

TangoJS – a web-based interface for TANGO Control System

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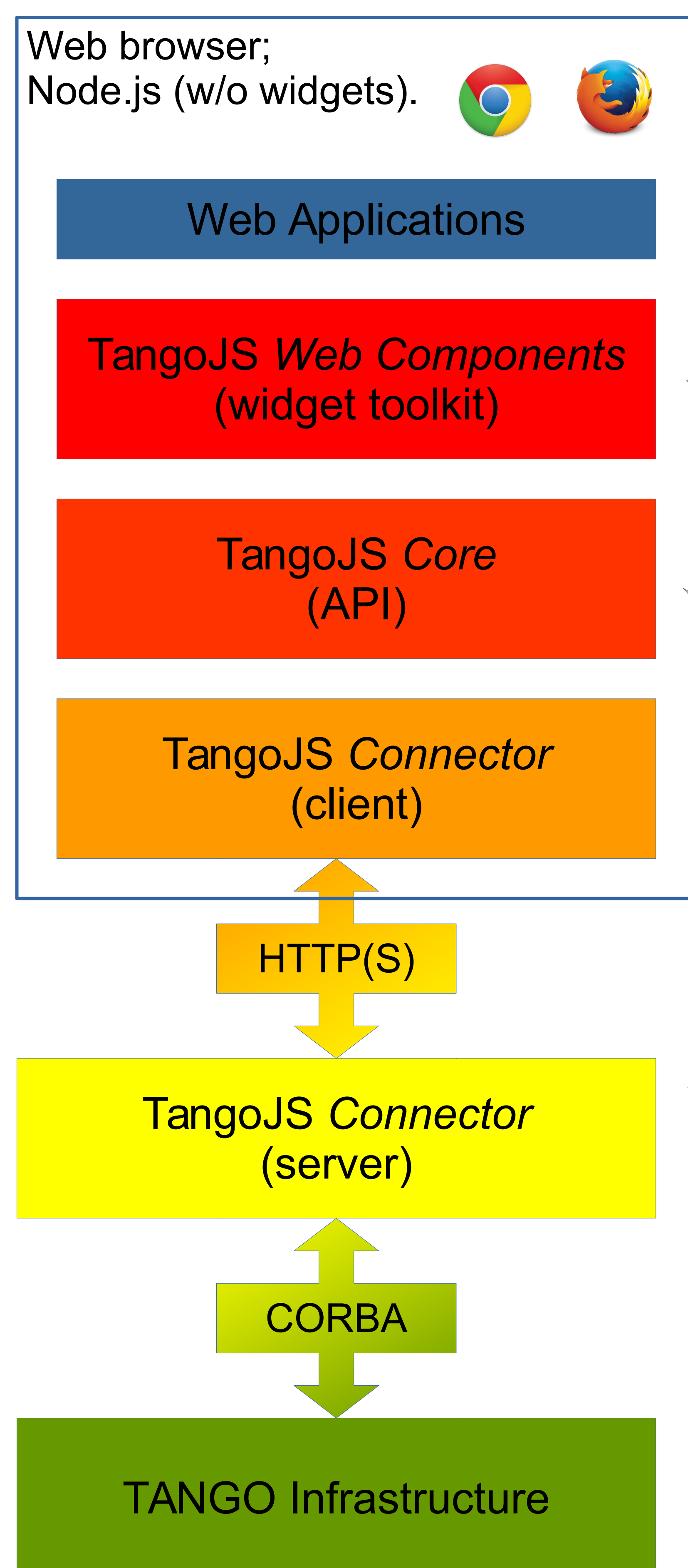
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Introduction

Control of the expensive and sensitive hardware components in large installations like scientific facilities may be a challenging task. In order to conduct an experiment, multiple elements like motors, ion pumps, valves and power-supplies have to be orchestrated. To address this problem, the TANGO Control System [1] has been developed at ESRF synchrotron-radiation facility. This poster presents TangoJS – a modular, standard-based library for building TANGO clients for web browsers.

TangoJS Stack

TangoJS uses layered architecture, built on top of existing TANGO infrastructure.



Motivation

Recently, web-based approach has become crucial in building accessible and adaptive GUI applications. Unfortunately, TANGO-based applications cannot run in web browsers. Here TangoJS comes into play, allowing for rapid development of TANGO clients, integrating neatly with modern frameworks and using standard frontend development tools.



