# Catalog interface for microservices

# **GET**

### GET catalog/all - Get all the information from the catalog database

### GET catalog/table\_name?[key1=…&key2=…] - GET something based of the key or just the table name

Returns all the corresponding data from the table. If not found 404.

Example get all the table - /topics

Returns all the table:

[

{

"sensor\_id": "npk\_001",

"device\_id": "rasp001",

"topic": "pub/R1/T1/S1"

},

{

"sensor\_id": "dht22\_001",

"device\_id": "rasp001",

"topic": "pub/R1/T1/S1"

},

{

"sensor\_id": "HC-SR04\_001",

"device\_id": "rasp001",

"topic": "pub/R1/T1/S1"

}

]

Example get single topic - /topics?sensor\_id=npk\_001&device\_id=rasp001

Returns the raw that corresponds to the sensor\_id and device\_id in the params:

[

{

"sensor\_id": "npk\_001",

"device\_id": "rasp001",

"topic": "pub/R1/T1/S1"

}

]

Example get where the plant P1 is planted - /shelves?plant\_id=P1

Returns:

[

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S1",

"plant\_id": "P1",

"status": "Seeding",

"light": "ON",

"light\_id": "light\_001",

"status\_light": "GREEN",

"status\_light\_id": "status\_light\_001",

"water\_pump": "OFF",

"water\_pump\_id": "water\_pump\_001"

},

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S2",

"plant\_id": "P1",

"status": "Seeding",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

}

]

Example: get host and port of a microservice - /services?name=light\_management

Returns (if it’s present):

[

{

"name": "light\_management",

"host": "light\_management",

"port": 1234,

"last\_updated": "2024-05-02 17:55:00.405883"

}

]

Returns (if no matches found):

[]

# **POST**

### POST catalog/prefill - Prefill database with sample data

- Returns the prefilled database (it does not delete the service registry):

{

"plants": [

{

"plant\_id": "P1",

"plant\_name": "Romaine Lettuce",

"type\_id": "L"

},

{

"plant\_id": "P2",

"plant\_name": "Canasta Lettuce",

"type\_id": "L"

},

{

"plant\_id": "P3",

"plant\_name": "Blonde Di Lyon Swiss Chard",

"type\_id": "L"

},

{

"plant\_id": "P4",

"plant\_name": "Ribbed Roman Swiss Chard",

"type\_id": "L"

},

{

"plant\_id": "P5",

"plant\_name": "Alpine Strawberry",

"type\_id": "S"

},

{

"plant\_id": "P6",

"plant\_name": "Wild Strawberry",

"type\_id": "S"

},

{

"plant\_id": "P7",

"plant\_name": "San Marzano Tomato",

"type\_id": "T"

},

{

"plant\_id": "P8",

"plant\_name": "Florentine Ribbed Tomato",

"type\_id": "T"

