SKA Observation Management and Control software: the italian contribution

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INAF-SKAO OMC contract

SKAO-INAF agreement 10th Dec, 2021.

NEC4 FC for Software Development signed on Jan 24th 2022.

Contract started on Feb 9th, 2022 – after some years-lasted Bridging Phase.

Valid until July 31st 2029, renewed every year (first renewal on Jan 24th 2023).

6 key people involved:
- high-level TANGO controls skill
- SAFe management skill

NEC4 PSSC (Work Order) issued every 3 months (Program Increments), labour and non-labour costs invoiced monthly.

Where in the WBS ? *(actually, not only OMC…!)*

INAF ISTITUTO NAZIONALE DI ASTROFISICA NATIONAL INSTITUTE FOR ASTROPHYSICS

SKAO

Solution

SKA Solution Team

ART

OMC ART

DP ART

Services ART

MID integration ART

LOW integration ART

TEAMS

Program

BUTTONS

STARGAZER

NAKSHATRA

SAHYADRI

HIMALAYA

CREAM

WOMBAT

FUSION

Program

System

IT

SCOOP

SKANET

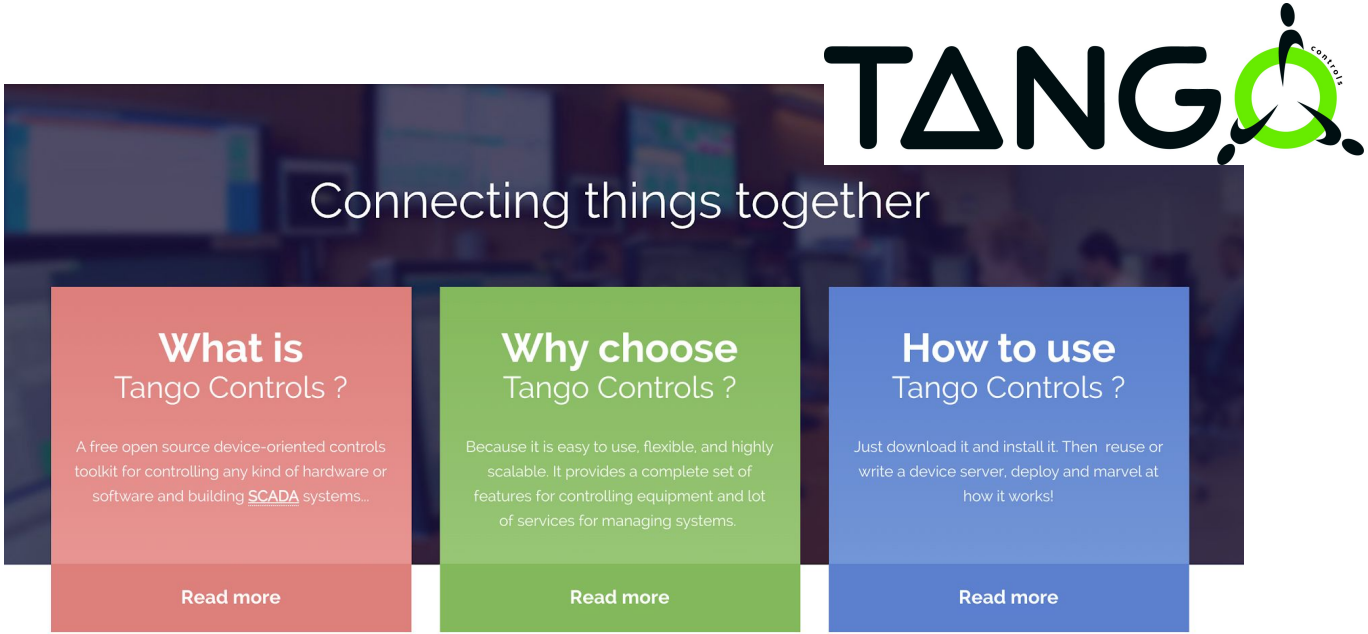
BANG !

