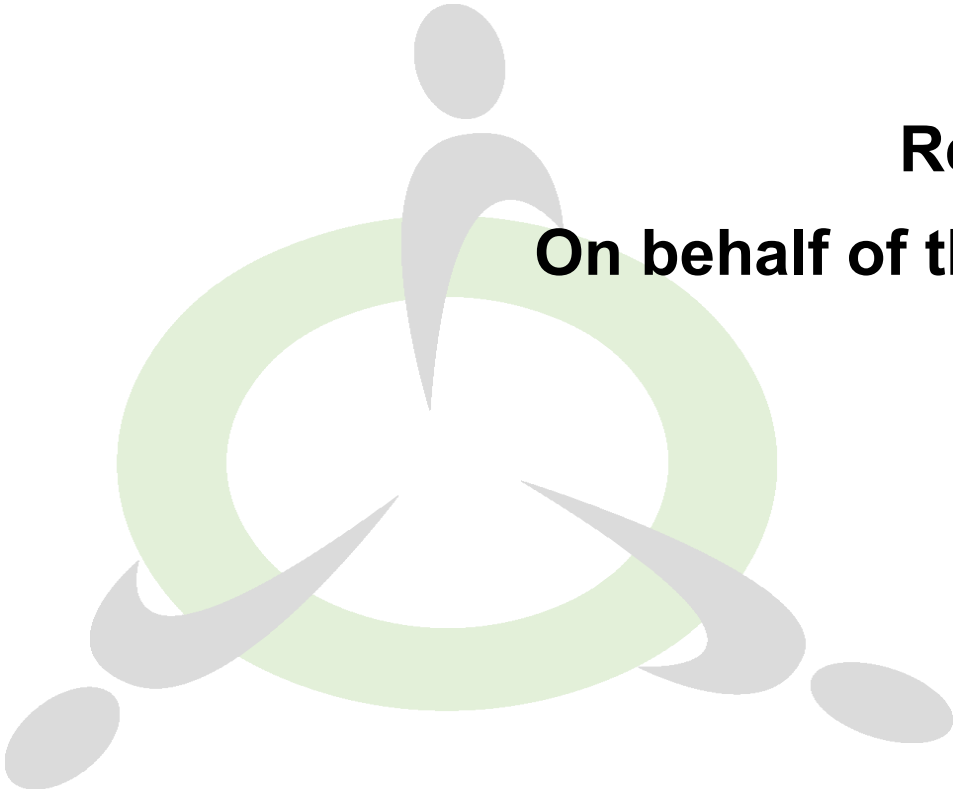




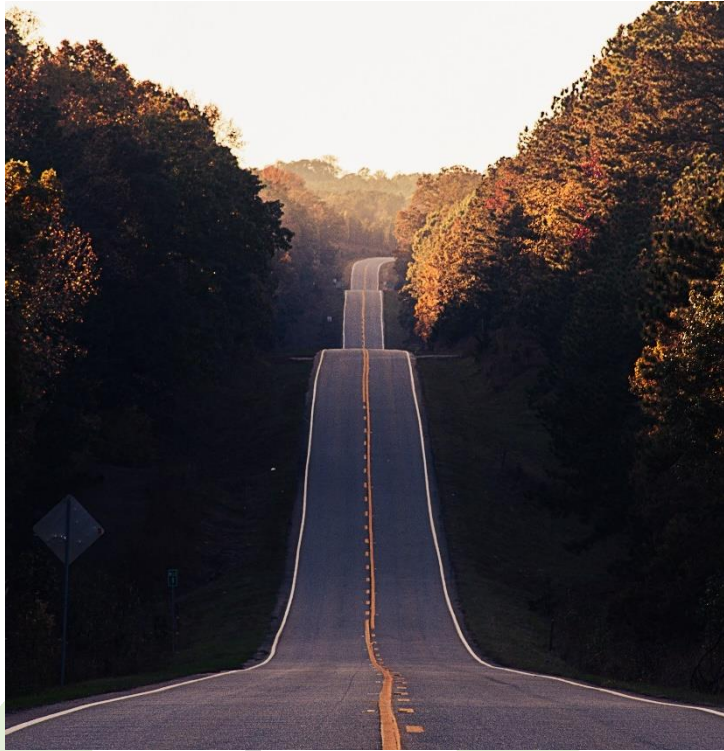
TANGO KERNEL DEVELOPMENT STATUS

Reynald Bourtembourg

On behalf of the TANGO Controls Collaboration

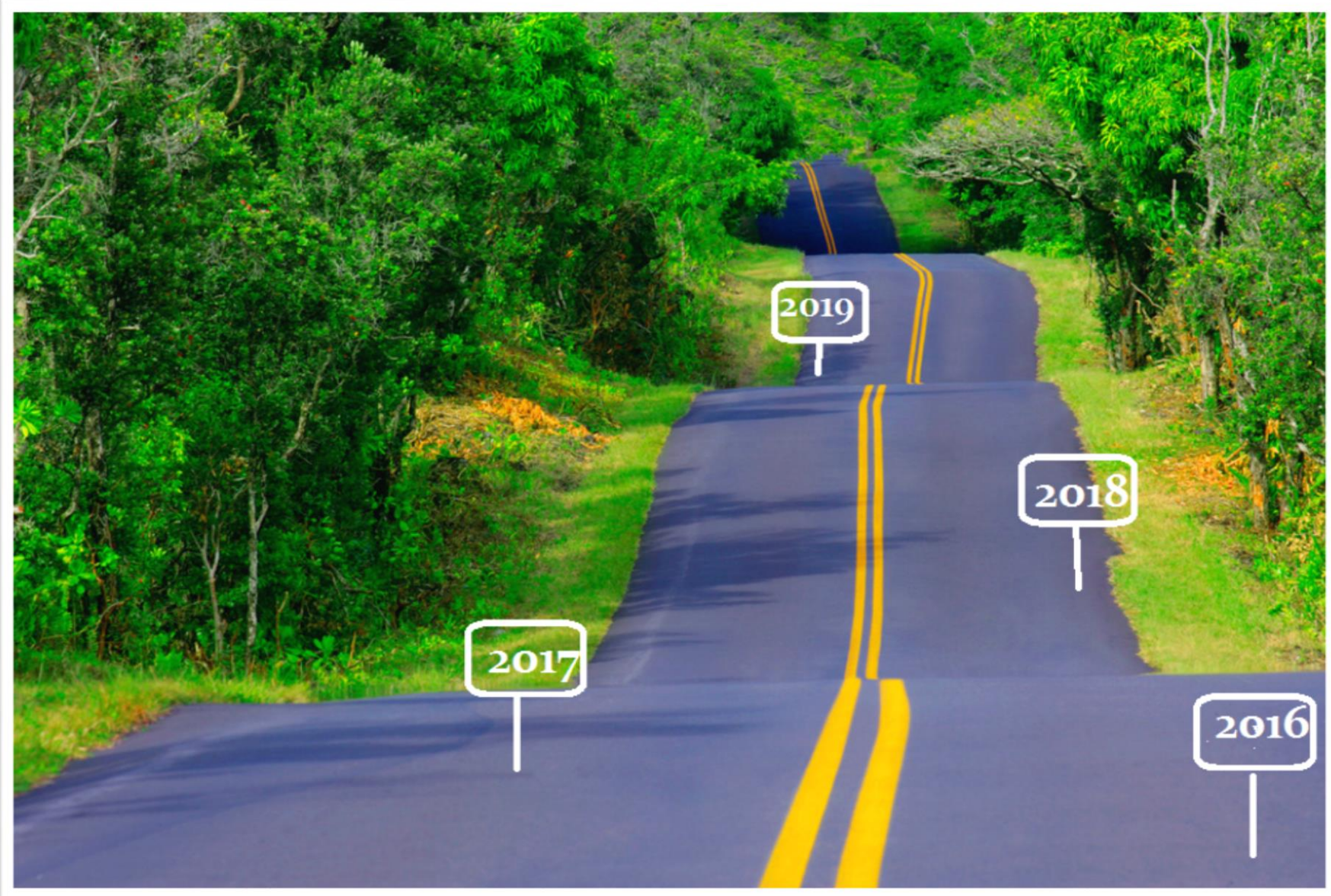


OUTLINE



- Roadmap
- Bonus

ROADMAP



Roadmap from ICALEPCS 2015 (as described in WEA3O01):

- 1) Improve documentation
- 2) Move to Git
- 3) Remove CORBA completely
- 4) Grow the community
- 5) REST API
- 6) Web browser application
- 7) Secure encryption
- 8) Database performance
- 9) Device class Marketplace
- 10) Long Term Support
- 11) Tango Virtual Machine
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- 14) Replace Boost.Python

Roadmap from ICALEPCS 2015 (as described in WEA3O01):



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14) Replace Boost.Python



ROADMAP #1: IMPROVE DOCUMENTATION

Re-factor and consolidate documentation

<http://tango-controls.readthedocs.io>

Tango Controls

TANGO

latest

Search docs

Welcome to Tango Controls documentation!

Authors

Overview

Installation

Getting Started

Developer's Guide

Tools and Extensions

Administration

Tutorials and How-Tos

Reference

[Read the Docs](#) v: latest

[Docs](#) » Welcome to Tango Controls documentation! [Edit on GitHub](#)

Welcome to Tango Controls documentation!

