
MAX IV

“dsconfig”, a Tango configuration tool

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What is dsconfig?

A command line tool that reads a configuration from a file and applies it to an existing Tango control system.

Depends on **PyTango**

Defines a **JSON** file format

https://gitlab.com/MaxIV/lib-maxiv-dsconfig

JSON file format

```
"servers": {
        "some-server/instance": {
            "SomeDeviceClass": {
                "some/device/1": {
                    "properties": {
                        "someImportantProperty": [
                            "foo",
                            "bar"
                        ],
                        "otherProperty": ["7"]
                    },
                    "attribute_properties": {
                        "anAttribute": {
                            "min_value": ["-5"],
                            "unit": ["mV"]
                        }
                    }
                “some/device/2”: { ...
```

How it works

1. Read and validate the JSON file

2. “Dump” the relevant parts of the Tango database

3. Compare the two configurations
   → If there is no difference, we are already done!

4. Display the “diff” to the user
   → If the “--write” flag was not added, stop here.

5. Add/remove/change in the database what is needed for the user supplied configuration to be “true”.

What is the point?

Tango DB is a “moving target”; automated configuration may **overwrite** important manual changes

Applying configuration with **deployment tools** like Ansible (see Benjamin’s talk yesterday).

Developers can generate and reproduce testing setups. Also useful for automated testing, e.g. in CI.

Convenient way to get a “**snapshot**” of the database for backup or further analysis.

Example session

```
$ conda create -n dsconfig -c conda-forge python=3.10 dsconfig

$ conda activate

$ json2tango --help
Usage: json2tango [options] JSONFILE

Options:
  -h, --help            show this help message and exit
  -w, --write           write to the Tango DB
  -u, --update          don't remove things, only add/update
  -c, --case-sensitive  Don't ignore the case of server, device,
...
```

Example session

```
johfor@w-johfor-pc-0 ~/kits/meetings/tango_meeting_2022
$ cat dsconfig_example.json
{
    "servers": {
        "TangoTest/test": {
            "TangoTest": {
                "sys/tg_test/1": {}
            }
        }
    }
}

johfor@w-johfor-pc-0 ~/kits/meetings/tango_meeting_2022
$ json2tango dsconfig_example.json

*** No changes needed in Tango DB ***
```

Example session

```
$ cat dsconfig_example2.json
{
    "servers": {
        "TangoTest/test": {
            "TangoTest": {
                "sys/tg_test/1": {
                    "properties": {
                        "message": ["Hello tangoers!"]
                    }
                },
                "sys/tg_test/2": {}
            }
        }
    }
}
```

Example session

```
$ json2tango dsconfig_example2.json
= Device: sys/tg_test/1
  Properties:
    + message
      Hello tangoers!
+ Device: sys/tg_test/2
  Server: TangoTest/test
  Class: TangoTest

Summary:
Add 1 devices to 1 servers.
Add/change 1 device properties in 1 devices.

*** Nothing was written to the Tango DB (use -w) ***
```

Example session

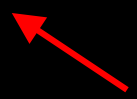
```
johfor@w-johfor-pc-0 ~/kits/meetings/tango_meeting_2022
$ json2tango dsconfig_example2.json -w
= Device: sys/tg_test/1
  Properties:
    + message
      Hello tangoers!
+ Device: sys/tg_test/2
  Server: TangoTest/test
  Class: TangoTest
Progress: [####################] 100%

Summary:
Add 1 devices to 1 servers.
Add/change 1 device properties in 1 devices.

*** Data was written to the Tango DB ***
The previous DB data was saved to /tmp/dsconfig-kfcm6ke3.json

johfor@w-johfor-pc-0 ~/kits/meetings/tango_meeting_2022
$ json2tango dsconfig_example2.json

*** No changes needed in Tango DB ***
```



-w flag required
for writing to DB

Use case: plc2tango

At MAX IV, PLC handles vacuum interlocks, cooling flows, temperatures, etc

Need to make this info available via Tango for data acquisition, GUIs, archiving…

Facade devices, a "low code" solution to create devices combining info from various parts of the control system, configured via properties

→ Large numbers of different devices that need frequent updates.

Fortunately: **naming convention**!

Use case: plc2tango

Example: A thermocouple

B316A-O01-DIA-TCO-04
B316A = **System**: beamline on R3, number 16, branch A
O01 = **Location**: optics area 1
DIA = **Subsystem**: diagnostics
TCO = **Equipment type**: thermocouple
04 = Fourth in order

PLC tags:
B316A_O01_DIA_TCO04_AS Temperature value
B316A_O01_DIA_TCO04_BP Bypassed
B316A_O01_DIA_TCO04_A01_AA__HHInAlarm High alarm
...

