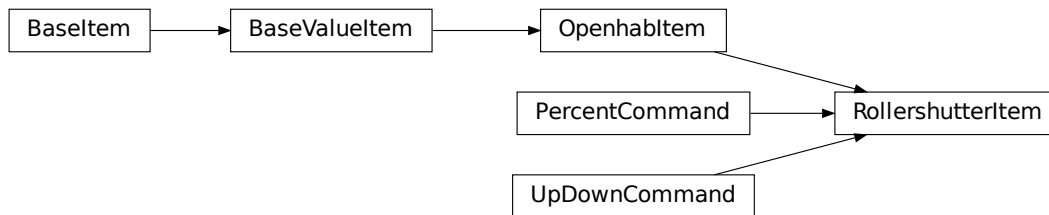
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.6 RollershutterItem



```
class HABApp.openhab.items.RollershutterItem(name, initial_value=None)
```

**down()**

Command down

**classmethod get\_item(name)**

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters name** (`str`) – Name of the item

**get\_persistence\_data(persistence=None, start\_time=None, end\_time=None)**

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (`Optional[str]`) – name of the persistence service (e.g. `rrd4j`, `mapdb`). If not set default will be used
- **start\_time** (`Optional[datetime]`) – return only items which are newer than this
- **end\_time** (`Optional[datetime]`) – return only items which are older than this

**get\_value(default\_value=None)**

Return the value of the item.



**Parameters** `default_value` – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**is\_down()**

Test value against off-value

**Return type** bool

**is\_up()**

Test value against on-value

**Return type** bool

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**percent**(*value*)

Command to value (in percent)

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (*ValueUpdateEvent*, *ValueChangeEvent*)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**up()**

Command up

**watch\_change**(secs)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

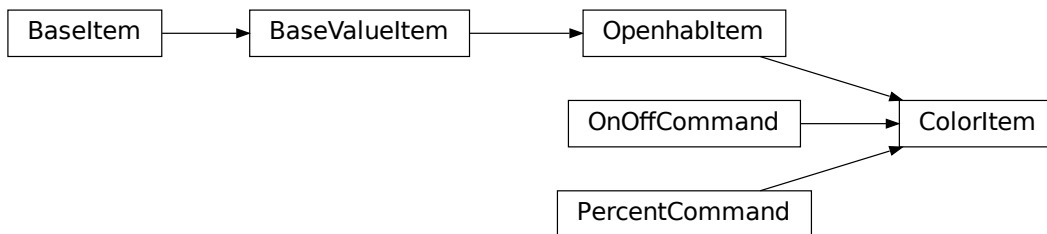
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.7 ColorItem



```
class HABApp.openhab.items.ColorItem(name, h=0.0, s=0.0, b=0.0)
```

**classmethod** `get_item(name)`

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** `name` (str) – Name of the item

**get\_persistence\_data**(*persistence=None, start\_time=None, end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_rgb**(*max\_rgb\_value=255*)

Return a rgb equivalent of the color

**Parameters** `max_rgb_value` – the max value for rgb, typically 255 (default) or 65.536

**Return type** Tuple[int, int, int]

**Returns** rgb tuple

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** `default_value` – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**is\_off**()

Return true if item is off

**Return type** bool

**is\_on**()

Return true if item is on

**Return type** bool

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, [EventFilter](#), Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**off**()

Command item off

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** `value` (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value*=<\_MissingType.MISSING: <object object>>)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**on()**

Command item on

**percent**(*value*)

Command to value (in percent)

**post\_rgb**(*r, g, b, max\_rgb\_value=255*)

Set a new rgb value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters**

- **r** – red value
- **g** – green value
- **b** – blue value
- **max\_rgb\_value** – the max value for rgb, typically 255 (default) or 65.536

**Return type** *ColorItem*

**Returns** self

**post\_value**(*hue=0.0, saturation=0.0, brightness=0.0*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters**

- **hue** – hue (in °)
- **saturation** – saturation (in %)
- **brightness** – brightness (in %)

**set\_rgb**(*r, g, b, max\_rgb\_value=255, ndigits=2*)

Set a rgb value

**Parameters**

- **r** – red value
- **g** – green value
- **b** – blue value
- **max\_rgb\_value** – the max value for rgb, typically 255 (default) or 65.536
- **ndigits** (Optional[int]) – Round the hsb values to the specified digits, None to disable rounding

**Return type** *ColorItem*

**Returns** self

**set\_value**(*hue=0.0, saturation=0.0, brightness=0.0*)

Set the color value

**Parameters**

- **hue** – hue (in °)

- **saturation** – saturation (in %)
- **brightness** – brightness (in %)

**watch\_change**(secs)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** DateTime

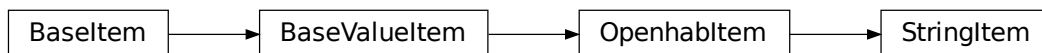
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** str

**Returns** Name of the item (read only)

### 9.3.8 StringItem



**class** HABApp.openhab.items.**StringItem**(name, initial\_value=None)

StringItem which accepts and converts the data types from OpenHAB

**classmethod** **get\_item**(name)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_persistence\_data**(*persistence=None, start\_time=None, end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, [EventFilter](#), Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(secs)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** DateTime

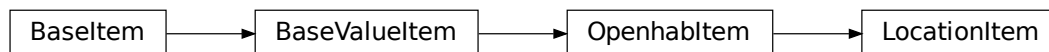
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** str

**Returns** Name of the item (read only)

### 9.3.9 LocationItem



**class** HABApp.openhab.items.**LocationItem**(name, initial\_value=None)

LocationItem which accepts and converts the data types from OpenHAB

**classmethod** **get\_item**(name)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_persistence\_data**(persistence=None, start\_time=None, end\_time=None)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.



**Parameters** `secs` (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoChangeWatch`

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** `secs` (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoUpdateWatch`

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

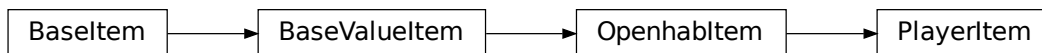
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.10 PlayerItem



**class** `HABApp.openhab.items.PlayerItem`(*name*, *initial\_value=None*)

PlayerItem which accepts and converts the data types from OpenHAB

**classmethod** `get_item`(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** `name` (`str`) – Name of the item

**get\_persistence\_data**(*persistence=None*, *start\_time=None*, *end\_time=None*)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[`str`]) – name of the persistence service (e.g. `rrd4j`, `mapdb`). If not set default will be used

- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openHAB or mqtt.

**Return type** *EventBusListener*

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (*ValueUpdateEvent*, *ValueChangeEvent*)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, *timedelta*]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

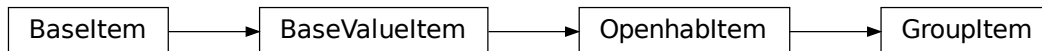
**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.11 GroupItem



**class** `HABApp.openhab.items.GroupItem`(name, initial\_value=None)

GroupItem which accepts and converts the data types from OpenHAB

**classmethod** `get_item`(name)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_persistence\_data**(persistence=None, start\_time=None, end\_time=None)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*value=<\_MissingType.MISSING: <object object>>*)

Post an update to the openHAB item

**Parameters** **value** (Any) – (optional) value to be posted. If not specified the item value will be used.

**oh\_send\_command**(*value=<\_MissingType.MISSING: <object object>>*)

Send a command to the openHAB item

**Parameters** **value** (Any) – (optional) value to be sent. If not specified the item value will be used.

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** **pendulum.datetime.DateTime**

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** **pendulum.datetime.DateTime**

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** **str**

**Return type** str

**Returns** Name of the item (read only)

### 9.3.12 ImageItem



**class** HABApp.openhab.items.**ImageItem**(name, initial\_value=None)

ImageItem which accepts and converts the data types from OpenHAB

**classmethod** **get\_item**(name)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_persistence\_data**(persistence=None, start\_time=None, end\_time=None)

Query historical data from the OpenHAB persistence service

**Parameters**

- **persistence** (Optional[str]) – name of the persistence service (e.g. rrd4j, mapdb). If not set default will be used
- **start\_time** (Optional[datetime]) – return only items which are newer than this
- **end\_time** (Optional[datetime]) – return only items which are older than this

**get\_value**(default\_value=None)

Return the value of the item.

**Parameters** `default_value` – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**oh\_post\_update**(*data, img\_type=None*)

Post an update to an openhab image with new image data. Image type is automatically detected, in rare cases when this does not work it can be set manually.

**Parameters**

- **data** (bytes) – image data
- **img\_type** (Optional[str]) – (optional) what kind of image, jpeg or png

**oh\_send\_command**(*data, img\_type=None*)

Send a command to an openhab image with new image data. Image type is automatically detected, in rare cases when this does not work it can be set manually.

**Parameters**

- **data** (bytes) – image data
- **img\_type** (Optional[str]) – (optional) what kind of image, jpeg or png

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (*ValueUpdateEvent*, *ValueChangeEvent*)

**Parameters** `new_value` – new value of the item

**Return type** bool

**Returns** True if state has changed

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** `new_value` – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** `secs` (Union[int, float, *timedelta*]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** *secs* (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

### 9.3.13 Thing



**class** `HABApp.openhab.items.Thing`(*name*)

Base class for Things

**Variables** *status* (*str*) – Status of the thing (e.g. OFFLINE, ONLINE, ...)

**classmethod** `get_item`(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** *name* (*str*) – Name of the item

**listen\_event**(*callback*, *event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically `ValueUpdateEvent` or `ValueChangeEvent` which will also trigger on changes/update from openHAB or mqtt.

**Return type** `EventBusListener`

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (`Union[int, float, timedelta]`) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoChangeWatch`

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (`Union[int, float, timedelta]`) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoUpdateWatch`

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** `str`

**Return type** `str`

**Returns** Name of the item (read only)

## 9.4 Openhab event types

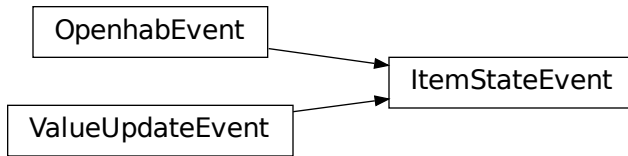
Openhab produces various events that are mapped to the internal event bus. On the [OpenHab page](#) there is an explanation for the various events.

### 9.4.1 Item events

#### ItemStateEvent

Since this event inherits from `ValueUpdateEvent` you can listen to `ValueUpdateEvent` and it will also trigger for `ItemStateEvent`.





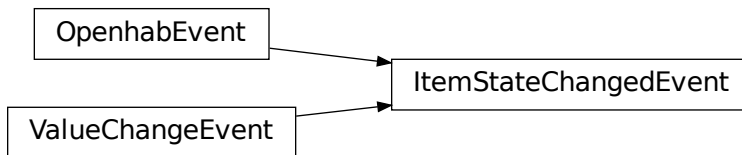
```
class HABApp.openhab.events.ItemStateEvent(name="", value=None)
```

**Variables**

- **name** (*str*) –
- **value** –

**ItemStateChangedEvent**

Since this event inherits from *ValueChangeEvent* you can listen to *ValueChangeEvent* and it will also trigger for *ItemStateChangedEvent*.