How this documentation is organized

The documentation is organized in the following categories (some of them overlap):

- **Overview** will give you a quick overview of what Tango Controls is, its origins and who uses it. Start reading here.
- **First steps** will lead you through getting started with Tango Controls. This category includes an overview of Tango Controls concepts, procedures for installation and starting the system as well as *Getting started* tutorials.
- **Developer's Guide** documents the API and information for **Developers** needed for development of **Device Servers** and client applications.
- **Administration** section is important mainly for **System Administrators**. However, it may provide some information for both **End Users** and **Developers**, too. It contains useful information on Tango Controls system deployment, startup and maintenance.
- **Tools and extensions**. Tango comes with rich set of command line tools, graphical toolkits and programming tools for management, developing graphical applications and connecting with other systems and applications. All, **End Users**, **Developers** and **System Administrators** should take a look at the toolkits' manuals.
- **Tutorials and HOWTOs** give step by step guidance and teach you how to work with Tango Controls.
- **Table of Contents** provides access to all documents.
- If you want to contribute to the documentation please read the document [How to work with Tango Controls documentation](#) and the [Documentation workflow tutorial](#).

Indices and tables

- [Table of Contents](#)
- [Index](#)
- [Module Index](#)



Roadmap from ICALEPCS 2015 (as described in WEA3O01):



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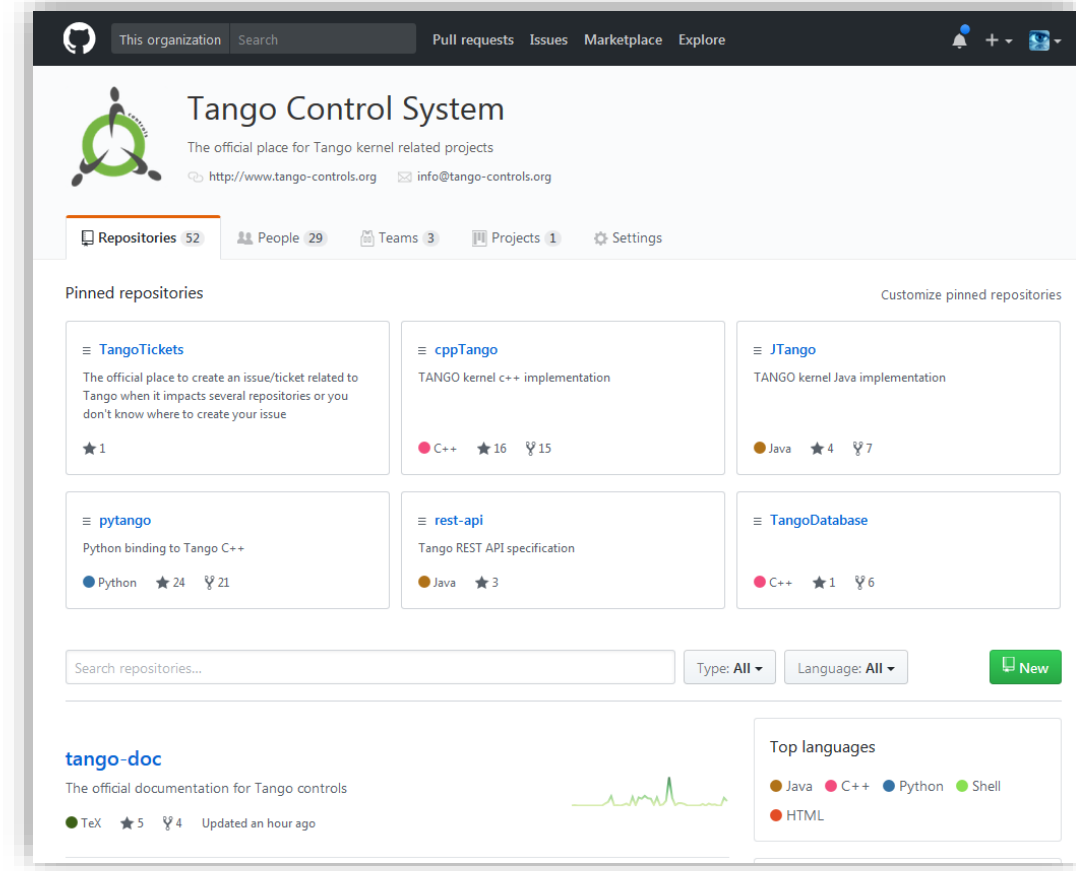
ROADMAP #2: MOVE TO GIT

Sourceforge / subversion

Github / git



<http://sourceforge.net/projects/tango-cs/>



<https://github.com/tango-controls>





ROADMAP #2: MOVE TO GIT

3rd party tools for free!



Travis CI



AppVeyor



Codecov

sonarcloud 



Read *the* Docs



versioneye



CODEBEAT



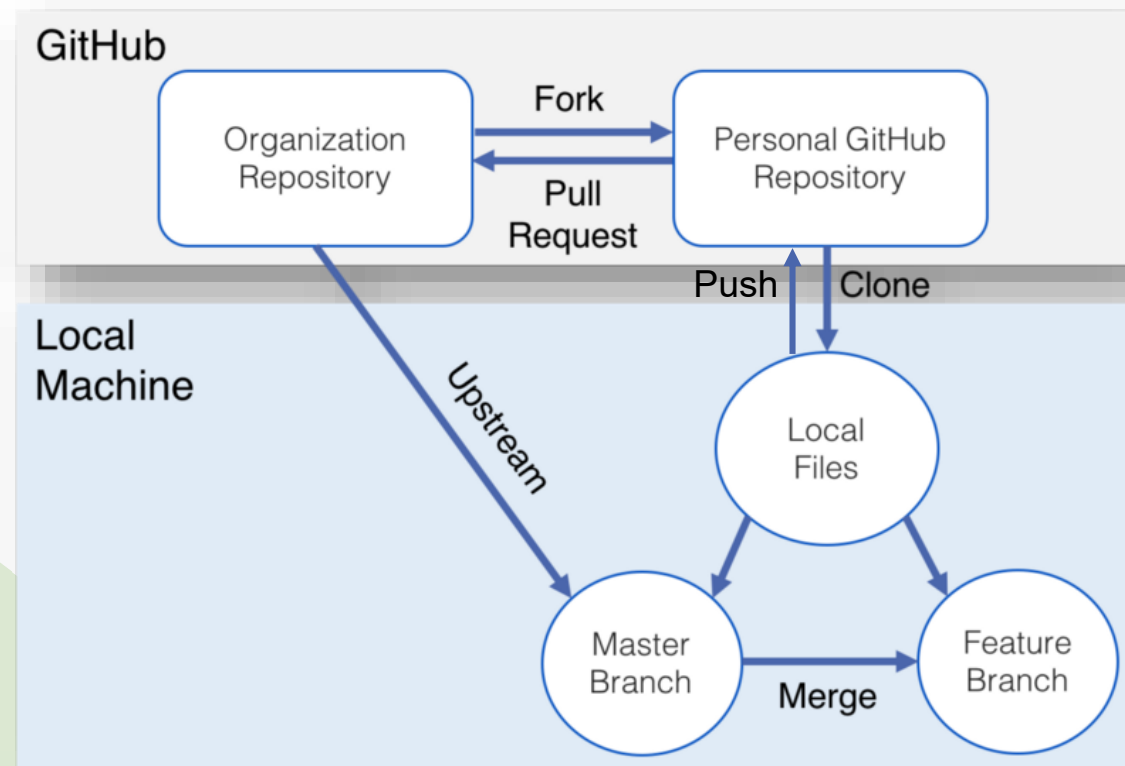
C O D A C Y





ROADMAP #2: MOVE TO GIT

Pull Requests



Source: <https://medium.com/@swinkler/git-workflow-explained-a-step-by-step-guide-83c1c9247f03>



ROADMAP #2: MOVE TO GIT

Pull Requests

Forwarded dynamic attributes implementation by jairomoldes · Pull Request #341 · tango-controls/cppTango · GitHub - Mozilla Firefox

Forwarded dynamic a... x +

GitHub, Inc. (US) | https://github.com/tango-controls/cp... Search

Conversation 15 Commits 1 Files changed 3

Changes from all commits 3 files +47 -2

Unified Split

38 cppapi/server/device.cpp Show comments View

```
@@ -3229,7 +3229,43 @@ void DeviceImpl::add_attribute(Tango::Attr *new_attr)
3229 3229
3230 3230     if (new_attr->is_fwd() == true)
3231 3231     {
3232 -         dev_attr->add_fwd_attribute(device_name, device_class, i, new_attr);
3232 +         // If forwarded attribute is dynamically created and was constructed without specifying
```

Ingvord on 19 Dec 2016 **Owner**
This code should be extracted into method `add_forwarded_attribute(Tango::Attr* fwd_attr)`

jairomoldes on 19 Dec 2016 • edited
I agree. Well actually I would create method `add_forwarded_attribute(Tango::FwdAttr* fwd_attr)`

jairomoldes on 20 Dec 2016
I think that maybe its better to include this code in existing `add_forwarded_attribute` method

```
3233 +         // the root_attribute parameter then we have to get its __root_att property from tango DB
3234 +         // prior to calling validate_fwd_att()
3235 +         vector<AttrProperty> dev_prop;
3236 +         Tango::Util *tg = Tango::Util::instance();
3237 +         Tango::FwdAttr *fwd_attr = static_cast<Tango::FwdAttr *> (new_attr);
```

Roadmap from ICALEPCS 2015 (as described in WEA3O01):

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ROADMAP #3: REMOVE CORBA COMPLETELY

- Introduce an abstract transport layer
- Replace CORBA as synchronous communications protocol with a pluggable protocol layer
- remove all dependencies on CORBA
 - serialisation library
 - data types
- use **ØMQ** as first implementation



ROADMAP #3: REMOVE CORBA COMPLETELY

cppTango (C++ Tango library):

- Code restructured
- CORBA notified events related code purged in Tango V10
- Proof of concept refactoring to:
 - ✓ Isolate CORBA code
 - ✓ Implement DevVarDoubleArray type using an architecture allowing plugins
 - ✓ Replace omni_threads with C++ 11 threads

Compatibility will be preserved all along the way!