}

],

"plant\_types": [

{

"type\_id": "L",

"type\_name": "Lettuce",

"vegetative\_h": 10.0,

"mature\_h": 20.0,

"humidity\_day": 50.0,

"humidity\_night": 50.0,

"low\_ph": 6.0,

"high\_ph": 7.0,

"low\_temp": 7.0,

"high\_temp": 24.0

},

{

"type\_id": "SC",

"type\_name": "Swiss Chard",

"vegetative\_h": 10.0,

"mature\_h": 20.0,

"humidity\_day": 50.0,

"humidity\_night": 50.0,

"low\_ph": 6.0,

"high\_ph": 7.5,

"low\_temp": 10.0,

"high\_temp": 24.0

},

{

"type\_id": "T",

"type\_name": "Tomato",

"vegetative\_h": 30.0,

"mature\_h": 60.0,

"humidity\_day": 60.0,

"humidity\_night": 85.0,

"low\_ph": 6.0,

"high\_ph": 6.8,

"low\_temp": 21.0,

"high\_temp": 29.0

},

{

"type\_id": "S",

"type\_name": "Strawberries",

"vegetative\_h": 15.0,

"mature\_h": 30.0,

"humidity\_day": 65.0,

"humidity\_night": 65.0,

"low\_ph": 5.5,

"high\_ph": 6.5,

"low\_temp": 15.0,

"high\_temp": 27.0

}

],

"rooms": [

{

"room\_id": "R1",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

},

{

"room\_id": "R2",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

}

],

"plant\_nutrients": [

{

"type\_id": "L",

"state": "Seeding",

"N": 0.95,

"P": 0.38,

"K": 0.76,

"liters": 1.89,

"light": 17.0,

"low\_soil\_moisture": 50.0,

"high\_soil\_moisture": 70.0,

"low\_CO2": 300.0,

"high\_CO2": 800.0

},

{

"type\_id": "L",

"state": "Vegetative",

"N": 1.89,

"P": 0.76,

"K": 1.52,

"liters": 3.79,

"light": 15.0,

"low\_soil\_moisture": 60.0,

"high\_soil\_moisture": 80.0,

"low\_CO2": 800.0,

"high\_CO2": 1200.0

},

{

"type\_id": "L",

"state": "Mature",

"N": 2.84,

"P": 1.14,

"K": 2.27,

"liters": 5.68,

"light": 13.0,

"low\_soil\_moisture": 70.0,

"high\_soil\_moisture": 90.0,

"low\_CO2": 1000.0,

"high\_CO2": 1500.0

},

{

"type\_id": "SC",

"state": "Seeding",

"N": 1.14,

"P": 0.57,

"K": 0.95,

"liters": 2.65,

"light": 17.0,

"low\_soil\_moisture": 50.0,

"high\_soil\_moisture": 70.0,

"low\_CO2": 300.0,

"high\_CO2": 800.0

},

{

"type\_id": "SC",

"state": "Vegetative",

"N": 2.27,

"P": 0.95,

"K": 1.9,

"liters": 4.54,

"light": 15.0,

"low\_soil\_moisture": 60.0,

"high\_soil\_moisture": 80.0,

"low\_CO2": 800.0,

"high\_CO2": 1200.0

},

{

"type\_id": "SC",

"state": "Mature",

"N": 3.41,

"P": 1.34,

"K": 2.68,

"liters": 6.81,

"light": 13.0,

"low\_soil\_moisture": 70.0,

"high\_soil\_moisture": 90.0,

"low\_CO2": 1000.0,

"high\_CO2": 1500.0

},

{

"type\_id": "T",

"state": "Seeding",

"N": 1.51,

"P": 0.76,

"K": 1.14,

"liters": 3.41,

"light": 17.0,

"low\_soil\_moisture": 50.0,

"high\_soil\_moisture": 70.0,

"low\_CO2": 300.0,

"high\_CO2": 800.0

},

{

"type\_id": "T",

"state": "Vegetative",

"N": 3.02,

"P": 1.51,

"K": 2.27,

"liters": 5.68,

"light": 15.0,

"low\_soil\_moisture": 60.0,

"high\_soil\_moisture": 80.0,

"low\_CO2": 800.0,

"high\_CO2": 1200.0

},

{

"type\_id": "T",

"state": "Mature",

"N": 4.53,

"P": 2.27,

"K": 3.41,

"liters": 7.57,

"light": 13.0,

"low\_soil\_moisture": 70.0,

"high\_soil\_moisture": 90.0,

"low\_CO2": 1000.0,

"high\_CO2": 1500.0

},

{

"type\_id": "S",

"state": "Seeding",

"N": 1.32,

"P": 0.95,

"K": 0.76,

"liters": 3.79,

"light": 17.0,

"low\_soil\_moisture": 50.0,

"high\_soil\_moisture": 70.0,

"low\_CO2": 300.0,

"high\_CO2": 800.0

},

{

"type\_id": "S",

"state": "Vegetative",

"N": 2.65,

"P": 7.89,

"K": 1.52,

"liters": 5.68,

"light": 15.0,

"low\_soil\_moisture": 60.0,

"high\_soil\_moisture": 80.0,

"low\_CO2": 800.0,

"high\_CO2": 1200.0

},

{

"type\_id": "S",

"state": "Mature",

"N": 3.98,

"P": 2.84,

"K": 2.27,

"liters": 7.57,

"light": 13.0,

"low\_soil\_moisture": 70.0,

"high\_soil\_moisture": 90.0,

"low\_CO2": 1000.0,

"high\_CO2": 1500.0

}

],

"shelves": [

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S1",

"plant\_id": "P1",

"status": "Seeding",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S2",

