

FibEmu

```
1 --name=HTTP Test
2 --type=com.fibaro.binarySwitch
3
4
5 function QuickApp:OnInit()
6   self:debug('Started',self.id)
7
8
9   net.HTTPClient():request('http://worldtimeapi.org/api/timezone/Europe/Stockholm',{
10     options = {
11       method = 'GET',
12       headers = {
13         ['Accept'] = 'application/json'
14       },,,
15     success = function(response)
16       self:debug('Response',response.data)
17     end,
```

DEBUG CONSOLE

```
[03.07.2023] [09:16:24] [SYS] [boot] : Fibemu v0.0.3
[03.07.2023] [09:16:24] [SYS] [boot] : Web UI : http://127.0.0.1:5004/
[03.07.2023] [09:16:24] [SYS] [boot] : API Doc: http://127.0.0.1:5004/docs
[03.07.2023] [09:16:24] [SYS] [boot] : API EP : http://127.0.0.1:5004/api
[03.07.2023] [09:16:24] [SYS] [boot] : QA emulator started
[03.07.2023] [09:16:24] [SYS] [install]: QA '/Users/jangabrielsson/Desktop/dev/fibemu/examples/QA_http_test.lua'
[03.07.2023] [09:16:25] [SYS] [refresh]: DeviceCreatedEvent ID:5000
[03.07.2023] [09:16:25] [SYS] [QUICKAPP5000]: Running 'main'
[03.07.2023] [09:16:25] [DEBUG] [QUICKAPP5000]: Started 5000
[03.07.2023] [09:16:25] [DEBUG] [QUICKAPP5000]: HTTP called
[03.07.2023] [09:16:25] [DEBUG] [QUICKAPP5000]: Response {"abbreviation":"CEST","client_ip":"84.55.66.19","datetime":"2023-07-03T09:16:25.072173+02:00","day_of_week":1,"day_of_year":184,"dst":true,"dst_from":"2023-03-26T01:00:00+00:00","dst_offset":3600,"dst_until":"2023-10-29T01:00:00+00:00","raw_offset":3600,"timezone":"Europe/Stockholm","unixtime":1688368585,"utc_datetime":"2023-07-03T07:16:25.072173+00:00","utc_offset":"+02:00","week_number":27}
```

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Introduction

This is a Visual Studio Code setup for QuickApp development for the Fibaro HC3. Vscod is one of the most popular development environments and is cross-platform. It's available for Windows, MacOS, and Linux.

Developing QuickApps directly on the HC3 is challenging as the editor is limited and the debugging tools are even more so. Usually, it means resorting to using print statements to try and understand what is happening. Many developers do edit their code in an editor on their computer and copy&paste it to the HC3 to try it out.

This setup consists of a Vscod project that provides an HC3 emulator that allow us to edit, run, and debug QA in Vscod. We can use all the productive tools and plugins that Vscod provides; everything from highlighting coding warnings to help us write code using AI like Copilot.

The QA can interact with the HC3 with the provided Fibaro APIs. Like turning on and off light devices on the HC3, call QAs running on the HC3 etc.

This makes it very quick to develop and test your QuickApp, and you are in control of what resources on the HC3 that your QA can interact with.

It gives you a way to develop and run a QuickApp offline on your PC/Mac/Linux and let it interact with the HC3 in a controlled way.

There is also a simple UI to interact with the QAs UI and see events etc.

Please note that this is not a tutorial for Vscod or git/github. [Here is Msft's Vscod tutorial](#).

The latest version of this document is stored <[here](#)>

There is a youtube video how to install on Windows 11 <[here](#)>

Installation

Summary of steps to run

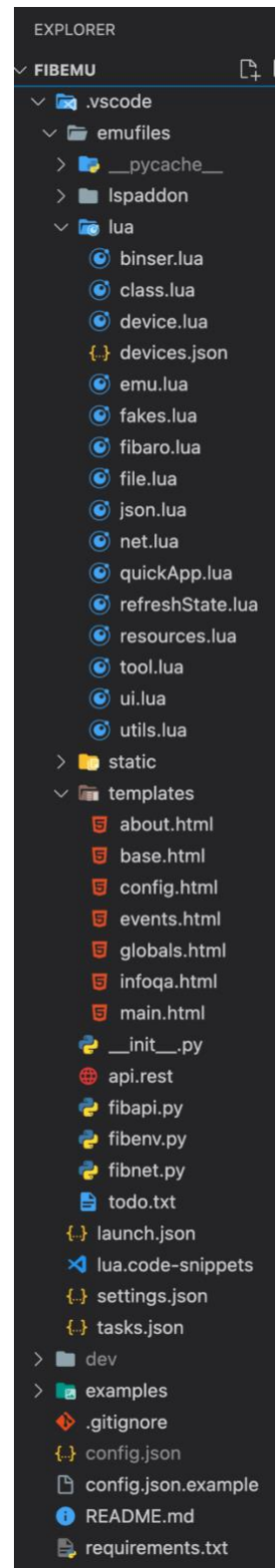
1. Install Visual [Studio Code](#). Yes, it's free Microsoft software(!)
2. Use Vscode to clone the fibemu github repository into a folder where you want to do the development. The repository for downloading it is here <https://github.com/jangabrielsson/fibemu>
3. Have python3 installed on your machine. Make sure that you have set up Path environment variable so that the command can be run from any directory.
4. Install pip and do a "pip install" of the needed python libraries listed in the file requirements.txt

```
pip install -r requirements.txt
```

5. Create a config.json file with the credentials to access the HC3.
See the file config.json.example and the next chapter "Configuration".
6. Install the vscode extension "[Local Lua Debugger](#)" by Tom Blind

Most of the emulator files resides inside the `.vscode/emufiles/` directory.