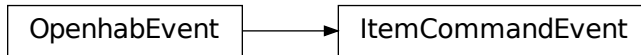


```
class HABApp.openhab.events.ItemStateChangedEvent(name="", value=None, old_value=None)
```

**Variables**

- **name** (*str*) –
- **value** –
- **old\_value** –

## ItemCommandEvent

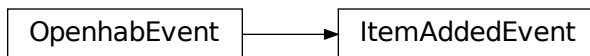


```
class HABApp.openhab.events.ItemCommandEvent(name="", value=None)
```

### Variables

- **name** (*str*) –
- **value** –

## ItemAddedEvent

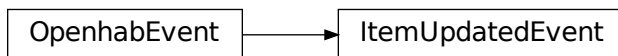


```
class HABApp.openhab.events.ItemAddedEvent(name="", type="")
```

### Variables

- **name** (*str*) –
- **type** (*str*) –

## ItemUpdatedEvent

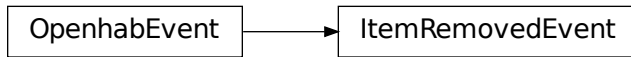


```
class HABApp.openhab.events.ItemUpdatedEvent(name="", type="")
```

### Variables

- **name** (*str*) –
- **type** (*str*) –

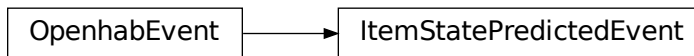
### ItemRemovedEvent



```
class HABApp.openhab.events.ItemRemovedEvent(name="")
```

**Variables** **name** (*str*) –

### ItemStatePredictedEvent

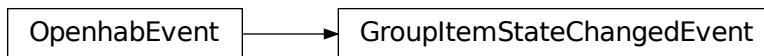


```
class HABApp.openhab.events.ItemStatePredictedEvent(name="", value=None)
```

**Variables**

- **name** (*str*) –
- **value** –

### GroupItemStateChangedEvent



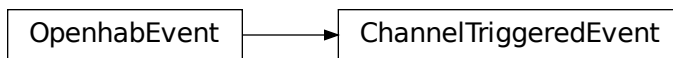
```
class HABApp.openhab.events.GroupItemStateChangedEvent(name="", item="", value=None,
old_value=None)
```

**Variables**

- **name** (*str*) –
- **item** (*str*) –
- **value** –
- **old\_value** –

## 9.4.2 Channel events

### ChannelTriggeredEvent



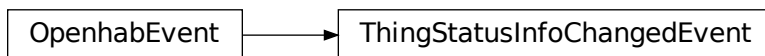
```
class HABApp.openhab.events.ChannelTriggeredEvent(name="", event="", channel=")
```

**Variables**

- **name** (*str*) –
- **event** (*str*) –
- **channel** (*str*) –

## 9.4.3 Thing events

### ThingStatusInfoChangedEvent



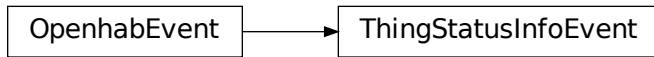
```
class HABApp.openhab.events.ThingStatusInfoChangedEvent(name="", status="", detail="", old_status="", old_detail="")
```

**Variables**

- **name** (*str*) –
- **status** (*str*) –
- **detail** (*str*) –

- `old_status` (*str*) –
- `old_detail` (*str*) –

### ThingStatusInfoEvent

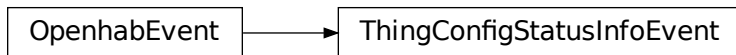


```
class HABApp.openhab.events.ThingStatusInfoEvent(name="", status="", detail="")
```

#### Variables

- `name` (*str*) –
- `status` (*str*) –
- `detail` (*str*) –

### ThingConfigStatusInfoEvent

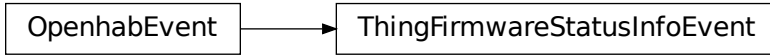


```
class HABApp.openhab.events.ThingConfigStatusInfoEvent(name="", messages=[{}])
```

#### Variables

- `name` (*str*) –
- `messages` (*list*) –

## ThingFirmwareStatusInfoEvent



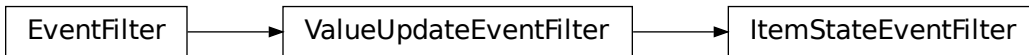
```
class HABApp.openhab.events.ThingFirmwareStatusInfoEvent(name="", status="")
```

### Variables

- **name** (*str*) –
- **status** (*str*) –

## 9.4.4 Event filters

### ItemStateEventFilter



```
class HABApp.openhab.events.ItemStateEventFilter(value)
```

### ItemStateChangedEventFilter



```
class HABApp.openhab.events.ItemStateChangedEventFilter(value=<_MissingType.MISSING: <object object>>,
old_value=<_MissingType.MISSING: <object object>>)
```

## 9.5 Textual thing configuration

### 9.5.1 Description

HABApp offers a special mechanism to textually define thing configuration parameters and linked items for things which have been added through the gui. This combines the best of both worlds: auto discovery, easy and fast sharing of parameters and items across things.

Configuration is done in the `thing_your_name.yml` file in the `config` folder (see [Configuration](#)). Every file that starts with `thing_` has the `.yml` ending will be loaded.

The Parameters and items will be checked/set when HABApp connects to openHAB or whenever the corresponding file gets changed.

### 9.5.2 Principle of operation

All existing things from openHAB can be filtered by different criteria. For each one of these remaining things it is then possible to

- Set thing parameters
- Create items with values taken from the thing fields
- Apply filters to the channels of the thing
  - For each matching channel it is possible to create and link items with values taken from the thing and the matching channel values

There is also a test mode which prints out all required information and does not make any changes.

A valid `.items` file will automatically be created next to the `.yml` file containing all created items. It can be used to get a quick overview what items (would) have been created or copied into the items folder.

### 9.5.3 File Structure

Configuration is done through a `.yml` file.

#### Example

The following example will show how to set the Z-Wave Parameters 4, 5, 6 and 8 for a `Philio PST02A Z-Wave` sensor and how to automatically link items to it.

---

**Tip:** Integer values can be specified either as integer (20) or hex (0x14)

---

The entries `thing config`, `create items` and `channels` are optional and can be combined as desired.

```
# Test mode: will not do anything but instead print out information
test: True

# Define filters which will reduce the number of things,
# all defined filters have to match for further processing
filter:
  thing_type: zwave:philio_pst02a_00_000
```

(continues on next page)

```

# Set this configuration every matching thing. HABApp will automatically only
# change the values which are not already correct.
# Here it is the z-wave parameters which are responsible for the device behaviour
thing config:
  4: 99    # Light Threshold
  5: 8     # Operation Mode
  6: 4     # MultiSensor Function Switch
  7: 20    # Customer Function

# Create items for every matching thing
create items:
- type: Number
  name: '{thing_label, :(.+)}_MyNumber'      # Use the label from the thing as an
↳input for the name,
  label: '{thing_label, :(.+)} MyNumber [%d]' # the regex will take everything from
↳the ':' on until the end
  icon: battery

channels:
# reduce the channels of the thing with these filters
# and link items to it
- filter:
  channel_type: zwave:alarm_motion
  link items:
  - type: Number
    name: '{thing_label, :(.+)}_Movement'      # Use the label from the thing
↳as an input for the name,
    label: '{thing_label, :(.+)} Movement [%d %%]' # the regex will take
↳everything from the ':' on until the end
    icon: battery
    groups: ['group1', 'group2']
    tags: ['tag1']

- filter:
  channel_type: zwave:sensor_temperature
  link items:
  - type: Number
    name: '{thing_label, :(.+)}_Temperature'
    label: '{thing_label, :(.+)} Temperature [%d %%]'
    icon: battery

```



## Multiple filters and filter definitions in one file

It is possible to add multiple thing processors into one file. To achieve this the root entry is now a list.

Filters can also be lists e.g. if they have to be applied multiple times to the same field.

```
- test: True
  filter:
    thing_type: zwave:philio_pst02a_00_000
    ...
- test: True
  # multiple filters on the same field, all have to match
  filter:
  - thing_type: zwave:fibaro.+
  - thing_type: zwave:fibaro_fgrgbw_00_000
  ...
```

## 9.5.4 Thing configuration

With the `thing config` block it is possible to set a configuration for each matching thing. If the parameters are already correct, they will not be set again.

**Warning:** The value of the configuration parameters will not be checked and will be written as specified. It is recommended to use HABmin or PaperUI to generate the initial configuration and use this mechanism to spread it to things of the same type.

### Example

```
thing config:
4: 99      # Light Threshold
5: 8       # Operation Mode
6: 4       # MultiSensor Function Switch
7: 20      # Customer Function
```

### References to other parameters

It is possible to use references to mathematically build parameters from other parameters. Typically this would be fade duration and refresh interval. References to other parameter values can be created with `$`. Example:

```
thing config:
5: 8
6: '$5 / 2'      # Use value from parameter 5 and divide it by two.
7: 'int($5 / 2)' # it is possible to use normal python data conversions
```

### 9.5.5 Item configuration

Items can be configured under `create items -> []` and `channels -> [] -> link items -> []`.

#### Structure

Mandatory values are `type` and `name`, all other values are optional.

```
type: Number
name: my_name
label: my_label
icon: my_icon
groups: ['group1', 'group2']
tags: ['tag1', 'tag1']
```

#### Metadata

It is possible to add metadata to the created items through the optional `metadata` entry in the item config.

There are two forms how metadata can be set. The implicit form for simple key-value pairs (e.g. `autoupdate`) or the explicit form where the entries are under `value` and `config` (e.g. `alexa`)

```
- type: Number
  name: '{thing_label, :(.+)$}_Temperature'
  label: '{thing_label, :(.+)$} Temperature [%d %%]'
  icon: battery
  metadata:
    autoupdate: 'false'
    homekit: 'TemperatureSensor'
    alexa:
      'value': 'Fan'
      'config':
        'type': 'oscillating'
        'speedSteps': 3
```

The config is equivalent to the following item configuration:

```
Number MyLabel_Temperature "MyLabel Temperature [%d %%]" { autoupdate="false", homekit=
↪"TemperatureSensor", alexa="Fan" [ type="oscillating", speedSteps=3 ] }
```

### 9.5.6 Fields

#### Filtering things/channels

The filter value can be applied to any available field from the Thing/Channel. The filter value is a regex that has to fully match the value.

Syntax:

```
filter:
  FIELD_NAME: REGULAR_EXPRESSION
```

e.g.

```
filter:
  thing_uid: zwave:device:controller:node35
```

If multiple filters are specified all have to match to select the Thing or Channel.

```
# Multiple filters on different columns
filter:
  thing_type: zwave:fibaro.+
  thing_uid: zwave:device:controller:node35

# Multiple filters on the same columns (rarely needed)
filter:
- thing_type: zwave:fibaro.+
- thing_type: zwave:fibaro_fgrgbw_00_000
```

## Field values as inputs

Filed values are available for item configuration and can be applied to all fields in the item configuration except for type and metadata.