- ✓ Runtime compatibility
- ✓ Source code compatibility with minor changes
- Setup CI for cross-version checking

IMPORTANT

Roadmap from ICALEPCS 2015 (as described in WEA3O01):

- 
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 - 14) Replace Boost.Python



ROADMAP #4: GROW THE COMMUNITY

New contributing members in the TANGO Controls Steering committee:

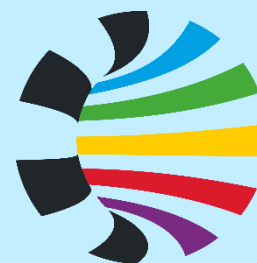
- INAF
- SKA Office
- SKA South-Africa



Core members



Other contributing members



SOLARIS
NARODOWE CENTRUM
PROMIENIOWANIA
SYNCHROTRONOWEGO



ROADMAP #4: GROW THE COMMUNITY

New contributing members in the TANGO Controls Steering committee:

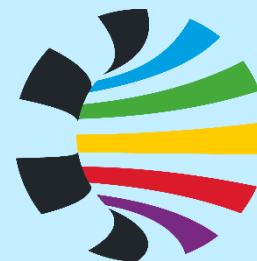
- INAF
- SKA Office
- SKA South-Africa



Core members



Other contributing members

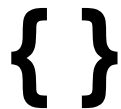


SOLARIS
NARODOWE CENTRUM
PROMIENIOWANIA
SYNCHROTRONOWEGO



Roadmap from ICALEPCS 2015 (as described in WEA3O01):

- 1) Improve documentation
- 2) Move to Git
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- 4) Grow the community
- { } 5) REST API**
- 6) Web browser application
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ROADMAP #5: REST API

Implement a REST API for TANGO

<https://github.com/tango-controls/rest-api>

tango-controls / rest-api

Watch 4 Star 3 Fork 0

Code Issues 11 Pull requests 0 Projects 0 Wiki Settings Insights

Tango REST API specification <http://tango-rest-api.readthedocs.io> Edit

tango tango-controls rest-api tango-controls-rest Manage topics

137 commits 1 branch 9 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

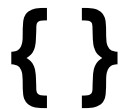
Ingvord update docker Latest commit 80b99f5 22 hours ago

docs	close #21	6 months ago
src	add AttributeValue.toString	a day ago
.gitignore	add .gitignore	9 months ago
.travis.yml	enable tests in travis	4 months ago
README.md	Update README	4 months ago
docker-compose.yml	update docker	22 hours ago
mkdocs.yml	add mkdocs.yml	10 months ago
pom.xml	[maven-release-plugin] prepare for next development iteration	a day ago

README.md

TANGO





ROADMAP #5: REST API

<http://tango-rest-api.readthedocs.io/en/latest>

Tango REST API specification

Search docs

Home

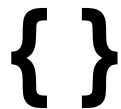
- Tango REST API RC4
- URL example driven specification:
- API version and Security
- Tango host:port (database)
- Devices:
- Device:
- Filters:
- Pages:
- Failure:
- Implementation remarks:
- Implementation recommendations:
- Implementation references:
- References

Docs » Home

- Tango REST API RC4
- URL example driven specification:
 - API version and Security
 - Tango host:port (database)
 - Devices:
 - Device:
 - Device attributes:
 - value:
 - plain value:
 - image:
 - info:
 - history:
 - properties:
 - Device attributes events:
 - Device commands:
 - Device properties:
 - Device pipes
 - Filters:
 - Pages:
 - Failure:
- Implementation remarks:
- Implementation recommendations:
- Implementation references:
- References

Tango REST API RC4

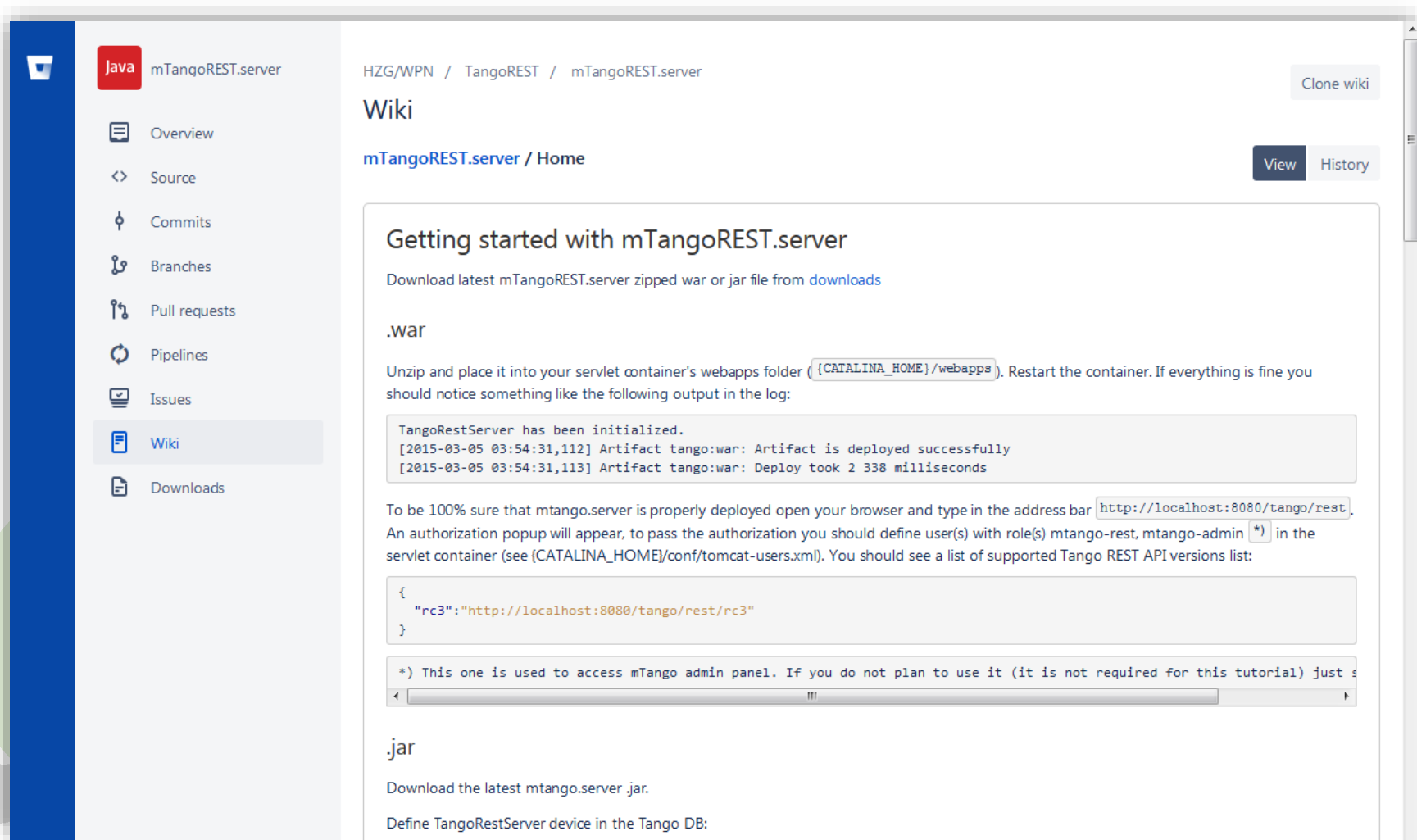
There are three parts in this proposal: URL specification; Implementation remarks; Implementation



ROADMAP #5: REST API

REST API implementation: mTangoREST.server

<https://bitbucket.org/hzgwpm/mtangorest.server/wiki/Home>



The screenshot shows the Bitbucket Wiki page for mTangoREST.server. The left sidebar contains navigation links: Overview, Source, Commits, Branches, Pull requests, Pipelines, Issues, Wiki (selected), and Downloads. The main content area is titled 'Getting started with mTangoREST.server' and includes instructions for deploying the .war and .jar files. It also shows a log snippet and a JSON response for the REST API.