- `__pycache__/` is just a place where temporary runtime files are placed
- `lspaddon/` is a directory to store editor autocompletion and tooltips info. Work in progress.
- `lua/` contains the emulator's lua environment for your QA. Like the QuickApp and fibaro.* functions.
- `static/` contains stylesheets and js for the web interface
- `templates/` are the web pages for the emulator Web UIs
- `__init__.py` is the main/startup file for the emulator
- `api.rest` is a test file to work with the HC3 REST API. Work in progress
- `fibapy.py` is the REST API code for the emulator. Tries to mimic the REST API of the real HC3
- `fibenv.py` is the main "runtime" for the QA environments we run.
- `fibnet.py` is the HTTPClient, UDPClient, WebSocketClient etc implementations.
- `todo.txt`, my to-do list of stuff I would like to implement
- `launch.json` is the definition of the different way to start debugging. You can launch debugging with HC3 access, or just run it local without HC3 access. More on this later.
- `lua.code-snippets` contains shortcuts for inserting code snippets, ex. A QA skeleton, or fibemu code headers.
- `settings.json` contains Vscode project specific settings. Here you also configure some of the Vscode plugins.
- `.gitignore` is a file defining what files should not be under source control
- `config.json` is where you setup HC3 credentials etc.
- `requirements.txt` is a file with the Python libraries that need to be installed to run the emulator



In principle you should not need to change anything in the `.vscode/emufiles/` directory.

The emufiles comes with Lua and libraries so there is no more to download. There is a python wrapper for the lua runtime ([Lupa](#)) so we solve dependencies on `luasocket` etc. and we don't need any special headers in the QA lua file to invoke/include the emulator/apis to make the QA being able to execute (we don't even need Lua installed on our machine)

The directory, when cloned, comes with a `.gitignore` file that tells the source control what files should not be controlled. There are two directories specified there.

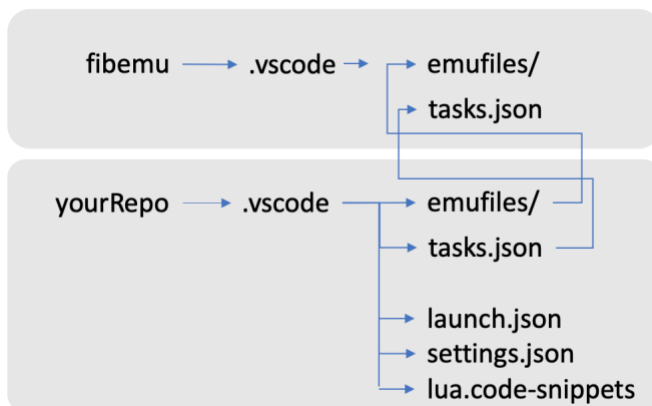
```
./dev/
```

and

```
./test/
```

If you create these directories, you can do your development in them and still pull down new releases of the fibemu repository without it impacting your own files. This is because `dev/` and `test/` is ignored by the source control.

If you want to develop your own code under source control, I recommend that you make soft links from your own `.vscode/emufiles` to the `.vscode/emufiles` in the fibemu directory that you cloned. Do also the same with `task.json`. You should keep your own versions of `launch.json`, `settings.json`. and `lua.code-snippets`



Configuration

Configuration file

```
{...} config.json > ...
1  {
2    "host": "192.168.1.57",
3    "user": "admin",
4    "password": "admin",
5    "secret": "kaka",
6    "dark": true,
7    "colors": {
8      "SYS": "brown",
9      "SYSERR": "red",
10     "DEBUG": "green",
11     "TRACE": "blue",
12     "WARNING": "orange",
13     "ERROR": "red",
14     "TEXT": "black",
15     "DARKTEXT": "grey"
16   }
17 }
```

Configuration parameters are a mix of values that can be set in your config.json file and configurations value that are determined by the emulator.

Param	Value
host	192.168.1.57 , This is the IP address of the HC3
user	admin , Username credential for HC3
password	admin , Password credential for HC3
secret	Kaka , example of an user config parameter that can be supplied and use to initialize quickAppVariables. More on this later.

Param	Value
dark	True , If set to true will make sure that text in console is white. A necessity for Vscode in dark mode
colors	{'SYS': 'brown', 'SYSERR': 'red', 'DEBUG': 'green', 'TRACE': 'blue', 'WARNING': 'orange', 'ERROR': 'red', 'TEXT': 'black', 'DARKTEXT': 'grey'} , Mapping of text colors used in the console window
local	False , set to True if no HC3 access is allowed
port	80 , API port on HC3
wport	5004 , fibemu's API port
whost	127.0.0.1 , fibemu's host address
wlog	Warning , debug level for the fibemu API server (uvicorn)
emulator	emu.lua
init	None
break	False
file1	/Users/jangabrielsson/Desktop/dev/fibemu/examples/QA_ui.lua
file2	None
file3	None
version	0.32
server	False
path	.vscode/emufiles/
argv	['/Users/jangabrielsson/Desktop/dev/fibemu/.vscode/emufiles/_in it_.py', '-f', '/Users/jangabrielsson/Desktop/dev/fibemu/examples/QA_ui.lua']

Param	Value
extra	[]
nogreet	False
apiURL	http://127.0.0.1:5004/api
apiDocURL	http://127.0.0.1:5004/docs
webURL	http://127.0.0.1:5004/

QA header configuration

To give some hints to the emulator what type of QA we have etc. we can give directive like TQAE in our QA file (but a bit different)

Ex.

```
--%%name=MyQA
--%%type=com.fibaro.binarySwitch
--%%file=qa3_1.lua,extra;
--%%remote=devices:788,790
--%%remote=globalVariables:myVar,anotherVar
--%%debug=libraryfiles:false,userfilefiles:false

function QuickApp:onInit()
    self:debug(self.name,self.type,self.id)
    fibaro.call(788,"turnOn")
end
```

Name of QA

```
--%%name=MyQA
```

This will be the name your QA will have

Type of QA

```
--%%type=com.fibaro.binarySwitch
```

Type type of your QA (see list of types here)

QA deviceID

```
--%%id=1099
```

This should normally not be set. Let the emulator choose a deviceId for you. (starting at 5000). In some cases it may be a reason to have the same id as an QA on the HC3.

Interfaces

```
--%%interface=power,energy
```

List of interfaces the QA should have.

