Python Device server for SCPI instruments

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What's SCPI?

Standard Commands for Programmable Instruments

From the wikipedia's definition

The *Standard Commands for Programmable Instruments* (SCPI; often pronounced "skippy") defines a standard for syntax and commands to use in controlling programmable test and measurement devices, such as automatic test equipment and electronic test equipment.

Standard definition

- SCPI-99
- IEEE 488.2-2004

How it looks like:

```
*IDN?,                  SOURce:FREQuency:STARt?,
*RST,...                SYSTem:COMMunicate:SERial:BAUD 2400
```

Tango Device Servers

What we (all) did with SCPI, or at least what I've seen:

- At least 49 Device Servers identified in the Catalogue
- Represents $>$ 6% of the current Device Servers in the inventory
- 40 are written in Cpp, 8 in Python, 1 in Java

by Family

Communications	8
Instrumentation	19
Measurement Instruments	20
Other Instruments	1
Standard Interfaces	1

by Institute

3control	1[a]
alba	7
desy	22
esrf	8
nexeya	2
soleil	9

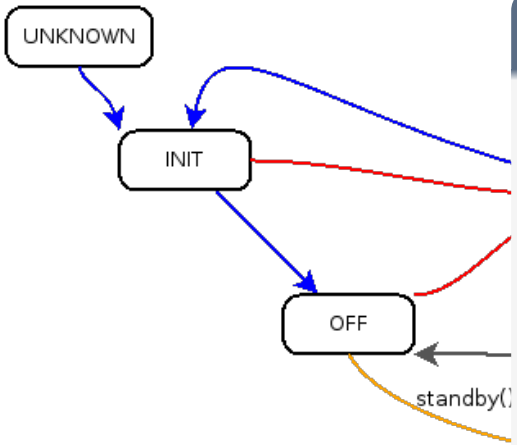
Skippy:

- 13 instruments
- 9 manufacturers
- 4 in progress

[a] ScpiDS multiple instruments

SkippyDS

State machine and tango description



Properties

- Instrument
- Port
- Serial{Baudrate,Bytesize,...}
- Num{Channels,Functions,Multiple}
- MonitoredAttributes
- Auto{Standby,On,Start}
- TxTerminator

commands

- IDN()
- Off(), Standby(), On()
- Start(), Stop()
- {Add,Remove}Monitoring()
- {Get,Set}MonitoringPeriod()
- CMD()

attributes

- QueryWindow
- TimeStampsThreshold

Attribute builder

```
Attribute('IO',
          {'type': PyTango.CmdArgType.DevString,
           'dim': [0],
           'readCmd': lambda mult, num: "%s%.2d:VALU?" % (mult, num),
           'writeCmd': lambda mult, num: (
               lambda value: "%s%.2d:VALU %s" % (mult, num, value)),
           'multiple': {'scpiPrefix': 'IOPOrt', 'attrSuffix': 'Port'}
           })
```

keywords

- type, dim
- label, description,
- format, unit,
- memorized
- min/max
- readCmd, writeCmd
- channels, functions, multiple
- delayAfterWrite
- readFormula

Sardana Controller

1. Use a proxy in the controller
2. Reduce layers: Instead of use a tango device, implement a native access to the instruments in the controller