"plant\_id": "P1",

"status": "Seeding",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R1",

"tower\_id": "T2",

"shelf\_id": "S1",

"plant\_id": "P2",

"status": "Seeding",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R1",

"tower\_id": "T2",

"shelf\_id": "S2",

"plant\_id": "P2",

"status": "Seeding",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T1",

"shelf\_id": "S1",

"plant\_id": "P5",

"status": "Vegetative",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T1",

"shelf\_id": "S2",

"plant\_id": "P5",

"status": "Vegetative",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T2",

"shelf\_id": "S1",

"plant\_id": "P6",

"status": "Vegetative",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T2",

"shelf\_id": "S2",

"plant\_id": "P6",

"status": "Vegetative",

"light": "ON",

"light\_id": "",

"status\_light": "GREEN",

"status\_light\_id": "",

"water\_pump": "OFF",

"water\_pump\_id": ""

}

],

"topics": [],

"servicees": [

...

]

}

### POST catalog/connect – Connect a device or service to the catalog

- Body to connect a device:

{

    "device\_id": "rasp001",

    "sensors": [

        {

            "sensor\_id": "npk\_001",

            "room\_id": "R1",

            "tower\_id": "T1",

            "shelf\_id": "S1"

        },

        {

            "sensor\_id": "dht22\_001",

            "room\_id": "R1",

            "tower\_id": "T1",

            "shelf\_id": "S1"

        },

        {

            "sensor\_id": "HC-SR04\_001",

            "room\_id": "R1",

            "tower\_id": "T1",

            "shelf\_id": "S1"

        }

    ],

    "actuators": [

        {

            "actuator\_id": "ventilation\_001",

            "room\_id": "R1"

        },

        {

            "actuator\_id": "light\_001",

            "room\_id": "R1",

            "tower\_id": "T1",

            "shelf\_id": "S1"

        },

        {

            "actuator\_id": "status\_light\_001",

            "room\_id": "R1",

            "tower\_id": "T1",

            "shelf\_id": "S1"

        },

        {

            "actuator\_id": "water\_pump\_001",

            "room\_id": "R1",

            "tower\_id": "T1",

            "shelf\_id": "S1"

        }

    ]

}

- Response: topics of the sensors

{

"topics\_to\_publish": [

{

"sensor\_id": "npk001",

"topic": "pub/R1/T1/S1"

},

{

"sensor\_id": "dht23",

"topic": "pub/R1/T2/S2"

},

...

]

}

Names of the microservices (must be one of these):

* **catalog**
* nutrient\_dosing\_management
* light\_management
* water\_management
* ventilation\_management
* data\_analysis
* thingspeak\_adaptor
* device\_connector\_n
* user\_interface
* telegram\_interface

- Body to connect a service:

{

    "name" : "light\_management",

    "host" : "light\_management",

    "port" : 1234

}

- Returns all the services connected to the catalog:

[

{

"name": "ventilation\_management",

"host": "ventilation\_management",

"port": 2345,

"last\_updated": "2024-05-02 19:07:35.159209"

},

{

"name": "light\_management",

"host": "light\_management",

"port": 1234,

"last\_updated": "2024-05-02 19:09:25.353940"

}

]

Not relevant, there can be more devices in the room, the user sees and decides everything

* the device\_id does not exist in the database and the room is not associated with a device:
* create a new room if it does not exists, and associate it with the device\_id
* the device\_id does not exist in the database but the room is associated with another device:
* update the device\_id of the room, the sensors ids and the corresponding topics
* signal to the device that it is now free
* the device\_id does exist in the database but it’s associated with another room:
* signal error 409 (Conflict)

### POST catalog/table\_name/keys?value\_to\_change=new\_value – Change the state of a value in a table

Things you CAN change (for each table):