UI definition

User elements for you QA can be defined. The elements are added in the order they are listed and elements on the same row needs to be in the same `--%%u` definition.

```
--%%u={button='b1', text='My Button', onReleased='myButtonFun'}  
--%%u={slider='s1', text='My Slider', onChanged='mySliderFun'}  
--%%u={label='l1', text='My Label'}
```

If we want to have buttons in the same row, we do one `--%%u` directive like:

```
--%%u={{button='b1', text="Turn On",  
onReleased='turnOn'}},{button='b2', text="Turn Off",  
onReleased='turnOff'}}
```

Debug flags

```
--%%debug=flag1:value1,flag2:value2,...
```

- color, true, uses colors in debug console
- refresh, true, logs refreshStates (system triggers)
- dark, true, sets debug console text to a light color (vscode in darkmode)
- debugFlags, true, logs debugFlags being set in header
- quickVars, true, logs quickAppVariables being defined in header
- hc3_http, true, logs http calls to HC3 or emulator
- libraryfiles, true, logs Lua library files loaded (ex. quickApp.lua)
- userfiles, true, logs user's QA files loaded (`--%%file` directive)
- refresh_resource, true, logs refresh of resource in internal DB
- autoui, true, will add 2s autorefresh for QA UI web interface page

QuickAppVariables

```
--%%var=test:foo
```

When defining quickAppVariables with

```
--%%var=foo:42  
--%%var=bar:"Hello"  
--%%var=baz:{a = 9, b = 19}
```

The value, right hand of the ':', is an evaluated lua expressions. The environment where the expression is evaluated is limited so you can't call functions etc. It's for setting up constants.

However, there is one variable available, 'config', that is the config file read in.

This means that if we have the config.json

```
{  
  "host": "192.168.1.57",  
  "user": "admin",  
  "password": "admin",  
  "secrets": {"user": "admin", "pwd2": "hushhush"},  
  "dark": true,  
}
```

We can define a quickAppVariable in our QA as

```
--%%var=password:config.secrets.pwd2
```

and then access it in our code as

```
function QuickApp:onInit()  
  local pwd = self:getVariable("password")  
end
```

The advantage is of course that we don't have to put the secret in plain text in the QA code, and by accident publish it in the forum or commit it to a repository...

File inclusion

```
--%%file=dev/myfile.lua,lib;
```

This will include dev/myfile.lua as an QA file named "lib".

Note that your working directory is the Vscode project folder, so your paths starts from there.

If you have many files in a subdirectory, you can define a file root path that will be prepended to the file path.

```
--%%root=dev/  
--%%file=myfile.lua,lib;  
--%%file=myfile2.lua,lib2;
```

Remote access

```
--%%remote=devices:788,790  
--%%remote=globalVariables:myVar,anotherVar
```

It instructs the emulator that it's ok to call device 788,789 o the HC3. As a default, the emulator treats all resources as local (we can read from HC3 but then treat them as local copies) and we enable resources we want to interact with on the HC3 as 'remote'. This goes for other resources also like 'globalVariables'.

A special case is to set the access to *

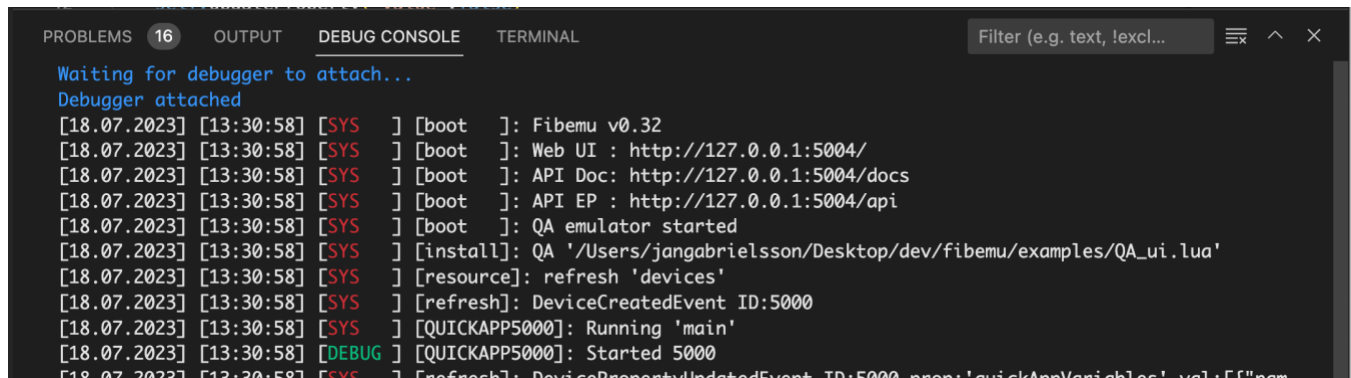
```
--%%remote=devices:*
```

This will allow remote access to all devices

```
--%%allRemote=true
```

Will set all resources to remote access allowed.

Running you QA



```
PROBLEMS 16 OUTPUT DEBUG CONSOLE TERMINAL
Waiting for debugger to attach...
Debugger attached
[18.07.2023] [13:30:58] [SYS] [boot]: Fibemu v0.32
[18.07.2023] [13:30:58] [SYS] [boot]: Web UI : http://127.0.0.1:5004/
[18.07.2023] [13:30:58] [SYS] [boot]: API Doc: http://127.0.0.1:5004/docs
[18.07.2023] [13:30:58] [SYS] [boot]: API EP : http://127.0.0.1:5004/api
[18.07.2023] [13:30:58] [SYS] [boot]: QA emulator started
[18.07.2023] [13:30:58] [SYS] [install]: QA '/Users/jangabrielsson/Desktop/dev/fibemu/examples/QA_ui.lua'
[18.07.2023] [13:30:58] [SYS] [resource]: refresh 'devices'
[18.07.2023] [13:30:58] [SYS] [refresh]: DeviceCreatedEvent ID:5000
[18.07.2023] [13:30:58] [SYS] [QUICKAPP5000]: Running 'main'
[18.07.2023] [13:30:58] [DEBUG] [QUICKAPP5000]: Started 5000
[18.07.2023] [13:30:58] [SYS] [refresh]: DevicePropertyUpdatedEvent ID:5000 prop:'quickAppVariables' val:'{"name'...
```

When the QA starts up it will log the links to the Web UI and the Web API docs. CMD-click on these links will open the web