Widget Toolkit

- Collection of UI widgets;
- Built using the standard Web Components API [3];
- All components are derived from `HTMLElement`;
- May be connected together to build a synoptic panel;
- No framework required;
- Almost no dependencies required (just plot library);
- Inspired by the Taurus [2] library (for Python).

label
Visualizes name, value and status of selected attribute.

line-edit
Writable variant of label. May be a text-box, a spinner or a toggle.

command-button
When pressed, invokes a command on a device.

state-led
Visualizes state of a device, e.g. on/off, alert, error.

trend

form

device-tree

sine_trend	0.99116...	u	
attribute name (obtained from the database)	current value (device is polled at constant rate)	unit	quality
scalar	0	u	

writable field (depends on attribute type)			
state: ON state: OFF state: FAULT state: ALARM			
A set of buttons – each invokes specified command and calls user-defined callback when result is obtained.			

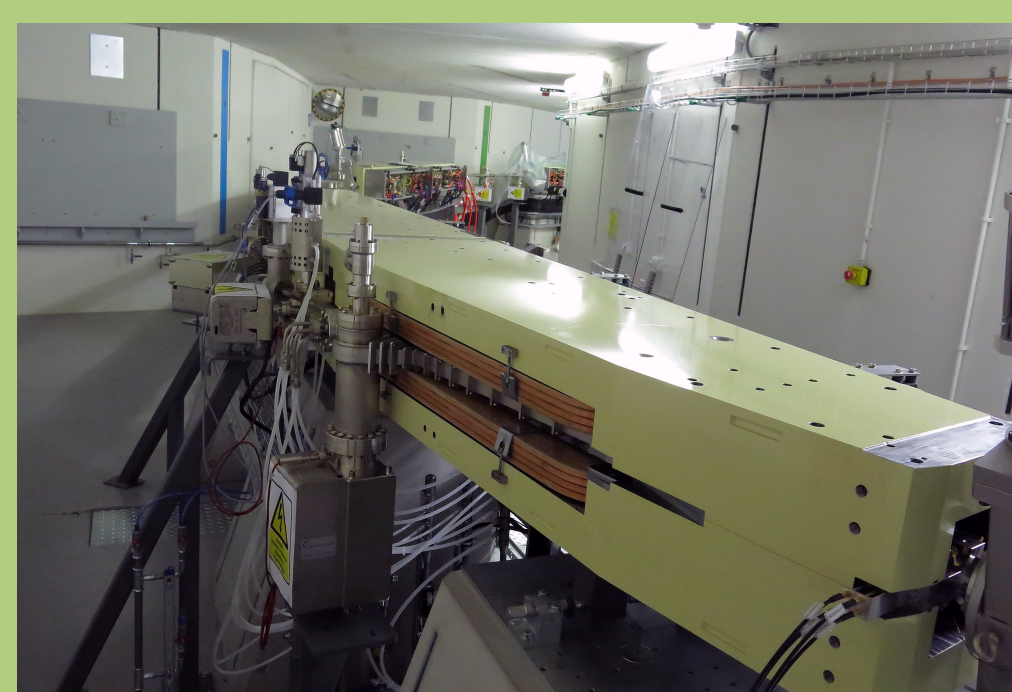
tangojs/test/dev1	OFF	
full device name (obtained from the database)	textual state representation (status)	state visualized with multi-colored
Plots values of multiple attributes over time.		
Groups attributes and detects best widgets.		
Displays devices hierarchy using tree-view.		

- Set of interfaces, enums, structs and constants;
- Partly generated from the TANGO IDL;
- Interfaces similar to the TANGO Java API;
- Passes all calls to the underlying connector;
- Runs in all modern browsers and Node.js;
- Plain Javascript – no dependencies required.

- Proxy that connects TangoJS and TANGO;
- Separated in server-side and client-side parts;
- Multiple configuration options possible: HTTP, WebSocket, in-memory mock, etc.;
- Server-side: possible integration with existing TANGO-REST servers, e.g. mTango [4];
- Client-side: consuming server's API.

- Hardware;
- Database;
- Device Servers.

Storage ring magnet in National Synchrotron Radiation Centre Solaris.



TangoJS Assets

Creating TangoJS applications is dead simple and requires only basic knowledge of web-development and Node.js.

- All parts of the TangoJS stack are available in npm Registry. Just drop desired dependencies in your package.json file;
- Each widget is a self-contained HTML file, which may be included in your page (using standard HTML Imports feature);
- Components may be created using declarative syntax (HTML) or programmatically (with DOM manipulation APIs).

```
<tangojs-line-edit
  model="tangojs/test/dev1/scalar"
  poll-period="1000"
  show-name
  show-unit
  show-quality>
</tangojs-line-edit>
```

Sample project and more details are available at <https://tangojs.github.io>.

References

1. TANGO Controls website: <http://www.tango-controls.org/>,
2. Taurus project website: <http://www.taurus-scada.org>,
3. Web Components technical standard: <https://www.w3.org/standards/techs/components>,
4. mTango project website: <https://bitbucket.org/hzgwpn/mtango/wiki/Home>

Acknowledgments

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