## Syntax

Macros that select field values are framed with `{}` so the containing string has to be put in annotation marks. There are three modes of operation with wildcards:

1. Just insert the value from the field:  
`{field}`
2. Insert a part of the value from the field. A regular expression is used to extract the part and therefore has to contain a capturing group.  
`{field, regex(with_group)}`
3. Do a regex replace on the value from the field and use the result  
`{field, regex, replace}`

## Available fields

---

**Tip:** Test mode will show a table with all available fields and their value

---

The following fields are available for things:

- `thing_uid`
- `thing_type`
- `thing_location`
- `thing_label`
- `bridge_uid`

Additional available fields for channels:

- channel\_uid
- channel\_type
- channel\_label
- channel\_kind

### 9.5.7 Example

#### Log output

This will show the output for the example from *File Structure*

```

Loading /config/thing_philio.yml!
+-----+
↪-----+
↪
↪ Thing overview
↪ |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
↪-----+
|          thing_uid          |          thing_type          | thing_location |
↪ thing_label          |          bridge_uid          |                |
↪ editable |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
↪-----+
| zwave:device:controller:node32 | zwave:fibaro_fgrgbw_00_000 | Room1          | Fibaro_
↪ RGBW (Node 32): Room1 RGBW | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node7 | zwave:fibaro_fgrgbw_00_000 | Room2          | Fibaro_
↪ RGBW (Node 07): Room2 RGBW | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node23 | zwave:fibaro_fgrgbw_00_000 | Room3          | Fibaro_
↪ RGBW (Node 23): Room3 RGBW | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node35 | zwave:philio_pst02a_00_000 | Room1          | Philio_
↪ PST02A (Node 35): Room1 Door | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node15 | zwave:philio_pst02a_00_000 | Room2          | Philio_
↪ PST02A (Node 15): Room2 Window | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node17 | zwave:philio_pst02a_00_000 | Room3          | Philio_
↪ PST02A (Node 17): Room3 Window | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node3 | zwave:philio_pst02a_00_000 | Room1          | Philio_
↪ PST02A (Node 03): Room1 Window | zwave:serial_zstick:controller |                | True
↪ |
| zwave:device:controller:node5 | zwave:philio_pst02a_00_000 | Room4          | Philio_
↪ PST02A (Node 05): FrontDoor | zwave:serial_zstick:controller |                | True
↪ |

```

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```

| zwave:serial_zstick:controller | zwave:serial_zstick | | ZWave
↪Controller | | | ↪
↪False | | |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
↪---+
thing_type "zwave:philio_pst02a_00_000" matches for zwave:device:controller:node35!
thing_type "zwave:philio_pst02a_00_000" matches for zwave:device:controller:node15!
thing_type "zwave:philio_pst02a_00_000" matches for zwave:device:controller:node17!
thing_type "zwave:philio_pst02a_00_000" matches for zwave:device:controller:node3!
thing_type "zwave:philio_pst02a_00_000" matches for zwave:device:controller:node5!
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
| | | | | Current configuration | |
↪ | | | | |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
| Parameter | controller:node35 | controller:node15 | controller:node17 | ↪
↪controller:node3 | controller:node5 | | |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
| 2 | | | | | | | -
↪1 | | -1 | | | | |
| 3 | | | | | | | 80
↪80 | | 80 | | | | |
| 4 | | | | | | | 99
↪99 | | 99 | | | | |
| 5 | | | | | | | 0
↪8 | | 8 | | | | |
| 6 | | | | | | | 4
↪0 | | 0 | | | | |
| 7 | | | | | | | 22
↪20 | | 20 | | | | |
| 8 | | | | | | | 3
↪3 | | 3 | | | | |
| 9 | | | | | | | 4
↪4 | | 4 | | | | |
| 10 | | | | | | | 12
↪12 | | 12 | | | | |
| 11 | | | | | | | 12
↪12 | | 12 | | | | |
| 12 | | | | | | | 12
↪12 | | 4 | | | | |
| 13 | | | | | | | 12
↪12 | | 4 | | | | |
| 20 | | | | | | | 30
↪30 | | 30 | | | | |
| 21 | | | | | | | 1
↪0 | | 0 | | | | |
| 22 | | | | | | | 0
↪0 | | 0 | | | | |
| Group1 | | ['controller'] | ['controller'] | ['controller'] | [
↪'controller'] | ['controller'] | | | | | (continues on next page)

```

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```

| Group2          | []          | []          | []          |
↪ []             | []         |             |             |
| binding_cmdrepollperiod | 1500      |             | 1500      |
↪ 1500          | 1500      |             |             |
| binding_pollperiod   | 86400     |             | 86400     |
↪ 86400        | 86400     |             |             |
| wakeup_interval     | 86400     |             | 86400     |
↪ 86400        | 86400     |             |             |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
Would set {5: 8, 7: 20} for zwave:device:controller:node35
Would set {6: 4} for zwave:device:controller:node15
Would set {6: 4} for zwave:device:controller:node17
Would set {6: 4} for zwave:device:controller:node3
Would set {6: 4} for zwave:device:controller:node5
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
|                                     Channels for zwave:philio_pst02a_00_000
↪                                     |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
|          channel_uid                |          channel_type          |
↪channel_label | channel_kind |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
| zwave:device:controller:node35:sensor_door | zwave:sensor_door | Door/
↪Window Sensor | STATE |
| zwave:device:controller:node35:alarm_motion | zwave:alarm_motion | Motion
↪Sensor | STATE |
| zwave:device:controller:node35:alarm_tamper | zwave:alarm_tamper | Tamper
↪Alarm | STATE |
| zwave:device:controller:node35:sensor_luminance | zwave:sensor_luminance | Sensor
↪(luminance) | STATE |
| zwave:device:controller:node35:sensor_temperature | zwave:sensor_temperature | Sensor
↪(temperature) | STATE |
| zwave:device:controller:node35:alarm_access | zwave:alarm_access | Alarm
↪(Access Control) | STATE |
| zwave:device:controller:node35:alarm_burglar | zwave:alarm_burglar | Alarm
↪(Burglar) | STATE |
| zwave:device:controller:node35:battery-level | system:battery-level |
↪Batterieladung | STATE |
+-----+-----+-----+-----+
↪-----+-----+-----+-----+
channel_type "zwave:alarm_motion" matches for zwave:device:controller:node35:alarm_
↪motion!
channel_type "zwave:sensor_temperature" matches for
↪zwave:device:controller:node35:sensor_temperature!

channel_type "zwave:alarm_motion" matches for zwave:device:controller:node15:alarm_
↪motion!
channel_type "zwave:sensor_temperature" matches for
↪zwave:device:controller:node15:sensor_temperature!

```

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```

channel_type "zwave:alarm_motion" matches for zwave:device:controller:node17:alarm_
↳motion!
channel_type "zwave:sensor_temperature" matches for↳
↳zwave:device:controller:node17:sensor_temperature!

channel_type "zwave:alarm_motion" matches for zwave:device:controller:node3:alarm_motion!
channel_type "zwave:sensor_temperature" matches for zwave:device:controller:node3:sensor_
↳temperature!

channel_type "zwave:alarm_motion" matches for zwave:device:controller:node5:alarm_motion!
channel_type "zwave:sensor_temperature" matches for zwave:device:controller:node5:sensor_
↳temperature!

Would create Item(type='Number', name='Room1_Door_MyNumber', label='Room1 Door MyNumber [
↳%d]', icon='battery', groups=[], tags=[], link=None)
Would create Item(type='Number', name='Room1_Door_Movement', label='Room1 Door Movement [
↳%d %%]', icon='battery', groups=['group1', 'group2'], tags=['tag1'], link=
↳'zwave:device:controller:node35:alarm_motion')
Would create Item(type='Number', name='Room1_Door_Temperature', label='Room1 Door↳
↳Temperature [%d %%]', icon='battery', groups=[], tags=[], link=
↳'zwave:device:controller:node35:sensor_temperature')
Would create Item(type='Number', name='Room2_Window_MyNumber', label='Room2 Window↳
↳MyNumber [%d]', icon='battery', groups=[], tags=[], link=None)
Would create Item(type='Number', name='Room2_Window_Movement', label='Room2 Window↳
↳Movement [%d %%]', icon='battery', groups=['group1', 'group2'], tags=['tag1'], link=
↳'zwave:device:controller:node15:alarm_motion')
Would create Item(type='Number', name='Room2_Window_Temperature', label='Room2 Window↳
↳Temperature [%d %%]', icon='battery', groups=[], tags=[], link=
↳'zwave:device:controller:node15:sensor_temperature')
Would create Item(type='Number', name='Room3_Window_MyNumber', label='Room3 Window↳
↳MyNumber [%d]', icon='battery', groups=[], tags=[], link=None)
Would create Item(type='Number', name='Room3_Window_Movement', label='Room3 Window↳
↳Movement [%d %%]', icon='battery', groups=['group1', 'group2'], tags=['tag1'], link=
↳'zwave:device:controller:node17:alarm_motion')
Would create Item(type='Number', name='Room3_Window_Temperature', label='Room3 Window↳
↳Temperature [%d %%]', icon='battery', groups=[], tags=[], link=
↳'zwave:device:controller:node17:sensor_temperature')
Would create Item(type='Number', name='Room1_Window_MyNumber', label='Room1 Window↳
↳MyNumber [%d]', icon='battery', groups=[], tags=[], link=None)
Would create Item(type='Number', name='Room1_Window_Movement', label='Room1 Window↳
↳Movement [%d %%]', icon='battery', groups=['group1', 'group2'], tags=['tag1'], link=
↳'zwave:device:controller:node3:alarm_motion')
Would create Item(type='Number', name='Room1_Window_Temperature', label='Room1 Window↳
↳Temperature [%d %%]', icon='battery', groups=[], tags=[], link=
↳'zwave:device:controller:node3:sensor_temperature')
Would create Item(type='Number', name='FrontDoor_MyNumber', label='FrontDoor MyNumber [
↳%d]', icon='battery', groups=[], tags=[], link=None)
Would create Item(type='Number', name='FrontDoor_Movement', label='FrontDoor Movement [
↳%d %%]', icon='battery', groups=['group1', 'group2'], tags=['tag1'], link=
↳'zwave:device:controller:node5:alarm_motion')
Would create Item(type='Number', name='FrontDoor_Temperature', label='FrontDoor↳
↳Temperature [%d %%]', icon='battery', groups=[], tags=[], link=
↳'zwave:device:controller:node5:sensor_temperature')

```

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## Created items file

```

Number Room1_Door_MyNumber      "Room1 Door MyNumber [%d]"          <battery>
Number Room1_Door_Movement      "Room1 Door Movement [%d %]"        <battery>
↳(group1, group2) [tag1] {channel = "zwave:device:controller:node35:alarm_motion"}
Number Room1_Door_Temperature   "Room1 Door Temperature [%d %]"     <battery>
↳
↳temperature"}
Number Room2_Window_MyNumber    "Room2 Window MyNumber [%d]"        <battery>
Number Room2_Window_Movement    "Room2 Window Movement [%d %]"      <battery>
↳(group1, group2) [tag1] {channel = "zwave:device:controller:node15:alarm_motion"}
Number Room2_Window_Temperature "Room2 Window Temperature [%d %]"   <battery>
↳
↳temperature"}
Number Room3_Window_MyNumber    "Room3 Window MyNumber [%d]"        <battery>
Number Room3_Window_Movement    "Room3 Window Movement [%d %]"      <battery>
↳(group1, group2) [tag1] {channel = "zwave:device:controller:node17:alarm_motion"}
Number Room3_Window_Temperature "Room3 Window Temperature [%d %]"   <battery>
↳
↳temperature"}
Number Room1_Window_MyNumber    "Room1 Window MyNumber [%d]"        <battery>
Number Room1_Window_Movement    "Room1 Window Movement [%d %]"      <battery>
↳(group1, group2) [tag1] {channel = "zwave:device:controller:node3:alarm_motion"}
Number Room1_Window_Temperature "Room1 Window Temperature [%d %]"   <battery>
↳
↳temperature"}
Number FrontDoor_MyNumber       "FrontDoor MyNumber [%d]"           <battery>
Number FrontDoor_Movement       "FrontDoor Movement [%d %]"         <battery>
↳(group1, group2) [tag1] {channel = "zwave:device:controller:node5:alarm_motion"}
Number FrontDoor_Temperature     "FrontDoor Temperature [%d %]"      <battery>
↳
↳temperature"}

```

## 9.6 Example openHAB rules

### 9.6.1 Example 1