Example files

QA_ui.lua

This a QA that demonstrates how to declare UI elements in the header of the QA using the

```
--%%u=...
```

directive

```
--[[
  Simple QA with UI elements
  Open browser at http://127.0.0.1:5004/ to interact with this app
--]]

--%%name=QA0
--%%debug=permissions:false,refresh_resource:true

--%%u={{button='turnOn', text='On', onReleased='turnOn'}, {button='turnOff', text='Off', onReleased='turnOff'}}
--%%u={{button='t1', text='A', onReleased='t1'}, {button='t2', text='B', onReleased='t1'}, {button='t3', text='C',
onReleased='t1'}, {button='t4', text='D', onReleased='t1'}, {button='t5', text='E', onReleased='t1'}}
```

```

--%%u={button='test', text='Test', onReleased='testFun'}
--%%u={{button='test', text='A', onReleased='testA'}, {button='test', text='B', onReleased='testB'}}
--%%u={slider="slider", max="80", onChanged='sliderA'}
--%%u={label="lblA", text="This is a text"}

function QuickApp:onInit()
    self:debug("Started", self.id)
    self:setVariable("test", "HELLO")
    setTimeout(function() self:updateView("lblA", "text", "FOO") end, 5000)
end

function QuickApp:testFun()
    self:debug("Test pressed")
end

function QuickApp:testA()
    self:debug("A pressed")
end

function QuickApp:testB()
    self:debug("B pressed")
end

function QuickApp:sliderA(ev)
    self:debug("Slide A", ev.values[1])
end

function QuickApp:turnOn()
    self:debug("Turned on")
    self:updateProperty("value", true)
end

function QuickApp:turnOff()
    self:debug("Turned off")
    self:updateProperty("value", false)
end

```

QA_api_test.lua

This is a quite extensive QA testing various APIs

QA_fibaroExtra.lua

This is a QA including fibaroExtra.lua as an extra QA file and creating a QuickAppChild with the fibaroExtra class QuickerAppChild.

```
--[[
  QA using fibaroExtra to create child object
  Open browser at http://127.0.0.1:5004/ to interact with this app
  fibaroExtra.lua is expected to be available in ../TQAE/lib/fibaroExtra.lua
  relative to this project
--]]

--%%name=QA_fibaroExtra
--%%debug=refresh_resource:true
--%%debug=http:true,hc3_http:true

--%%file=../TQAE/lib/fibaroExtra.lua,fibaroExtra;

--%%u={{button='turnOn', text='On', onReleased='turnOn'}, {button='turnOff', text='Off', onReleased='turnOff'}}
--%%u={{button='t1', text='A', onReleased='t1'}, {button='t2', text='B', onReleased='t1'}, {button='t3', text='C',
onReleased='t1'}, {button='t4', text='D', onReleased='t1'}, {button='t5', text='E', onReleased='t1'}}
--%%u={button='test', text='Test', onReleased='testFun'}
--%%u={{button='test', text='A', onReleased='testA'}, {button='test', text='B', onReleased='testB'}}
--%%u={slider="slider", max="80", onChanged='sliderA'}
--%%u={label="lblA", text="This is a text"}

function QuickApp:onInit()
  self:debug("Started",self.id)

  class 'MyChild'(QuickerAppChild)
  function MyChild:__init(args)
    QuickerAppChild.__init(self, args)
```



```

        self:debug("Child init",self.id)
    end
    function MyChild:turnOn()
        self:debug("Child turned on")
    end
    function MyChild:turnOff()
        self:debug("Child turned off")
    end

    local child = MyChild{
        uid = 'x',
        name = 'MyChild',
        type = 'com.fibaro.binarySwitch',
    }

    setTimeout(function() fibaro.call(child.id,"turnOn") end, 1000)

    self:event({type='device'},function() end)
end

```

QA_centralSceneEvent.lua

This a QA that generates a centralSceneEvent with the REST api. It also catches the event using the fibaroExtra event mechanism

```

--%%name=CentralSceneEvent test
--%%type=com.fibaro.genericDevice
--%%file=examples/fibaroExtra.lua,fibaroExtra;

function fibaro.postCentralSceneEvent(keyId,keyAttribute)
    local data = {
        type = "centralSceneEvent",
        source = plugin.mainDeviceId,
        data = { keyAttribute = keyAttribute, keyId = keyId }
    }

```

```

    return api.post("/plugins/publishEvent", data)
end

function QuickApp:onInit()
    quickApp=self
    fibaro.debugFlags._allRefreshStates=true
    fibaro.event({type="device",property='centralSceneEvent'},function(env)
        local ev = env.event
        self:debugf("CentralSceneEvent: %s %s",ev.value.keyId,ev.value.keyAttribute)
    end)
    setTimeout(function() fibaro.postCentralSceneEvent(2,"Pressed") end,0)
end

```

QA_http_test.lua

A QA demonstrating the net.HTTPClient by requesting the time for Stockholm Sweden using worldtimeapi.org.

```

--%%name=HTTP Test
--%%type=com.fibaro.binarySwitch
--%%debug=http:true,hc3_http:true,dark:true

function QuickApp:onInit()
    self:debug("Started",self.id)

    net.HTTPClient():request("http://worldtimeapi.org/api/timezone/Europe/Stockholm",{
        options = {
            method = "GET",
            headers = {
                ["Accept"] = "application/json"
            }
        },
        success = function(response)

```

```

        self:debug("Response",response.data)
    end,
    error = function(err)
        self:error("Error",err)
    end
end
}))
print("HTTP called") -- async, so we get answer later
end

```

QA_include_file.lua

Another QA showing how to include another QA file.

```

--%%name=Include File QA
--%%type=com.fibaro.binarySwitch
--%%file=examples/include_file.lua,extra;
--%%debug=libraryfiles:false,userfilefiles:true

local function printf(fmt,...) print(string.format(fmt,...)) end
function QuickApp:onInit()
    foo()
end

```

included_file.lua just declare a global function named foo.

```

function foo()
    print("FOO")
end

```

QA_tcp_test.lua

This QA shows the net.TCPClient api.

```

--[[
Simple echo server using net.TCPsocket()

```

```

On same machine (Linux/MacOS) run
>nc -l 8986

to start a socket server to interact with this app
--]]

PORT = 8986
--%%name=TCP Test

local Event = {}
local function post(ev,self)
    self = self or {}
    function self:post(ev) setTimeout(function() Event[ev.type](self,ev) end, 0) end
    function self:debug(...) print(string.format(...)) end
    setTimeout(function() Event[ev.type](self,ev) end,0)
end

function Event:init(ev)
    self.sock = net.TCPSocket()
    self:debug("init")
    self:post{type='connect'}
end

function Event:connect(ev)
    self.sock:connect(self.host,self.port,{
        success = function(message)
            self:debug("connected",message)
            self:post{type='prompt'}
        end,
        error = function(message)
            self:debug("connection error:%s", message)
        end,
    })
end

function Event:prompt(ev)
    self.sock:write("Echo:",{