Java mTangoREST.server

Overview
Source
Commits
Branches
Pull requests
Pipelines
Issues
Wiki
Downloads

Clone wiki

View History

Getting started with mTangoREST.server

Download latest mTangoREST.server zipped war or jar file from [downloads](#)

.war

Unzip and place it into your servlet container's webapps folder (`{CATALINA_HOME}/webapps`). Restart the container. If everything is fine you should notice something like the following output in the log:

```
TangoRestServer has been initialized.  
[2015-03-05 03:54:31,112] Artifact tango:war: Artifact is deployed successfully  
[2015-03-05 03:54:31,113] Artifact tango:war: Deploy took 2 338 milliseconds
```

To be 100% sure that mtango.server is properly deployed open your browser and type in the address bar `http://localhost:8080/tango/rest`. An authorization popup will appear, to pass the authorization you should define user(s) with role(s) mtango-rest, mtango-admin (*) in the servlet container (see `{CATALINA_HOME}/conf/tomcat-users.xml`). You should see a list of supported Tango REST API versions list:

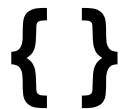
```
{  
  "rc3": "http://localhost:8080/tango/rest/rc3"  
}
```

*) This one is used to access mTango admin panel. If you do not plan to use it (it is not required for this tutorial) just s

.jar

Download the latest mtango.server .jar.

Define TangoRestServer device in the Tango DB:



ROADMAP #5: REST API

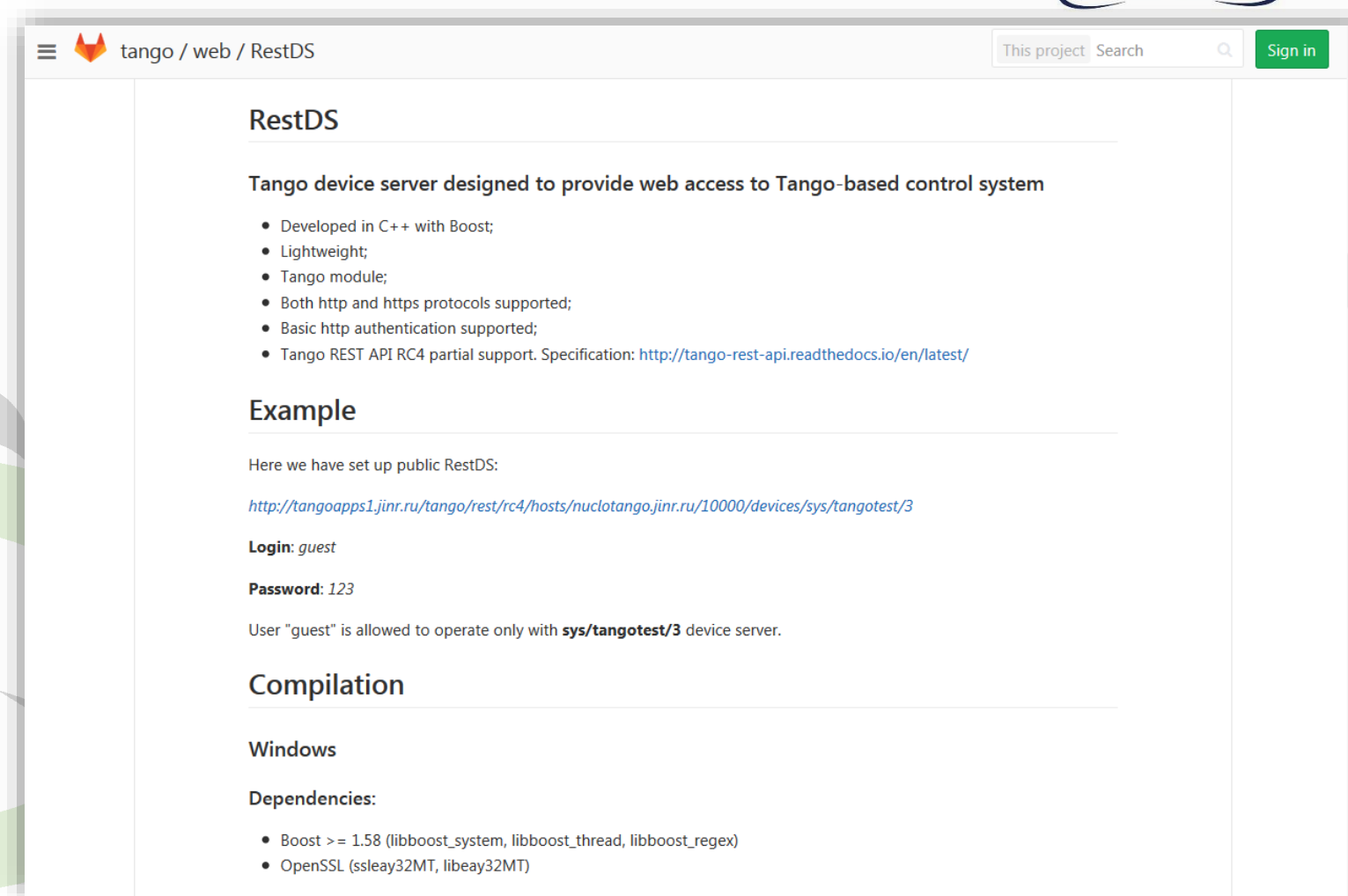
REST API implementation #2: RestDS / WebSocketDS

<http://tangodevel.jinr.ru/git/tango/web/RestDS>



Joint Institute for Nuclear
Research

SCIENCE BRINGING NATIONS TOGETHER



The screenshot shows the RestDS project page on the Tango website. The page has a header with the Tango logo and navigation links. The main content area is titled "RestDS" and describes it as a "Tango device server designed to provide web access to Tango-based control system". It lists several features: Developed in C++ with Boost; Lightweight; Tango module; Both http and https protocols supported; Basic http authentication supported; and Tango REST API RC4 partial support. It also provides a link to the specification. Below this is an "Example" section showing a public RestDS instance and login details. The "Compilation" section lists dependencies: Boost >= 1.58 and OpenSSL.

tango / web / RestDS

This project Search Sign in

RestDS

Tango device server designed to provide web access to Tango-based control system

- Developed in C++ with Boost;
- Lightweight;
- Tango module;
- Both http and https protocols supported;
- Basic http authentication supported;
- Tango REST API RC4 partial support. Specification: <http://tango-rest-api.readthedocs.io/en/latest/>

Example

Here we have set up public RestDS:

<http://tangoapps1.jinr.ru/tango/rest/rc4/hosts/nuclotango.jinr.ru/10000/devices/sys/tangotest/3>

Login: *guest*

Password: 123

User "guest" is allowed to operate only with **sys/tangotest/3** device server.

Compilation

Windows

Dependencies:

- Boost >= 1.58 (libboost_system, libboost_thread, libboost_regex)
- OpenSSL (ssleay32MT, libeay32MT)

Roadmap from ICALEPCS 2015 (as described in WEA3O01):

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- 7) Secure encryption
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ROADMAP #6: WEB BROWSER APPLICATION

Implement a device browser for the web

The screenshot displays the Tango Webapp interface within a web browser. The browser's address bar shows the URL `ec2-52-59-200-167.eu-central-1.compute.amazonaws.com:8080/TangoWebapp/`. The interface is divided into several sections:

- Devices Tree:** A hierarchical view of the system components. It includes a search bar and a tree structure with folders like `http://ec2-52-59-200-167.eu-central-1.comp`, `ip-172-31-23-197:10000`, `dserver`, `earth`, `weather`, `tango`, `sys`, `access_control`, `database`, `rest`, and `tg_test`. The `tg_test` folder is expanded, showing sub-items `1` and `2`.
- Central Panel:** Displays the selected device `[sys/tg_test/1@ip-172-31-23-197:10000]`. It includes an 'Update rate (ms)' set to `1000` and a 'Status' section indicating 'The device is in RUNNING state.' Below this is a 'Scalar' plot showing a noisy signal over time, with a value of `130` highlighted.
- Device Test Panel:** Contains tabs for 'Commands' and 'Attributes'. It includes a search bar, a list of attributes (Init, State, Status, SwitchStates), and an 'Execute' button.

The status bar at the bottom of the browser window shows the message: `DONE: GET http://ec2-52-59-200-167.eu-central-1.compute.amazonaws.com:8080/tango/rest/rc4/hosts/ip-172-31-23-197.eu-central-1.compute.internal`.



ROADMAP #6: WEB BROWSER APPLICATION

<https://github.com/tango-controls/tango-webapp>

The screenshot shows the GitHub repository page for `tango-controls/tango-webapp`. The repository is described as a "General purpose Tango web application". It has 144 commits, 1 branch, 2 releases, and 1 contributor. The latest commit is 7577b87, made 18 days ago. The repository structure is as follows:

File/Folder	Description	Last Commit
<code>WEB-INF</code>	README.md edited online with Bitbucket	9 months ago
<code>apps</code>	Resolve #34: Remember user defined REST_API and TANGO_HOST	3 months ago
<code>controllers</code>	Resolve #34: Remember user defined REST_API and TANGO_HOST	3 months ago
<code>docs/classes</code>	README.md edited online with Bitbucket	9 months ago
<code>engines</code>	README.md edited online with Bitbucket	9 months ago
<code>images</code>	README.md edited online with Bitbucket	9 months ago
<code>jmvc</code>	Progress #25:	5 months ago
<code>libs/webix</code>	README.md edited online with Bitbucket	9 months ago
<code>models</code>	progress #127	18 days ago

Roadmap from ICALEPCS 2015 (as described in WEA3O01):

- 1) Improve documentation
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- 6) Web browser application
- 7) **Secure encryption**
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ROADMAP #7: SECURE ENCRYPTION

Implement a secure encrypted protocol for public networks

➤ Security managed by infrastructure

- VPN
- Web server
- HAProxy



Roadmap from ICALEPCS 2015 (as described in WEA3O01):

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- 6) Web browser application
- 7) Secure encryption



- 8) **Database performance**
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- 10) Long Term Support
- 11) Tango Virtual Machine
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ROADMAP #8: DATABASE PERFORMANCE

Improve to remove bottlenecks for memorized attributes

✓ Implemented since 2016



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ROADMAP #9: DEVICE CLASS MARKETPLACE

TANGO [About us](#) [Downloads](#) [Resources](#) [Community](#) [Partners](#) [Contact](#)  

[Home](#) > [Resources](#) > [Device Classes](#) >

PfeifferGauge

[Edit](#) [Delete](#)

 **Development status:** Released, **Release:** Release_1.1
Information status: Updated
Repository: <http://svn.code.sf.net/p/tango-ds/code/DeviceClasses/Vacuum/PfeifferGauge>
Contact: tnunez@mail.desy.de

 Like 0  Share


Average: 4.00
Rating Count: 1
You Rated: 4

[PfeifferGauge](#) [History](#) [Documentation](#) [Comments \(0\)](#)

Class Description

Class for controlling the vacuum pressure measurement and control devices from Pfeiffer.