```

import HABApp
from HABApp.core.events import ValueUpdateEvent, ValueChangeEvent
from HABApp.openhab.events import ItemStateEvent, ItemCommandEvent, ItemStateChangedEvent
from HABApp.openhab.items import SwitchItem, ContactItem, DatetimeItem

class MyOpenhabRule(HABApp.Rule):

    def __init__(self):

```

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```

super().__init__()

# get items
test_contact = ContactItem.get_item('TestContact')
test_date_time = DatetimeItem.get_item('TestDateTime')
test_switch = SwitchItem.get_item('TestSwitch')

# Trigger on item updates
test_contact.listen_event(self.item_state_update, ItemStateEvent)
test_date_time.listen_event(self.item_state_update, ValueUpdateEvent)

# Trigger on item changes
test_contact.listen_event(self.item_state_change, ItemStateChangedEvent)
test_date_time.listen_event(self.item_state_change, ValueChangeEvent)

# Trigger on item commands
test_switch.listen_event(self.item_command, ItemCommandEvent)

def item_state_update(self, event):
    assert isinstance(event, ValueUpdateEvent)
    print( f'{event}')

def item_state_change(self, event):
    assert isinstance(event, ValueChangeEvent)
    print( f'{event}')

# interaction is available through self.openhab or self.oh
self.openhab.send_command('TestItemCommand', 'ON')

# example for interaction with openhab item type
switch_item = SwitchItem.get_item('TestSwitch')
if switch_item.is_on():
    switch_item.off()

def item_command(self, event):
    assert isinstance(event, ItemCommandEvent)
    print( f'{event}')

# interaction is available through self.openhab or self.oh
self.oh.post_update('ReceivedCommand', str(event))

```

MyOpenhabRule()

## 9.6.2 Check status of things

This rule prints the status of all Things and shows how to subscribe to events of the Thing status

```
import HABApp
from HABApp import Rule
from HABApp.openhab.events import ThingStatusInfoChangedEvent
from HABApp.openhab.items import Thing

class CheckAllThings(Rule):
    def __init__(self):
        super().__init__()

        for thing in HABApp.core.Items.get_all_items():
            if isinstance(thing, Thing):
                thing.listen_event(self.thing_status_changed,
↳ThingStatusInfoChangedEvent)
                print(f'{thing.name}: {thing.status}')

    def thing_status_changed(self, event: ThingStatusInfoChangedEvent):
        print(f'{event.name} changed from {event.old_status} to {event.status}')

CheckAllThings()
```

## 9.6.3 Check status if thing is constant

Sometimes Things recover automatically from small outages. This rule only triggers then the Thing is constant for 60 seconds.

```
from HABApp import Rule
from HABApp.core.events import ItemNoChangeEvent
from HABApp.openhab.items import Thing

class CheckThing(Rule):
    def __init__(self, name: str):
        super().__init__()

        self.thing = Thing.get_item(name)
        watcher = self.thing.watch_change(60)
        self.thing.listen_event(self.thing_no_change, watcher.EVENT)

    def thing_no_change(self, event: ItemNoChangeEvent):
        print(f'Thing {event.name} constant for {event.seconds}')
        print(f'Status: {self.thing.status}')

CheckThing('my:thing:uid')
```

```
Thing test_watch constant for 60  
Status: ONLINE
```



## 10.1 Interaction with the MQTT broker

Interaction with the MQTT broker is done through the `self.mqtt` object in the rule or through the `MqttItem`. When receiving a topic for the first time a new `MqttItem` will automatically be created.

## 10.2 Rule Interface

`class mqtt`

**publish**(*topic: str, payload: typing.Any*[, *qos: int = None, retain: bool = None*]) → int  
Publish a value under a certain topic.

**Parameters**

- **topic** – MQTT topic
- **payload** – MQTT Payload
- **qos** (*int*) – QoS, can be 0, 1 or 2. If not specified value from configuration file will be used.
- **retain** (*bool*) – retain message. If not specified value from configuration file will be used.

**Returns** 0 if successful

**subscribe**(*self, topic: str*[, *qos: int = None*]) → int  
Subscribe to a MQTT topic. Subscriptions will be active until next disconnect. For persistent subscriptions use the configuration file

**Parameters**

- **topic** – MQTT topic to subscribe to
- **qos** – QoS, can be 0, 1 or 2. If not specified value from configuration file will be used.

**Returns** 0 if successful

**unsubscribe**(*self, topic: str*) → int  
Unsubscribe from a MQTT topic

**Parameters** **topic** – MQTT topic

Returns 0 if successful

## 10.3 Mqtt item types

Mqtt items have an additional publish method which make interaction with the mqtt broker easier.

```

from HABApp.mqtt.items import MqttItem

# items can be created manually or will be automatically
# created when the first mqtt message is received
my_mqtt_item = MqttItem.get_create_item('test/topic')

# easy to publish values
my_mqtt_item.publish('new_value')

# comparing the item to get the state works, too
if my_mqtt_item == 'test':
    pass # do something

```

### 10.3.1 MqttItem



```
class HABApp.mqtt.items.MqttItem(name, initial_value=None)
```

A simple item that represents a topic and a value

```
classmethod get_create_item(name, initial_value=None)
```

Creates a new item in HABApp and returns it or returns the already existing one with the given name

#### Parameters

- **name** (str) – item name
- **initial\_value** – state the item will have if it gets created

**Return type** *MqttItem*

**Returns** item

```
classmethod get_item(name)
```

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

```
get_value(default_value=None)
```

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically ValueUpdateEvent or ValueChangeEvent which will also trigger on changes/update from openHAB or mqtt.

**Return type** EventBusListener

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**publish**(*payload, qos=None, retain=None*)

Publish the payload under the topic from the item.

**Parameters**

- **payload** – MQTT Payload
- **qos** (Optional[int]) – QoS, can be 0, 1 or 2. If not specified value from configuration file will be used.
- **retain** (Optional[bool]) – retain message. If not specified value from configuration file will be used.

**Returns** 0 if successful

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(*secs*)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** **secs** (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(*secs*)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** `secs` (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** `ItemNoUpdateWatch`

**Returns** The watch obj which can be used to cancel the watch

**property** `last_change`: `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been changed (read only)

**property** `last_update`: `pendulum.datetime.DateTime`

**Return type** `DateTime`

**Returns** Timestamp of the last time when the item has been updated (read only)

**property** `name`: `str`

**Return type** `str`

**Returns** Name of the item (read only)

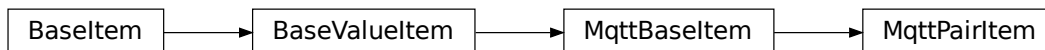
### 10.3.2 MqttPairItem

An item that consolidates a topic that reports states from a device and a topic that is used to write to a device. It is created on the topic that reports the state from the device.

```
from HABApp.mqtt.items import MqttPairItem

# MqttPairItem works out of the box with zigbee2mqtt
mqtt = MqttPairItem.get_create_item("zigbee2mqtt/my_bulb/brightness")
mqtt.publish("255") # <-- will use the write topic

# equivalent to
mqtt = MqttPairItem.get_create_item("zigbee2mqtt/my_bulb/brightness", write_topic=
↳ "zigbee2mqtt/my_bulb/set/brightness")
```



**class** `HABApp.mqtt.items.MqttPairItem`(`name`, `initial_value=None`, `write_topic=None`)

An item that represents both a topic that is used to read and a corresponding topic that is used to write values

**classmethod** `get_create_item`(`name`, `write_topic=None`, `initial_value=None`)

Creates a new item in HABApp and returns it or returns the already existing one with the given name. HABApp tries to automatically derive the write topic from the item name. In cases where this does not work it can be specified manually.

**Parameters**

- **name** (str) – item name (topic that reports the state)



- **write\_topic** (Optional[str]) – topic that is used to write values or None (default) to build it automatically
- **initial\_value** – state the item will have if it gets created

**Return type** *MqttPairItem*

**Returns** item

**classmethod** **get\_item**(*name*)

Returns an already existing item. If it does not exist or has a different item type an exception will occur.

**Parameters** **name** (str) – Name of the item

**get\_value**(*default\_value=None*)

Return the value of the item.

**Parameters** **default\_value** – Return this value if the item value is None

**Return type** Any

**Returns** value of the item

**listen\_event**(*callback, event\_type*)

Register an event listener which listens to all event that the item receives

**Parameters**

- **callback** (Callable[[Any], Any]) – callback that accepts one parameter which will contain the event
- **event\_type** (Union[AllEvents, *EventFilter*, Any]) – Event filter. This is typically *ValueUpdateEvent* or *ValueChangeEvent* which will also trigger on changes/update from openHAB or mqtt.

**Return type** *EventBusListener*

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (*ValueUpdateEvent*, *ValueChangeEvent*)

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**publish**(*payload, qos=None, retain=None*)

Publish the payload under the write topic from the item.

**Parameters**

- **payload** – MQTT Payload
- **qos** (Optional[int]) – QoS, can be 0, 1 or 2. If not specified value from configuration file will be used.
- **retain** (Optional[bool]) – retain message. If not specified value from configuration file will be used.

**Returns** 0 if successful

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**watch\_change**(secs)

Generate an event if the item does not change for a certain period of time. Has to be called from inside a rule function.

**Parameters** secs (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoChangeWatch*

**Returns** The watch obj which can be used to cancel the watch

**watch\_update**(secs)

Generate an event if the item does not receive and update for a certain period of time. Has to be called from inside a rule function.