RACOON

INAF staff

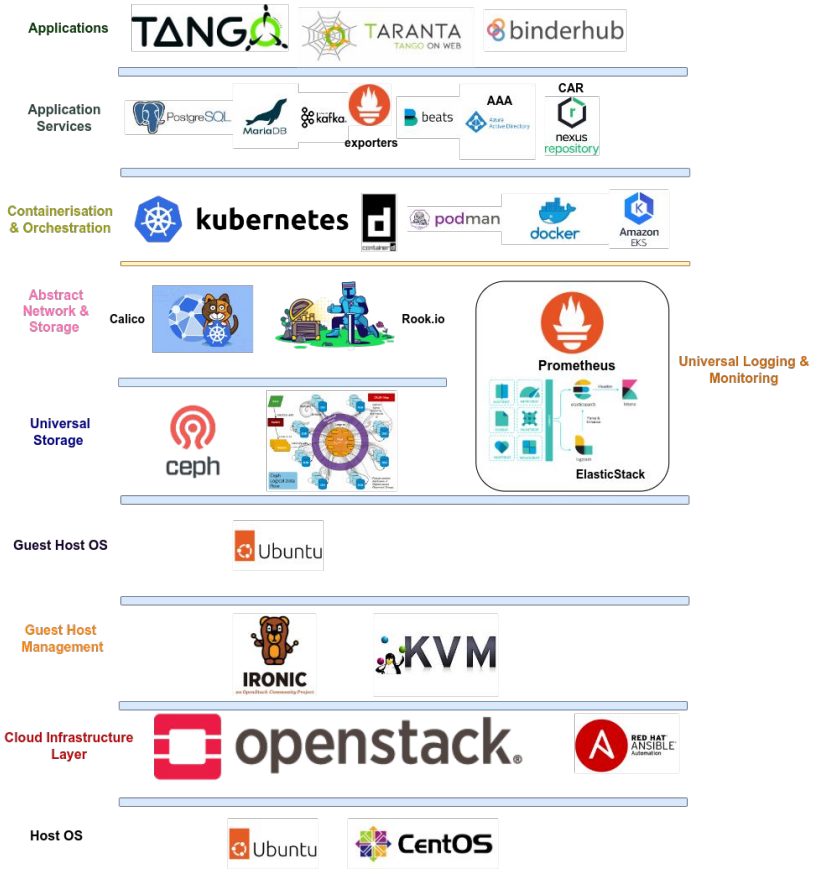
Meeting with M. Miccolis (SKAO) at INAF – Arcetri (Florence), May 11th 2022

TANGO - The SKAO control framework



Tango is an Open Source solution for **SCADA** and **DCS**. Supervisory Control and Data Acquisition (SCADA) systems are typically industrial type systems using standard hardware. Distributed Control Systems (DCS) are more flexible control systems used in more complex environments. Mostly used in Synchrotron, but also in industry and now in **radio astronomy, thanks to INAF.**

SKAO software stack



PLATFORM STACK

6 — SKAO Applications
TANGO, Taranta, BinderHub

5 — Application Services
MariaDB, PostgreSQL, TimescaleDB, ELK-agent, Prometheus exporters, KAFKA, AAA, Nexus Artefact Repository

4 — Virtualization and Containerisation
Kubernetes, Podman, Containerd, Docker, Amazon EKS,

3 — Storage, Networking, Logging, Monitoring
Calico, Rook.io, Ceph, Prometheus, Grafana, Kibana, ElasticSearch,

2 — Guest Host OS
Ubuntu

1 — Infrastructure Management
OpenStack, Ansible, KVM, Ironic

0 — Base
Host OS (Ubuntu, CentOS)
IPMI, BMC

SYSTEM Team

Specialized Agile Team that supports **building** using the Agile **development** environment, including **Continuous Integration**, **test automation**, and **Continuous Deployment**.

In particular, the System Team:

- **Supports** the integration of assets from all teams
- Performs end-to-end **solution testing** (when necessary)
- Provides assistance with **deployment** and **release**.