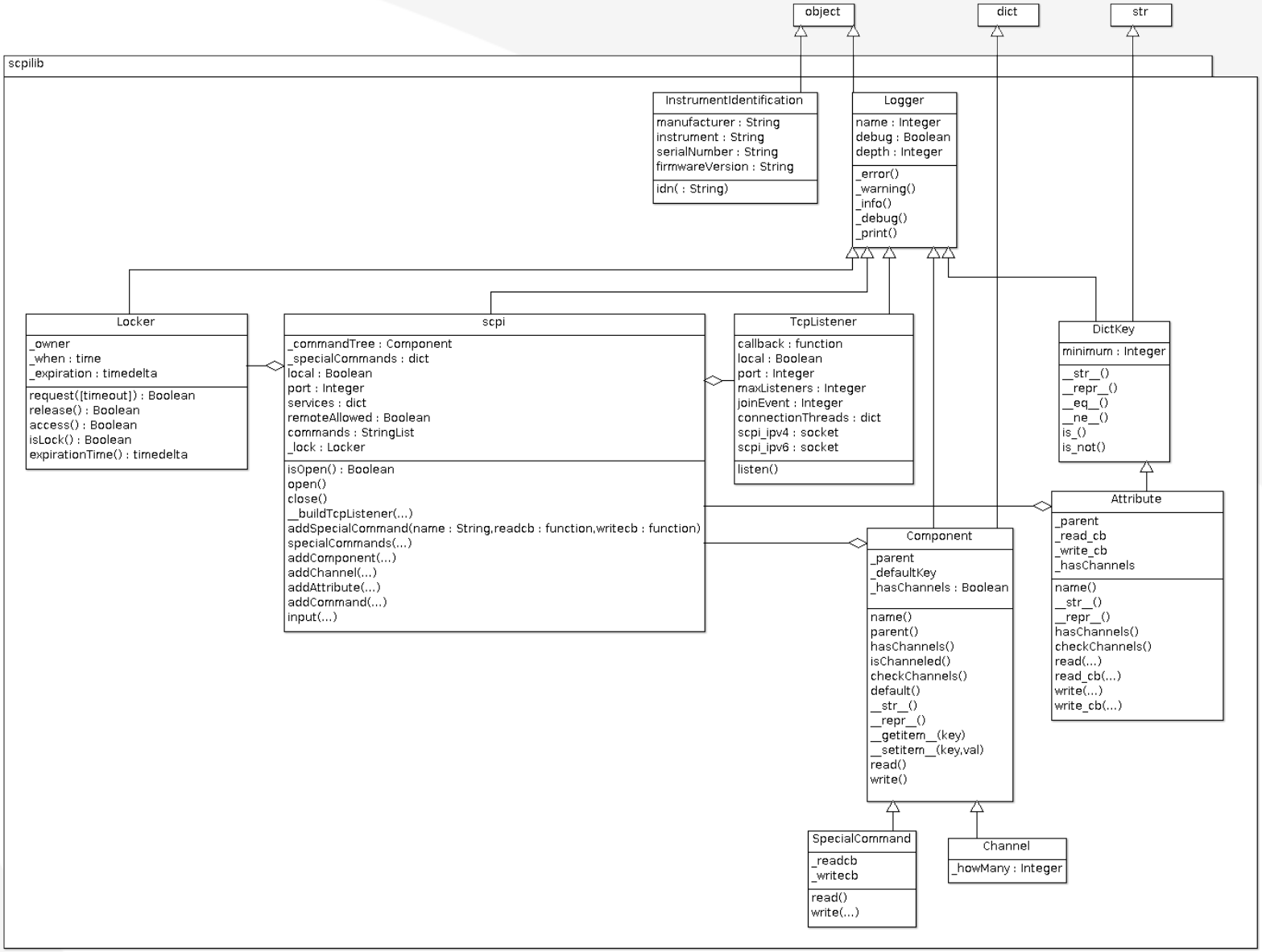
- Again, one specific controller per instrument?
- Reimplement generic features?
- Encapsulate and share the features: a python module

python-skippy module

Python console example

```
>>> from skippylib import Skippy
>>> skippyObj = Skippy(name='scodilt0401', port=5025, nChannels=4)
>>> skippyObj.idn
'KEYSIGHT␣TECHNOLOGIES,DSOS204A,MY58150181,06.30.00701'
>>> stateCh1 = skippyObj.attributes['StateCh1']
>>> print("{!r}".format(StateCh1))
StateCh1 (SkippyReadWriteAttribute):
    rvalue: True
    wvalue: None
    timestamp: 1559207397.3
    quality: ATTR_VALID
    type: DevBoolean
    dim: 0
    readCmd: ':CHAN1:DISPlay?'
    readFormula: None
    writeCmd: ':%s%d:DISPlay␣%s'
>>> stateCh1.isRampeable()
False
```

python-scpilib module



Wish & ToDo Lists

skippylib

- Improve new instrument insertion
- Improve the watchdog
- Dynamic attributes as property
- Dynamic commands
- Generalize *TxTerminator*
- Different ramp strategies
- `WriteFormula`
- input validation
- dependencies with state-like

scpilib

- *autodoc* scpi tree
- python3
- Set of *minimal* commands
- Write lock (current is RW)
- Report locker owner
- Extend *lock* feature to subtrees
- Listen more channels than network
- SSL and ACLs
- Event subscription
- mensional data

gui

- Generic taurus gui for any of the instruments