**Parameters** secs (Union[int, float, timedelta]) – secs after which the event will occur, max 1 decimal digit for floats

**Return type** *ItemNoUpdateWatch*

**Returns** The watch obj which can be used to cancel the watch

**property last\_change:** pendulum.datetime.DateTime

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been changed (read only)

**property last\_update:** pendulum.datetime.DateTime

**Return type** DateTime

**Returns** Timestamp of the last time when the item has been updated (read only)

**property name:** str

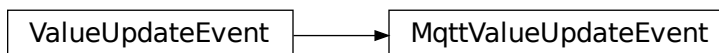
**Return type** str

**Returns** Name of the item (read only)

## 10.4 Mqtt event types

### 10.4.1 MqttValueUpdateEvent

Since this event inherits from *ValueUpdateEvent* you can listen to *ValueUpdateEvent* and it will also trigger for *MqttValueUpdateEvent*.



```
class HABApp.mqtt.events.MqttValueUpdateEvent(name=None, value=None)
```

## 10.4.2 MqttValueChangeEvent

Since this event inherits from *ValueChangeEvent* you can listen to *ValueChangeEvent* and it will also trigger for *MqttValueUpdateEvent*.



```
class HABApp.mqtt.events.MqttValueChangeEvent(name=None, value=None, old_value=None)
```

## 10.5 Example MQTT rule

```
import datetime
import random

import HABApp
from HABApp.core.events import ValueUpdateEvent
from HABApp.mqtt.items import MqttItem

class ExampleMqttTestRule(HABApp.Rule):
    def __init__(self):
        super().__init__()

        self.run.every(
            start_time=datetime.timedelta(seconds=10),
            interval=datetime.timedelta(seconds=20),
            callback=self.publish_rand_value
        )

        self.my_mqtt_item = MqttItem.get_create_item('test/test')

        self.listen_event('test/test', self.topic_updated, ValueUpdateEvent)

    def publish_rand_value(self):
        print('test mqtt_publish')
        self.my_mqtt_item.publish(str(random.randint(0, 1000)))

    def topic_updated(self, event):
        assert isinstance(event, ValueUpdateEvent), type(event)
        print( f'mqtt topic "test/test" updated to {event.value}')
```

```
ExampleMqttTestRule()
```



## ADVANCED USAGE

### 11.1 HABApp Topics

There are several internal topics which can be used to react to HABApp changes from within rules. An example would be dynamically reloading files or an own notifier in case there are errors (e.g. Pushover).

Topic	Description	Events
HABApp.File	The corresponding events trigger a load/unload of the file specified in the event	<i>RequestFileLoadEvent</i> and <i>RequestFileUnloadEvent</i>
HABApp.Info	All infos in functions and rules of HABApp create an according event	str
HABApp.Warning	Warnings in functions (e.g. caught exceptions) and rules of HABApp create an according event	<i>HABAppException</i> or str
HABApp.Error	Errors in functions and rules of HABApp create an according event. Use this topic to create an own notifier in case of errors (e.g. Pushover).	<i>HABAppException</i> or str

```
class HABApp.core.events.habapp_events.RequestFileLoadEvent(name)
    Request (re-) loading of the specified file
```

Variables **filename** (str) – relative filename

```
class HABApp.core.events.habapp_events.RequestFileUnloadEvent(name)
    Request unloading of the specified file
```

Variables **filename** (str) – relative filename

```
class HABApp.core.events.habapp_events.HABAppException(func_name, exception, traceback)
    Contains information about an Exception that has occurred in HABApp
```

Variables

- **func\_name** (str) – name of the function where the error occurred
- **traceback** (str) – traceback
- **exception** (Exception) – Exception

```
to_str()
```

Create a readable str with all information

Return type str

## 11.2 File properties

For every HABApp file it is possible to specify some properties. The properties are specified as a comment (prefixed with #) somewhere at the beginning of the file and are in the yml format. The keyword `HABApp` can be arbitrarily intended.

---

**Hint:** File names are not absolute but relative with a folder specific prefix. It's best to use the file name from the `RequestFileLoadEvent` from the HABApp event bus.

---

Configuration format

```
HABApp:
  depends on:
    - filename
  reloads on:
    - filename
```

Property	Description
depends on	The file will only get loaded when <b>all</b> of the files specified as dependencies have been successfully loaded
reloads on	The file will get automatically reloaded when <b>one of</b> the files specified will be reloaded

Example

```
# Some other stuff
#
# HABApp:
#   depends on:
#     - rules/rule_file.py
#   reloads on:
#     - params/param_file.yml

import HABApp
...
```

## 11.3 Invoking OpenHAB actions

The openhab REST interface does not expose `actions`, and thus there is no way to trigger them from HABApp. If it is not possible to create an OpenHAB item that directly triggers the action there is a way to work around it with additional items within openhab. An additional OpenHAB (note not HABApp) rule listens to changes on those items and invokes the appropriate openhab actions. On the HABApp side these actions are indirectly executed by setting the values for those items.

Below is an example how to invoke the openhab Audio and Voice actions.

First, define couple items to accept values from HABApp, and place them in `/etc/openhab2/items/habapp-bridge.items`:

```
String AudioVoiceSinkName
```

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```
String TextToSpeechMessage
String AudioFileLocation
String AudioStreamUrl
```

Second, create the JSR223 script to invoke the actions upon changes in the values of the items above.

```
from core import osgi
from core.jsr223 import scope
from core.rules import rule
from core.triggers import when
from org.eclipse.smarthome.model.script.actions import Audio
from org.eclipse.smarthome.model.script.actions import Voice

SINK_ITEM_NAME = 'AudioVoiceSinkName'

@rule("Play voice TTS message")
@when("Item TextToSpeechMessage changed")
def onTextToSpeechMessageChanged(event):
    ttl = scope.items[event.itemName].toString()
    if ttl is not None and ttl != '':
        Voice.say(ttl, None, scope.items[SINK_ITEM_NAME].toString())

    # reset the item to wait for the next message.
    scope.events.sendCommand(event.itemName, '')

@rule("Play audio stream URL")
@when("Item AudioStreamUrl changed")
def onTextToSpeechMessageChanged(event):
    stream_url = scope.items[event.itemName].toString()
    if stream_url is not None and stream_url != '':
        Audio.playStream(scope.items[SINK_ITEM_NAME].toString(), stream_url)

    # reset the item to wait for the next message.
    scope.events.sendCommand(event.itemName, '')

@rule("Play local audio file")
@when("Item AudioFileLocation changed")
def onTextToSpeechMessageChanged(event):
    file_location = scope.items[event.itemName].toString()
    if file_location is not None and file_location != '':
        Audio.playSound(scope.items[SINK_ITEM_NAME].toString(), file_location)

    # reset the item to wait for the next message.
    scope.events.sendCommand(event.itemName, '')
```

Finally, define the HABApp functions to indirectly invoke the actions:

```
def play_local_audio_file(sink_name: str, file_location: str):
    """ Plays a local audio file on the given audio sink. """
    HABApp.openhab.interface.send_command(ACTION_AUDIO_SINK_ITEM_NAME, sink_name)
    HABApp.openhab.interface.send_command(ACTION_AUDIO_LOCAL_FILE_LOCATION_ITEM_NAME,
    ↪file_location)
```

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```
def play_stream_url(sink_name: str, url: str):
    """ Plays a stream URL on the given audio sink. """
    HABApp.openhab.interface.send_command(ACTION_AUDIO_SINK_ITEM_NAME, sink_name)
    HABApp.openhab.interface.send_command(ACTION_AUDIO_STREAM_URL_ITEM_NAME, url)

def play_text_to_speech_message(sink_name: str, tts: str):
    """ Plays a text to speech message on the given audio sink. """
    HABApp.openhab.interface.send_command(ACTION_AUDIO_SINK_ITEM_NAME, sink_name)
    HABApp.openhab.interface.send_command(ACTION_TEXT_TO_SPEECH_MESSAGE_ITEM_NAME, tts)
```

## 11.4 Mocking OpenHAB items and events for tests

It is possible to create mock items in HABApp which do not exist in Openhab to create unit tests for rules and libraries. Ensure that this mechanism is only used for testing because since the items will not exist in openhab they will not get updated which can lead to hard to track down errors.

Examples:

Add an openhab mock item to the item registry

```
import HABApp
from HABApp.openhab.items import SwitchItem

item = SwitchItem('my_switch', 'ON')
HABApp.core.Items.add_item(item)
```

Remove the mock item from the registry

```
HABApp.core.Items.pop_item('my_switch')
```

Note that there are some item methods that encapsulate communication with openhab (e.g.: `SwitchItem.on()`, `SwitchItem.off()`, and `DimmerItem.percentage()`) These currently do not work with the mock items. The state has to be changed like any internal item.

```
import HABApp
from HABApp.openhab.items import SwitchItem
from HABApp.openhab.definitions import OnOffValue

item = SwitchItem('my_switch', 'ON')
HABApp.core.Items.add_item(item)

item.set_value(OnOffValue.ON)    # without bus event
item.post_value(OnOffValue.OFF)  # with bus event
```



**Warning:**

Please make sure you know what you are doing when using async functions!  
If you have no asyncio experience please do not use this! The use of blocking calls in async functions will prevent HABApp from working properly!

## 12.1 async http

Async http calls are available through the `self.async_http` object in rule instances.

### 12.1.1 Functions

`class HABApp.rule.interfaces.AsyncHttpConnection`

`get(url, params=None, **kwargs)`

http get request

**Parameters**

- **url** (`str`) – Request URL
- **params** (`Optional[Mapping[str, str]]`) – Mapping, iterable of tuple of key/value pairs (e.g. `dict`) to be sent as parameters in the query string of the new request. [Params example](#)
- **data** – Dictionary, bytes, or file-like object to send in the body of the request (optional)
- **json** – Any json compatible python object, json and data parameters could not be used at the same time. (optional)
- **kwargs** (`Any`) – See [aiohttp request](#) for further possible kwargs

**Return type** `_RequestContextManager`

**Returns** awaitable

`post(url, params=None, data=None, json=None, **kwargs)`

http post request

**Parameters**

- **url** (`str`) – Request URL

- **params** (Optional[Mapping[str, str]]) – Mapping, iterable of tuple of key/value pairs (e.g. dict) to be sent as parameters in the query string of the new request. [Params example](#)
- **data** (Optional[Any]) – Dictionary, bytes, or file-like object to send in the body of the request (optional)
- **json** (Optional[Any]) – Any json compatible python object, json and data parameters could not be used at the same time. (optional)
- **kwargs** (Any) – See [aiohttp request](#) for further possible kwargs

**Return type** `_RequestContextManager`

**Returns** awaitable

`put(url, params=None, data=None, json=None, **kwargs)`  
 http put request

**Parameters**

- **url** (str) – Request URL
- **params** (Optional[Mapping[str, str]]) – Mapping, iterable of tuple of key/value pairs (e.g. dict) to be sent as parameters in the query string of the new request. [Params example](#)
- **data** (Optional[Any]) – Dictionary, bytes, or file-like object to send in the body of the request (optional)
- **json** (Optional[Any]) – Any json compatible python object, json and data parameters could not be used at the same time. (optional)
- **kwargs** (Any) – See [aiohttp request](#) for further possible kwargs

**Return type** `_RequestContextManager`

**Returns** awaitable

`get_client_session()`  
 Return the aiohttp [client session object](#) for use in aiohttp libraries

**Return type** `ClientSession`

**Returns** session object

## 12.1.2 Examples

```
import asyncio

import HABApp

class AsyncRule(HABApp.Rule):

    def __init__(self):
        super().__init__()

        self.run.soon(self.async_func)

    async def async_func(self):
        await asyncio.sleep(2)
```

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```
async with self.async_http.get('http://httpbin.org/get') as resp:  
    print(resp)  
    print(await resp.text())
```

```
AsyncRule()
```



## UTIL - HELPERS AND UTILITIES

The util package contains useful classes which make rule creation easier.

### 13.1 Functions

#### 13.1.1 min

This function is very useful together with the all possible functions of *ValueMode* for the *MultiModeItem*. For example it can be used to automatically disable or calculate the new value of the *ValueMode* It behaves like the standard python function except that it will ignore *None* values which are sometimes set as the item state.

