µRPC: How We Learned to Stop Worrying and Love the Single Source Of Truth

A tale about Simple'n'Stupid (not only) TANGO adapter generator which saved us from boilerplate code and inconsistent data.

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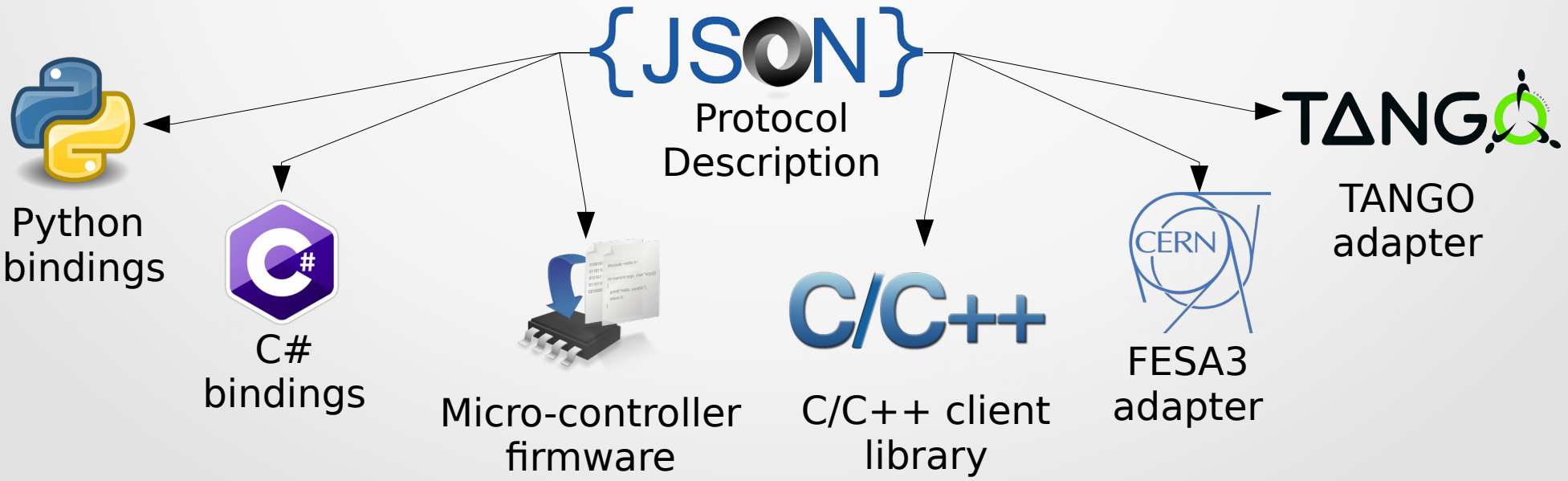
µRPC: extendable code generators

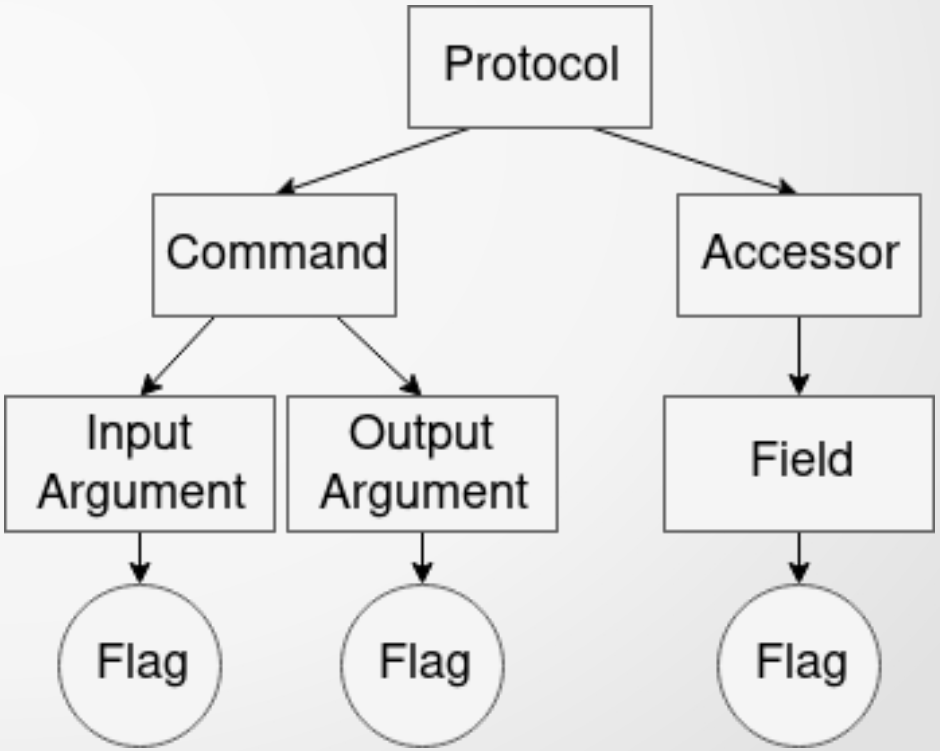
- µRPC is a modular and expendable code generator which consists of
  - unified AST definition (and reference storage format implementation),
  - a set of Python libraries to generate specific target (“builders”),
  - a simple web-based frontend (also in Python).
- µRPC provides a way to describe hardware protocol itself and generate full-stack solution (from firmware to TANGO adapter) from the single source of truth.