```

```

        success = function(n)
            self:debug("wrote %s bytes",n)
            self:post{type='read'}
        end,
        error = function(message)
            self:debug("send error:%s", message)
        end,
    })
end

function Event:read(ev)
    self.sock:read({
        success = function(msg)
            self:debug("Echo '%s'",msg)
            self.sock:write(string.format("Echo '%s'\n",msg))
            self:post{type='prompt'}
        end,
        error = function(message)
            self:debug("read error:%s", message)
        end,
    })
end

function QuickApp:onInit()
    self:debug(self.name,self.id)
    post({type='init'}, {host="127.0.0.1",port=PORT})
    --post({type='init'}, {host="127.0.0.1",port=PORT+1})
end

```

QA_udp_echo_test.lua

QA that implements a simple UDP echo server

```

--[[
Simple echo server using net.UDPSocket()

```

```

On same machine (Linux/MacOS) run
--]]

----- Not currently working -----

ADDR = "192.168.1.129"
PORT = 8986
BROADCAST = true

class "UDPServer"
function UDPServer:__init(port, handler)
    self.port = port
    self.handler = handler
    self.udp = net.UDPSocket({
        broadcast = BROADCAST,
        --timeout = 10000,
        reuseport = true,
        reuseaddr = true
    })
end

function UDPServer:run()
    self.udp:bind(ADDR, self.port)
    local cb
    cb = {
        success = function(data, ip, port)
            self.handler(self, data, ip, port)
            self.udp:receive(cb) -- will read next datagram
        end,
        error = function(error)
            self:debug("UDP server error:", error)
        end
    }
    print("Server waiting")
    self.udp:receive(cb)
    print("Running UDP server at port ", self.port)
end

```

```

end

--%%name=TCP Test
function QuickApp:onInit()

    local server = UDPServer(PORT, function(self, data, ip, port)
        print("Recieved", data, ip, port)
        self.udp:sendTo("OK", ip, port, {
            success = function()
                print("Sent ok")
            end,
            error = function(error)
                print("Error:", error)
            end
        })
    end)
    server:run()

    self.udp = net.UDPSocket({
        broadcast = BROADCAST,
        --timeout = 10000,
        reuseport = true,
        reuseaddr = true
    })

    local seqNr = 1

    local function loop()
        local msg = "HELLO-"..seqNr
        print("Client sending", msg, BROADCAST and "255.255.255.255" or ADDR, PORT)
        self.udp:sendTo(msg, BROADCAST and "255.255.255.255" or ADDR, PORT, {
            success = function(n)
                print("Sent", n, "bytes")
                self.udp:receive({
                    success = function(data, ip, port)
                        print("Recieved ", data, ip, port)
                    end
                })
            end
        })
    end
end

```

```

        setTimeout(loop,2000)
    end,
    error = function(error)
        self:debug("Error:", error)
    end
})
end,
error = function(error)
    print('UPD Client Error:', error)
end
})
fibaro.sleep(1000)
end
loop()
end

```

QA_udp_test.lua

A more extensive UDP test

```

--[[
    Simple echo server using net.UDPSocket()
    On same machine (Linux/MacOS) run
    >nc -u 8986
    >nc -ul 8986
    to start a socket server to interact with this app
--]]

PORT = 8986
--%%name=TCP Test
function QuickApp:onInit()
    self.udp = net.UDPSocket({
        broadcast = true,
        timeout = 10000
    })

```



```

local stat,res = pcall(function()
    --self.udp:bind("127.0.0.1",PORT)
end)
if not stat then
    self:debug("Error binding",res)
end
local payload = "HELLO"

self.udp:sendTo(payload, '255.255.255.255', PORT, {
    success = function()
        self:receiveData()
    end,
    error = function(error)
        print('Error:', error)
    end
})
end

function QuickApp:receiveData()
    print("Waiting for data")
    self.udp:receive({
        success = function(data, ip, port)
            print("Recieved",string.char(table.unpack(data)), ip, port)
            self:receiveData() -- will read next datagram
        end,
        error = function(error)
            self:debug("Error:", error)
        end})
end

```

QA_websocket_test.lua

A QA that connects to echo.websocket.events that echoes messages sent

```
--[[
```

```

Simple websocket test
--]]

--%%name=TCP Test
--%%var=url:"wss://echo.websocket.events/"

function QuickApp:onInit()
    self:debug("onInit")
    local url = self:getVariable("url")
    self.sock = net.WebSocketClient()

    self.sock:addEventListener("connected", function() self:handleConnected() end)
    self.sock:addEventListener("disconnected", function() self:handleDisconnected() end)
    self.sock:addEventListener("error", function(error) self:handleError(error) end)
    self.sock:addEventListener("dataReceived", function(data) self:handleDataReceived(data) end)

    self.sock:connect(url)

    --setInterval(function() self:debug("interval") end, 1000)
end

function QuickApp:handleConnected()
    self:debug("connected")
    self.sock:send("Hello from fibemu")
end

function QuickApp:handleDisconnected()
    self:warning("handleDisconnected")
end

function QuickApp:handleError(error)
    self:error("handleError:", error)
end

function QuickApp:handleDataReceived(data)
    self:trace("dataReceived:", data)
end

```

```
end
```

QA.fqa

This a .fqa file that can be loaded into the emulator and run. At the moment there is no way to debug it. It's just a proof that we can deploy .fqa files too.