```
from HABApp.util.functions import min

print(min(1, 2, None))
```

`HABApp.util.functions.min(*args, default=None)`

Behaves like the built in min function but ignores any *None* values. e.g. `min([1, None, 2]) == 1`. If the iterable is empty `default` will be returned.

##### Parameters

- **args** – Single iterable or 1..n arguments
- **default** – Value that will be returned if the iterable is empty

**Returns** min value

#### 13.1.2 max

This function is very useful together with the all possible functions of *ValueMode* for the *MultiModeItem*. For example it can be used to automatically disable or calculate the new value of the *ValueMode* It behaves like the standard python function except that it will ignore *None* values which are sometimes set as the item state.

```
from HABApp.util.functions import max

print(max(1, 2, None))
```

`HABApp.util.functions.max(*args, default=None)`

Behaves like the built in max function but ignores any *None* values. e.g. `max([1, None, 2]) == 2`. If the iterable is empty `default` will be returned.

##### Parameters

- **args** – Single iterable or 1..n arguments
- **default** – Value that will be returned if the iterable is empty

**Returns** max value

### 13.1.3 rgb\_to\_hsb

Converts a rgb value to hsb color space

```
from HABApp.util.functions import rgb_to_hsb

print(rgb_to_hsb(224, 201, 219))
```

`HABApp.util.functions.rgb_to_hsb(r, g, b, max_rgb_value=255, ndigits=2)`

Convert from rgb to hsb/hsv

**Parameters**

- **r** (Union[int, float]) – red value
- **g** (Union[int, float]) – green value
- **b** (Union[int, float]) – blue value
- **max\_rgb\_value** (int) – maximal possible rgb value (e.g. 255 for 8 bit or 65.535 for 16bit values)
- **ndigits** (Optional[int]) – Round the hsb values to the specified digits, None to disable rounding

**Return type** Tuple[float, float, float]

**Returns** Values for hue, saturation and brightness / value

### 13.1.4 hsb\_to\_rgb

Converts a hsb value to the rgb color space

```
from HABApp.util.functions import hsb_to_rgb

print(hsb_to_rgb(150, 40, 100))
```

`HABApp.util.functions.hsb_to_rgb(h, s, b, max_rgb_value=255)`

Convert from hsb to rgb/hsv

**Parameters**

- **h** – hue
- **s** – saturation
- **b** – brightness / value
- **max\_rgb\_value** – maximal value for the returned rgb values (e.g. 255 for 8 bit or 65.535 16bit values)

**Return type** Tuple[int, int, int]

**Returns** Values for red, green and blue

## 13.2 CounterItem

### 13.2.1 Example

```
from HABApp.util import CounterItem
c = CounterItem.get_create_item('MyCounter', initial_value=5)
print(c.increase())
print(c.decrease())
print(c.reset())
```

```
6
5
5
```

### 13.2.2 Documentation

**class** HABApp.util.**CounterItem**(*name*, *initial\_value=0*)

Implements a simple thread safe counter

**Parameters** **initial\_value** (int) – Initial value of the counter

**\_\_init\_\_**(*name*, *initial\_value=0*)

**Parameters** **initial\_value** (int) – Initial value of the counter

**set\_value**(*new\_value*)

Set a new value without creating events on the event bus

**Parameters** **new\_value** – new value of the item

**Return type** bool

**Returns** True if state has changed

**post\_value**(*new\_value*)

Set a new value and post appropriate events on the HABApp event bus (ValueUpdateEvent, ValueChangeEvent)

**Parameters** **new\_value** – new value of the item

**Returns** True if state has changed

**reset**()

Reset value to initial value

**increase**(*step=1*)

Increase value

**Parameters** **step** – increase by this value, default = 1

**Return type** int

**Returns** value of the counter

**decrease**(*step=1*)

Decrease value

**Parameters** **step** – decrease by this value, default = 1

**Return type** int

**Returns** value of the counter

## 13.3 Statistics

### 13.3.1 Example

```
s = Statistics(max_samples=4)
for i in range(1,4):
    s.add_value(i)
print(s)
```

```
<Statistics sum: 1.0, min: 1.00, max: 1.00, mean: 1.00, median: 1.00>
<Statistics sum: 3.0, min: 1.00, max: 2.00, mean: 1.50, median: 1.50>
<Statistics sum: 6.0, min: 1.00, max: 3.00, mean: 2.00, median: 2.00>
```

### 13.3.2 Documentation

**class** HABApp.util.**Statistics**(*max\_age=None, max\_samples=None*)

Calculate mathematical statistics of numerical values.

#### Variables

- **sum** – sum of all values
- **min** – minimum of all values
- **max** – maximum of all values
- **mean** – mean of all values
- **median** – median of all values
- **last\_value** – last added value
- **last\_change** – timestamp the last time a value was added

#### Parameters

- **max\_age** – Maximum age of values in seconds
- **max\_samples** – Maximum amount of samples which will be kept

#### **update**()

update values without adding a new value

#### **add\_value**(*value*)

Add a new value and recalculate statistical values

**Parameters** **value** – new value



## 13.4 MultiModelItem

Prioritizer item which automatically switches between values with different priorities. Very useful when different states or modes overlap, e.g. automatic and manual mode. etc.

### 13.4.1 Basic Example

```
import HABApp
from HABApp.core.events import ValueUpdateEvent
from HABApp.util.multimode import MultiModeItem, ValueMode

class MyMultiModeItemTestRule(HABApp.Rule):
    def __init__(self):
        super().__init__()

        # create a new MultiModeItem
        item = MultiModeItem.get_create_item('MultiModeTestItem')
        item.listen_event(self.item_update, ValueUpdateEvent)

        # create two different modes which we will use and add them to the item
        auto = ValueMode('Automatic', initial_value=5)
        manu = ValueMode('Manual', initial_value=0)
        item.add_mode(0, auto).add_mode(10, manu)

        # This shows how to enable/disable a mode and how to get a mode from the item
        print('disable/enable the higher priority mode')
        item.get_mode('manual').set_enabled(False) # disable mode
        item.get_mode('manual').set_value(11)      # setting a value will enable it
↪again

        # This shows that changes of the lower priority is only show when
        # the mode with the higher priority gets disabled
        print('')
        print('Set value of lower priority')
        auto.set_value(55)
        print('Disable higher priority')
        manu.set_enabled(False)

    def item_update(self, event):
        print(f'State: {event.value}')

MyMultiModeItemTestRule()
```

```
disable/enable the higher priority mode
State: 5
State: 11

Set value of lower priority
State: 11
Disable higher priority
State: 55
```

## 13.4.2 Advanced Example

```

import logging
import HABApp
from HABApp.core.events import ValueUpdateEvent
from HABApp.util.multimode import MultiModeItem, ValueMode

class MyMultiModeItemTestRule(HABApp.Rule):
    def __init__(self):
        super().__init__()

        # create a new MultiModeItem
        item = MultiModeItem.get_create_item('MultiModeTestItem')
        item.listen_event(self.item_update, ValueUpdateEvent)

        # helper to print the heading so we have a nice output
        def print_heading(_heading):
            print('')
            print('-' * 80)
            print(_heading)
            print('-' * 80)
            for p, m in item.all_modes():
                print(f'Prio {p:2d}: {m}')
            print('')

        log = logging.getLogger('AdvancedMultiMode')

        # create modes and add them
        auto = ValueMode('Automatic', initial_value=5, logger=log)
        manu = ValueMode('Manual', initial_value=10, logger=log)
        item.add_mode(0, auto).add_mode(10, manu)

        # it is possible to automatically disable a mode
        # this will disable the manual mode if the automatic mode
        # sets a value greater equal manual mode
        print_heading('Automatically disable mode')

        # A custom function can also disable the mode:
        manu.auto_disable_func = lambda low, own: low >= own

        auto.set_value(11) # <-- manual now gets disabled because
        auto.set_value(4) #     the lower priority value is >= itself

        # It is possible to use functions to calculate the new value for a mode.
        # E.g. shutter control and the manual mode moves the shades. If it's dark the
        ↪ automatic
            # mode closes the shutter again. This could be achieved by automatically
        ↪ disable the
            # manual mode or if the state should be remembered then the max function should
        ↪ be used

```

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```

# create a move and use the max function for output calculation
manu = ValueMode('Manual', initial_value=5, logger=log, calc_value_func=max)
item.add_mode(10, manu) # overwrite the earlier added mode

print_heading('Use of functions')

auto.set_value(7) # manu uses max, so the value from auto is used
auto.set_value(3)

def item_update(self, event):
    print(f'Item value: {event.value}')

```

```
MyMultiModeItemTestRule()
```

```
-----
Automatically disable mode
-----
```

```
Prio 0: <ValueMode Automatic enabled: True, value: 5>
Prio 10: <ValueMode Manual enabled: True, value: 10>
```

```
[AdvancedMultiMode] INFO | [x] Automatic: 11
[AdvancedMultiMode] INFO | [ ] Manual (function)
Item value: 11
[AdvancedMultiMode] INFO | [x] Automatic: 4
Item value: 4
```

```
-----
Use of functions
-----
```

```
Prio 0: <ValueMode Automatic enabled: True, value: 4>
Prio 10: <ValueMode Manual enabled: True, value: 5>
```

```
[AdvancedMultiMode] INFO | [x] Automatic: 7
Item value: 7
[AdvancedMultiMode] INFO | [x] Automatic: 3
Item value: 5
```

### 13.4.3 Example SwitchItemValueMode

The SwitchItemMode is same as ValueMode but enabled/disabled of the mode is controlled by a OpenHAB *SwitchItem*. This is very useful if the mode shall be deactivated from the OpenHAB sitemaps.

```

import HABApp
from HABApp.core.events import ValueUpdateEvent
from HABApp.openhab.items import SwitchItem
from HABApp.util.multimode import MultiModeItem, SwitchItemValueMode, ValueMode

class MyMultiModeItemTestRule(HABApp.Rule):
    def __init__(self):

```

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```

super().__init__()

# create a new MultiModeItem
item = MultiModeItem.get_create_item('MultiModeTestItem')

# this switch allows to enable/disable the mode
switch = SwitchItem.get_item('Automatic_Enabled')
print(f'Switch is {switch}')

# this is how the switch gets linked to the mode
# if the switch is on, the mode is on, too
mode = SwitchItemValueMode('Automatic', switch)
print(mode)

# Use invert_switch if the desired behaviour is
# if the switch is off, the mode is on
mode = SwitchItemValueMode('AutomaticOff', switch, invert_switch=True)
print(mode)

# This shows how the SwitchItemValueMode can be used to disable any logic except
↳for the manual mode.
# Now everything can be enabled/disabled from the openhab sitemap
item.add_mode(100, mode)
item.add_mode(101, ValueMode('Manual'))