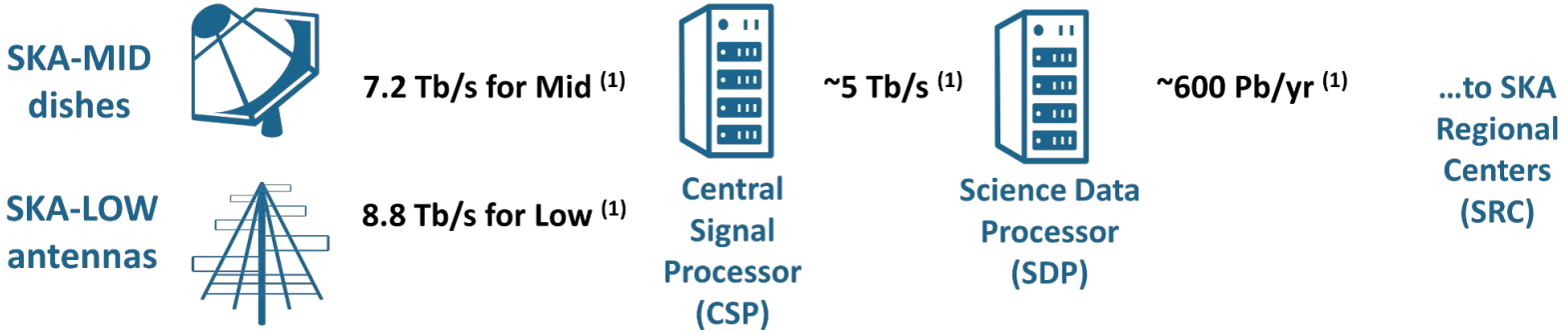
CREAM Team

Specialised Agile Team devoted to software development for SKAO in two main areas:

- CSP local and monitoring control (CB, PSS, PST)
- GUIs development platform TARANTA

The SKAO signal chain..

SKA will produce a *huge amount of data*

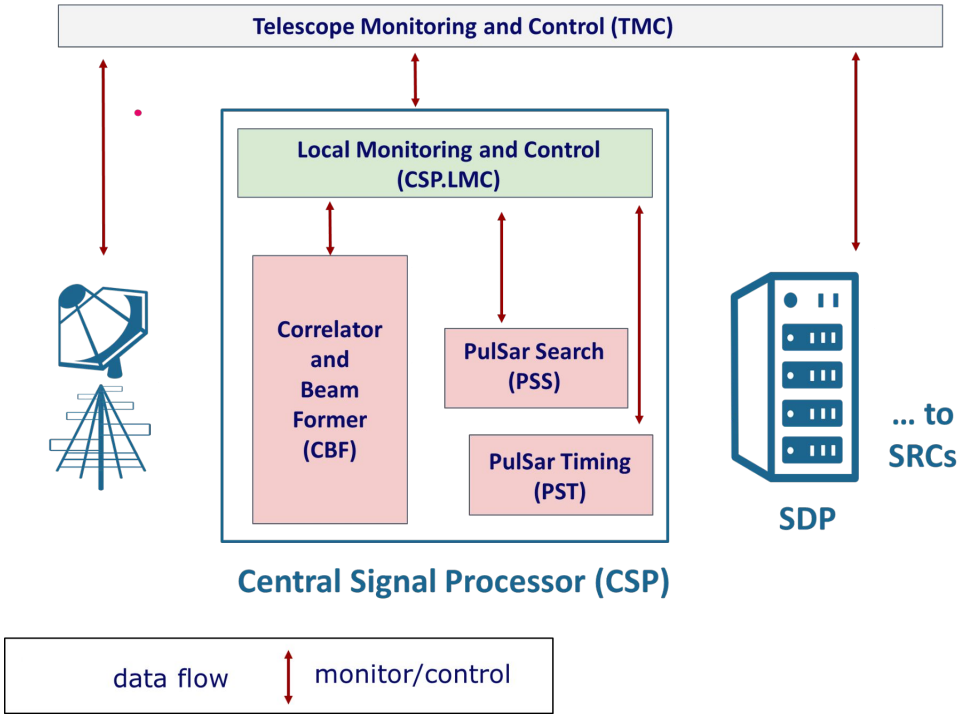


The purpose of CSP is to correlate, filter and make a preliminary analysis

SDP makes further data reduction

SRC stores data and made them available for scientific analysis

…and the role of CSP.LMC



CSP is composed by 4 main subsystems:

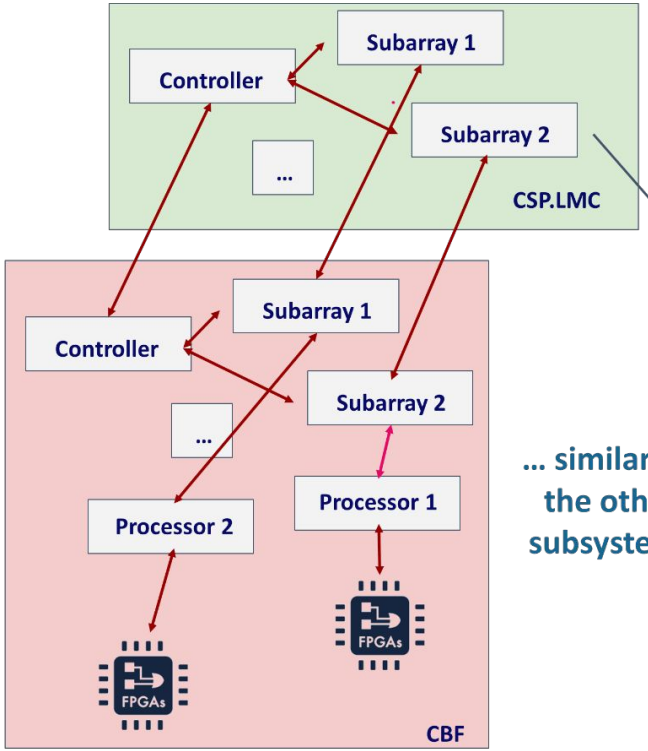
3 for data reduction (CBF, PSS, PST);