µRPC: Abstract Syntax Tree

A unified (across editors and builders) in-memory representation of request-response protocols

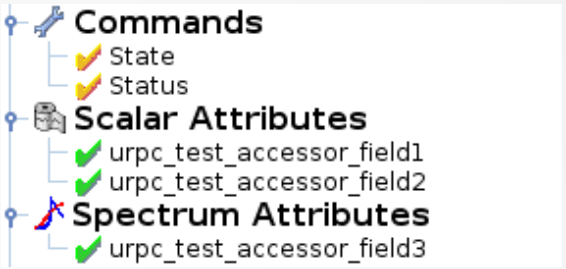
- Protocol – protocol entity as a whole; contains a set of commands and accessors.
- Command – a request to perform some action; can have multiple input arguments and return values.
- Accessor – getter/setter pair for some data; can contains multiple fields.
- Argument/Field – a single C-typed variable; can contain multiple Flags.
- Flag – predefined variable value; can contain nothing.

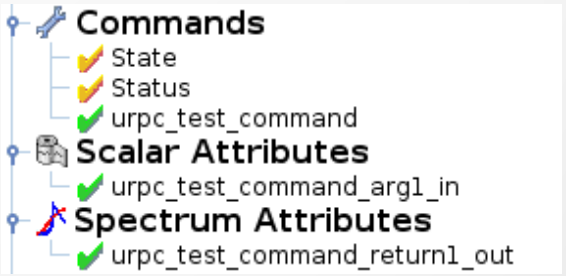


µRPC: the TANGO builder

- Protocol AST tree is translated to self-contained TANGO device server cmake project.
- Each AST Accessor is translated to a set of read-write attributes with buffered input-output.
- Each AST Command sub-tree is translated to:
  - write-only attributes for input arguments,
  - read-only arguments for return values,
  - empty command to trigger execution.

CMake
Cross-platform Make

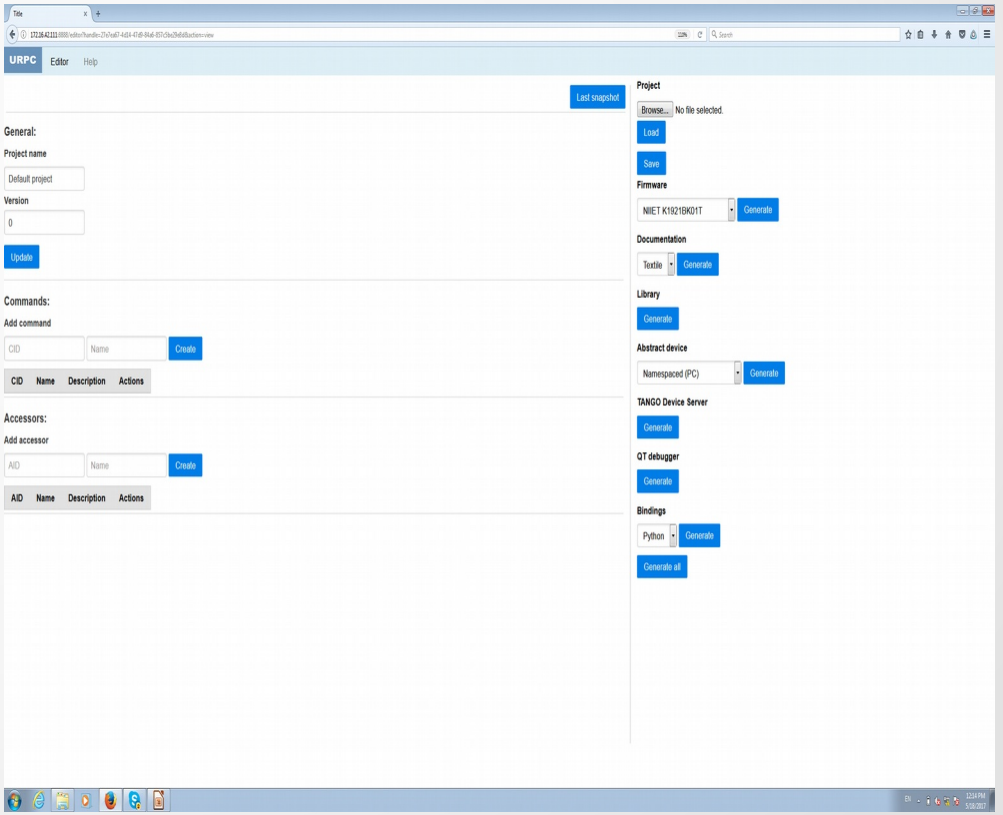




µRPC: web frontend

Everything is available right now in your browser at http://urpc.kea.su/v05

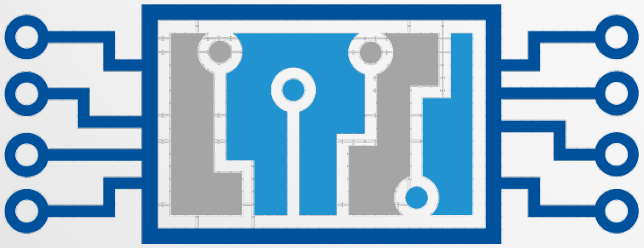
- No need to install anything on your machine
- Bulletproof HTML 1.0 web-based editor
- Automatically persists user session
- Validation support
- Get basic firmware to build upon and run it in 15 minutes
- Get C/C++ library and TANGO adapter in 5 more



µRPC: future plans

- Custom metadata support to parametrize code generation in builders
- Improve web-editor

- More micro-controllers support out of the box



- Open-sourcing and bug/issue tracker

µRPC: thanks for the attention!

Questions?

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