Features

Supported QuickApp functions

```
fibaro.debug(tag, str)
fibaro.warning(tag, str)
fibaro.trace(tag, str)
fibaro.error(tag, str)

fibaro.call(deviceID, actionName, ...)
fibaro.getType(deviceID)
fibaro.getValue(deviceID, propertyName)
fibaro.getName(deviceID)
fibaro.get(deviceID, propertyName)
fibaro.getGlobalVariable(varName)
fibaro.setGlobalVariable(varName, value)
fibaro.getRoomName(roomID)
fibaro.getRoomID(deviceID)
fibaro.getRoomNameByDeviceID(deviceID)
fibaro.getSectionID(deviceID)
fibaro.getIds(devices)
fibaro.getAllDeviceIds()
fibaro.getDevicesID(filter)
fibaro.scene(action, sceneIDs)
fibaro.profile(profile_id, action)
fibaro.callGroupAction(action, args)
fibaro.alert(alert_type, user_ids, notification_content)
fibaro.alarm(partition_id, action)
fibaro.setTimeout(ms, func)
fibaro.clearTimeout(ref)
fibaro.setInterval(ms, func)
fibaro.clearInterval(ref)
```

```

fibaro.emitCustomEvent(name)
fibaro.wakeUpDeadDevice(deviceID)
fibaro.sleep(ms)

net.HTTPClient()
net.TCPSocket()
net.UDPSocket()
net.WebSocketClient()
net.WebSocketClientTLS()
mqtt.Client.connect(uri, options) --no yet
<mqttclient>:addEventListener(message, handler) --no yet
<mqttclient>:subscribe(topic, options) --no yet
<mqttclient>:unsubscribe(topics, options) --no yet
<mqttclient>:publish(topic, payload, options) --no yet
<mqttclient>::disconnect(options) --no yet

api.get(call)
api.put(call <, data>)
api.post(call <, data>)
api.delete(call <, data>)

setTimeout(func, ms)
clearTimeout(ref)
setInterval(func, ms)
clearInterval(ref)
json.encode(expr)
json.decode(string)

plugin.mainDeviceId
plugin.deleteDevice(deviceId) --not yet
plugin.restart(deviceId)
plugin.getProperty(id, prop)
plugin.getChildDevices(id)
plugin.createChildDevice(prop)

class QuickAppBase
class QuickApp
class QuickAppChild

class <name>
property(get, set)

QuickApp:OnInit() -- called at startup if defined
QuickApp - self:setVariable(name, value)
QuickApp - self:getVariable(name)
QuickApp - self:debug(...)
QuickApp - self:trace(...)
QuickApp - self:warning(...)
QuickApp - self:error(...)
QuickApp - self:updateView(elm, type, value)
QuickApp - self:updateProperty(name, value)
QuickApp - self:createChildDevice(props, device)

```

Supported REST APIs

- GET **/emu/info** Get Emulator Info
- POST **/emu/dump** Dump Emulator Resources
- POST **/emu/load** Load Emulator Resources
- GET **/emu/button/{id}/{elm}/{val}** Invoke Ui Button
- POST **/api/devices/{id}/action/{name}** Call Quickapp Method
- GET **/api/devices** Get Devices
- GET **/api/devices/{id}** Get Device
- DELETE **/api/devices/{id}** Delete Device
- GET **/api/globalVariables** Get Global Variables
- POST **/api/globalVariables** Create Global Variable
- GET **/api/globalVariables/{name}** Get Global Variable
- PUT **/api/globalVariables/{name}** Modify Global Variable
- DELETE **/api/globalVariables/{name}** Delete Global Variable
- GET **/api/rooms** Get Rooms
- POST **/api/rooms** Create Room
- GET **/api/rooms/{id}** Get Room
- PUT **/api/rooms/{id}** Modify Room
- DELETE **/api/rooms/{id}** Delete Room
- GET **/api/sections** Get Sections
- POST **/api/sections** Create Section
- GET **/api/sections/{id}** Get Section
- PUT **/api/sections/{id}** Modify Section
- DELETE **/api/sections/{id}** Delete Section
- GET **/api/customEvents** Get Customevents
- POST **/api/customEvents** Create Customevent
- GET **/api/customEvents/{name}** Get Customevent
- PUT **/api/customEvents/{name}** Modify Customevent
- POST **/api/customEvents/{name}** Emit Customevent
- DELETE **/api/customEvents/{name}** Delete Customevent
- GET **/api/refreshStates** Get Refreshstates Events

- GET `/api/plugins/callUIEvent` Call Ui Event
- POST `/api/plugins/updateProperty` Update Qa Property
- POST `/api/plugins/updateView` Update Qa View
- POST `/api/plugins/restart` Restart Qa
- POST `/api/plugins/createChildDevice` Create Child Device
- DELETE `/api/plugins/removeChildDevice/{id}` Delete Child Device
- POST `/api/plugins/publishEvent` Publish Event
- GET `/api/plugins/{id}/variables` Internal Storage Set
- POST `/api/plugins/{id}/variables` Internal Storage Create
- DELETE `/api/plugins/{id}/variables` Internal Storage Delete
- GET `/api/plugins/{id}/variables/{name}` Internal Storage Set
- PUT `/api/plugins/{id}/variables/{name}` Internal Storage Set
- DELETE `/api/plugins/{id}/variables/{name}` Internal Storage Delete
- POST `/api/debugMessages` Add Debug Message
- GET `/api/quickApp/{id}/files` Get Quickapp Files
- PUT `/api/quickApp/{id}/files` Modify Quickapp Files
- POST `/api/quickApp/{id}/files` Create Quickapp Files
- GET `/api/quickApp/{id}/files/{name}` Get Quickapp File
- PUT `/api/quickApp/{id}/files/{name}` Modify Quickapp File
- DELETE `/api/quickApp/{id}/files/{name}` Delete Quickapp File
- GET `/api/quickApp/export/{id}` Export Quickapp Fqa
- POST `/api/quickApp/` Import Quickapp
- POST `/api/quickApp/import` Import Quickapp
- GET `/api/weather` Get Weather
- PUT `/api/weather` Modify Weather
- GET `/api/iosDevices` Get Ios Devices
- GET `/api/home` Get Home
- PUT `/api/home` Modify Home
- GET `/api/settings/{name}` Get Settings
- GET `/api/alarms/v1/partitions` Get Partitions
- GET `/api/alarms/v1/partitions/{id}` Get Partition
- GET `/api/alarms/v1/devices/` Get Alarm Devices
- GET `/api/notificationCenter` Get Notification Center
- GET `/api/profiles` Get Profiles
- GET `/api/icons` Get Icons
- GET `/api/users` Get Users