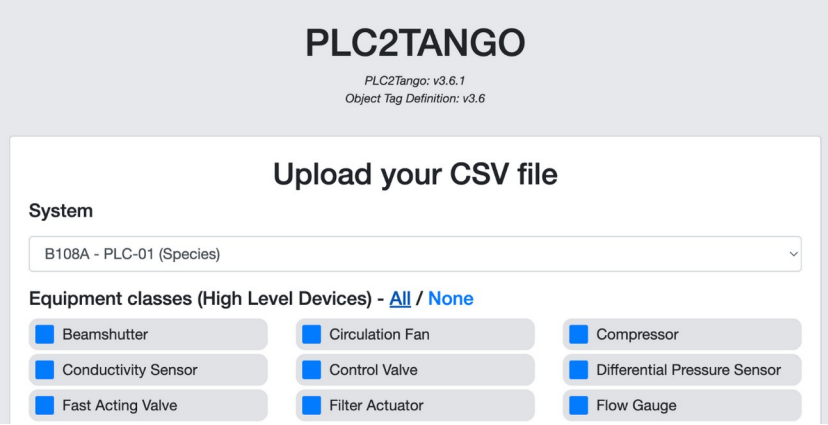
Tango device name: **B316A-O01/DIA/TCO-04**

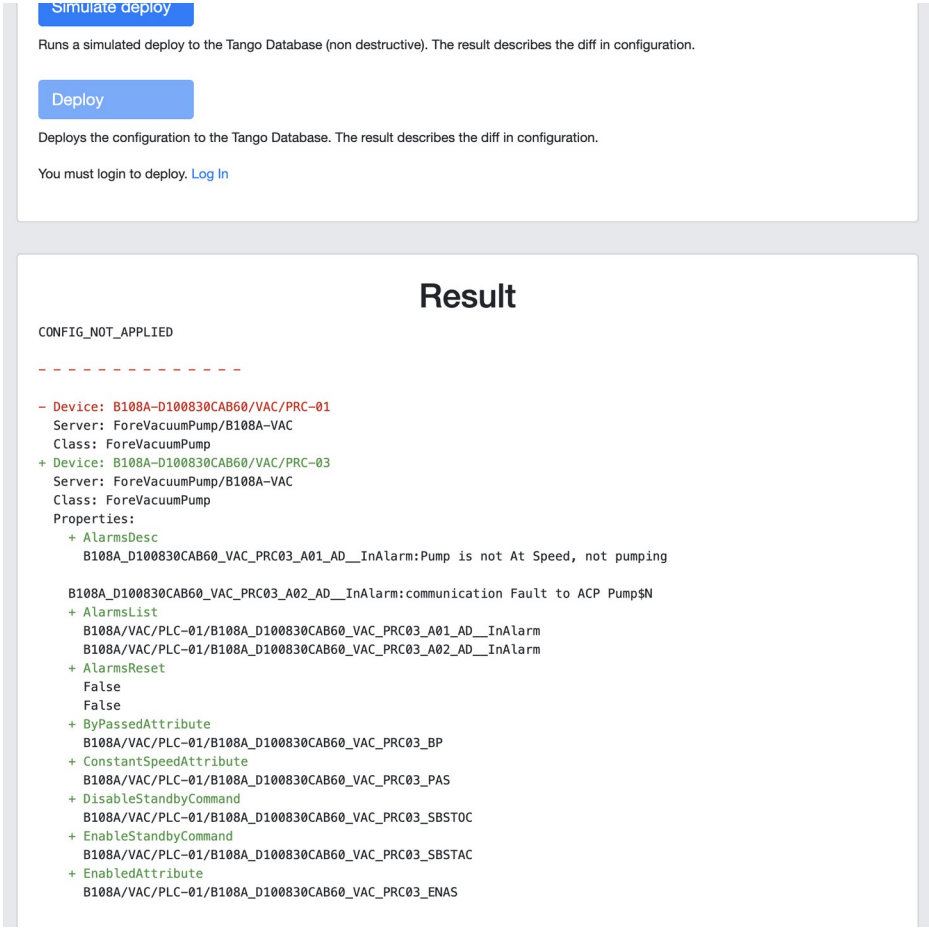
Use case: plc2tango

Tag list (CSV file) is parsed according to the naming convention and turned into a dsconfig file ->


```
{
    "servers": {
        "Thermocouple": {
            "B316A-DIA": {
                "Thermocouple": {
                    "B316A-O01/DIA/TCO-04": {
                        "properties": {
                            "AlarmsDesc": [
                                "B316A_O01_DIA_TCO04_A01_AD__InAlarm:TCO channel fault"
                            ],
                            "AlarmsList": [
                                "B316A/VAC/PLC-01/B316A_O01_DIA_TCO04_A01_AD__InAlarm"
                            ],
                            "AlarmsReset": [
                                "False"
                            ],
                            "ByPassedAttribute": [
                                "B316A/VAC/PLC-01/B316A_O01_DIA_TCO04_BP"
                            ],
                            "HighAlarmAttribute": [
                                "B316A/VAC/PLC-01/B316A_O01_DIA_TCO04_A01_AA__HHInAlarm"
                            ],
                            "HighAlarmLevelAttribute": [
                                "B316A/VAC/PLC-01/B316A_O01_DIA_TCO04_A01_AA__HHLimit"
                            ],
                            "HighWarningAttribute": [
                                "B316A/VAC/PLC-01/B316A_O01_DIA_TCO04_A01_AA__HInAlarm"
                            ], ...
```

Use case: plc2tango





Simple web service allows PLC engineers to upload and apply new tag lists without specific knowledge about Tango

Runs dsconfig in the background

Use case: Ansible

“declarative”: describe the config you want, and let the tool figure out how to get there.

“Idempotent”: do only what is needed to get to the desired state.

→ good fit for **Ansible**!

Our Ansible role for deploying Tango devices uses dsconfig as a python module.

(For more information about how we use Ansible at MAX IV, see Benjamin’s talk yesterday.)

How to get it

Code:
https://gitlab.com/MaxIV/lib-maxiv-dsconfig

PyPI:

```
$ pip install dsconfig
```

Conda:
“dsconfig” on conda-forge

RPM:
https://gitlab.com/tango-controls/RPM/dsconfig-spec

Thanks!