Families: [Vacuum](#)

Key words:

Platform: Unix Like

Language: Cpp

License: [GPL](#)

Contact: tnunez@mail.desy.de

Hardware

Manufacturer: Pfeiffer

Product:

TPG262 and TPG256A

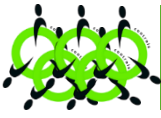
Bus: Data Socket

Class interface

Attributes:



Implement a marketplace



ROADMAP #9: DEVICE CLASS MARKETPLACE

UNDERSTANDING ONLINE STAR RATINGS:

★★★★★ [HAS ONLY ONE REVIEW]

★★★★☆ EXCELLENT

★★★★☆ OK

★★★★☆

★★★★☆

★★★★☆

★★★☆☆

★★★☆☆

★★☆☆☆

CRAP

<https://xkcd.com/1098>

Roadmap from ICALEPCS 2015 (as described in WEA3O01):

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- 8) Database performance
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ROADMAP #10 LONG TERM SUPPORT

Provide upgrades for older versions

- **Long Term Support for Tango 9**
(min 5 years after 1st Tango V10 stable release)
- Bug fixes
- Simple new features
- **tango-9-lts branch on Github:**
<https://github.com/tango-controls/cppTango/tree/tango-9-lts>



Roadmap from ICALEPCS 2015 (as described in WEA3O01):

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ROADMAP #11: TANGO VIRTUAL MACHINE

Upgrade Tango Box virtual machine to latest TANGO SW versions



Roadmap from ICALEPCS 2015 (as described in WEA3O01):

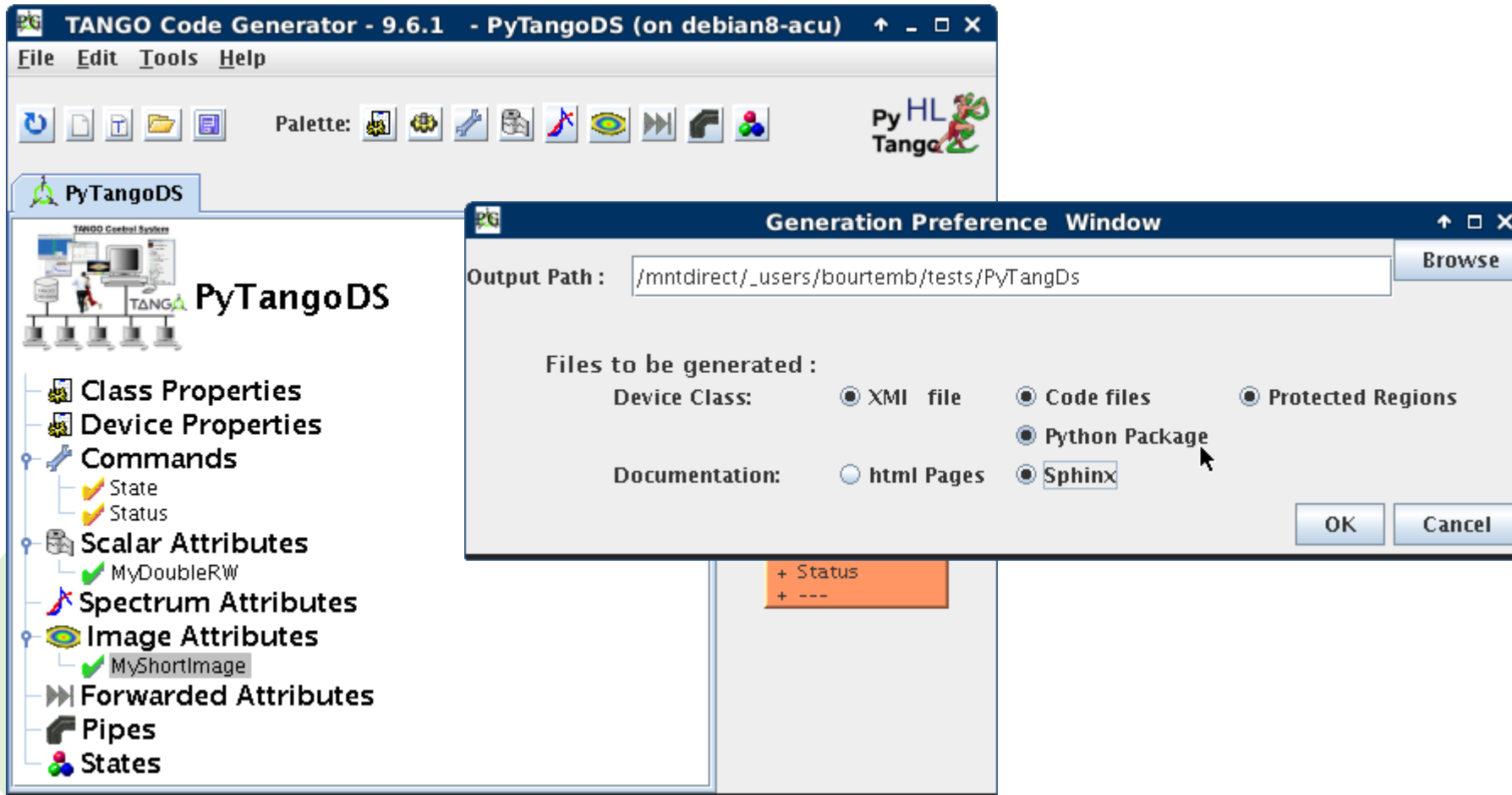
- 1) Improve documentation
- 2) Move to Git
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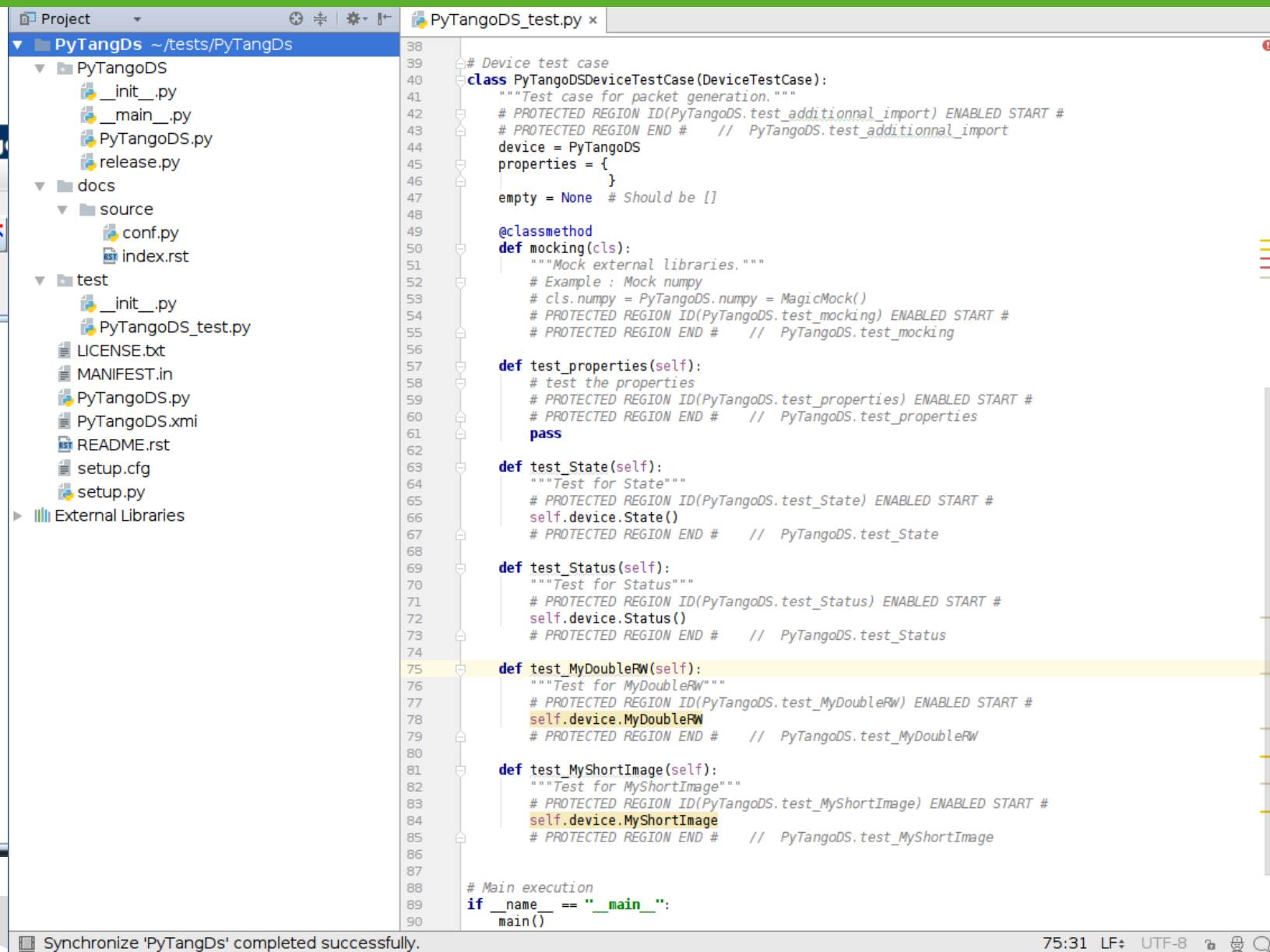
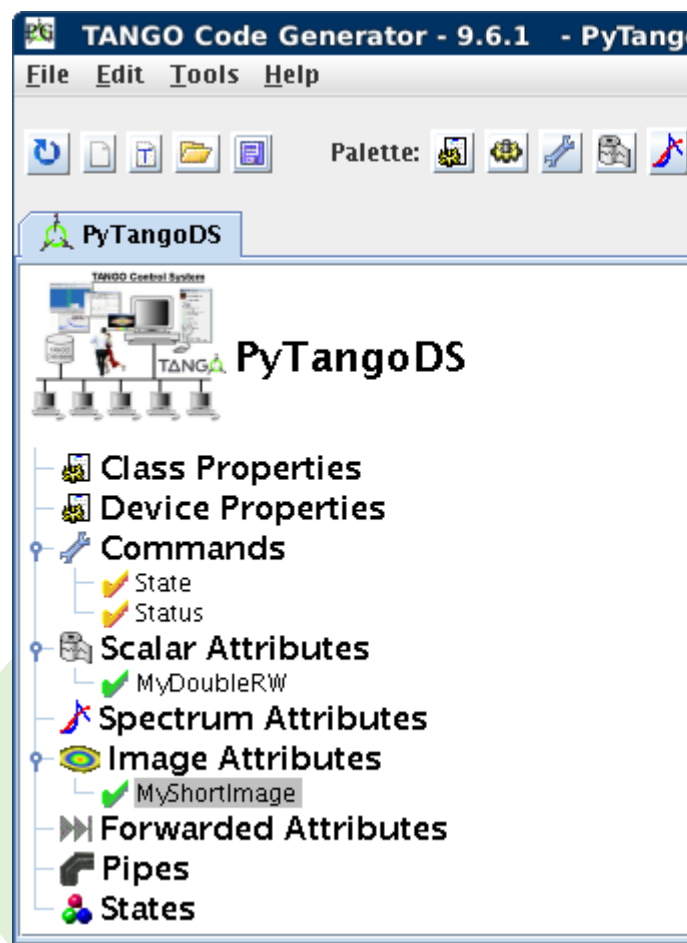
ROADMAP #12: AUTO-GENERATE UNIT TESTS