MyMultiModeItemTestRule()

```

```

Switch is ON
<SwitchItemValueMode Automatic enabled: True, value: None>
<SwitchItemValueMode AutomaticOff enabled: False, value: None>

```

## 13.4.4 Documentation

### MultiModeItem

**class** HABApp.util.multimode.**MultiModeItem**(name, initial\_value=None)  
 Prioritizer *Item*

**Variables** **logger** – Assign a logger to get log messages about the different modes

**classmethod** **get\_create\_item**(name, logger=None, initial\_value=None)

Creates a new item in HABApp and returns it or returns the already existing one with the given name

#### Parameters

- **name** (str) – item name
- **initial\_value** – state the item will have if it gets created

**Returns** item

**remove\_mode**(name)

Remove mode if it exists

**Parameters** **name** (str) – name of the mode (case insensitive)

**Return type** bool

**Returns** True if something was removed, False if nothign was found

**add\_mode**(*priority, mode*)

Add a new mode to the item, if it already exists it will be overwritten

**Parameters**

- **priority** (int) – priority of the mode
- **mode** (BaseMode) – instance of the MultiMode class

**Return type** *MultiModeItem*

**all\_modes**()

Returns a sorted list containing tuples with the priority and the mode

**Return type** List[Tuple[int, BaseMode]]

**Returns** List with priorities and modes

**get\_mode**(*name*)

Returns a created mode

**Parameters** **name** (str) – name of the mode (case insensitive)

**Return type** BaseMode

**Returns** The requested MultiModeValue

**calculate\_value**()

Recalculate the output value and post the state to the event bus (if it is not None)

**Return type** Any

**Returns** new value

## ValueMode

```
class HABApp.util.multimode.ValueMode(name, initial_value=None, enabled=None, enable_on_value=True,
                                       logger=None, auto_disable_after=None, auto_disable_func=None,
                                       calc_value_func=None)
```

**Variables**

- **last\_update** (*datetime.datetime*) – Timestamp of the last update/enable of this value
- **auto\_disable\_after** (*typing.Optional[datetime.timedelta]*) – Automatically disable this mode after a given timedelta on the next recalculation
- **auto\_disable\_func** (*typing.Optional[typing.Callable[[typing.Any, typing.Any], bool]]*) – Function which can be used to disable this mode. Any function that accepts two Arguments can be used. First arg is value with lower priority, second argument is own value. Return True to disable this mode.
- **calc\_value\_func** (*typing.Optional[typing.Callable[[typing.Any, typing.Any], typing.Any]]*) – Function to calculate the new value (e.g. min or max). Any function that accepts two Arguments can be used. First arg is value with lower priority, second argument is own value.

**Parameters**

- **name** (str) – Name of the mode

- **initial\_value** – initial value of the mode
- **enabled** (Optional[bool]) – initial enabled state of the mode
- **enable\_on\_value** (bool) – If True (default) setting a value (that is not None) will also enable the mode
- **logger** (Optional[Logger]) – logger to log events
- **auto\_disable\_after** – see variables
- **auto\_disable\_func** – see variables
- **calc\_value\_func** – see variables

### property value

Returns the current value

### property enabled: bool

Returns if the value is enabled

**Return type** bool

### set\_value(value, only\_on\_change=False)

Set new value and recalculate overall value. If **enable\_on\_value** is set, setting a value will also enable the mode.

#### Parameters

- **value** – new value
- **only\_on\_change** (bool) – will set/enable the mode only if value differs or the mode is disabled

### set\_enabled(value, only\_on\_change=False)

Enable or disable this value and recalculate overall value

#### Parameters

- **value** (bool) – True/False
- **only\_on\_change** (bool) – enable only on change

#### Returns

### cancel()

Remove the mode from the parent `MultiModeItem` and stop processing it

## SwitchItemValueMode

```
class HABApp.util.multimode.SwitchItemValueMode(name, switch_item, invert_switch=False,
                                                initial_value=None, logger=None,
                                                auto_disable_after=None, auto_disable_func=None,
                                                calc_value_func=None)
```

SwitchItemMode, same as ValueMode but enabled/disabled of the mode is controlled by a OpenHAB `SwitchItem`

#### Variables

- **last\_update** (*datetime.datetime*) – Timestamp of the last update/enable of this value
- **auto\_disable\_after** (*typing.Optional[datetime.timedelta]*) – Automatically disable this mode after a given timedelta on the next recalculation

- **auto\_disable\_func** (*typing.Optional[typing.Callable[[typing.Any, typing.Any], bool]]*) – Function which can be used to disable this mode. Any function that accepts two Arguments can be used. First arg is value with lower priority, second argument is own value. Return True to disable this mode.
- **calc\_value\_func** (*typing.Optional[typing.Callable[[typing.Any, typing.Any], typing.Any]]*) – Function to calculate the new value (e.g. min or max). Any function that accepts two Arguments can be used. First arg is value with lower priority, second argument is own value.

#### Parameters

- **name** (str) – Name of the mode
- **switch\_item** (*SwitchItem*) – *SwitchItem* that will enable/disable the mode
- **invert\_switch** (bool) – invert switch state (e.g. *OFF* -> enabled, default is False)
- **initial\_value** – initial value of the mode
- **logger** (Optional[Logger]) – logger to log events
- **auto\_disable\_after** – see variables
- **auto\_disable\_func** – see variables
- **calc\_value\_func** – see variables

#### cancel()

Remove the mode from the parent `MultiModeItem` and stop processing it

#### property enabled: bool

Returns if the value is enabled

**Return type** bool

#### set\_value(value, only\_on\_change=False)

Set new value and recalculate overall value. If `enable_on_value` is set, setting a value will also enable the mode.

#### Parameters

- **value** – new value
- **only\_on\_change** (bool) – will set/enable the mode only if value differs or the mode is disabled

#### property value

Returns the current value





## ADDITIONAL RULE EXAMPLES

### 14.1 Using the scheduler

```
from datetime import time, timedelta, datetime
from HABApp import Rule

class MyRule(Rule):

    def __init__(self):
        super().__init__()

        self.run.on_day_of_week(time=time(14, 34, 20), weekdays=['Mo'], callback=self.
↪run_mondays)

        self.run.every(timedelta(seconds=5), 3, self.run_every_3s, 'arg 1', asdf='kwarg 1
↪')

        self.run.on_workdays(time(15, 00), self.run_workdays)
        self.run.on_weekends(time(15, 00), self.run_weekends)

    def run_every_3s(self, arg, asdf = None):
        print(f'run_ever_3s: {datetime.now().replace(microsecond=0)} : {arg}, {asdf}')

    def run_mondays(self):
        print('Today is monday!')

    def run_workdays(self):
        print('Today is a workday!')

    def run_weekends(self):
        print('Finally weekend!')

MyRule()
```

## 14.2 Mirror openHAB events to a MQTT Broker

```
import HABApp
from HABApp.openhab.events import ItemStateEvent
from HABApp.openhab.items import Thing
from HABApp.mqtt.items import MqttItem

class ExampleOpenhabToMQTTRule(HABApp.Rule):
    """This Rule mirrors all updates from OpenHAB to MQTT"""

    def __init__(self):
        super().__init__()

        for item in HABApp.core.Items.get_all_items():
            if isinstance(item, (Thing, MqttItem)):
                continue
            item.listen_event(self.process_update, ItemStateEvent)

    def process_update(self, event):
        assert isinstance(event, ItemStateEvent)

        print(f'/openhab/{event.name} <- {event.value}')
        self.mqtt.publish(f'/openhab/{event.name}', str(event.value))
```

```
ExampleOpenhabToMQTTRule()
```

## 14.3 Trigger an event when an item is constant

Get an even when the item is constant for 5 and for 10 seconds.

```
import HABApp
from HABApp.core.items import Item
from HABApp.core.events import ItemNoChangeEvent

class MyRule(HABApp.Rule):
    def __init__(self):
        super().__init__()
        my_item = Item.get_item('test_watch')

        my_item.watch_change(5)      # Create event when item doesn't change for 5 secs
        my_item.watch_change(10)    # Create event when item doesn't change for 10 secs

        # Listen to these events
        self.listen_event(my_item, self.item_constant, ItemNoChangeEvent)

        # Set the item to a value
        my_item.set_value('my_value')
```

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```
def item_constant(self, event):
    print(f'{event}')
```

```
MyRule()
```

```
<ItemNoChangeEvent name: test_watch, seconds: 5>
<ItemNoChangeEvent name: test_watch, seconds: 10>
```

## 14.4 Turn something off after movement

Turn a device off 30 seconds after one of the movement sensors in a room signals movement.

```
import HABApp
from HABApp.core.items import Item
from HABApp.core.events import ValueUpdateEvent

class MyCountdownRule(HABApp.Rule):
    def __init__(self):
        super().__init__()

        self.countdown = self.run.countdown(30, self.switch_off)
        self.device = Item.get_item('my_device')

        self.movement1 = Item.get_item('movement_sensor1')
        self.movement1.listen_event(self.movement, ValueUpdateEvent)

        self.movement2 = Item.get_item('movement_sensor2')
        self.movement2.listen_event(self.movement, ValueUpdateEvent)

    def movement(self, event: ValueUpdateEvent):
        if self.device != 'ON':
            self.device.post_value('ON')

        self.countdown.reset()

    def switch_off(self):
        self.device.post_value('OFF')

MyCountdownRule()
```

## 14.5 Process Errors in Rules

This example shows how to create a rule with a function which will be called when **any** rule throws an error. The rule function then can push the error message to an openhab item or e.g. use Pushover to send the error message to the mobile device (see *Advanced Usage* for more information).

```
import HABApp
from HABApp.core.events.habapp_events import HABAppException

class NotifyOnError(HABApp.Rule):
    def __init__(self):
        super().__init__()

        # Listen to all errors
        self.listen_event('HABApp.Errors', self.on_error, HABAppException)

    def on_error(self, error_event: HABAppException):
        msg = event.to_str() if isinstance(event, HABAppException) else event
        print(msg)

NotifyOnError()

# this is a faulty example. Do not create this part!
class FaultyRule(HABApp.Rule):
    def __init__(self):
        super().__init__()
        self.run.soon(self.faulty_function)

    def faulty_function(self):
        1 / 0

FaultyRule()
```

## TIPS & TRICKS

### 15.1 yml files

#### 15.1.1 Entry sharing

If the values should be reused yml features anchors with & which then can be referenced with \*. This allows to reuse the defined structures:

```
my_key_value_pairs: &my_kv # <-- this creates the anchor node with the name my_kv
  4: 99      # Light Threshold
  5: 8       # Operation Mode
  7: 20      # Customer Function

value_1: *my_kv # <-- '*my_kv' references the anchor node my_kv
value_2: *my_kv

value_3:
  <<: *my_kv # <-- '<<: *my_kv' references and inserts the content (!) of the anchor_
↳node my_kv
  4: 80      # and then overwrites parameter 4
```

### 15.2 openHAB

#### 15.2.1 autoupdate

If external devices are capable of reporting their state (e.g. Z-Wave) it is always advised to use disable autoupdate for these items. This prevents openhab from guessing the item state based on the command and forces it to use the actual reported value. If in doubt if the device supports reporting their state watch the state after sending a command with autoupdate off. If the state changes autoupdate can remain off.

In the \*.items file autoupdate can be disabled by adding the following statement in the metadata field.

```
` Number MyItem { channel = "zwave:my_zwave_link", autoupdate="false" } `
```

It's also possible with textual thing configuration to add it as metadata.



## CLASS REFERENCE

Reference for returned classes from some functions. These are not intended to be created by the user.