- GET [/api/energy/devices](#) Get Energy Devices
- GET [/api/panels/location](#) Get Panels Location
- GET [/api/panels/notifications](#) Get Panels Notifications
- GET [/api/panels/family](#) Get Panels Family
- GET [/api/panels/sprinklers](#) Get Panels Sprinklers
- GET [/api/panels/humidity](#) Get Panels Humidity
- GET [/api/panels/favoriteColors](#) Get Favorite Colors
- GET [/api/panels/favoriteColors/v2](#) Get Favorite Colorsv2
- GET [/api/diagnostics](#) Get Diagnostics
- GET [/api/proxy](#) Call Via Proxy

Web UI

QuickApp "QA0"

com.fibaro.binarySwitch

Interfaces: quickApp,

Restart QA

On

Off

A

B

C

D

E

Test

A

B

33

FOO

QuickApp variables

Device structure

Event view

Fibemu v0.32		Home	Events	Globals	Config	About
Events						
Time	Type	Data				
07/18/2023/13:33:00	DevicePropertyUpdatedEvent	{'property': 'lastChanged', 'oldValue': 1689679380, 'id': 43, 'newValue': 1689679980}				
07/18/2023/13:33:00	DevicePropertyUpdatedEvent	{'unit': 'C', 'newValue': 25.56, 'id': 43, 'property': 'value', 'oldValue': 25.28}				
07/18/2023/13:31:15	DeviceActionRanEvent	{'args': [], 'actionName': 'poll', 'id': 1066, 'isSupportedByDevice': True}				
07/18/2023/13:30:58	DevicePropertyUpdatedEvent	{'property': 'quickAppVariables', 'newValue': [{'name': 'test', 'value': 'HELLO'}], 'id': 5000, 'oldValue': [{'name': 'test', 'value': 'HELLO'}]}				
07/18/2023/13:30:58	DeviceCreatedEvent	{'name': 'QA0', 'viewXml': True, 'visible': True, 'created': 1689679858, 'baseType': 'com.fibaro.actor', 'sortOrder': 191, 'isPlugin': True, 'interfaces': ['quickApp'], 'configXml': False, 'view': [{'translatesPath': '/dynamic-plugins/com.fibaro.binarySwitch/i18n', 'jsPath': '/dynamic-plugins/com.fibaro.binarySwitch/i18n'}]}				

GlobalVariables view

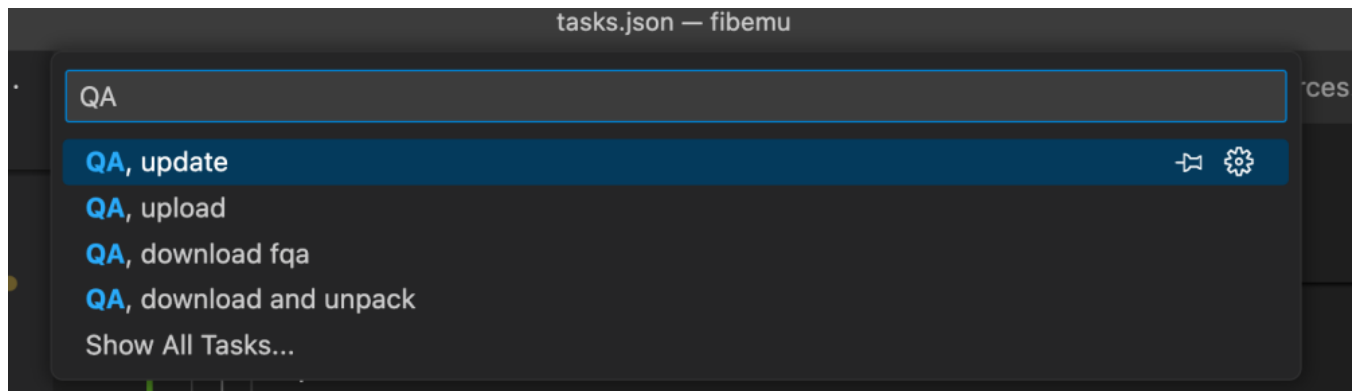
Fibemu v0.32		Home	Events	Globals	Config	About
myTest	77					
indexTable	{ "device": { "hueBridge": { "hueBridge2": { "hueUser": "q6eLpWdYiMGq0kdQWFZB1NZHSILvKLOGsNF					
iOS_BOB	Home					
iOSLocations	{ "Daniela": { "name": "Daniela", "device": "Danielas iPhone", "battery": 0.939999999761581, "dist": 1603					
RPC_1193						

Configuration view

Fibemu v0.32		Home	Events	Globals	Config	About
Config						
Parameter	Value					
host	192.168.1.57					
user	admin					
password	admin					
secret	kaka					
dark	True					
colors	{'SYS': 'brown', 'SYSERR': 'red', 'DEBUG': 'green', 'TRACE': 'blue', 'WARNING': 'orange', 'ERROR': 'red', 'TEXT': 'black', 'DARKTEXT': 'grey'}					

Workflow

There are some defined vscode Tasks that help in remotely uploading and updating the QA on the HC3 from within the vscode environment



- "QA, download fqa" downloads an QA from the HC3 and saves it as a .fqa file. The task will prompt for deviceID and path where to store. The path/dir needs to exist
- "QA, download and unpack" downloads an QA from the HC3 and saves all QA files as .lua files. It also adds fibemu headers in the main file so it can be opened and run with the

emulator . The task will prompt for deviceId and path where to store. The path/dir needs to exist

- "QA, upload" will upload the QA to the HC3. It will prompt for QA file. If '.' is given as argument it will upload the current opened file. This will create a new QA, with a new deviceId on the HC3.
- "QA, update" will try to update QA files, viewLayout, uiCallbacks, and quickAppVariables of an existing QA on the HC3. If '.' is given as argument the file must have set the fibemu header --%%id=<ID> so it knows what QA to update. One can also give the deviceId of the QA on the HC3 that should be updated. This is convenient when developing and avoiding new IDs being "consumed". Sometimes when you update a QA you would not like to update the quickAppVariables. In that case give '-' instead '.' for the current opened file, or -deviceId for an exiting QA on the HC3.