POGO to generate unit tests automatically





ROADMAP #12: AUTO-GENERATE UNIT TESTS





ROADMAP #12: AUTO-GENERATE UNIT TESTS

Maven™

JTango Maven archetype



Simple Unit tests





ROADMAP #12: AUTO-GENERATE UNIT TESTS

```
InterfaceDescription ID{
  commands{
    c1[], c2[]
  }
  dataPoints{
    float d1[], float d2[]
  }
  operatingStates{
    s1[], s2[]
  }
}

ControlNode CN{
  Associated Interface Description : ID
  CommandResponseBlock {
    Command test.ID.c1{
      Transitions {
        currentState test.ID.s1 => nextState test.ID.s2
      }
    }
  }
}
```

Capture of controller description (M&C ML)

Auto -Generate



```
commands {
  Command c1 {
    description c1 argin Argument {
      type VoidType
    }
    argout Argument {
      type VoidType
    }
    status InheritanceStatus {
      inherited ^false concrete ^true concre
    }
  }
}

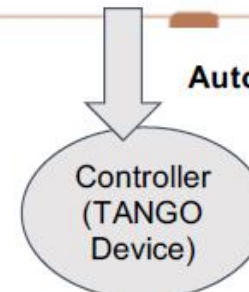
attributes {
  Attribute d1 {
    attType Scalar rwType READ dataType Double
    inherited ^false concrete ^true concre
  }
  properties AttrProperties {
    description "" label "" unit "" standa
    maxValue "0" minValue "0" maxWarning "
    deltaValue ""
  }
},
  Attribute d2 {
    attType Scalar rwType READ dataType DoubleType status InheritanceStatus
    inherited ^false concrete ^true concreteHere ^true
  }
  properties AttrProperties {
    description "" label "" unit "" standardUnit "" displayUnit "" forma
    maxValue "0" minValue "0" maxWarning "" minWarning "" deltaTime ""
    deltaValue ""
  }
}
```

SimLib configuration view

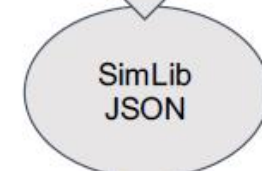
```
TangoSimLib for CN {
  dataSimulations {
    Attribute CN.d1 {
      data_Simulation_Algorithm
    },
    Attribute CN.d2 {
      data_Simulation_Algorithm
    }
  }
  behaviours {
    Command CN.c1 {
    },
  }
}
```

Controller view in TANGO (POGO)

Auto -Generate



Auto -Generate



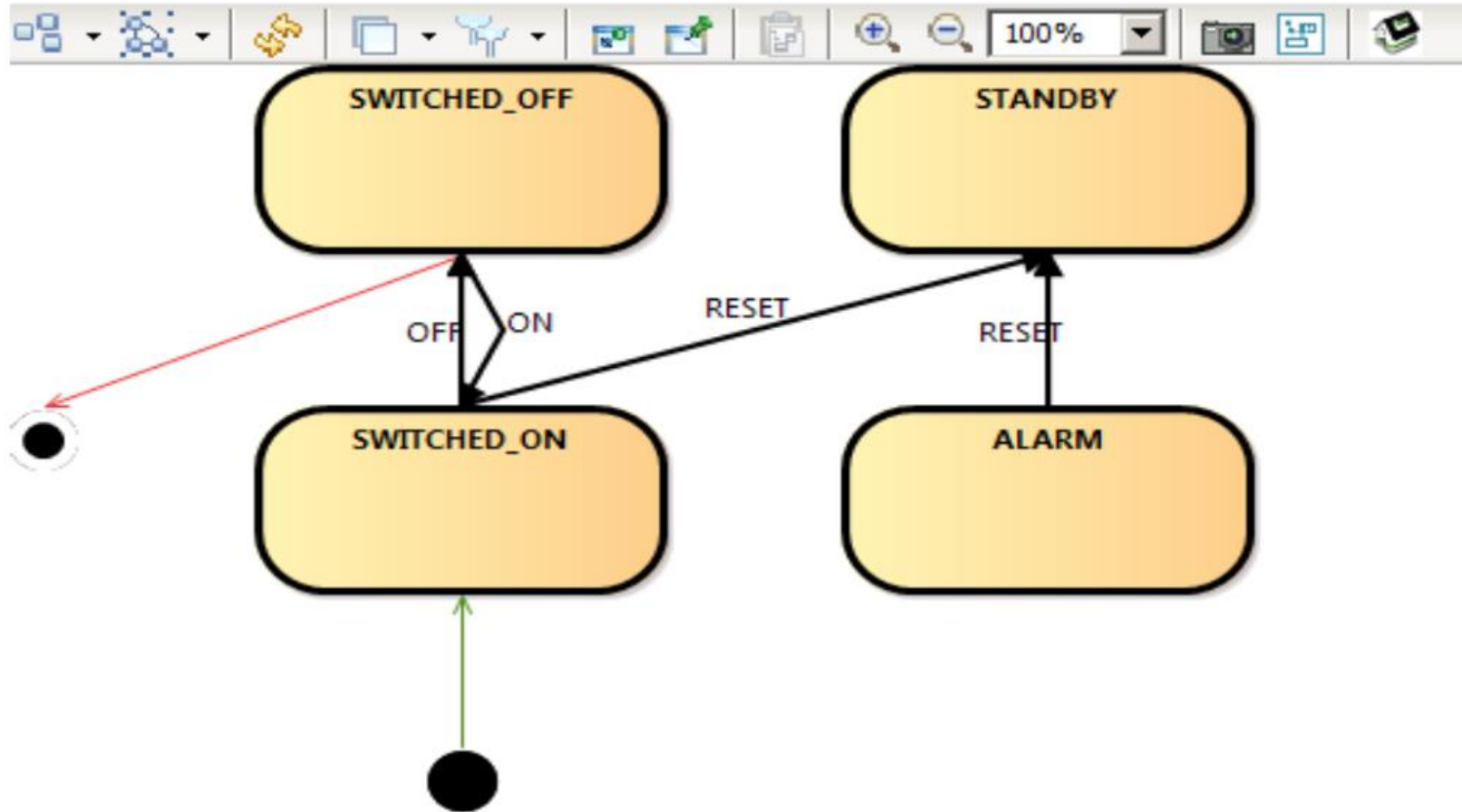
Roadmap from ICALEPCS 2015 (as described in WEA3O01):