1 for monitoring/control (CSP.LMC)

CSP.LMC provides the interface to TMC **without exposing CSP internal complexity.**

CSP.LMC and its environment

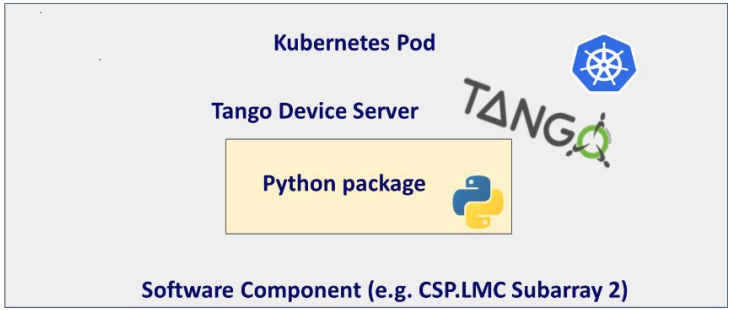
A *very simplified* view of the internal structure…



... similar for the other subsystems

A *software component* is a ***TANGO Device*** written in *Python*.

Each TANGO Device is containerized and orchestrated with *Kubernetes (k8S)*



TARANTA - The GUI generator for SKAO

Web application that allows a user to:

- **easily browse devices of a Tango** server, **inspect** them and **interact** with them, all using web browser of choice.

- **quickly develop and change interactive dashboards** with widgets that allow you to monitor and interact with Tango devices. Once created, dashboards can be run, saved, and exported.

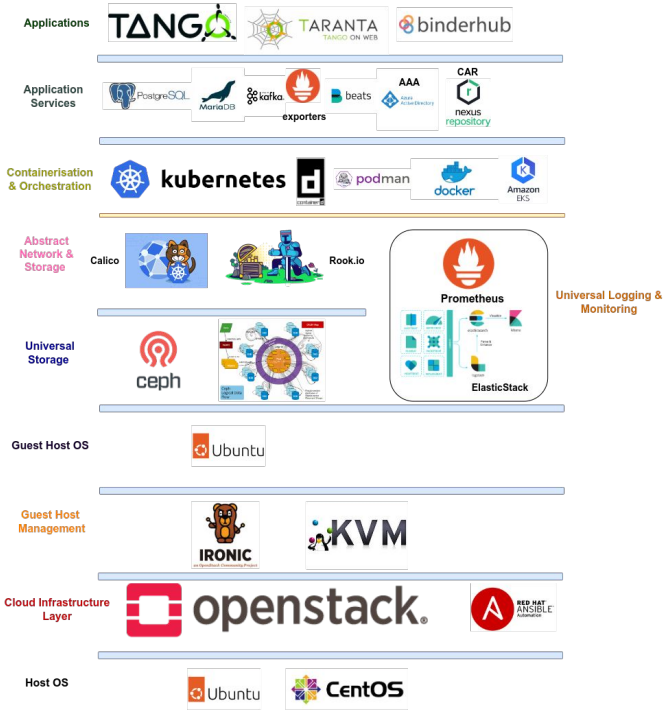
- a dashboard can be defined in a few minutes, with **minimal knowledge of web technologies**; you only need to know which devices you want to interact with and what attributes and commands they expose.

TARANTA SKAO use cases

Taranta is a tool used by **engineers**, **integrators** and **commissioners** for monitoring, controlling and debugging Tango devices for the telescope.

Key selling points:

- quick development of UIs
- easy to modify existing UIs
- no need for UI-related skills
- no need to use other tools



Taranta users

The following Users are set on SKA Taranta-Auth:

User	Password
ATLAS	
BUTTON	
CIPA	
CREAM	
DEFAULT	
HIMALAYA	
KAROO	
MCCS	
NAKSHATRA	
NALEDI	
NCRA	
OMC	
PERENTIE	
PSS	
PST	
SAYADRI	
SKANET	
SYSTEM	
TOPIC	
VIOLA	

An overall example

Taranta dashboard showing CSP.LMC / hardware integration