### 16.1 Watches

#### 16.1.1 ItemNoUpdateWatch

**class** HABApp.core.items.base\_item\_watch.**ItemNoUpdateWatch**(*name, secs*)

**EVENT**

alias of *HABApp.core.events.events.ItemNoUpdateEvent*

**cancel()**

Cancel the item watch

**listen\_event**(*callback*)

Listen to (only) the event that is emitted by this watcher

**Return type** EventBusListener

#### 16.1.2 ItemNoChangeWatch

**class** HABApp.core.items.base\_item\_watch.**ItemNoChangeWatch**(*name, secs*)

**EVENT**

alias of *HABApp.core.events.events.ItemNoChangeEvent*

**cancel()**

Cancel the item watch

**listen\_event**(*callback*)

Listen to (only) the event that is emitted by this watcher

**Return type** EventBusListener

## 16.2 Scheduler

### 16.2.1 OneTimeJob

```
class eascheduler.jobs.OneTimeJob(parent, func)
```

```
cancel()
```

Cancel the job.

```
get_next_run()
```

Return the next execution timestamp.

**Return type** datetime

### 16.2.2 CountdownJob

```
class eascheduler.jobs.CountdownJob(parent, func)
```

```
cancel()
```

Cancel the job.

```
countdown(time)
```

Set the time after which the job will be executed.

**Parameters** **time** (Union[timedelta, float, int]) – time

**Return type** *CountdownJob*

```
get_next_run()
```

Return the next execution timestamp.

**Return type** datetime

### 16.2.3 ReoccurringJob

```
class eascheduler.jobs.ReoccurringJob(parent, func)
```

```
boundary_func(func)
```

Add a function which will be called when the datetime changes. Use this to implement custom boundaries. Use None to disable the boundary function.

**Parameters** **func** (Optional[Callable[[datetime], datetime]]) – Function which returns a datetime obj, arg is a datetime with the next run time. Return SKIP\_EXECUTION together with a reoccurring job to skip the proposed run time.

**Return type** DateTimeJobBase

```
cancel()
```

Cancel the job.

```
earliest(time_obj)
```

Set earliest boundary as time of day. None will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run earlier

**Return type** DateTimeJobBase



**get\_next\_run()**

Return the next execution timestamp.

**Return type** datetime

**interval**(*interval*)

Set the interval at which the task will run.

**Parameters** **interval** (Union[int, float, timedelta]) – interval in secs or a timedelta obj

**Return type** *ReoccurringJob*

**jitter**(*start, stop=None*)

Add a random jitter per call in the interval [start <= secs <= stop] to the next run. If stop is omitted start must be positive and the interval will be [-start <= secs <= start] Passing None as start will disable jitter.

**Parameters**

- **start** (Union[int, float, None]) – Interval start or None to disable jitter
- **stop** (Union[int, float, None]) – Interval stop or None to build interval based on start

**Return type** DateTimeJobBase

**latest**(*time\_obj*)

Set latest boundary as time of day. None will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run later

**Return type** DateTimeJobBase

**offset**(*timedelta\_obj*)

Set a constant offset to the calculation of the next run. None will disable the offset.

**Parameters** **timedelta\_obj** (Optional[timedelta]) – constant offset

**Return type** DateTimeJobBase

## 16.2.4 DayOfWeekJob

**class** eascheduler.jobs.**DayOfWeekJob**(*parent, func*)

**boundary\_func**(*func*)

Add a function which will be called when the datetime changes. Use this to implement custom boundaries. Use None to disable the boundary function.

**Parameters** **func** (Optional[Callable[[datetime], datetime]]) – Function which returns a datetime obj, arg is a datetime with the next run time. Return SKIP\_EXECUTION together with a reoccurring job to skip the proposed run time.

**Return type** DateTimeJobBase

**cancel**()

Cancel the job.

**earliest**(*time\_obj*)

Set earliest boundary as time of day. None will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run earlier

**Return type** DateTimeJobBase

**get\_next\_run()**

Return the next execution timestamp.

**Return type** `datetime`

**jitter**(*start, stop=None*)

Add a random jitter per call in the interval [`start <= secs <= stop`] to the next run. If `stop` is omitted `start` must be positive and the interval will be [`-start <= secs <= start`] Passing `None` as `start` will disable jitter.

**Parameters**

- **start** (`Union[int, float, None]`) – Interval start or `None` to disable jitter
- **stop** (`Union[int, float, None]`) – Interval stop or `None` to build interval based on start

**Return type** `DateTimeJobBase`

**latest**(*time\_obj*)

Set latest boundary as time of day. `None` will disable boundary.

**Parameters** **time\_obj** (`Optional[time]`) – time obj, scheduler will not run later

**Return type** `DateTimeJobBase`

**offset**(*timedelta\_obj*)

Set a constant offset to the calculation of the next run. `None` will disable the offset.

**Parameters** **timedelta\_obj** (`Optional[timedelta]`) – constant offset

**Return type** `DateTimeJobBase`

**time**(*time*)

Set a time of day when the job will run.

**Parameters** **time** (`Union[time, datetime]`) – time

**Return type** `DayOfWeekJob`

**weekdays**(*weekdays*)

Set the weekdays when the job will run.

**Parameters** **weekdays** (`Union[str, Iterable[Union[str, int]]]`) – Day group names (e.g. `'all'`, `'weekend'`, `'workdays'`), an iterable with day names (e.g. `['Mon', 'Fri']`) or an iterable with the `isoweekday` values (e.g. `[1, 5]`).

**Return type** `DayOfWeekJob`

## 16.2.5 DawnJob

```
class eascheduler.jobs.DawnJob(parent, func)
```

**boundary\_func**(*func*)

Add a function which will be called when the datetime changes. Use this to implement custom boundaries. Use `None` to disable the boundary function.

**Parameters** **func** (`Optional[Callable[[datetime], datetime]]`) – Function which returns a datetime obj, arg is a datetime with the next run time. Return `SKIP_EXECUTION` together with a reoccurring job to skip the proposed run time.

**Return type** `DateTimeJobBase`

**cancel**()

Cancel the job.

**earliest**(*time\_obj*)

Set earliest boundary as time of day. `None` will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run earlier

**Return type** DateTimeJobBase

**get\_next\_run**()

Return the next execution timestamp.

**Return type** datetime

**jitter**(*start, stop=None*)

Add a random jitter per call in the interval [`start <= secs <= stop`] to the next run. If `stop` is omitted `start` must be positive and the interval will be [`-start <= secs <= start`] Passing `None` as `start` will disable jitter.

**Parameters**

- **start** (Union[int, float, None]) – Interval start or `None` to disable jitter
- **stop** (Union[int, float, None]) – Interval stop or `None` to build interval based on start

**Return type** DateTimeJobBase

**latest**(*time\_obj*)

Set latest boundary as time of day. `None` will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run later

**Return type** DateTimeJobBase

**offset**(*timedelta\_obj*)

Set a constant offset to the calculation of the next run. `None` will disable the offset.

**Parameters** **timedelta\_obj** (Optional[timedelta]) – constant offset

**Return type** DateTimeJobBase

## 16.2.6 SunriseJob

**class** eascheduler.jobs.SunriseJob(*parent, func*)

**boundary\_func**(*func*)

Add a function which will be called when the datetime changes. Use this to implement custom boundaries. Use `None` to disable the boundary function.

**Parameters** **func** (Optional[Callable[[datetime], datetime]]) – Function which returns a datetime obj, arg is a datetime with the next run time. Return `SKIP_EXECUTION` together with a reoccurring job to skip the proposed run time.

**Return type** DateTimeJobBase

**cancel**()

Cancel the job.

**earliest**(*time\_obj*)

Set earliest boundary as time of day. `None` will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run earlier

**Return type** DateTimeJobBase

**get\_next\_run()**

Return the next execution timestamp.

**Return type** datetime

**jitter**(*start, stop=None*)

Add a random jitter per call in the interval [*start* <= secs <= *stop*] to the next run. If *stop* is omitted *start* must be positive and the interval will be [*-start* <= secs <= *start*] Passing *None* as *start* will disable jitter.

**Parameters**

- **start** (Union[int, float, None]) – Interval start or *None* to disable jitter
- **stop** (Union[int, float, None]) – Interval stop or *None* to build interval based on start

**Return type** DateTimeJobBase

**latest**(*time\_obj*)

Set latest boundary as time of day. *None* will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run later

**Return type** DateTimeJobBase

**offset**(*timedelta\_obj*)

Set a constant offset to the calculation of the next run. *None* will disable the offset.

**Parameters** **timedelta\_obj** (Optional[timedelta]) – constant offset

**Return type** DateTimeJobBase

## 16.2.7 SunsetJob

**class** eascheduler.jobs.**SunsetJob**(*parent, func*)

**boundary\_func**(*func*)

Add a function which will be called when the datetime changes. Use this to implement custom boundaries. Use *None* to disable the boundary function.

**Parameters** **func** (Optional[Callable[[datetime], datetime]]) – Function which returns a datetime obj, arg is a datetime with the next run time. Return `SKIP_EXECUTION` together with a reoccurring job to skip the proposed run time.

**Return type** DateTimeJobBase

**cancel**()

Cancel the job.

**earliest**(*time\_obj*)

Set earliest boundary as time of day. *None* will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run earlier

**Return type** DateTimeJobBase

**get\_next\_run**()

Return the next execution timestamp.

**Return type** datetime

**jitter**(*start, stop=None*)

Add a random jitter per call in the interval [*start* <= secs <= *stop*] to the next run. If *stop* is omitted *start* must be positive and the interval will be [*-start* <= secs <= *start*] Passing *None* as *start* will disable jitter.

**Parameters**

- **start** (Union[int, float, None]) – Interval start or None to disable jitter
- **stop** (Union[int, float, None]) – Interval stop or None to build interval based on start

**Return type** DateTimeJobBase**latest**(*time\_obj*)

Set latest boundary as time of day. None will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run later**Return type** DateTimeJobBase**offset**(*timedelta\_obj*)

Set a constant offset to the calculation of the next run. None will disable the offset.

**Parameters** **timedelta\_obj** (Optional[timedelta]) – constant offset**Return type** DateTimeJobBase

## 16.2.8 DuskJob

**class** eascheduler.jobs.**DuskJob**(*parent, func*)**boundary\_func**(*func*)

Add a function which will be called when the datetime changes. Use this to implement custom boundaries. Use None to disable the boundary function.

**Parameters** **func** (Optional[Callable[[datetime], datetime]]) – Function which returns a datetime obj, arg is a datetime with the next run time. Return SKIP\_EXECUTION together with a reoccurring job to skip the proposed run time.**Return type** DateTimeJobBase**cancel**()

Cancel the job.

**earliest**(*time\_obj*)

Set earliest boundary as time of day. None will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run earlier**Return type** DateTimeJobBase**get\_next\_run**()

Return the next execution timestamp.

**Return type** datetime**jitter**(*start, stop=None*)

Add a random jitter per call in the interval [start &lt;= secs &lt;= stop] to the next run. If stop is omitted start must be positive and the interval will be [-start &lt;= secs &lt;= start] Passing None as start will disable jitter.

**Parameters**

- **start** (Union[int, float, None]) – Interval start or None to disable jitter
- **stop** (Union[int, float, None]) – Interval stop or None to build interval based on start

**Return type** DateTimeJobBase

**latest**(*time\_obj*)

Set latest boundary as time of day. None will disable boundary.

**Parameters** **time\_obj** (Optional[time]) – time obj, scheduler will not run later

**Return type** DateTimeJobBase

**offset**(*timedelta\_obj*)

Set a constant offset to the calculation of the next run. None will disable the offset.

**Parameters** **timedelta\_obj** (Optional[timedelta]) – constant offset

**Return type** DateTimeJobBase

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