- 1) Improve documentation
- 2) Move to Git
- 3) Remove CORBA completely
- 4) Grow the community
- 5) REST API
- 6) Web browser application
- 7) Secure encryption
- 8) Database performance
- 9) Device class Marketplace
- 10) Long Term Support
- 11) Tango Virtual Machine
- 12) Auto-Generate Unit tests
- 13) SysML support**
- 14) Replace Boost.Python



Add support for using SysML to specify device servers

Generated SysML View



Roadmap from ICALEPCS 2015 (as described in WEA3O01):

- 1) Improve documentation
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- 13) SysML support
- 14) Replace Boost.Python**





ROADMAP #14: REPLACE BOOST.PYTHON

Replace Boost.Python in PyTango with a lighter weight solution

pybind11 — Seamless operability between C++11 and Python

docs passing docs passing chat on gitter build passing build passing

pybind11 is a lightweight header-only library that exposes C++ types in Python and vice versa, mainly to create Python bindings of existing C++ code. Its goals and syntax are similar to the excellent [Boost.Python](#) library by David Abrahams: to minimize boilerplate code in traditional extension modules by inferring type information using compile-time introspection.

The main issue with Boost.Python—and the reason for creating such a similar project—is Boost. Boost is an enormously large and complex suite of utility libraries that works with almost every C++ compiler in existence. This compatibility has its cost: arcane template tricks and workarounds are necessary to support the oldest and buggiest of compiler specimens. Now that C++11-compatible compilers are widely available, this heavy machinery has become an excessively large and unnecessary dependency.

Think of this library as a tiny self-contained version of Boost.Python with everything stripped away that isn't relevant for binding generation. Without comments, the core header files only require ~4K lines of code and depend on Python (2.7 or 3.x, or PyPy2.7 >= 5.7) and the C++ standard library. This compact implementation was possible thanks to some of the new C++11 language features (specifically: tuples, lambda functions and variadic templates). Since its creation, this library has grown beyond Boost.Python in many ways, leading to dramatically simpler binding code in many common situations.

Proof of Concept tests in progress

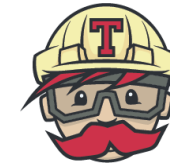
<https://github.com/pybind/pybind11>



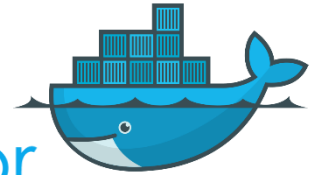


C++ TANGO LIBRARY STATUS

- Code restructured
- Autotools →  **CMake**
- Continuous integration with *Travis CI*, using *docker* containers
- Continuous integration with *AppVeyor* for Windows 
- Bug fixes
- New features:
 - ☐ DevEnum labels for DevEnum command parameters
 - ☐ DevPipeBlob in command parameters
 - ☐ Tango 10 frequent development releases to Bintray (www.bintray.com/tango-controls) as Debian packages for Tango
 - ☐ Major releases packaging will go to official repositories



Travis CI



AppVeyor



JFrog Bintray





C++ TANGO LIBRARY STATUS

API Blog Pricing Sign In

 tango-controls / debian <https://dl.bintray.com/tango-control...>

Owned by TANGO Control...  Report

 **debian**

 Official Tango debian repository for developers



Package Name 

 Sorted By Priority 

cgreen
★★★★★
cgreen unit testing library A C unit tester. Features include composite test suites, each test can be run in it's own process, trapping of hung tests, setup and teardown, extensible interface and support for mocking functions.


cgreen-1.0.0
Nov 08, 2016

 TANGO Controls

cppTango
★★★★★
TANGO kernel c++ implementation


10.0.1
Jun 03, 2017

 TANGO Controls

48

TANGO Kernel Status - ICALEPCS 2017 - Barcelona





JTANGO STATUS

- Code restructured
- Bug fixes
- Mavenization
- Automatic deployment on Bintray



www.bintray.com/tango-controls

JFrog

API Blog Pricing Sign In

tango-controls / maven <https://dl.bintray.com/tango-control...>

Owned by TANGO Control... [Report](#)

maven

Official maven repository for TANGO

SET ME UP!

jtango [Sorted By Score](#)

jtango-maven-archetype
★★★★★
Maven archetype for JTango
1.1
Aug 22, 2017
TANGO Controls

JTangoClientLang
★★★★★
Tango client utilities
9.3.5
Sep 19, 2017
TANGO Controls

JTangoServer
★★★★★
Library for Tango Server (ie. Tango Device) in Java
9.3.5
Sep 19, 2017
TANGO Controls

JTangoCommons
★★★★★
commons for java tango
9.3.5
Sep 19, 2017
TANGO Controls





Soon on Maven Central

The Central Repository

SEARCH | [ADVANCED SEARCH](#) | [BROWSE](#) | [QUICK STATS](#)

Search: a:"jtango-maven-archetype" [SEARCH](#)

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All Day DevOps 2017 October 24th 100 Sessions Free Online [REGISTER NOW!](#)
[All Day DevOps - Register Now!](#)

Browse Central For [org.tango-controls : jtango-maven-archetype : 1.1](#)

Click on a link above to browse the repository.

Project Information

GroupId:

ArtifactId:

Version:

Project Object Model (POM)

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema"
  <modelVersion>4.0.0</modelVersion>

  <groupId>org.tango-controls</groupId>
  <artifactId>jtango-maven-archetype</artifactId>
  <version>1.1</version>
  <packaging>maven-archetype</packaging>

  <name>JTango maven archetype</name>
  <description>This is a custom archetype to generate skeleton JTango projects. JTango is a
  <url>https://github.com/tango-controls/jtango-maven-archetype</url>

  <issueManagement>
    <system>GitHub</system>
    <url>https://github.com/tango-controls/jtango-maven-archetype/issues</url>
  </issueManagement>

  <licenses>
    <license>
      <name>LGPL-3.0</name>
    </license>
  </licenses>
```

Dependency Information

Apache Maven

