
qth_yarp Documentation

Release 0.3.0

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Jan 15, 2022

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This library implements a simplified API for writing certain types of **Qth** clients. `qth_yarp` uses the `yarp` library to expose a reactive programming style interface to Qth. Clients written using `qth_yarp` can be just a handful of lines and be entirely free from callbacks. For example, the following converts a Qth temperature property from degrees Celsius to Kelvin, storing the result in a new property:

```
from qth_yarp import get_property, set_property, run_forever

temperature_celsius = get_property("house/temperature", 19.0)
temperature_kelvin = temperature_celsius + 273.15

set_property("house/temperature-in-kelvin",
             temperature_kelvin,
             register=True,
             description="Current temperature in kelvin.")

run_forever()
```

`qth_yarp` is not intended as a replacement for the lower-level Qth API but rather to complement it. While it makes certain types of clients easier to write, particularly ‘if-this-then-that’-style or value-transformation focused clients. It is not suitable for writing clients which maintain complex program state or which need to dynamically watch, subscribe or create properties and events. For these more complex applications, the standard Qth API should be used.

`qth_yarp` and the low-level Qth API can be used simultaneously within the same client in cases where only a small proportion of the client’s functionality requires the low-level API. For example:

```
import asyncio
from qth import Client
from qth_yarp import watch_event, send_event
from yarp import instantaneous_add

async def main():
    c = Client("mixed-qth-and-qth_yarp-client",
              "A client using both the qth and qth_yarp libraries.")

    # Regular Qth API
    def on_foo(topic, value):
        print("Event {} fired with value {}".format(topic, value))
    await c.watch_event("example/foo", on_foo)

    # Also with qth_yarp (passing in the Qth Client)
    bar = watch_event("example/bar", qth_client=c)
    send_event("example/bar-plus-one",
              value=instantaneous_add(bar, 1),
              register=True,
              description="Incremented version of example/bar.",
              qth_client=c)

loop = asyncio.get_event_loop()
loop.create_task(main())
loop.run_forever()
```

The `qth_yarp` API is documented below:

1.1 Qth to Value Functions

The following functions can be used to fetch a `yarp.Value` representing Qth properties or event.

```
qth_yarp.get_property(topic,      initial_value=None,      register=False,      description=None,
                     one_to_many=False,      delete_on_unregister=True,      qth_client=None,
                     **kwargs)
```

Return a (continuous) `yarp.Value` containing the value of a qth property.

Parameters

topic [str] The Qth topic name. (Not verified for existence).

initial_value [object] The initial value to assign to the returned `yarp.Value` while waiting for the property to arrive from Qth. Defaults to `None` but you may wish to choose an alternative dummy value which won't crash later processing.

If (and only if) `register` is `True`, also sets the Qth property to this value.

register [bool] If `True`, registers this property with Qth. The 'description' argument must also be provided if this is `True`.

description [str] If `register` is `True`, the description of the property to include with the registration.

one_to_many [bool] If `register` is `True`, is this a one-to-many (`True`) or many-to-one (`False`) property. Defaults to many-to-one (`False`).

on_unregister [value] (Keyword-only argument). The value to set this property to when this Qth client disconnects. If not provided, no change is made. If this argument is used, set `delete_on_unregister` to `False` since it defaults to `True` and will conflict with this argument.

delete_on_unregister [bool] (Keyword-only argument). Should this value be deleted when this Qth client disconnects? Defaults to `True`.

qth_client [`qth.Client`] The Qth `qth.Client` object to use. If not provided, uses the client returned by `get_default_qth_client()`.

`qth_yarp.watch_event` (*topic*, *register=False*, *description=None*, *one_to_many=False*, *qth_client=None*, ***kwargs*)

Return an (instantaneous) `yarp.Value` representing a qth event.