* **plants**/plant\_id?
  + plant\_name
  + type\_id
* **plant\_types**/type\_id?
  + vegetative\_h
  + mature\_h
  + humidity\_day
  + humidity\_night
  + low\_ph
  + high\_ph
  + low\_temp
  + high\_temp
* **rooms**/room\_id?
  + device\_id
  + ventilation {ON,OFF}
  + ventilation\_id
* **plant\_nutrients**/type\_id/state?
  + N
  + P
  + K
  + light
  + low\_soil\_moisture
  + high\_soil\_moisture
  + low\_CO2
  + high\_CO2
* **shelves**/room\_id/tower\_id/shelf\_id?
  + plant\_id
  + status
  + light {ON,OFF}
  + light\_id
  + status\_light {GREEN,YELLOW,RED}
  + status\_light\_id
  + water\_pump {ON,OFF}
  + device\_id

Actuators name and possible values:

* light: {ON,OFF}
* status\_light: {GREEN,YELLOW,RED}
* water\_pump: {ON,OFF}

If something goes wrong, it returns: HTTP 404 - wrong names where put/resource not found/not an allowed value/no actuator Id found so no device connected

Example set light ON - /shelves/R1/T1/S1?light=ON

Returns:

{

"actuator\_id": "light\_001",

"status": "ON"

}

Example set ventilation OFF - /rooms/R1?ventilation=OFF

Returns:

{

"actuator\_id": "ventilation\_001",

"status": "OFF"

}

Example set status at ‘Mature’ on a shelf - /shelves/R1/T1/S1?status=Mature

Returns all the values of that shelf:

[

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S1",

"plant\_id": "P1",

"status": "Mature",

"light": "ON",

"light\_id": "light\_001",

"status\_light": "GREEN",

"status\_light\_id": "status\_light\_001",

"water\_pump": "OFF",

"water\_pump\_id": "water\_pump\_001"

}

]

# **PUT**

### PUT catalog/table\_name - insert a new row to a table

The body should contain as fields all the data. If in conflict it will return 409 error, otherwise the table updated.

- Example body to add a new row in table rooms:

{

    "room\_id" : "R3",

    "device\_id" : "",

    "ventilation" : "OFF",

    "ventilation\_id" : ""

}

It will return:

[

{

"room\_id": "R1",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

},

{

"room\_id": "R2",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

},

{

"room\_id": "R3",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

}

]

# **DELETE**

If page not found (wrong page name) returns 404 “Page not found”.

### catalog/table\_name/keys - delete single plant/type/… - delete entire row from table

Returns all the remaining database.

Keys for each table:

* plants -> also delete from table shelves
  + plant\_id
* plant\_types -> also delete from table plants and plant\_nutrients
  + type\_id
* rooms -> also delete from table shelves and topics
  + room\_id
  + room\_id/device\_id to delete only one device
* plant\_nutrients
  + type\_id
* shelves
  + room\_id
  + room\_id/tower\_id
  + room\_if/tower\_id/shelf\_id
* topics
  + sensor\_id
  + sensor\_id/device\_id

Example delete a room - catalog/rooms/R1:

Deletes also the room references from other tables.

Example delete a plant - catalog/plants/P1

Also deletes the shelves where the plant is present.

### catalog/table\_name?param=value – delete a single row, other method

Returns all the remaining database.

### catalog/reset – reset catalog , everything is emptied

Reset all tables on the database.

* Returns:

{

"plants": [],

"plant\_types": [],

"rooms": [

{

"room\_id": "R1",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

},

{

"room\_id": "R2",

"device\_id": "",

"ventilation": "OFF",

"ventilation\_id": ""

}

],

"plant\_nutrients": [],

"shelves": [

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S1",

"plant\_id": "P1",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R1",

"tower\_id": "T1",

"shelf\_id": "S2",

"plant\_id": "P1",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R1",

"tower\_id": "T2",

"shelf\_id": "S1",

"plant\_id": "P2",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R1",

"tower\_id": "T2",

"shelf\_id": "S2",

"plant\_id": "P2",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T1",

"shelf\_id": "S1",

"plant\_id": "P5",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T1",

"shelf\_id": "S2",

"plant\_id": "P5",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T2",

"shelf\_id": "S1",

"plant\_id": "P6",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

},

{

"room\_id": "R2",

"tower\_id": "T2",

"shelf\_id": "S2",

"plant\_id": "P6",

"status": "",

"light": "",

"light\_id": "",

"status\_light": "",

"status\_light\_id": "",

"water\_pump": "",

"water\_pump\_id": ""

}

],

"topics": [],

"services": []

}