Examples & (tips & tricks)

- Debug console colors can be setup in config.json (see config.json.example). If you run vscode in dark mode that can be nice to modify to your liking.
A quick fix is to set the config parameter dark=true, then the text color will be set to light grey.
- All system logs in the Debug console is tagged as [SYS] or [SYSERR] and can thus easily be filtered out in the Debug console's filter field with !SYS
- Break-points in Lua can not be set while the program is running. To add a new break-point, add and restart the QA. This is a limitation of the Lua debugger used. Break-points can be removed while the program is running though.
- There are 3 ways to add configuration. In ~/.fibemu.json. That file, if available, is read first. Can be a good place to store HC3 credentials like ip, user, password.
After that, config.json in the vscode project directory is read in and merged with the

previous config data.

Lastly, config parameters set in the QA source file is added to the config data.

- The vscode launch.json file contains a number of different launch options when debugging. There is usually a "remote" and a "local" version, and the "local" version will run without accessing the HC3. Good to have if developing where there is no access to an HC3, like on the beach...
- The launch option marked with "emu files" include the Lua emulator files in the path for the debugger so that one can step into these files. Normally, you don't want that, instead you only want to step through your own code. Ex. with "emu files" and you step into a 'setTimeout' you will step into the setTimeout implementation...
- There are also 2 python launch options used to run the program with the python debugger ("remote" and "local"). Mainly used for debugging the framework. However, you can't see your Lua code this way.
- There is an option in the launch file to add an Lua init file with the "-I" option. This is a Lua file run before the QAs. It can be a place to setup som "virtual" QAs or other things....

Example 1

```
function QuickApp:onInit()  
end
```

Example 2

```
function QuickApp:onInit()  
end
```

Implementation details

The environment is a mix of Python and Lua. The blue parts in the picture below is Python and the green is implemented in Lua.

The Lua debugger is started in the green environment when we run the emulator and the vscode IDE can then let us debug our QA like any other Lua code.

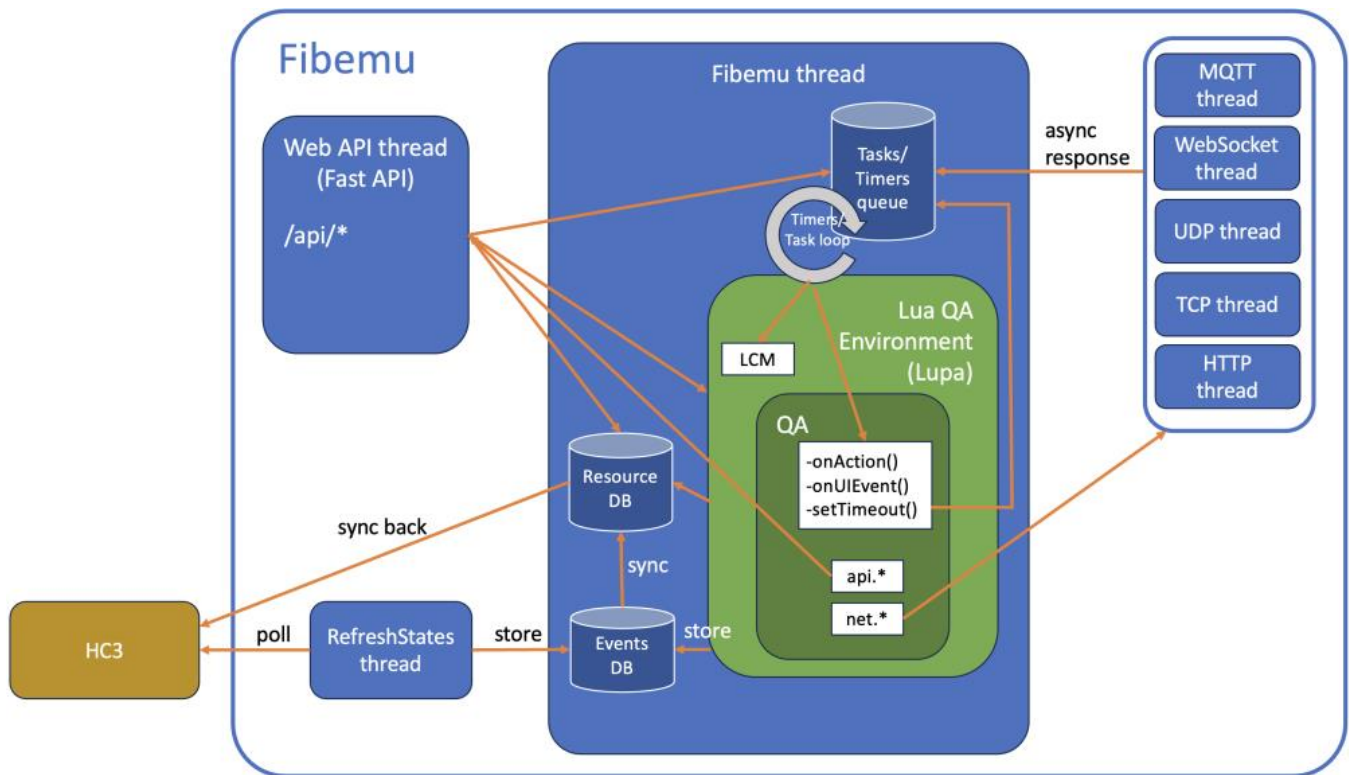
The model is based on that we have a copy of the HC3 resources in our own "Resource DB" and all manipulation of devices, globalvariables, rooms, sections etc are done towards that database.

If some resource is manipulated in the HC3, we get an event (refreshStates) and update our copy in our database.

If a resource is marked as "remote", e.g. we are allowed to change the resource on the HC3 too, we will "sync" back the change from our database, back to the HC3.

Ex. if we set a globalvariable in the emulator and it is marked "remote" we will sync that back to the HC3. Same for device property changes etc.

The exception is `fibaro.call(ID,...)` that will call the device on the HC3 if the device is marked "remote".



The picture shows one QA, but the emulator can load several QAs and run them at the "same" time. There will still be only one fibemu thread, and the QAs will share the same timer queue (e.g., they run as Lua coroutines). However, they will have separate fibaro.sleep that don't block each other.

Known issues

- While the QA is running, break-points can't be added. This is a limitation of the debugger used. Just add the break-point and restart the QA.
- When the emulator crashes, it may leave a process open that keeps the port 5004 in use. The emulator will complain at restart that the port is already bound. You may need to manually kill the process.

On Mac:

```
>kill -9 $(lsof -ti:5004)
```