Parameters

topic [str] The Qth topic name. (Not verified for existence).

register [bool] If True, registers this event with Qth. The ‘description’ argument must also be provided if this is True.

description [str] If `register` is True, the description of the event to include with the registration.

one_to_many [bool] If `register` is True, is this a one-to-many (True) or many-to-one (False) event. Defaults to many-to-one (False).

on_unregister [value] (Keyword-only argument). The value send for this event to when this Qth client disconnects. If not provided, event is sent.

qth_client [`qth.Client`] The Qth `qth.Client` object to use. If not provided, uses the client returned by `get_default_qth_client()`.

The next two functions use a `yarp.Value` to set or send a Qth property or event.

`qth_yarp.set_property` (*topic*, *value*, *register=False*, *description=None*, *one_to_many=True*, *delete_on_unregister=True*, *ignore_no_value=True*, *qth_client=None*, ***kwargs*)

Set a Qth property to the value of a continuous `yarp.Value`.

Parameters

topic [str] The Qth topic name. (Not verified for existence).

value [Value] The `yarp.Value` whose value will be written to the specified qth property.

register [bool] If True, registers this property with Qth. The ‘description’ argument must also be provided if this is True.

description [str] If `register` is True, the description of the property to include with the registration.

one_to_many [bool] If `register` is True, is this a one-to-many (True) or many-to-one (False) property. Defaults to one-to-many (True).

on_unregister [value] (Keyword-only argument). The value to set this property to when this Qth client disconnects. If not provided, no change is made. If this argument is used, set `delete_on_unregister` to False since it defaults to True and will conflict with this argument.

delete_on_unregister [bool] (Keyword-only argument). Should this value be deleted when this Qth client disconnects? Defaults to True.

ignore_no_value [bool] (Keyword-only argument). Should the property not be written when ‘NoValue’ is set. Defaults to True. If False, the property will be deleted when set to ‘NoValue’.

qth_client [`qth.Client`] The Qth `qth.Client` object to use. If not provided, uses the client returned by `get_default_qth_client()`.

`qth_yarp.send_event(topic, value, register=False, description=None, one_to_many=True, qth_client=None, **kwargs)`
 Return an (instantaneous) `yarp.Value` representing a qth event.

Parameters

- topic** [str] The Qth topic name. (Not verified for existence).
- value** [`yarp.Value`] An instantaneous `yarp.Value` whose changes will be turned into qth events.
- register** [bool] If True, registers this event with Qth. The ‘description’ argument must also be provided if this is True.
- description** [str] If `register` is True, the description of the event to include with the registration.
- one_to_many** [bool] If `register` is True, is this a one-to-many (True) or many-to-one (False) event. Defaults to one-to-many (True).
- on_unregister** [value] (Keyword-only argument). The value send for this event to when this Qth client disconnects. If not provided, event is sent.
- qth_client** [`qth.Client`] The Qth `qth.Client` object to use. If not provided, uses the client returned by `get_default_qth_client()`.

In all cases, the Values will not be updated, nor will value changes be sent to Qth until the `asyncio` mainloop is started. See `run_forever()`.

1.2 Specifying the Qth Client

The functions defined above accept a `qth_client` parameter giving the `qth.Client` object to use. The following function can be used (before any calls to the `qth_yarp` functions) to specify a specific `qth.Client` instance to use.

`qth_yarp.set_default_qth_client(client)`
 Set the default `qth.Client` object to be used by `qth_yarp`.

If this function is not called, a Qth `qth.Client` will be created automatically. To fetch the Qth instance used, call:

`qth_yarp.get_default_qth_client()`
 Get the default `qth.Client` object.

One will be created with the name `qth_yarp_based_client` if no client has been provided by `set_default_client()`.

1.3 Main-loop utility function

As a convenience for simple scripts, the `asyncio` event loop can be run forever using the following function.

`qth_yarp.run_forever()`
 Run the main event loop forever.

This function is a convenience method which is exactly equivalent to calling:

```
import asyncio
loop = asyncio.get_event_loop()
loop.run_forever()
```


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