```
<dependency>
  <groupId>org.tango-controls</groupId>
  <artifactId>jtango-maven-archetype</art.
  <version>1.1</version>
</dependency>
```

Apache Buildr

Apache Ivy

Groovy Grape

Gradle/Grails

Scala SBT

Leiningen



News since latest ICALEPCS

- PyTango 9.2.2 released in September 2017:
 - Pipes
 - Dynamic commands
 - Forwarded Attributes
 - Mandatory properties
 - Interface Change Events
- 2 modules for unit-testing added
- Bug fixes
- Code refactoring
- More Unit Tests
- Code quality check with pylint and flake8
- official tango-controls conda channel

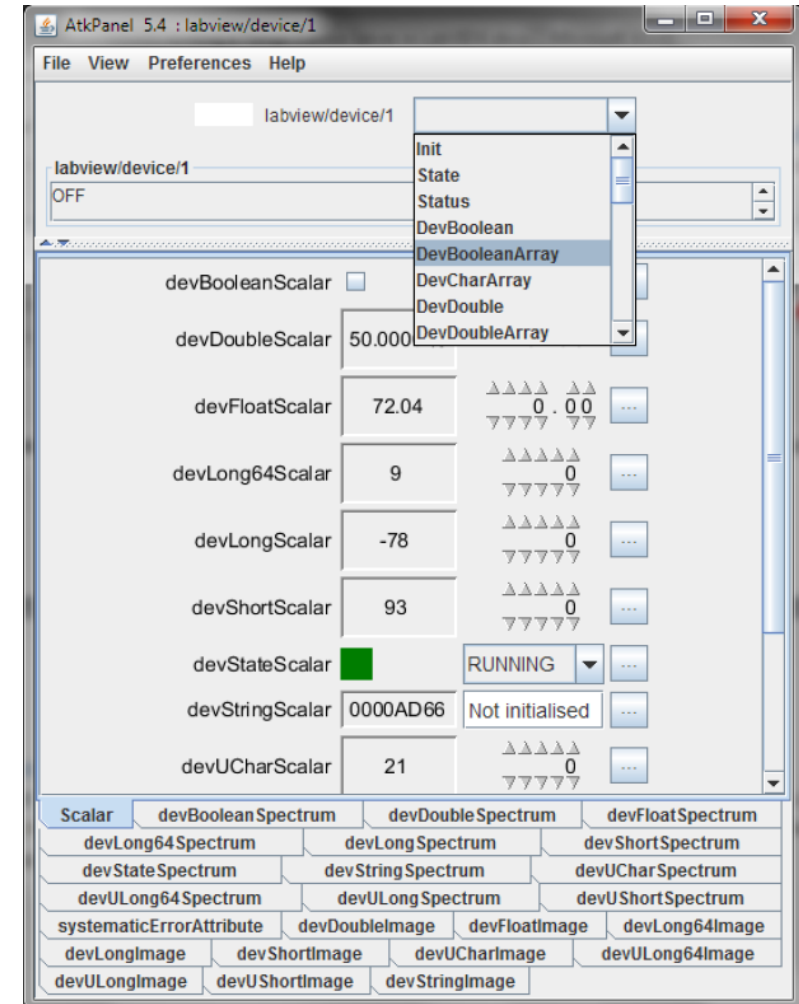
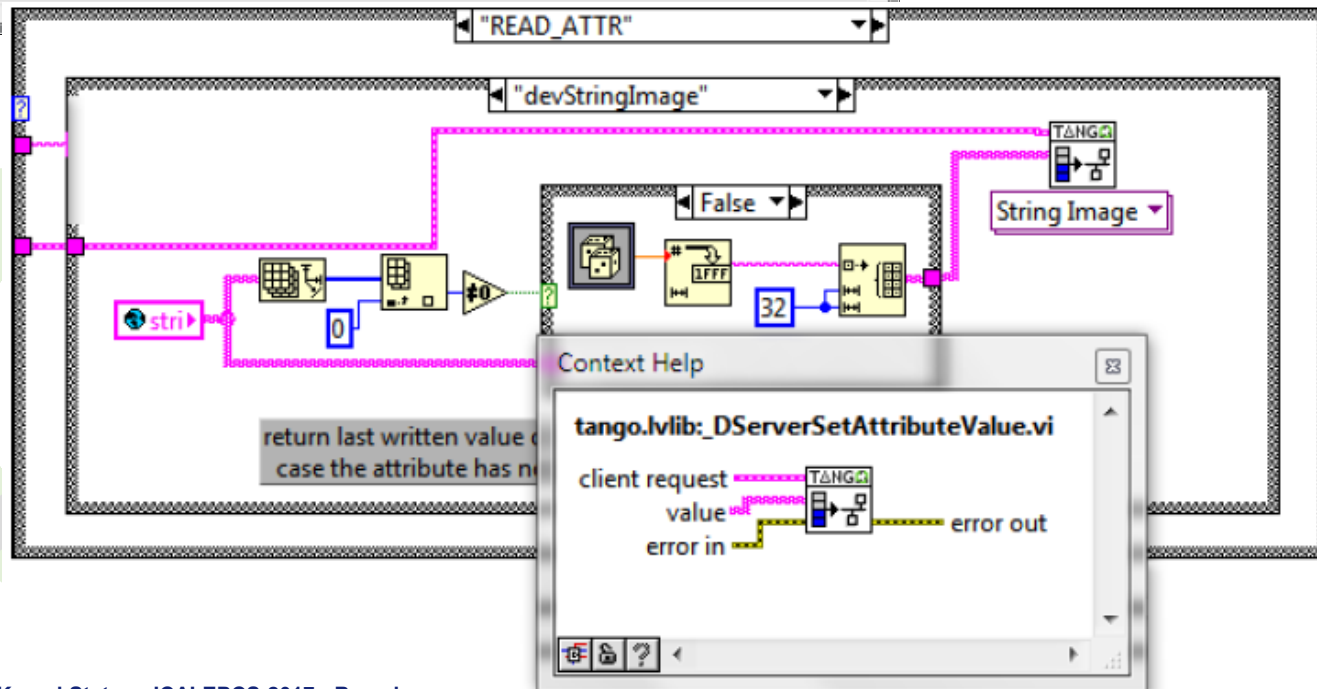
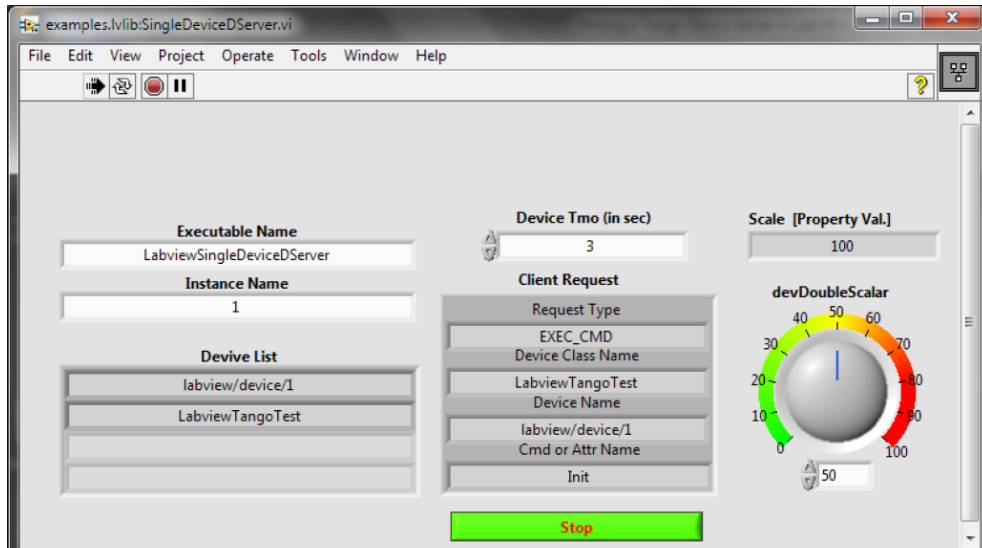


<https://github.com/tango-controls/pytango>



LABVIEW BINDING

<https://github.com/tango-controls/labview-binding>





CONCLUSION

TANGO collaboration contract ensures sustainability

More details on Thursday:

TANGO HEADS FOR INDUSTRY presented by A. Götz (THCPL05)

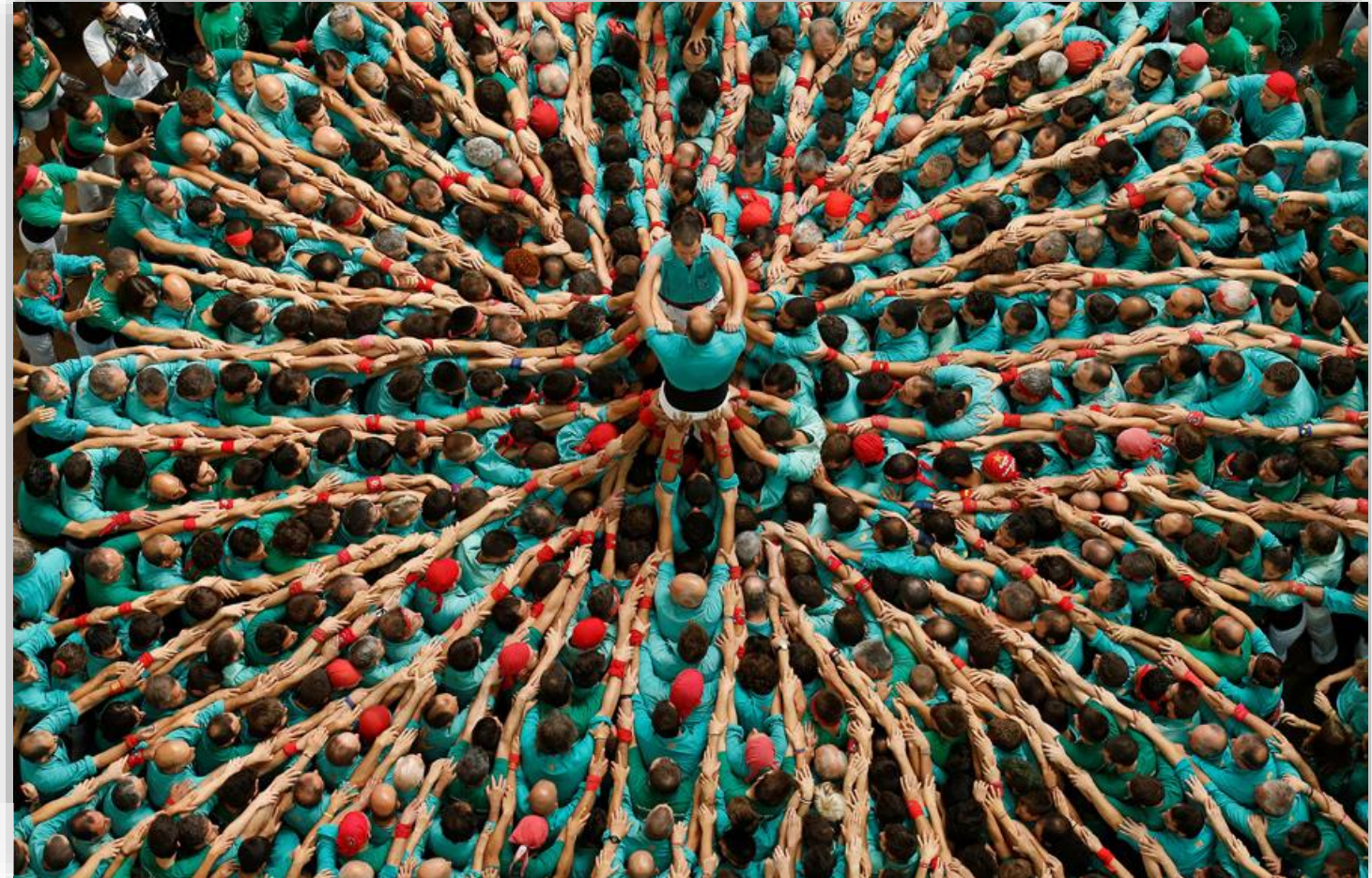


Photo: Albert Gea / Reuters



**Many thanks to the TANGO Controls
community and kernel team!
Thank you for your attention!**

Questions?



www.tango-controls.org

